ENABLING THE CIRCULAR ECONOMY

AMG ADVANCED METALLURGICAL GROUP N.V.
ANNUAL REPORT 2019

SUPPLY

AMG sources, processes and supplies the critical materials that the market demands

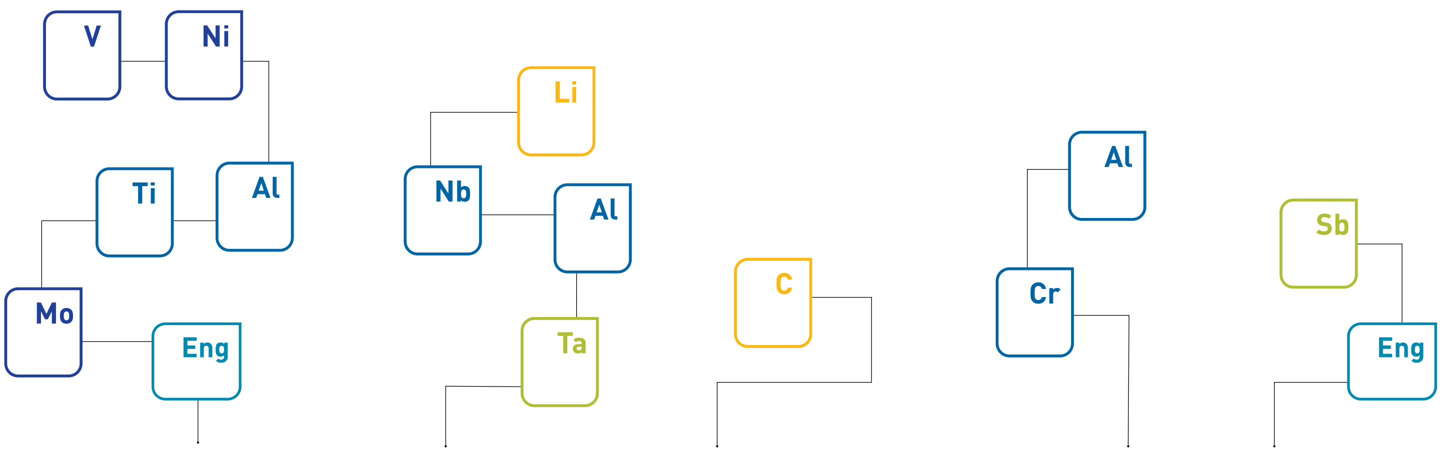
GLOBAL TRENDS
CO_2 emission reduction, circular economy, population growth, increasing affluence, and energy efficiency

DEMAND
Innovative new products that are lighter, stronger, and resistant to higher temperatures

CRITICAL MATERIALS COMPANY

AT A GLANCE

AMG is a global critical materials company at the forefront of CO_2 reduction trends. AMG produces highly engineered specialty metals and mineral products and provides vacuum furnace systems and services to the transportation, infrastructure, energy and specialty metals & chemicals end markets.



USA

- Aluminum Master Alloys
- Titanium Alloys
- Nickel
- Ferrovanadium
- Molybdenum
- Engineering

Brazil

- Tantalum
- Aluminum Master Alloys
- Niobium
- Lithium

Czech Republic

- Natural Graphite

United Kingdom

- Aluminum Master Alloys
- Aluminum Powders
- Chrome Metal

France

- Antimony
- Engineering

TRANSPORTATION

Innovation is driving demand for critical materials in the transportation industry. Highly engineered metallurgical solutions are needed to increase operating efficiency, lower aircraft weight and improve economics. AMG's gamma titanium aluminide is a lightweight aerospace alloy which enables aircraft engines to operate at higher temperatures, reducing carbon emissions and improving fuel consumption.

ENERGY

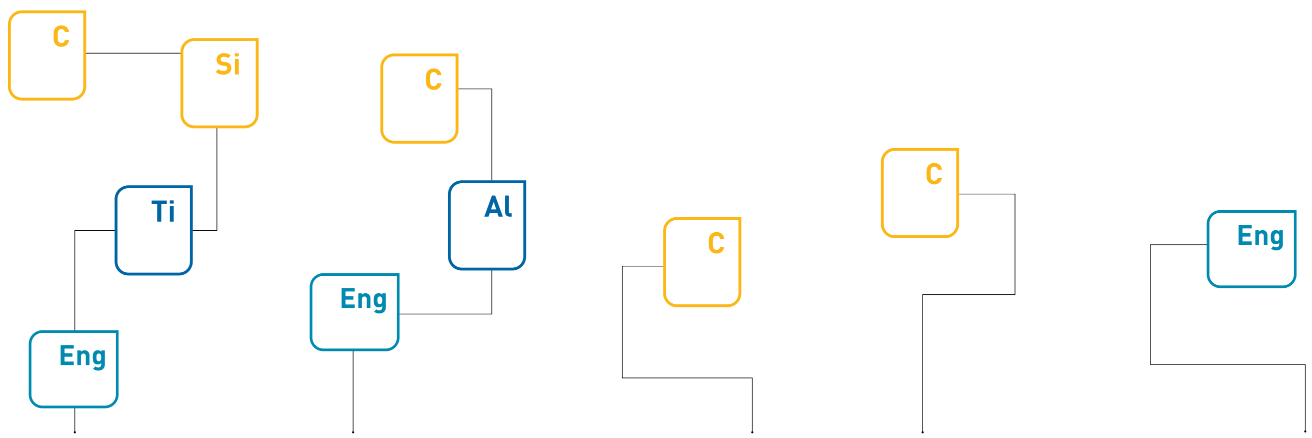
Global energy demand growth is driven by two opposing factors—increased energy usage and improvements in energy efficiency. AMG provides metallurgical technologies to improve energy efficiency and increase energy supply, such as silicon metal used for the production of polysilicon by the solar energy industry.

INFRASTRUCTURE

Improvements in infrastructure are essential to growing global GDP and reducing carbon emissions. AMG provides critical materials such as ferrovanadium for high-strength steels, and graphite that is used to improve the insulating performance of homes and buildings. These technologies are deployed in infrastructure projects that are critical to addressing global urbanization trends.

SPECIALTY METALS & CHEMICALS

Specialty metals and chemicals are used to create products that improve global living standards. AMG produces customized metallurgical solutions that meet the market's exacting demands, including tantalum, a material used as a capacitor in electronics, and vanadium-based chemicals which improve the insulating and infrared absorbent properties of structural glass and chemical compounds.



Germany

Titanium Alloys and Coatings

Natural Graphite

Silicon Metal

Engineering

China

Aluminum Master Alloys

Natural Graphite

Engineering

Sri Lanka

Natural Graphite

Mozambique

Natural Graphite

Mexico

Engineering

REPORT OF THE

MANAGEMENT BOARD

DR. HEINZ SCHIMMELBUSCH

CHAIRMAN & CHIEF EXECUTIVE OFFICER

ERIC JACKSON

CHIEF OPERATING OFFICER

JACKSON DUNCKEL

CHIEF FINANCIAL OFFICER

BORN 1944

Dr. Schimmelbusch was appointed Chief Executive Officer and Chairman of the Management Board on November 21, 2006, and he was reappointed for a term of two years on May 2, 2018, starting 2019. He has served in a similar capacity for businesses comprising AMG since 1998.

Dr. Schimmelbusch served as Chairman of the Management Board of Metallgesellschaft AG from 1989 to 1993. His directorships have included Allianz Versicherung AG, Mobil Oil AG, Teck Corporation, Methanex Corporation, Metall Mining Corporation and MMC Norilsk Nickel.

Dr. Schimmelbusch served as a member of the Presidency of the Federation of German Industries (BDI) and the Presidency of the International Chamber of Commerce (ICC). Dr. Schimmelbusch received his graduate degree (with distinction) and his doctorate (magna cum laude) from the University of Tübingen, Germany.

BORN 1952

Mr. Jackson was appointed a member of the AMG Management Board on April 1, 2007. He was appointed to the newly created position of Chief Operating Officer on November 9, 2011, and reappointed to the AMG Management Board for a term of four years on May 4, 2017. Mr. Jackson has served in various senior management positions for businesses now owned by AMG since 1996, most recently as President and Chief Operating Officer of Metallurg, Inc.

He previously held senior management positions at Phibro, a division of Salomon Inc., Louis Dreyfus Corporation and Cargill Incorporated in Canada and the United States. Mr. Jackson received a Bachelor of Science degree in Economics and an MBA, both from the University of Saskatchewan.

BORN 1964

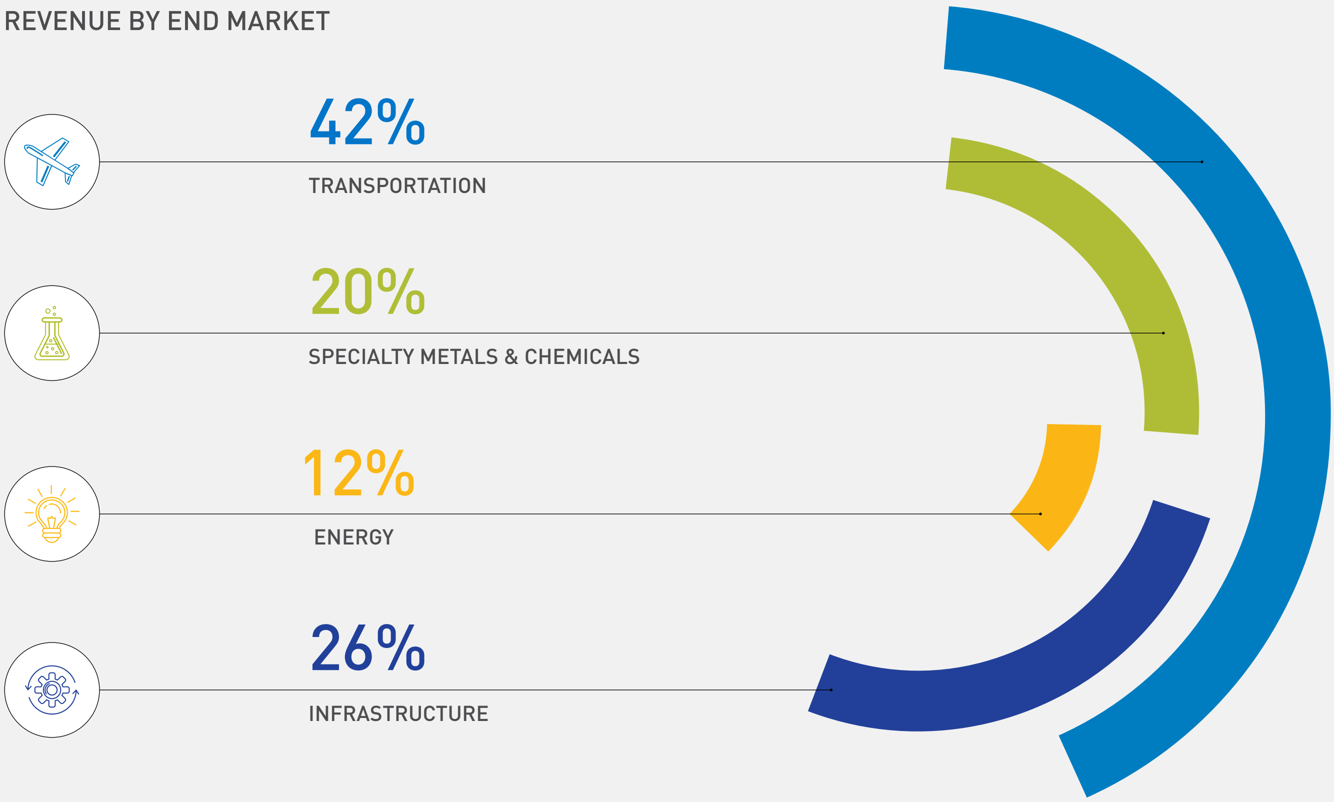
Mr. Dunckel was appointed Chief Financial Officer of AMG on February 1, 2016 and a member of the AMG Management Board on May 4, 2016, when he was appointed for a term of four years. Mr. Dunckel joined AMG from the Macquarie Group Limited where he served as Managing Director and US Head of Chemicals from 2010 to 2015. Prior to this, Mr. Dunckel held various senior level positions at JP Morgan Chase since 1995, including Executive Director, Investment Banking Coverage. Mr. Dunckel graduated, cum laude, with a bachelor's degree in European History from the University of California, Berkeley, and completed his MBA in International Finance at the Leonard Stern School of Business in 1995.

FINANCIAL & OPERATIONAL

HIGHLIGHTS

1,188.6	118.3	121.4
REVENUE $M	GROSS PROFIT $M	EBITDA $M
46.6	21	162.9
CASH FROM OPERATING ACTIVITIES $M	WORKING CAPITAL DAYS	NET DEBT $M
0.80	1.46	(1.64) / 0.67
LOST TIME INCIDENT RATE	TOTAL INCIDENT RATE	DILUTED (LOSS) PER SHARE $ / ADJUSTED DILUTED EARNINGS PER SHARE $[1]

REVENUE BY END MARKET



1 Adjusted diluted earnings per share reflects the net income adjusted for non-cash impairments, net of tax.

AMG GROUP

1,188.6 REVENUE $M

121.4 EBITDA $M

Returned over $100 million to shareholders in 2019 through its share repurchase program and dividend payments

AMG CRITICAL MATERIALS

762.5 REVENUE $M

65.4 EBITDA $M

Began the construction of a new catalyst recycling facility in Ohio which will essentially double our spent catalyst recycling capacity to 60,000 tons; to finance the expansion, AMG closed on a tax-exempt bond, generating proceeds of $325 million

Signed a long-term agreement to supply 100% of its available ferrovanadium production from both the existing and the future Ohio facilities to Glencore AG

Entered into a 50/50 joint venture for the global expansion of catalyst recycling services: upon obtaining the necessary regulatory approvals, the joint venture company, Shell & AMG Recycling B.V., will provide a long-term sustainable solution for reclamation and recycling services to the global refinery industry

Commenced basic engineering for a battery-grade lithium hydroxide facility: the new plant, subject to the necessary approvals, will operate with validated processes and be fed with technical-grade lithium hydroxide, enabling AMG to serve a key requirement of the European electric vehicle lithium battery market

Signed a memorandum of understanding with the Saudi Arabian General Investment Authority and Shell Overseas Services Ltd. to explore the feasibility, subject to regulatory approvals, of building a world-class facility to reclaim vanadium and other valuable metals by recycling spent residue upgrading catalysts generated by refineries in Saudi Arabia and the surrounding region

AMG TECHNOLOGIES

426.1 REVENUE $M

56.0 EBITDA $M

Formed AMG Technologies by combining AMG Engineering's expertise in metallurgical process design & development and AMG Titanium Alloys and Coatings' industry-leading expertise in the development of metallurgical products, furnace operations, and quality assurance processes in order to accelerate innovation

Completed its acquisition of the assets of International Specialty Alloys Division from Kennametal Inc.

Developing a route to a separate public listing of AMG Technologies by appointing ABN AMRO and Citi as Joint Global Coordinators of an Amsterdam IPO

FROM THE CEO

LETTER TO SHAREHOLDERS

On behalf of the Management Board, I hereby present AMG's 2019 Annual Report. 2019 was a year of advancement on several key strategic themes which are cornerstones of our strategy for long-term value creation.

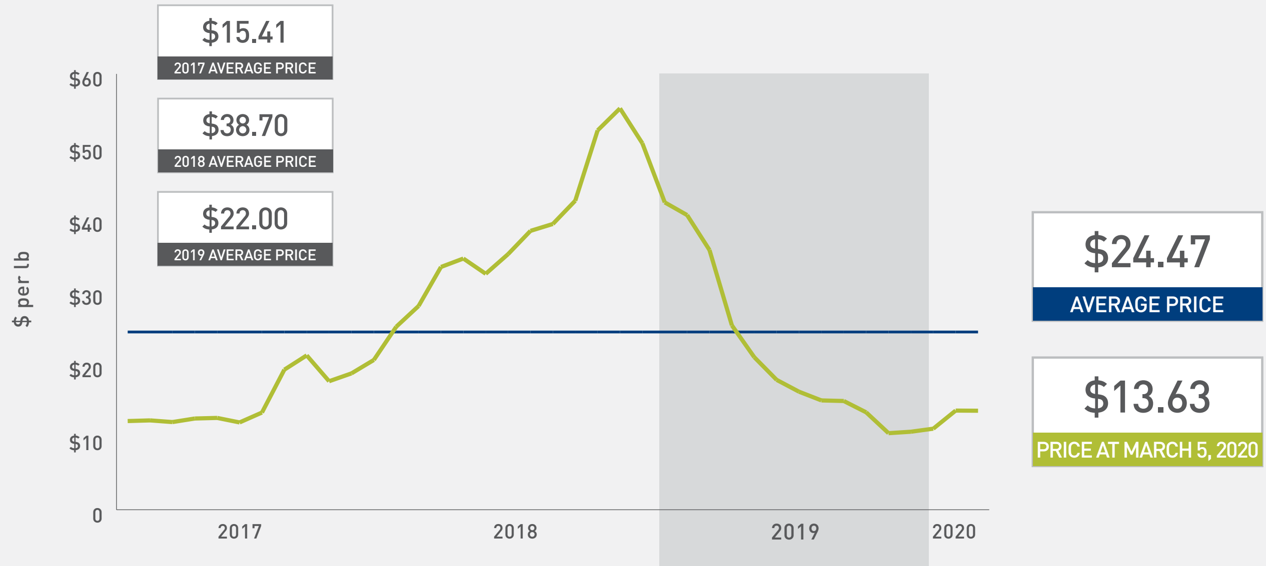
Dear Shareholders,

For AMG, 2019 was a year with strong operational headwinds in the form of unprecedented low prices for our key products which further declined even after we thought the bottom had been reached. Despite these price headwinds facing our operating units—with prices across the board substantially below even 2008 crisis levels—AMG achieved an EBITDA of $121 million, an operating cash flow of $47 million, and a return on capital employed of 13.7%. It is important to note that even at these low prices, all nine AMG business units were EBITDA positive, indicating that our focus on being the low-cost producer in each of our niche markets was successful. As usual in the AMG portfolio, AMG Technologies operated under different cycle times, and acted as an EBITDA stabilizer. The vanadium market posed a special challenge with the upward price spike in 2018 followed by a sharp downward price trough in 2019, negatively impacting EBITDA by more than $70 million compared to the prior year. This effect is described in more detail in the Critical Materials section of this Annual Report. Most importantly for the future, we executed a contract that helps to eliminate the inventory spike risk by selling our ferrovanadium production to Glencore under a 6-year agreement at indexed prices.

2019 was a year of advancement on several key strategic themes which are cornerstones of our strategy for long-term value creation. The **dominating theme** in 2019 has been AMG's success in **enabling the circular economy** and is featured on the cover page of this Annual Report. This success is highlighted by our project in Ohio to double the capacity of the world's largest vanadium recycling facility which extracts vanadium from refinery waste. Other important themes advanced in 2019 were the pursuit of an innovative value chain by AMG Mineração, Brazil, and AMG Lithium, Germany; the integration of AMG Engineering and AMG Titanium Alloys & Coatings into a new division called AMG Technologies as a first step, prior to seeking a separate listing; and the successes in AMG's comprehensive approach to enable CO_2 savings by our customers, an approach which has now taken on the status of a mission throughout all of AMG and was the theme of last year's Annual Report. All of these strategic themes work well with AMG's approach toward its stakeholders and within AMG's strategic framework and its overriding objective to create long-term value. AMG's strategic objectives, as first formulated and adopted in 2017, are unchanged and are continuously monitored, taking into account the changing economic environment and AMG's priorities and opportunities.

As a reminder, AMG's comprehensive approach to CO_2 savings started several years ago when we developed a methodology to measure tons per annum CO_2 savings associated with the use of certain AMG products by our customers. In the interim, we have made significant advancements across our entire product portfolio. Cooperating with a third party, ERM Group Inc, we have upgraded our in-house analytics and developed and

FERROVANADIUM PRICE TREND SINCE 2017



Pricing source: Metal Bulletin's Ferro-vanadium 70-80% V, in-whs Pittsburgh, $/lb
Note: average price defined as the average of the monthly prices from January 1, 2017 through March 5, 2020

are implementing what we believe to be a best-in-class proprietary measurement methodology. In addition, we are continuously improving our methodologies by working with carbon exchanges to qualify certain CO_2 savings associated with AMG's technologies as tradable "products." As a result of these efforts, we are proud to announce that we have enabled 67 million tons of net CO_2 savings on an annualized basis. CO_2 saving activities have become a defining element of AMG's corporate strategy, developed step-by-step over many years across our portfolio.

THE VANADIUM RECYCLING EXPANSION

During 2019, we commenced construction of our second recycling plant for the production of ferrovanadium and other alloys from refinery waste (vanadium-containing spent catalysts and similar residues), solidifying our position as the world's largest recycler of such secondary materials by using our proprietary best-in-class process technology. The new plant is located in Zanesville, Ohio, and will double the capacity of the first plant in neighboring Cambridge, Ohio.

In order to finance the Zanesville project, we were able to secure $325 million of funding from a tax-exempt bond issue with attractive conditions (30-year maturity, 4.28% fixed interest).

Subject to regulatory approvals, we also formed Shell AMG Recycling B.V. ("Shell-AMG"), a joint venture equally owned by Shell Catalysts & Technologies and AMG for the construction of refinery waste recycling plants outside of North America. The IMO 2020 legislation, reducing the sulfur levels in maritime fuels from 3.5% to a maximum of 0.5%, has led to a growth trend in refinery catalyst consumption, which in turn implies a growth trend in spent catalysts. Additional recycling capacity will be needed. That is one of the main drivers of this joint venture.

As a first major step for the new joint venture, subject to regulatory approvals, both Shell and AMG signed a memorandum of understanding with the Saudi Arabia Government Investment Authority (SAGIA) for a feasibility study for the construction of an Ohio-type refinery waste recycling facility in the Kingdom of Saudi Arabia.

EXPANDING VANADIUM MARKETS

We achieved significant progress in the process technology to convert roasted spent catalyst (the first step in our process to reclaim metals from spent catalysts by removing sulfur) to vanadium pentoxide ("V_2O_5"). Our plan is to use this V_2O_5 in the production of electrolytes for vanadium redox flow batteries ("VRFB"). VRFBs are a highly competitive solution for stationary electricity storage. This application represents an exciting new vanadium demand category, primarily to facilitate grid-stabilization. To better understand this potentially very large market, AMG has filed an investment application with the German regulatory authorities for the construction and operation of a VRFB with a planned operating capacity of 55 MW/220MWh.

CAMBRIDGE, OHIO PLANT

ZANESVILLE, OHIO PLANT (UNDER CONSTRUCTION)

There are high growth expectations for stationary battery-based electricity storage systems in general, and for VRFBs specifically, which are usually expressed in multiples of today's storage capacity. Advantages for VRFBs when compared to lithium-ion batteries include, first and foremost, safety (due to no fire risk from thermal runaway), long lifetime cycles, low operating cost, ease of recycling (100% of the vanadium is reusable), and very fast response time. There are people who agree with these advantages but have concerns about the volatility of vanadium prices. The world's largest VRFB, the Dalian Province-based project built and operated by Rongke Power, incurred a major commissioning delay when it entered the market for a substantial vanadium purchase only to face the very same 2018 upward price spike referred to earlier.

AMG is positioning itself to act as a partner for aspiring battery operators, mitigating the V_2O_5 price risk. Since expanding wind and solar energy production, with their inherent intraday cycles (sun) and the inherent volatility (wind), requires expanding electricity storage capacity, and because the conventional pumped hydro storage is of limited use in these situations, the use of vanadium oxide for VRFB electrolytes adds another dimension to AMG's relevance in the reduction of CO_2 emissions, namely by making renewable energy more efficient.

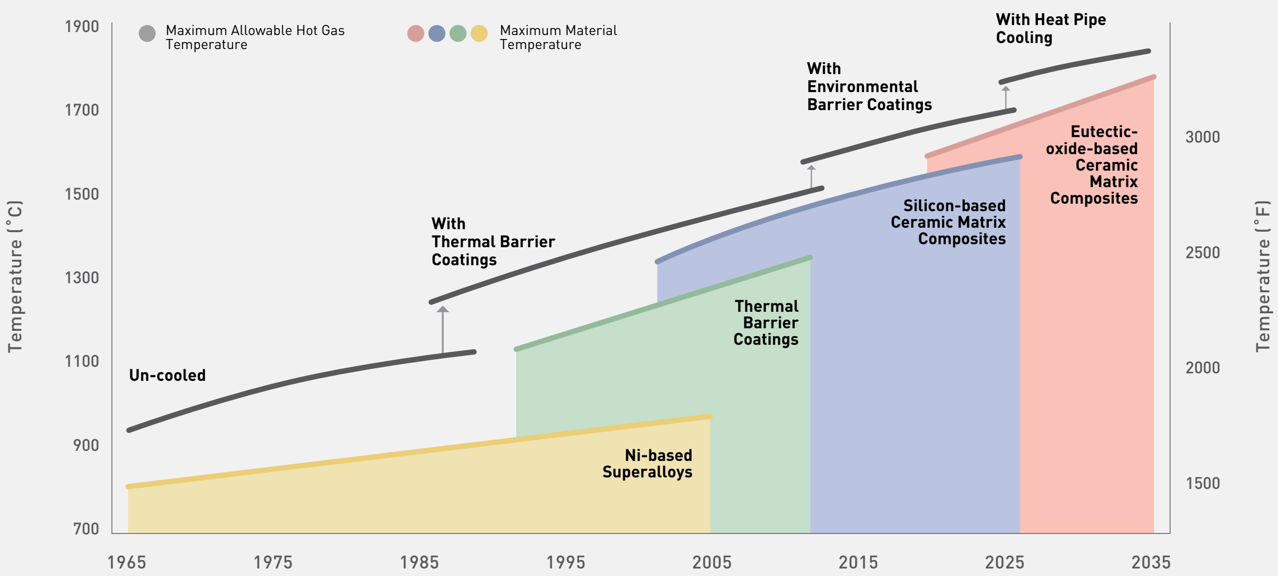
LITHIUM: NEW CHEMICALS VALUE CHAIN

In 2019, we substantially completed the build-up of a highly experienced team in the lithium chemicals space, thereby providing the necessary human resources to develop and implement a revised downstream strategy within the fast-moving landscape of emerging European lithium battery initiatives.

The lithium world has changed considerably within the last 24 months. The supply chain for the electric vehicle sector in Europe is in rapid formation. In this context, we have revised our lithium strategy to match the requirements of that emerging supply chain. As announced, we are completing the preparatory stages to invest in a lithium hydroxide refinery to be built in Zeitz, Sachsen-Anhalt. This facility will upgrade a variety of lower-grade lithium chemical products into high-quality material suitable for usage in lithium-ion battery cells. We talk about the whole spectrum of quality here, not only chemical specifications but also a quality assurance system to comply with automotive quality standards. This battery-grade hydroxide plant will also have the advantage of being in close proximity to our European customers. The first module will be designed to deliver 20,000 tons per annum of battery-grade hydroxide to the market by the end of 2022/beginning of 2023. The production site will have the potential to support 4 more such modules.

We have commissioned a state-of-the-art laboratory and pilot plant operation for lithium chemical product development and testing in Frankfurt-Hoechst. This facility enables us to analyze the performance of certain lithium-based materials. We will also utilize our in-house expertise for the development of new lithium materials which target the next generation of lithium-ion batteries. We are actively supporting our customers in developing these new materials. As an example, we are now investing in

THERMAL BARRIER COATING REVOLUTION



Source: Wadley Research Group, University of Virginia, 2013

a new pilot reactor which will produce substantial amounts of sulfur-containing lithium battery materials designed for solid-state lithium batteries.

AMG CRITICAL MATERIALS

The strategic fundamentals of AMG which we have pursued for over a decade are leading the Company to an important crossroads. The common theme of **AMG Critical Materials** has been to manage global value chains from unconventional origins and transform them into highly refined products for sophisticated end-market applications. Regarding vanadium and lithium, this has led to plant construction projects in the US, Germany, Brazil and now—together with Shell—in Saudi Arabia. As a result, we are about to change the portfolio substantially. The $300 million investment in Zanesville, Ohio, is equal to the total capex of AMG over the last 5 years. The size of this project illustrates the significance of the change happening within AMG, which has in turn caused an adjustment of our management structure.

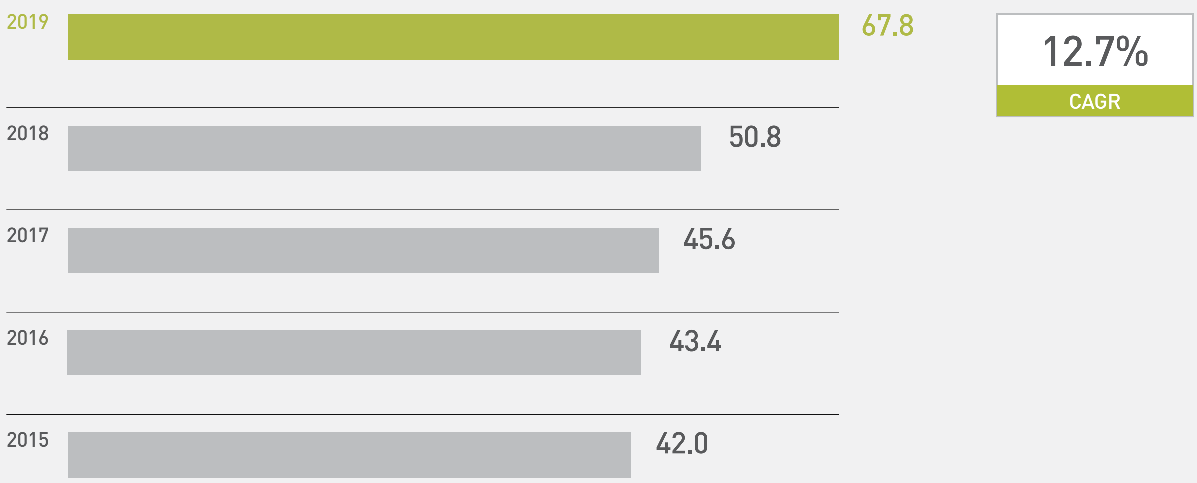
AMG TECHNOLOGIES: IPO READINESS

AMG Technologies is at the forefront of many recent advancements in aircraft engine technology, both in terms of technologies and materials. AMG Engineering's turbine blade coating equipment enables aircraft engine manufacturers to increase operating temperatures way beyond the physical limitations of the base materials by coating nickel-based superalloy blades in the high-pressure combustion section of the engine.

In 2019, it became obvious that AMG Titanium Alloys & Coatings and AMG Engineering should be a business unit under one operative and strategic management team. Combining engineering and operational knowhow worked well when we created a vacuum technology-based heat treatment services unit, which did not sell machines but owned and operated them. This route usually leads to accelerated learning; so we asked ourselves why don't we apply this experience to our core metallurgical furnace field? The answer to that obvious question became AMG Titanium Alloys & Coatings' "own-operate" activity, in which it owns and operates furnaces produced by AMG Engineering to manufacture titanium aluminides. This change in strategy has led, over many years, to market leadership in titanium aluminides, where AMG is presently the key supplier to the new generation LEAP engine platform for this material. This platform is expected to deliver more than 100,000 engines over its 20-year lifespan. Using proprietary Plasma Melting systems, we produce titanium aluminide feedstock for blades in the low-pressure turbine section of the Leap engine. Furthermore, AMG Engineering is the lead supplier of Thermal Barrier Coating equipment for that same engine, used to coat nickel-based superalloy turbine blades utilized in the high-pressure combustion section.

The management focus of **AMG Technologies** is the development of new technological solutions which enable aerospace engines to be more fuel-efficient and to offer our customers—the major US and European aerospace engine producers and their supply chain partners—a host of services related to these product lines. One such area

AMG'S ENABLED CO_2 EMISSION REDUCTIONS
(Million MT)



of development for AMG Technologies has been in the realm of additive manufacturing. In 2018, AMG Titanium Alloys & Coatings commissioned a new powder metallurgy furnace, designed and built in-house by AMG Engineering, and is currently in the process of developing new high performance metal powders for additive manufacturing in the aerospace market. Furthermore, AMG Engineering is developing new technological solutions in the additive manufacturing field which we believe will deliver substantial cost and productivity improvements when compared to the existing product offerings available today from our competitors. It is worth noting that additive manufacturing adds another dimension in advancing the circular economy by eliminating the waste associated with traditional manufacturing techniques.

These key market positions developed over many years resulted in substantial earnings growth and, combined with new technologies and products currently under development, will position the business for continued growth moving forward.

The ideal skill set for AMG Technologies' future development has only a small overlap with the skills needed to develop AMG Critical Materials. Furthermore, AMG Technologies has opportunities for growth through industry consolidation and through the nurturing of technology startups to develop new materials and coating technologies. Therefore, since the beginning of 2019, we have been developing a route to a separate public listing of AMG Technologies. To this end, we have appointed ABN AMRO and Citi as Joint Global Coordinators of an Amsterdam IPO. Presently, the priority is to establish AMG Technologies' IPO "readiness," including corporate reporting structures and respective audits, and then await appropriate market windows. Upon its public listing, AMG Technologies will be a truly standalone public company where AMG's Board representatives will be joined by a majority of independent board members.

CO_2 SAVINGS

Let me mention a few of the CO_2 saving successes that led to the net CO_2 savings of 67 million tons on an annualized basis in 2019. First, the use of ferrovanadium in steel alloys provides a lightweighting effect, reducing the quantity of steel required. If 100% of AMG's ferrovanadium production in 2019 had been used for (Chinese) rebar, the annual savings would be approximately 1.2 million metric tons of CO_2. Second, natural graphite-based graphite polystyrene insulation materials, compared to conventional expandable polystyrene materials, leads to lower domestic heating and cooling requirements. Given our deliveries to graphite polystyrene customers, AMG's product saves approximately 1.0 million tons of CO_2 per year. Third—and much more dramatic—CO_2 savings in aerospace engines are achieved by AMG's turbine blade coating which allows the operation of the engine at higher temperatures, thus enabling significant fuel reduction. Given our global turbine blade coating furnace footprint, these fuel savings add up to an annual reduction of 46.3 million tons of CO_2 emitted per year. This is the biggest CO_2 savings success for AMG over the years.

In 2019, we signed a long-term contract for the delivery of sintering furnace systems to the government of China to convert plutonium into **MOX (Mixed Oxide)** fuel for use in nuclear power plants. The calculated CO_2 savings—given the amounts of plutonium converted versus the average CO_2 production of Chinese grid electricity—is more than 12 million tons annually. That will show up if and when the conversion operations start. AMG is the sole supplier of that conversion technology through our subsidiary ALD France in Grenoble, France. You can appreciate the benefits of this arrangement in various ways: (i) it is profitable; (ii) it reduces the atomic weapons potential (with, obviously, everyone as a stakeholder); and (iii) it saves CO_2 by providing clean energy.

MOX Sintering Furnace

BALANCE SHEET SOLIDITY

Reflecting on our long-term strategy, the strength of our balance sheet and ample liquidity bear mentioning. Although we are planning on spending significant capital on our Zanesville ferrovanadium facility over the next two years, all of that money has been raised and is sitting on our balance sheet in the form of restricted cash—i.e., the use of that cash is restricted to expenses related to building that plant. To put it another way: the entire Zanesville plant has been paid for with a 4.28% 30-year bond, and it will not require any cash or cash flow from AMG NV. At AMG, as of December 31, 2019, we have $226 million in cash plus $170 million available from our revolving credit facility for a total liquidity of $396 million. If you include our yearly operating cash flow together with these figures, you will see that AMG can easily meet its dividend obligations as well as its maintenance and growth capital expenditures. The strength of AMG's balance sheet is a key competitive advantage, and we intend to protect it zealously.

COMPLIANCE

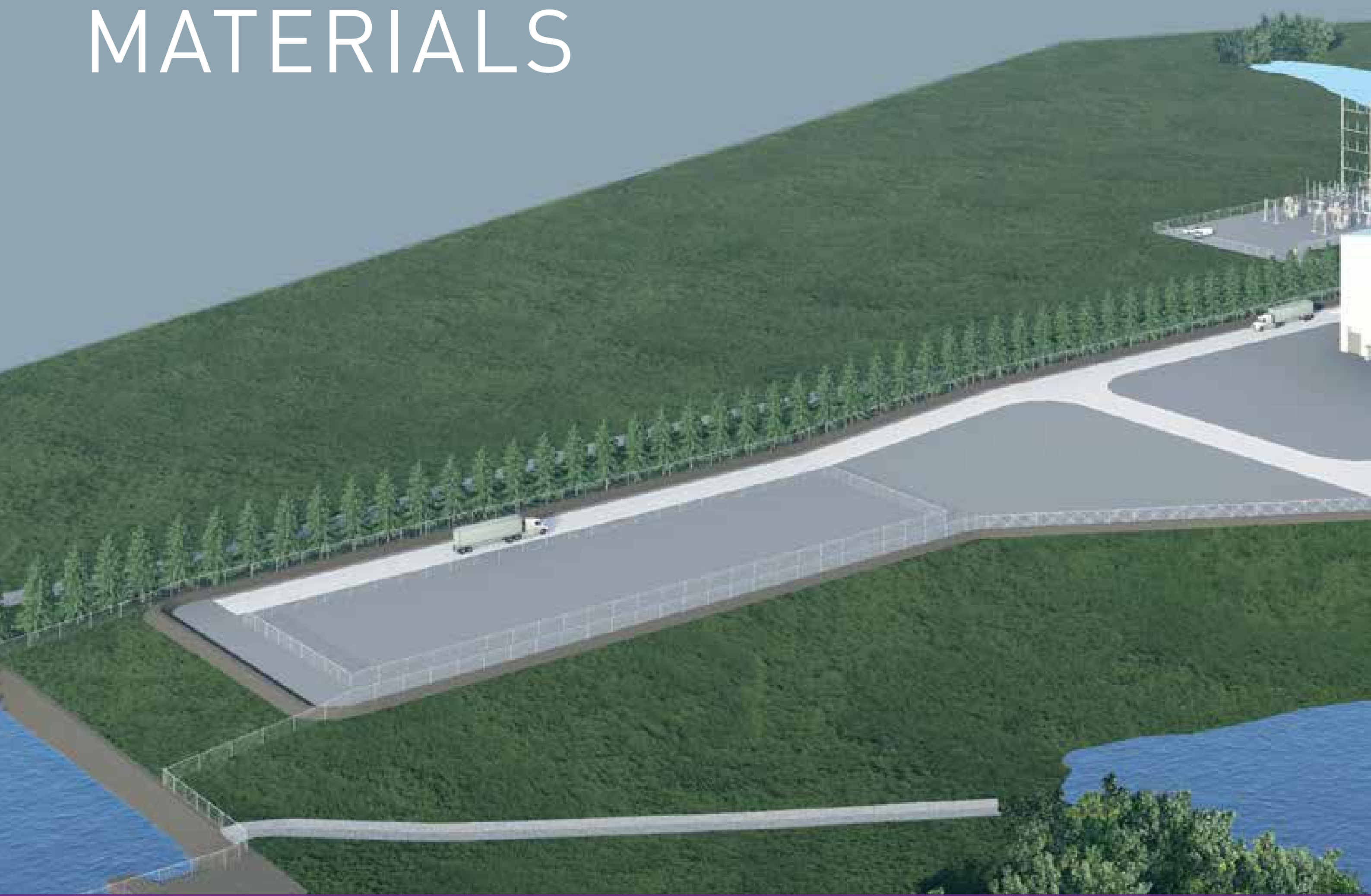
Finally, I wish to say a word about AMG's culture, its values, and the importance of compliance. AMG's Values—safety, value creation, respect for people and integrity—form the basis of how we conduct our operations and deal with our employees, business partners and stakeholders. Based on our Code of Business Conduct and Speak Up & Reporting Policy, as well as other essential policies such as those concerning anti-bribery and anti-corruption, antitrust and competition law, we have built a dedicated legal and compliance organization with a Chief Compliance Officer that reports directly to the Chairman of the Management Board and who is heading a core compliance team, assisted by a global network of local compliance officers mirroring all AMG locations worldwide. This seamless and dedicated network keeps compliance's ear to the ground and safeguards permanent monitoring and improvement of policy promotion and implementation. It also coordinates comprehensive ethics training programs for all AMG staff, as AMG highly values continued learning and improvement of knowledge in this area.

As I have told my fellow employees at AMG on many occasions, success without integrity is no success at all. The AMG leadership team strives to live up to the AMG Values on a daily basis and aims to set a clear example of the behavior and attitude required from all our employees.

DR. HEINZ SCHIMMELBUSCH

CHIEF EXECUTIVE OFFICER

AMG CRITICAL MATERIALS



AMG began the construction of a new catalyst recycling facility in Ohio that will essentially double our spent catalyst recycling capacity to 60,000 tons.

AMG Critical Materials' gross profit decreased to $19.3 million during 2019. The reduction was largely driven by lower vanadium profitability and non-cash inventory cost adjustments for vanadium as a result of a significant decline in prices. Revenue decreased by 13% to $762.5 million in 2019, driven by a significant metal price decline across our portfolio. The negative trend was a major challenge throughout the year, causing a 56% decrease in EBITDA, from $149.7 million in 2018 to $65.4 million in 2019. However, AMG Critical Materials' working capital days decreased from 66 days at the end of 2018 to 39 days at the end of 2019 due to lower prices and increased operating efficiency.

The division also advanced several key strategic and operational initiatives in 2019. AMG began the construction of a new catalyst recycling facility in Ohio that will essentially double our spent catalyst recycling capacity to 60,000 tons; to finance the expansion, AMG closed on a tax-exempt bond, generating proceeds of $325 million.

In addition, AMG Vanadium signed a long-term agreement to supply 100% of its available ferrovanadium production from both the existing and the future Ohio facilities to Glencore AG. AMG also signed a memorandum of understanding with the Saudi Arabian General Investment Authority and Shell Overseas Services Ltd. to explore the feasibility, subject to regulatory approvals, of building a world-class facility to reclaim valuable metals by recycling spent residue upgrading catalysts generated by refineries in Saudi Arabia and the surrounding region. AMG Lithium GmbH commenced basic engineering for a battery-grade lithium hydroxide facility which, subject to the necessary approvals, will operate with validated processes and be fed with technical-grade lithium hydroxide, enabling AMG to serve a key need of the electric vehicle lithium battery market.

As demand for our products and services continues to rise due to the associated energy savings and CO_2 reduction trends, AMG Critical Materials is well positioned to deliver improved financial performance in 2020.

AMG TECHNOLOGIES

AMG Technologies, formed at the beginning of 2019 by combining AMG Engineering and AMG Titanium Alloys & Coatings into one division, brings together two industry leaders primarily serving the aerospace market.

EBITDA in 2019 decreased 17%, from $67.5 million in 2018 to $56.0 million, due to lower profitability in the Titanium Alloys & Coatings business, driven by falling metals prices in 2019 and the effect of a large customer payment in 2018.

Order intake in the Engineering business unit in 2019 remained strong at $249.4 million, while order backlog decreased by 8% from $241.4 million at the end of 2018 to $222.6 million at the end of 2019. In the first quarter of 2020, order intake continues to be very strong, driven by large orders from aerospace customers for turbine blade coating machines, and management expects order backlog at the end of the first quarter of 2020 to return to record levels.

On November 15, 2019, AMG Technologies completed the acquisition of International Specialty Alloys Division ("ISA") from Kennametal, Inc. ISA is a leading U.S. producer of titanium master alloys and other binary alloys for the aerospace market. The acquisition enables AMG Titanium Alloys & Coatings to increase its already-strong market position in North America and Europe for these key aerospace products.

AMG Technologies sees more opportunities for growth through industry consolidation and through the nurturing of technology startups to develop new materials and coating technologies. Therefore, since early 2019, we have been developing a route to a separate public listing of AMG Technologies. To this end, we have appointed ABN AMRO and Citi as Joint Global Coordinators of an Amsterdam IPO.

Presently, the priority is to establish AMG Technologies' IPO "readiness," including corporate reporting structures and respective audits, and then await appropriate market windows. Upon formation, AMG Technologies will be a truly standalone public company where AMG's board representatives will be joined by a majority of independent board members.

Based on the strong order intake in 2019 and the first quarter of 2020, the acquisition of the ISA business and the development of a number of well-defined organic growth initiatives, management expects profitability to grow in 2020.

AMG'S

RISK MANAGEMENT & INTERNAL CONTROLS

AMG employs a risk management approach that identifies and mitigates risk at all levels of the organization.

The Audit & Risk Management Committee is comprised of Donatella Ceccarelli (Chair), Willem van Hassel and Frank Löhner, and meets on a quarterly basis. In addition to its Audit Committee duties, this committee is responsible for monitoring and advising the Supervisory Board on the risk environment as well as the risk management process of AMG.

RISK MANAGEMENT APPROACH

AMG employs a risk management approach that identifies and mitigates risk at all levels of the organization. The Company analyzes risks in formal settings such as scheduled Management Board and Supervisory Board meetings as well as everyday operational situations faced by its global employee base. AMG has implemented a comprehensive risk management program centered on the Company's Risk Assessment Package (RAP). The RAP includes a "top-down" and "bottom-up" analysis and assessment of the Company's risks. The RAP is a detailed document requiring each business unit to:

(i) identify potential risks and quantify the impact of such risks;

(ii) prioritize the risks using a ranking system to estimate the financial impact, probability and mitigation delay of these risks;

(iii) describe the risk mitigation or transfer procedures in place;

(iv) document the periodic monitoring of the risks;

(v) assign the individuals responsible for monitoring the risks;

(vi) review the trends of the risks identified by the business units; and

(vii) periodically audit previous RAP submissions to evaluate the risk management process.

Each business unit undertakes a full review of its RAP on a quarterly basis. The RAPs are then reviewed and discussed in detail by AMG's risk management function in coordination with the senior management of each business unit. Direct follow-up calls take place by AMG's Chief Financial Officer and his team with the Presidents of the business units. The corporate Legal, Finance and HSE (Health, Safety and Environment) functions also contribute to the quarterly submission of risks identified. Key risks from all business units and functions are then summarized and presented to the Management Board, which reviews them. Any new material risk assessment observed by a business unit or function is reported instantly to the Management Board, while individual risks of special note are regularly discussed at the Management Board's bi-weekly meetings. The Chair of the Audit & Risk Management Committee of the Supervisory Board is informed immediately of any new material risk assessments which have been reported to the Management Board. The Audit & Risk Management Committee of the Supervisory Board formally reviews the consolidated risk package provided by AMG's Management Board during its quarterly meetings. In addition, the Audit & Risk Management Committee of the Supervisory Board supervises, monitors, and reports on the Company's internal control and risk management programs.

During 2019, special attention was given to:

- managing price and volume risk associated with the volatility of commodities;
- improving contractual terms to lessen inventory price risk;
- understanding global political and environmental risks; and
- evaluating risks associated with long-term contracts.

Appropriate and diverse lines of property and liability insurance coverage are also an integral part of AMG's risk management program.

RISKS

Risks faced by AMG can be broadly categorized as:

Strategic: includes risks related to marketing and sales strategy, product innovation, technology innovation, raw material sourcing, capacity utilization, and acquisitions or divestitures

Operational: includes risks related to executing the strategic direction, production, maintenance of production equipment, distribution of products, labor relations, human resources, IT infrastructure and cybersecurity, and health, safety and environmental issues

Market and External: includes risks related to global and regional economic conditions, market supply/demand characteristics, competition, metal prices, product substitution, customer and supplier performance and community relations

Financial: includes risks related to compliance with credit facility covenants, currency fluctuations, liquidity, refinancing, budgeting, metal price and currency hedging, treasury and tax functions, accuracy and timeliness of financial reporting, compliance with IFRS-EU accounting standards, compliance with the Netherlands Authority for the Financial Markets (AFM) and Euronext Amsterdam requirements

Legal and Regulatory: includes risks related to the political, environmental, legislative, and corporate governance environment

AMG is subject to a broad array of risks which are inherent to the markets in which it operates. While all risks are important to consider, the following are the principal risks that could have a material impact on results.

METAL PRICE VOLATILITY RISK

AMG is exposed to metal price volatility. AMG is primarily a processor of metals, so risk can arise from short-term changes in price between purchase, process, and sale of the metals or from end-user price risk for metals when raw materials are purchased under fixed-price contracts. The Company hedges exchange-traded metals when possible. In its aluminum business, AMG also sells conversion services with no metal-price risk. However, most metals, alloys and chemicals that AMG processes and sells, such as vanadium, chrome metal, tantalum, graphite, niobium, and antimony trioxide, cannot be hedged on an exchange. The drop in prices across AMG's portfolio in 2019, including vanadium, tantalum, spodumene, and chrome, caused significant net realizable value adjustments to the inventory cost position. AMG took several actions regarding its supply and sales contracts to mitigate this risk going forward, particularly in terms of its vanadium inventory price exposure.

To mitigate price risk across its portfolio, AMG takes the following actions:

- Seeks to enter into complementary raw material supply agreements and sales agreements whereby the price is determined by the same index;
- Aligns its raw material purchases with sales orders from customers;
- Establishes low-cost long positions in key raw materials through, for example, ownership positions in mining activities or structured long-term supply contracts;
- Maintains limits on acceptable metals positions, as approved by the Management Board; and
- Enters into long-term fixed-price sales contracts at prices which are expected to be sustainably above the cost of production.

Success of the mitigation plan is dependent on the severity of metal price volatility and on the stability of counterparties performing under their contracts. Due to the diverse mix of metals that AMG processes and the fact that metal processing has more pass-through risk than long-position risk, this risk is difficult to quantify.

MINING RISK

At its lithium and tantalum mine in Brazil and three graphite mines in Germany, Sri Lanka and Mozambique, AMG is exposed to certain safety, regulatory, geopolitical, environmental, operational and economic risks that are inherent to a mining operation. The profitability and sustainability of the Company's operations in various jurisdictions could be negatively impacted by environmental legislation or political developments, including changes to safety standards and permitting processes. The mining businesses have certain operational risks related to the ability to extract materials, including weather conditions, the performance of key machinery and the ability to maintain appropriate tailings dams. These risks are all mitigated by continuous monitoring and maintenance of all mining activities. AMG has always recognized the need to carefully manage the risk associated with tailings dams within its operations and takes its commitment to ensuring the safety of its workforce and the surrounding communities very seriously. AMG leadership commissioned a study that was conducted by a third-party to ensure that its three tailings dams in Brazil are legally compliant and technically sound. The outcome of the legal study indicated we are compliant with applicable regulation as they related to our three tailings facilities. In accordance with the Church of England Investor Mining and Tailings Safety Initiative, AMG posted a comprehensive disclosure, which was signed by our CEO, to our company website. Mining is also subject to geological risk relating to the uncertainty of mine resources, and economic risk relating to the uncertainty of future market prices of particular minerals. Geological risk is managed by continuously updating mine maps and plans; however, the profitability of the Company's mining operations is somewhat dependent upon the market price of mineral commodities. Mineral prices fluctuate widely and are affected by numerous factors beyond the control of the Company. The level of interest rates, the rate of inflation, world supply of mineral commodities, consumption patterns, speculative activities and stability of exchange rates can all cause significant fluctuations in prices. The prices of mineral commodities have fluctuated widely in recent years. Continued future price volatility could cause commercial production to be impracticable. Mitigation strategies include managing price risk by entering into long-term fixed-price contracts with customers, and via vertical integration strategies.

Other cost-related strategies include continuously reducing cost of production for current products or expanding product lines to enable profitable mine production even in low price environments.

CUSTOMER RISK

Customer concentrations in certain business units amplify the importance of monitoring customer risk. In addition, turbulent economic conditions for commodity producers increase customer risk. Since AMG has a low appetite for customer credit risk, the Company attempts to mitigate this exposure by insuring and monitoring receivables, maintaining a diversified product and contract portfolio and retaining adequate liquidity. AMG has insured its accounts receivable where economically feasible and has set credit limits on its customers, which are closely tracked. In addition to constant monitoring from business unit leaders, AMG's Management Board reviews accounts receivable balances monthly. Given that the Company has thousands of customers, this risk is difficult to quantify. However, no single customer accounts for more than 10% of AMG's revenues, and therefore, while the impact of a customer failure is manageable, it may have an adverse impact on results. In particular, AMG Engineering can mitigate a portion of customer payment and performance risk due to the collection of prepayments from many of its customers. In addition to risks associated with collectability of receivables, AMG has long-term contracts with numerous customers that have enabled the Company to solidify relationships and deepen its knowledge of its customer base. If a customer does not perform according to a long-term contract and a replacement customer cannot be immediately found, it could have an adverse impact on results.

SUPPLY RISK

AMG Critical Materials is dependent on supplies of metals and metal-containing raw materials to produce its products. Despite a normally low appetite for risk in most categories, supply risk is more difficult to manage given the limited number of suppliers for certain materials. Some of these raw materials are available from only a few sources or a few countries, including countries that have some amount of political risk. AMG Engineering is dependent on a limited number of suppliers for many of the components of its vacuum furnace systems because of its stringent quality requirements. If the availability of AMG's raw materials or engineering components is limited, the Company could suffer from reduced capacity utilization. This could result in lower economies of scale and higher per-unit costs. If AMG is not able to pass on its increased costs, financial results could be negatively impacted. To mitigate the risk of raw materials and supplies becoming difficult to source, AMG enters into longer-term contracts with its suppliers when practical and has been diversifying its supplier base when alternative suppliers are available. The Company also mitigates the risk by monitoring supplier performance, maintaining a diversified product portfolio and retaining adequate liquidity.

LEGAL AND REGULATORY RISK

AMG must comply with evolving regulatory environments in the countries and regions where it conducts business. Adjustments to environmental policy, as well as governmental restrictions on the flexibility to operate in certain locations, could affect the Company. AMG is required to comply with various international trade laws, including import, export, export control and economic sanctions laws. Failure to comply with any of these regulations could have an adverse effect on the Company's financial results, and AMG's appetite for regulatory compliance risk is very low. Additionally, changes to these laws could limit AMG's ability to conduct certain business. A change in regulatory bodies that have jurisdiction over AMG products and facilities could also result in new restrictions, including those relating to the storage or disposal of legacy material at AMG-owned properties. This may result in significantly higher costs to AMG. See note 33 to the consolidated financial statements for more details on the currently known environmental sites. More stringent regulations may be enacted for air emissions, wastewater discharge or solid waste, which may negatively impact AMG's operations. In addition, international and governmental policies and regulations may restrict AMG's access to key materials or scarce natural resources in certain regions or countries or may limit its ability to operate with respect to certain countries. As regulations change, the Company proactively works to implement any required changes in advance of the deadlines. The REACH Directive is in effect in the European Union, and AMG's business units pre-registered all required materials and made complete registrations for those products. AMG has continuing obligations to comply with international and national regulations and practices concerning corporate organization, business conduct, and corporate governance. For example, in addressing possible conflicts of interest affecting its Management or Supervisory Board members, AMG follows strict rules of procedure, which are described in the Company's Articles of Association and the rules of procedure of the Management Board and Supervisory Board, respectively. Compliance with both legal and regulatory matters is monitored and augmented by the Company's Chief Compliance Officer and the Company's General Counsel who make use of the services of several prominent local and global law firms. The Corporate Code of Business Conduct and AMG's Values have been distributed to all employees and is displayed in all workplace locations in local languages. A Speak Up and Reporting policy is widely available to employees, who are advised to report situations that do not comply with AMG's guidelines and policies on how to deal with its employees, business partners and stakeholders. Continuous mandatory training programs, and updates thereof, are provided by the Company to its management and employees to ensure appropriate business conduct. An estimate of potential impact related to regulatory risk is not possible.

CURRENCY RISK

AMG's global production and sales footprint exposes the Company to potential adverse changes in currency exchange rates, resulting in transaction, translation, and economic foreign exchange risk. These risks arise from operations, investments and financing transactions related to AMG's international business profile. While AMG transacts business in numerous currencies other than its functional currency, the US dollar, the Company's primary areas of exposure are the euro, Brazilian real, and British pound. Given the location of our operations, it is not possible to mitigate translation risk in a cost-effective manner. AMG has developed a uniform foreign exchange policy that governs the activities of its subsidiaries and corporate headquarters. AMG enters into non-speculative spot and forward hedge transactions to mitigate its transaction risk exposure and employs hedges to limit certain balance sheet translation risks. The Company will also at times hold cash in foreign currencies to naturally hedge certain translation risks. AMG's overall economic foreign exchange risk is somewhat mitigated by the natural hedge provided by its global operations and diversified portfolio of products: namely, a majority of AMG's products are sold in the country in which they are produced. While AMG will continue to manage foreign exchange risk and hedge exposures where appropriate, fundamental changes in exchange rates could have an adverse impact on the Company's financial results.

COMPETITION

AMG's markets are highly competitive. The Company competes domestically and internationally with multinational, regional and local providers. AMG competes primarily on product technology, quality, availability, distribution, price and service. Competition may also arise from alternative materials and the development of new products. Increased competition could lead to higher supply or lower overall pricing. AMG is a leader in many of its key niche markets. The Company strives to be at the forefront of technology and product development. Despite this, there can be no assurance that the Company will not be materially impacted by increased competition.

PRODUCT QUALITY, SAFETY AND LIABILITY

AMG's products are used in various applications including mission critical components. Failure to maintain strict quality control could result in material liabilities and reputational damage. The Company maintains a stringent quality control program to ensure its products meet or exceed customer requirements and regulatory standards. AMG further mitigates this risk via liability insurance.

FINANCING RISK

A prolonged restriction on AMG's ability to access the capital markets and additional financing may negatively affect the Company's ability to fund future innovations and capital projects. AMG's financing risk was mitigated in early 2018 with its expansion and extension of the Company's syndicated credit facilities. It is further mitigated by the year-end 2019 liquidity of $396.1 million. AMG's future liquidity is dependent on the Company's continued compliance with the terms and conditions of its credit facility and its ability to refinance. As of December 31, 2019, the Company was in compliance with all financial covenants.

BUSINESS INTERRUPTION

A significant interruption of a key business operation could have a material impact on results. AMG's operations could be impacted by many factors including a natural disaster, serious incident or labor strike. Key suppliers and customers could also experience business interruption whereby the Company is indirectly impacted. AMG's broadly diversified business model mitigates some of the risk associated with business interruption. The Company's insurance policies also include business interruption coverage subject to certain terms. AMG attempts to further mitigate this risk by actively monitoring the supply chain and maintaining rigorous training programs on operational and safety procedures.

RISK MONITORING AND PROCEDURES

AMG has a strategic risk function that actively monitors and establishes internal controls to mitigate business and financial risks. AMG's strategic risk function is complemented by its Internal Audit function. Through the risk reporting system, the AMG Corporate Risk Committee works with business unit managers to develop risk mitigation strategies, where applicable. The purpose of the risk reporting and monitoring system is to manage, rather than eliminate, the risk of failure to achieve business objectives, and provide only reasonable, not absolute, assurance against material misstatement or loss.

STATEMENT ON INTERNAL CONTROL PURSUANT TO THE DUTCH CORPORATE GOVERNANCE CODE

Risks related to financial reporting include timeliness, accuracy, and implementation of appropriate internal controls to avoid material misstatements. During 2019, the Management Board conducted an evaluation of the structure and operation of the internal risk management and control systems. The Management Board discussed the outcome of such assessment with the Supervisory Board in accordance with the 2016 Dutch Corporate Governance Code. AMG's Management Board believes the internal risk management and control systems in place provide a reasonable level of assurance that AMG's financial reporting does not include material misstatements. In relation to AMG's financial reporting, these systems operated effectively during 2019.

STATEMENT OF RESPONSIBILITIES

The Management Board regularly assesses the effectiveness of the design and operation of the internal control and risk management systems.

Based on this report and in accordance with best practice 1.4.3 of the Dutch corporate governance code as adopted on December 8, 2016, and article 5:25c of the Financial Supervision Act, the aforementioned assessment, the current state of affairs, the Management Board confirms that, to the best of its knowledge:

- the internal risk management and control systems of the Company provide reasonable assurance that financial reporting does not contain any material inaccuracies;
- there have been no material failings in the effectiveness of the internal risk management and control systems of the Company;
- there are no material risks or uncertainties that could reasonably be expected to have a material adverse effect on the continuity of the Company's operations in the coming twelve months; and
- it is appropriate that the financial reporting is prepared on a going concern basis.

It should be noted that the above does not imply that these systems and procedures provide absolute assurance as to the realization of operational and strategic business objectives, or that they can prevent all misstatements, inaccuracies, errors, fraud and non-compliances with legislation, rules and regulations. Nor can they provide certainty that we will achieve our objectives.

In view of all the above, the Management Board confirms that, to the best of its knowledge:

- the financial statements give a true and fair view of the assets, liabilities, financial position and profit or loss of the Company and of companies included in the consolidation;
- the management report provides a fair review of the position at the balance sheet date, the development and performance of the business during the financial year of the Company; and
- the management report describes the principal risks and uncertainties that the Company faces.

DR. HEINZ SCHIMMELBUSCH

ERIC JACKSON

JACKSON DUNCKEL

Management Board
AMG Advanced Metallurgical Group N.V.
March 11, 2020

REPORT OF THE

SUPERVISORY BOARD

STEVE HANKE

CHAIRMAN

Nationality: American

Born: 1942

Date of initial appointment: May 3, 2013

Date of end of term: 2023

Professor of Applied Economics and Founder & Co-Director of the Institute for Applied Economics, Global Health and the Study of Business Enterprise at The Johns Hopkins University in Baltimore, Maryland, USA, Senior Fellow at the Cato Institute in Washington, D.C., USA, and Chairman Emeritus, the Friedberg Mercantile Group, Inc. (Toronto, Canada)

Former positions: Professor, Colorado School of Mines, Professor, the University of California, Berkeley, and senior economist, President's Council of Economic Advisers (Ronald Reagan)

WILLEM VAN HASSEL

VICE CHAIRMAN

Nationality: Dutch

Born: 1946

Date of initial appointment: May 4, 2017

Date of end of term: 2021

Current board positions: Investigator/director a.i. by appointment of Enterprise Chamber (Court of Appeals Amsterdam)

Former positions: Attorney-at-law with Trenite van Doorne law firm (Chairman), Dean of the Dutch Bar Association

HERB DEPP

Nationality: American

Born: 1944

Date of initial appointment: November 8, 2013

Date of end of term: 2021

Former positions: VP GE Boeing Commercial Aircraft Programs, VP GE Aviation Operations, VP Marketing and Sales GE Aircraft Engines, President General Electric Capital Aviation Services (GECAS)

DONATELLA CECCARELLI

Nationality: Italian

Born: 1959

Date of initial appointment: May 8, 2014

Date of end of term: 2022

Current board position: Executive Board of the Flick Foundation (Chairwoman)

Former positions: Global Wealth Management Director at Merrill Lynch International Bank Ltd. (Milan, Italy), Executive Director at Lehman Brothers International Europe (Frankfurt, Germany)

FRANK LÖHNER

Nationality: German

Born: 1965

Date of initial appointment: December 18, 2018

Date of end of term: 2022

Director of Montagu Private Equity GmbH in Germany (Frankfurt)

Former positions: Managing Director SEB AG (Head of Corporate Finance Germany), Managing Director Investment Banking Credit Suisse Securities (Europe), Head of Corporate Accounting (Germany) at Celanese AG, Project Leader Mergers & Acquisitions at Hoechst AG (Germany)

DAGMAR BOTTENBRUCH

Nationality: German and American

Born: 1960

Date of initial appointment: May 1, 2019

Date of end of term: 2023

Current board position: Supervisory Board member of the CFA Society (Germany)

Former positions: Managing Director of Rabobank International (Germany), Director Investment Banking at Credit Suisse (London and Frankfurt)

The Supervisory Board advises the Management Board and monitors the implementation of AMG's long-term value-creation strategy, ensuring that all stakeholder interests are appropriately considered.

The Supervisory Board supervises the actions taken by the Management Board and the general affairs of AMG. In doing so, the Supervisory Board focuses on the effectiveness of AMG's internal risk management and control system and the integrity and quality of the financial system. The Supervisory Board is also responsible for determining the remuneration of the individual members of the Management Board within the context of the Remuneration Policy as adopted by the General Meeting of Shareholders.

While retaining overall responsibility, it has assigned certain of its preparatory tasks to three committees: the Audit & Risk Management Committee, the Selection & Appointment Committee and the Remuneration Committee, each of which reports on a regular basis to the Supervisory Board. The separate reports of each of these committees are included on the following pages.

COMPOSITION OF THE SUPERVISORY BOARD

The Supervisory Board was first established on June 6, 2007, and currently consists of six members, as follows: Professor Steve Hanke (Chairman), Willem van Hassel (Vice Chairman), Herb Depp, Donatella Ceccarelli, Frank Löhner and Dagmar Bottenbruch (the personal details of each member are included at the beginning of this chapter). During the 2019 financial year, Dagmar Bottenbruch was elected as a Board member, while the Board said farewell to Mr. Jack Messman, who served for 12 years. Since AMG is active in the supply of critical materials (including specialty metals and alloys), mining and capital goods, and operates in a difficult and unpredictable economic environment, the Supervisory Board believes that diversity in skills and experience is a key prerequisite for the performance of the Supervisory Board going forward. The Supervisory Board believes it has the right skill set in place to

take on the challenges of the future. The Supervisory Board aims for an appropriate level of experience in technological, manufacturing, economic, operational, strategic, social and financial aspects of international business, public administration and corporate governance. The composition of the Supervisory Board must be such that the combined experience, expertise, and independence of its members enable it to carry out its duties. During 2019, all Supervisory Board members qualified as independent, as defined in the Dutch Corporate Governance Code. All current members of the Supervisory Board completed and signed a questionnaire to verify compliance in 2019 with the applicable corporate governance rules, including the Rules of Procedure of the Supervisory Board.

THE RESIGNATION SCHEDULE OF THE MEMBERS OF THE SUPERVISORY BOARD IS AS FOLLOWS:

Steve Hanke	2023
Willem van Hassel	2021
Herb Depp	2021
Donatella Ceccarelli	2022
Frank Löhner	2022
Dagmar Bottenbruch	2023

No changes in the composition of the Supervisory Board are envisaged during 2020.

DIVERSITY

The Supervisory Board recognizes the importance of a diverse composition of the Supervisory Board and the Management Board in general, and in terms of gender in particular. In line with the Diversity Policy of the Company, which was adopted in 2017, AMG pursues a policy of having at least 30% of the seats on the Supervisory Board and the Management Board be held by each gender. The company will continue to take its key diversity objectives, including maintaining a proper balance of nationalities to reflect the transatlantic structure of AMG, and the gender allocation of seats as outlined above, into account in connection with recruitment, retention of employees and succession planning for both the Management Board and the Supervisory Board. In 2019, the Management Board deployed measures to attract and maintain a diverse workforce at its units, including linking incentive payments for unit managers to meaningful progress toward diversity targets. Since the Annual Meeting in May 2019, AMG is meeting its diversity objectives in terms of gender as outlined above with respect to the Supervisory Board. The Supervisory Board will continue to look for suitable female candidates for both the Management Board and the Supervisory Board in order to meet all of its diversity objectives as outlined in its Diversity Policy as soon as reasonably possible.

SUPERVISORY BOARD MEETINGS

The Supervisory Board held fourteen meetings over the course of 2019, including six by telephone conference. Ten of these meetings were held in the presence of the Management Board. All meetings were attended by all members, with the exception of Ms. Ceccarelli, who missed one meeting. Physical meetings were held in Amsterdam, the Netherlands, and once at the operational headquarters in Wayne, PA, USA.

The items discussed in the meetings included recurring subjects, such as AMG's financial position, objectives and results, the operating cash flow (OCF) development as well as the net debt situation of the Company; potential acquisitions and divestments; the business plans of AMG Critical Materials and AMG Technologies, the new division that was formed on January 1, 2019 comprising (the former) AMG Engineering segment and the unit AMG Titanium Alloys & Coatings; capital expenditure programs; succession planning; legal and compliance review; operations review as well as regular review of the strategic objectives and initiatives of the Company as well as the share repurchase program that was initiated and completed in 2019; and the Company's ongoing actions in the field of corporate social responsibility. Financial metrics presented to the Supervisory Board to measure the performance of AMG included net income, earnings per share, EBITDA, financial leverage (net debt to EBITDA), working capital, liquidity, OCF and return on capital employed (ROCE). The Supervisory Board further discussed the top risks and risk profile of AMG's business and operations and the assessment by the Management Board of the structure of the internal risk management and control systems, and any significant changes thereto, as well as the functioning of the internal audit function and of the external auditor, KPMG Accountants NV ("KPMG"). Besides the scheduled meetings, the Chairman had regular contact with the Chief Executive Officer and the other members of the Management Board as well as senior executives of the Company throughout the year.

Throughout 2019, the Supervisory Board regularly reviewed, and was regularly updated by the Management Board about, the implementation of the long-term strategy of AMG, which was renewed and approved by the Supervisory Board in July 2016 and subsequently fine-tuned during the following years. This strategy review took place on a continuous basis, headed by the Chairman of the Management Board, in order to keep the Supervisory Board fully informed on the progress and financing of the strategy, as well as the principal risks related to the strategy. AMG's overriding strategic objective is to achieve industry leadership while being the low-cost producer. That resulted in a plan to build and grow its critical materials business with a commitment to doubling AMG's annual EBITDA to a minimum of $200 million by 2020. AMG's strategy is based on a growth-driven approach focusing on three principles: A) process innovation and product development, aimed at improving the market position of AMG's businesses; B) industry consolidation, achieved by pursuing opportunities for horizontal and vertical industry consolidation across AMG's critical materials portfolio; and C) expansion of high-growth businesses within AMG's existing product portfolio.

The extraordinary financial results of 2018 could not be repeated in 2019. The global economic environment saw increased volatility during the first quarter of 2019, which began an unprecedented decline in prices that, for the rest of the year, affected all of AMG's business units. The economic environment, severely impacted by global trade frictions (US-China), Brexit uncertainty, and volatile investor sentiment, continued to be highly unpredictable during the remainder of 2019.

As a result, 2019 was an extremely challenging year for AMG's Management Board, which had to manage a sharp decline in both results (compared to the peak performance of 2018) and share price (that hit its 10-year high in June 2018 at EUR 52.80). During 2019, the Management Board had to announce twice that it had lowered its target for full year 2019 EBITDA. Given the various challenges faced during 2019, the resulting EBITDA of $121 million was welcomed by the Supervisory Board as a very positive result. The Management Board focused on many projects during 2019 that it had initiated earlier. The new segment, AMG Technologies, established on January 1, 2019 with a renewed and central focus on the aerospace markets, had a promising start with good results in 2019. AMG also announced during the year that it would start the review of various public listing alternatives of AMG Technologies. In addition, during 2019, the Management Board was strongly focused on driving the strategic projects of the Company, including: i) securing the $307 million municipal bond financing necessary to essentially double capacity of the AMG Vanadium recycling facility in Ohio, USA; ii) the signing of a joint venture agreement with Shell Catalysts & Technologies; and iii) the reorientation of the lithium strategy to focus on a battery-grade lithium hydroxide plant in Germany.

Please refer to the Chairman of the Management Board's Letter to Shareholders for an overview of AMG's strategy and its implementation thereof going forward (pages 8-13).

In 2019, the annual self-evaluation process took place with the assistance of an external facilitator, in line with the Board's policy to use the services of external facilitators for this process once every three years. Accordingly, the Supervisory Board completed a comprehensive self-evaluation process under the guidance and leadership of Dr. Stefan Peij (Managing Director Governance University), who acted as external facilitator. Dr. Peij distributed a comprehensive questionnaire to all Supervisory Board members (all of whom responded) which concerned, among other things, the Board members' mutual interaction; their interaction with the Management Board; the functioning of the Supervisory Board Committees; and the desired profile and competencies of the Supervisory Board. Dr. Peij subsequently held individual follow-up discussions with all Board members. During the executive session of the Supervisory Board meeting on October 29, 2019, Dr. Peij shared and discussed the results with the Board members, and the Supervisory Board concluded, after ample and lively discussion, based on the findings and the report, that the Board, its Committees and individual members have been functioning very well and that improvement areas would focus on: (i) moving to a more structural approach concerning onboarding programs; and (ii) working on a more comprehensive dialogue during Committee report items at plenary Board meetings.

On October 30, 2019, the Supervisory Board (without the presence of the Management Board) met and reviewed the performance of the Management Board and its members over the past twelve months. During this meeting, the Supervisory Board discussed the recommendation of the Selection & Appointment Committee, which had based its findings on the results of the Company and feedback from senior management within the AMG Group. The Committee concluded that the performance of the Management Board and its individual members, despite financial results that were less than initially targeted, was very good, as evidenced by, among other things, the start of the expansion project of AMG Vanadium including financing, the joint venture agreement signed with Shell Catalysts & Technologies, and the pursuit of growth initiatives in the downstream lithium and vanadium spaces; and therefore, that no changes in its composition were merited. In particular, the Supervisory Board was impressed by the persistent focus on operational performance and costs, and on the implementation and monitoring by the Management Board members of the strategic objectives which form the basis of AMG's long-term value-creation strategy.

SHARES HELD BY MEMBERS OF THE SUPERVISORY BOARD

As of December 31, 2019, the members of the Supervisory Board held 110,366 shares in the Company. Out of that number, 61,508 shares were awarded to them as part of their annual remuneration.

COMMITTEE REPORTS

The Supervisory Board has three standing committees: the Audit & Risk Management Committee, the Selection & Appointment Committee and the Remuneration Committee.

REPORT OF THE AUDIT & RISK MANAGEMENT COMMITTEE

COMPOSITION: DR. DONATELLA CECCARELLI (CHAIR), MR. WILLEM VAN HASSEL, AND MR. FRANK LÖHNER

The Audit & Risk Management Committee is responsible for, among other things, considering matters relating to financial controls and reporting, internal and external audits, the scope and results of audits and the independence and objectivity of auditors as well as the Company's process for monitoring compliance with laws and regulations and its Code of Business Conduct.

It monitors and reviews the Company's internal audit function and, with the involvement of the independent external auditor, focuses on compliance with applicable legal and regulatory requirements and accounting standards.

The Audit & Risk Management Committee met five times during 2019, in addition to its meetings to review and approve annual and interim financial reports and statements of the Company, and reported its findings periodically to the plenary meeting of the Supervisory Board. All members of the Audit & Risk Management Committee attended all meetings.

The structure, process and effectiveness of the Company's internal risk management and control systems and the accompanying risk reports from the Management Board were a regular topic of discussion by the Audit & Risk Management Committee. Topics of discussion at the Audit & Risk Management Committee meetings also included the Internal Audit plan prepared by the Internal Auditor of AMG and the External Audit plan prepared by KPMG (see further chapter on Corporate Governance). Additional topics discussed were internal audit reports of the various units within the group and the identified risks per entity, summarized in the top risks of the Company; quarterly financial results; liquidity and cash situation; credit facility and arrangement with the Company's major banks; insurance; environmental risk; status of the IT environment within AMG; compliance and Code of Business Conduct review program; foreign currency exposure and hedging policies; tax structuring and spending approval matrices; risk management reports; and litigation reports. The Company's Internal Auditor maintained regular contact with the Audit & Risk Management Committee and the external auditors of the Company. The Audit & Risk Management Committee also met with the external auditors without any member of the Company's Management Board or financial and accounting staff present.

At all committee meetings, an important agenda item concerned the review of the Quarterly Risk Report that was prepared by the Management Board as further explained in the Risk Report section of the Annual Report. During that agenda item, all Management Board members attend the committee meeting to explain the Risk Report, and to update the committee members about any changes in the risk profile of the Company.

The Audit & Risk Management Committee discussed with KPMG the findings from the 2019 audit and reviewed the contents and key audit matters of the 2019 Independent Auditor's Report of KPMG and reported on this matter to the plenary meeting of the Supervisory Board. In 2019, external audit fees were $1.815 million for the group financial statements. Present at all non-executive session meetings of the Audit & Risk Management Committee were the Chief Financial Officer, Chief Controller and the Internal Auditor. KPMG was present at all these meetings, while at certain meetings, the Chief Compliance Officer was also present.

The Internal Auditor at AMG reports to the Audit & Risk Management Committee and to the Management Board and operates on the basis of an Internal Audit plan approved by the Audit & Risk Management Committee, the Management Board, and the Supervisory Board. The Internal Audit plan is risk-based and comprises units and subsidiaries of the AMG Group with a focus on operational, financial, strategic and IT risks.

The Internal Audit function closely cooperates with the external auditors of the Company and attends all meetings of the Audit & Risk Management Committee of the Supervisory Board.

As the mandate of KPMG as external auditor of the Company will come to an end with the 2019 financial results, the Committee also did an extensive review of the performance by KPMG as external auditor during the period 2018-2019.

Part of this review process was a meeting held by the Chairman of the Supervisory Board and the Chair of the Committee with representatives of KPMG in October 2019. The results of the review were positive, as KPMG received high scores on all relevant sub-aspects, such as planning, quality, execution and delivery. Also, the joint communication with AMG's staff is greatly appreciated due to the proactive way topics are dealt with. The Committee is pleased that, during the Annual Meeting on May 6, 2020, the General Meeting of Shareholders will be asked to approve the reappointment of KPMG as external auditors of the Company for a period of two financial years (2020 and 2021).

SELECTION & APPOINTMENT COMMITTEE

COMPOSITION: PROF. STEVE HANKE (CHAIR) AND DR. DONATELLA CECCARELLI

The Selection & Appointment Committee is responsible for: (i) preparing the selection criteria, appointment procedures and leading searches for Management Board and Supervisory Board candidates; (ii) periodically evaluating the scope and composition of the Management Board and the Supervisory Board; (iii) periodically evaluating the functioning of individual members of the Management Board and the Supervisory Board; and (iv) supervising the policy of the Supervisory Board in relation to the selection and appointment criteria for senior management of the Company. The Selection & Appointment Committee held two regular meetings during 2019, in addition to various informal meetings between the committee members and contacts with the Chairman of the Management Board and other members of the Supervisory Board, and reported its findings to the Supervisory Board. In these meetings, all committee members were present.

In its succession planning for the Management Board and Supervisory Board, the Committee takes into account the profile set for new members as well as the diversity policy of the Company as explained above (page 27), bearing in mind the need to have in place at all times the right skill set and experience on the Board. During 2019, the committee continued its succession planning process to find adequate candidates for the Supervisory Board, based on the profile which was approved in 2016.

Mr. Jack Messman, Chairman of the Supervisory Board until May 1, 2019, had served twelve years on the Supervisory Board when his term ended in May 2019. The Supervisory Board was very pleased that Professor Steve Hanke, whose term also ended in May 2019, had made himself available for a four-year term on the Supervisory Board. The General Meeting of Shareholders reappointed Professor Hanke for a term of four years effective May 1, 2019. The Supervisory Board had also unanimously elected Professor Hanke as Chairman of the Board and successor to Mr. Messman, effective May 1, 2019, during its meeting on February 27, 2019.

Given the vacancy created by the retirement of Mr. Messman, the Supervisory Board found an excellent candidate to join the Supervisory Board in Ms. Dagmar Bottenbruch. Ms. Bottenbruch has both German and US nationality and brings highly relevant experience in the fields of financial services, public and private equity/venture capital investments, and investments in technology companies. Ms. Bottenbruch was appointed by the General Meeting of Shareholders on May 1, 2019 as member of the Supervisory Board with immediate effect. Ms. Bottenbruch has served as a member of the Remuneration Committee since May 1, 2019.

The Selection & Appointment Committee further continued the review of its succession planning scenarios for the Management Board, as in May 2021, the terms of both Dr. Schimmelbusch and Mr. Jackson will end.

REMUNERATION COMMITTEE

COMPOSITION: MR. HERB DEPP (CHAIR) AND MS. DAGMAR BOTTENBRUCH

The Remuneration Committee is responsible for establishing and reviewing material aspects of the Company's policy on compensation of members of the Management Board and preparing decisions for the Supervisory Board in relation thereto. This responsibility includes, but is not limited to, the preparation and ongoing review of: (i) the remuneration policy as adopted by the General Meeting of Shareholders; and (ii) proposals concerning the individual remuneration of the members of the Management Board to be determined by the Supervisory Board.

The Remuneration Committee met twice in 2019, in addition to various informal discussions among its members, the other members of the Supervisory Board, the Chairman of the Management Board and the Chief Financial Officer. In these meetings, all committee members were present.

The main topic of discussion and review in 2019 concerned the implementation of the EU Shareholder Rights Directive which became effective in the Netherlands in 2019 ("the SRD") and which calls for a revised Remuneration Policy for the Management Board and a new Remuneration Policy for the Supervisory Board, both for adoption by the General Meeting of Shareholders during the Annual Meeting in May 2020. In addition, the SRD calls for an advisory vote by the General Meeting of Shareholders, for the first time during the Annual Meeting in May 2020, of the Remuneration Report of the Company covering the remuneration paid during the previous year (i.e. 2019) to the Management Board members and the Supervisory Board members. Based on the recommendations from the Remuneration Committee, the Supervisory Board approved the revised Management Board Remuneration Policy and the new Supervisory Board Remuneration Policy and the 2019 Remuneration Report, during its meeting on February 26, 2020.

Other topics of discussion at the meetings included the regular items such as the review of the base salary and short-term incentives for members of the Management Board as well as the senior executive team at AMG's divisions; the review of the performance-related compensation of the Management Board members; and the review of the peer group selected for executive remuneration. In addition, the Chair of the Remuneration Committee met with the Chairman of the Management Board to learn about the views of the Management Board members regarding the amount and structure of the Management Board's own compensation in view of best practice provision 3.1.2.

2019 REMUNERATION REPORT

See the following chapter on remuneration for further detail.

APPRECIATION FOR THE MANAGEMENT BOARD AND THE EMPLOYEES OF AMG

The Supervisory Board would like to thank the Management Board for its dedication and extraordinary efforts in leading the Company. In 2019, the Management Board continued to focus not only on its operational and financial performance during the year, but also on long-term value creation amid the challenges presented by the uncertain global economic environment. The Supervisory Board would also like to thank all the employees of AMG for their continued commitment to the Company's success.

ANNUAL REPORT 2019

The Annual Report and the 2019 financial statements, audited by KPMG, have been presented to the Supervisory Board. The 2019 financial statements and the Independent Auditor's Report with respect to the audit of the financial statements were discussed with the Audit & Risk Management Committee in the presence of the Management Board and the external auditor. The Supervisory Board endorses the Annual Report and recommends that the General Meeting of Shareholders adopt the 2019 financial statements.

SUPERVISORY BOARD
AMG ADVANCED METALLURGICAL GROUP N.V.

PROFESSOR STEVE HANKE, CHAIRMAN

WILLEM VAN HASSEL, VICE CHAIRMAN

HERB DEPP

DONATELLA CECCARELLI

FRANK LÖHNER

DAGMAR BOTTENBRUCH

MARCH 11, 2020

AMG'S

REMUNERATION REPORT FOR THE YEAR 2019

This Remuneration Report is the first report on remuneration from the Supervisory Board reflecting the provisions of EU Shareholder Rights Directive that became effective in the Netherlands in 2019 ("SRD").

The Supervisory Board has prepared a revised Remuneration Policy for the Management Board as well as a Remuneration Policy for the Supervisory Board, both of which will be on the agenda of the Annual Meeting in May 2020 for adoption by the General Meeting of Shareholders of the Company. The Management Board Remuneration Policy is unchanged from the Policy that was adopted in 2013, although the level of disclosure is higher, commensurate with the SRD. As such, although this Remuneration report for 2019 should be read in conjunction with the 2013 Remuneration Policy, it reflects those disclosure changes that were mandated by the SRD. Regarding the Supervisory Board, its remuneration policy has been in place since 2013 when it was approved by the shareholders, and this Remuneration Report 2019 reflects the increased disclosure requirements inherent in the SRD.

2. MANAGEMENT BOARD REMUNERATION REPORT 2019

2.A. CONTRIBUTION TO LONG-TERM VALUE CREATION

The AMG Values (Safety, Value Creation, Respect for People, and Integrity) are the foundation of AMG's ambition to be a leader in the field of critical materials and aerospace technologies.

AMG's strategy—as extensively explained in its Annual Reports and during investor meetings— is to be at the forefront of critical material technologies which target clean energy and energy efficiency and ultimately reduce CO_2 production.

This Remuneration Policy and the performance measures included within it endeavor to align AMG's performance targets with AMG's long-term strategic objectives and AMG's values and generate long-term, sustainable stakeholder value creation.

The financial performance measures focus management on the delivery of a combination of robust return on capital employed (ROCE), on healthy operating cash flow (OCF), and on long-term share price appreciation. AMG has concluded that this combination of three factors are the main contributors to long-term shareholder value creation.

AMG believes that shareholder value creation is an important pillar to creating long-term, sustainable stakeholder value. Without shareholder value creation, the company will struggle with an increased cost of capital and decreased access to global capital markets. However, sustaining shareholder value creation is impossible without a strong and enduring focus on other stakeholder values: Employees must be motivated and work in an environment that puts safety first, and the company must consider the best interests of the surrounding community, customers, suppliers, service providers, financial institutions, and government agencies.

AMG's non-financial performance measures focus management on delivering leadership in strategic projects and in long-term sustainability by targeting a specific set of goals including CO_2 abatement, safety, environmental stewardship, human resource development, risk management, investor relations and comprehensive regulatory compliance.

The longer-term performance measures chosen as part of the remuneration components for the year 2019, reflect a long-term incentive (LTI) framework that is designed to drive and reward sound business decisions and judgment to support AMG's long-term health that is necessary for achieving its strategic objectives, and to align the interests of the Management Board with those of AMG's shareholders. These measures permit the Management Board to acquire shares in the Company's share capital through stock option and performance shares programs which both carry vesting terms of at least three years and carry share retention guidelines for the Management Board members concerning the shares acquired.

2.B. COMPETITIVE ENVIRONMENT AND PEER GROUP

From the inception of AMG in 2007, the Supervisory Board has adopted a US-centric approach towards executive remuneration, but with due regard to the Dutch corporate governance environment. This US focus is due to the location of AMG's operational headquarters in the US and the fact that all of its Management Board members have been and continue to be US residents. AMG is mindful of the views of society about the level and structure of remuneration for its senior leadership and AMG continues to inform itself about those views in the major countries in which it is operating like the United States, Germany, Brazil, and the United Kingdom. Although AMG has no operational activities in the Netherlands, it continues to take into account the Dutch perspective since its head office is located and its shares are listed in Amsterdam.

The AMG group of companies competes throughout the world for business and for talent. Given its size and the diversity of its business it must compete for superior talent with corporations of considerable scale. Therefore, AMG must provide top talent with roles that are challenging and motivating in a fast-paced environment and offer very competitive reward opportunities for superior performance.

Every year the Remuneration Committee of the Supervisory Board reviews, confirms and uses an executive compensation peer group for benchmarking purposes. For 2019, the Supervisory Board utilized the peer group that was first established in 2016 with the assistance of Willis Towers Watson.

The selected peer group for 2019 consisted of the following companies (in alphabetical order):

1. Albemarle Corporation
2. Allegheny Technologies Inc.
3. Ametek, Inc.
4. AMAG Austria Metall AG
5. Bodycote plc
6. Cabot Corporation
7. Carpenter Technology Corporation
8. Commercial Metals Company
9. Elementis plc
10. Ferroglobe plc (formerly Globe Specialty Metals Inc.)
11. Hill & Smith Holdings plc
12. Imerys SA
13. Materion Corporation
14. Minerals Technologies Inc.
15. Quaker Chemicals Corporation
16. Worthington Industries Inc.

This peer group is an important yardstick for the Supervisory Board in determining performance by the Company and setting compensation for the Company's Management Board.

In establishing the 2019 remuneration, the Supervisory Board considered multiple scenarios with regard to how the remuneration components would be affected given different sets of circumstances (which related in this year particularly to the level of growth by the Company resulting from the global economy, price developments in its Critical Materials portfolio, volatility levels of the financial markets and the EUR:USD exchange rate).

2.C. PAY RATIO AND AMG GROUP WORKFORCE COMPENSATION

Since the introduction of the pay ratio in 2017, the Supervisory Board, upon recommendation of the Remuneration Committee, has established that the most informative ratio would be one which compares the average Management Board actual compensation with that of the average total employee benefit cost per employee (global workforce). The average Management Board compensation (rather than only CEO compensation) is deemed to be the appropriate parameter, given the collective management responsibility of the Management Board members under the Dutch corporate governance system. It should be noted that pay-ratios are specific to a company's industry, geographic footprint and organizational structure. For example, a large part of AMG's workforce is located in emerging and developing countries, whereas AMG's Management Board members are based in the United States. Compensation packages are designed to be locally competitive. Also, it should be noted that pay ratios can be quite volatile over time, as they can vary with stock market movements (impacting the LTI part of the Management Board compensation), exchange rate movements and actual performance by the Company. In 2016, AMG's pay ratio was 71 (the first year AMG published its pay ratio). AMG's pay ratios for 2017 and 2018 were 72 and 62, respectively. The pay ratio for 2019 is 40.

The development of this pay ratio will be monitored and disclosed going forward. The Remuneration Committee has taken into account these pay ratios in establishing the Management Board compensation for 2019 and 2020 and believes that these ratios are fair and adequate for this purpose.

The average remuneration on a full time equivalent basis of the workforce of the AMG Group has moved up over the period from 2015-2019 from $65 in 2015 to $70 in 2019.

2.D. MANAGEMENT BOARD REMUNERATION IN 2019

(I) SUMMARY

In 2019, the Management Board members were compensated in the form of base salary, annual bonus (calculated over results 2018) and long-term incentives that have vested and paid out in 2019. The total amount of compensation split between fixed and variable compensation for each Management Board member in 2019 is shown in the table at the bottom of this page.

2019 COMPENSATION	FIXED	(%)	VARIABLE	(%)	TOTAL	(%)
Dr. Heinz Schimmelbusch	$1,030	(25%)	$3,165	(75%)	$4,195	(100%)
Eric Jackson	$750	(37%)	$1,285	(63%)	$2,035	(100%)
Jackson Dunckel	$635	(33%)	$1,271	(67%)	$1,906	(100%)

The table on the next page shows the change in total remuneration for each Management Board member over the past five year period, compared to (i) financial performance by the Company and (ii) average remuneration AMG Group workforce, during the same period.

(II) BASE SALARY

Certain members of the Management Board have entered into remuneration contracts with companies that are part of the AMG Group. The remuneration levels in the table show the aggregate base salary values of the contracts per Management Board member.

BASE SALARY	
Heinz Schimmelbusch	$1,030
Eric Jackson	$835[1]
Jackson Dunckel	$635

1 Effective November 2019

The base salaries of the Management Board members in 2019 were determined by the Supervisory Board in line with the Remuneration Policy of the Company.

(III) ANNUAL BONUS

In 2019, a variable cash bonus could be earned based on achievement of challenging targets which, as has been established by the Remuneration Committee, contribute to the short and the long-term value-creation objectives of the Company. The annual bonus criteria are set forth below and relate 80% to financial indicators of the Company and 20% to the individual (non-financial) performance of Management Board members. The Supervisory Board determines ambitious target ranges with respect to each performance metric and with respect to the threshold, target, and maximum payout, and determines whether performance targets have been met. The annual bonus payout in any year relates to achievements realized during the preceding year against the agreed targets. The 2019 annual bonus was determined as follows:

- 40% from ROCE (against agreed target ranges) realized
- 40% from OCF (against agreed target ranges) realized
- 20% from individual performance—at the discretion of the Supervisory Board

The tables on page 35 and in Section VIII show the components of and the annual bonus for each member of the Management Board as a percentage of base salary, in the case that threshold and target performance levels are reached. Below threshold level, the payout will be 0%. The annual bonus can vary based on actual performance and can range from zero up to three times target in case of superior performance.

The Supervisory Board has decided for competitive reasons not to disclose the actual financial targets that are related to the financial indicators referenced above.

The Company's ROCE and OCF in 2019 were significantly below the annual targets set by the Supervisory Board, and therefore the financial bonus targets set by the Supervisory Board were only partially met by the Management Board.

YEAR ON YEAR % CHANGE (EXCEPT ROCE)	2015	2016	2017	2018	2019
Heinz Schimmelbusch	89%	36%	10%	-17%	-38%
Eric Jackson	46%	21%	11%	-11%	-29%
Jackson Dunckel	N/A	N/A	-9%	12%	-38%
Cash Flow from Operations	-20%	-26%	40%	24%	-52%
Share Price Change	34%	63%	184%	-33%	-23%
Actual ROCE	12.0%	18.8%	21.2%	35.4%	13.7%
Average Remuneration AMG Group Workforce	-7%	3%	4%	4%	-4%

ROCE PAYOUT %	
Heinz Schimmelbusch	63%
Eric Jackson	63%
Jackson Dunckel	63%

CASH FLOW FROM OPERATIONS PAYOUT %	
Heinz Schimmelbusch	0%
Eric Jackson	0%
Jackson Dunckel	0%

The individual non-financial performance targets (20%) set by the Supervisory Board for each Management Board member were exceeded in 2019 and were calculated as set forth hereafter.

For 2019 the Supervisory Board had identified the following individual non-financial bonus target areas for the Management Board members:

Heinz Schimmelbusch: Overall Strategic Direction for AMG; External and Organic Growth Projects; Environmental, Health and Safety Performance; Management resources and capabilities; and investor relations.

Eric Jackson: Operational Improvement and managing price volatility in the critical materials portfolio; Advance lithium and vanadium projects; Leadership, management development and accountability at each unit.

Jackson Dunckel: Improve internal reporting timing and budgeting process; improve cyber-security measures; attract financing for AMG Vanadium expansion.

The Remuneration Committee sets the individual (non-financial) targets for each Management Board member within the target areas outlined above, and twice per year reviews the performance of the Management Board members against these individual bonus targets; performance is weighed, and measured, amongst other things, against the overall financial and operational performance the Company and the prevailing economic and industrial environment.

This review over 2019 resulted in the decision by the Supervisory Board, based on the recommendation of the Remuneration Committee, to award three times the target amount for the individual non-financial bonus target, due to outstanding performance by the Management Board and each Management Board member vis-à-vis their individual targets, achieved in an extremely volatile and difficult economic environment.

In particular, the Supervisory Board noted that the Management Board is to be commended in 2019 for keeping control of and focus on its strategic agenda whilst simultaneously making necessary adjustments in timing and scope in a highly unpredictable economic environment. An example of this ongoing strategic focus is the establishment of AMG Technologies as a new segment with a strong focus on aerospace markets and the ongoing review of its potential public listing alternatives. Another example is the multi-pronged expansion of AMG's vanadium business.

Highlights in 2019 for the individual performance by Heinz Schimmelbusch include signing the partnership agreement signed with Shell Catalysts and Technologies; leading the re-orientation of the lithium strategy towards a lithium hydroxide upgrader plant in Germany; and his relentless focus on risk management within the AMG Group and its units.

Highlights in 2019 for the individual performance by Eric Jackson include signing a multi-year ferrovanadium offtake agreement with Glencore plc which was of crucial importance for the Company's focus on inventory price risk reduction. For Jackson Dunckel his individual performance in 2019 was highlighted by his instrumental role in the negotiation and conclusion of a 30-year $307 million tax-exempt municipal bond for the doubling of AMG Vanadium's Ohio operations.

TOTAL ANNUAL BONUS AS A % OF BASE SALARY		
For the year ended December 31, 2019	TARGET	PAYOUT
Dr. Heinz Schimmelbusch	85%	72%
Eric Jackson	65%	55%
Jackson Dunckel	65%	55%

The base salary for annual bonus calculation purposes corresponds to full-year base salary.

(IV) LONG-TERM INCENTIVES—STOCK OPTIONS

Dr. Schimmelbusch, Mr. Jackson, and Mr. Dunckel participate in the AMG Management Board Option Plan per the Remuneration Policy. In addition, each member of the Management Board participates in the AMG Performance Share Unit Plan adopted as part of the Remuneration Policy. The table on the next page provides an overview of the options granted under the AMG Management Board Option Plan that are outstanding as of the end of 2019. In May 2019, options were granted to the Management Board members pursuant to the Remuneration Policy as part of the long-term incentive plan. These options are all conditional and follow the conditions set forth in the Remuneration Policy and are governed by the AMG Management Board Option Plan adopted in 2009. No stock options were granted to other employees of the AMG Group during 2019.

(V) LONG-TERM INCENTIVES—PERFORMANCE SHARE UNITS

In 2019, the Supervisory Board awarded Performance Share Units to the Management Board pursuant to the Remuneration Policy. The present value of the Performance Share Units (PSU) award for the Management Board members in 2019 is as follows (in thousands):

Heinz Schimmelbusch	€1,360
Eric Jackson	€460
Jackson Dunckel	€400

The present value of the PSUs is calculated as 100% of the fair market value at the grant date. These PSU awards will vest after three years, in accordance with the Remuneration Policy. Vesting of the PSU is subject to:

A three-year vesting period

- A minimum average ROCE over the performance period as established by the Supervisory Board
- The relative Total Shareholder Return (TSR) compared to the Bloomberg World Metal Fabricate/Hardware Index

(VI) VESTED STOCK OPTIONS AND PERFORMANCE SHARES

During 2019, Dr. Heinz Schimmelbusch exercised 103,057 vested stock options and Eric Jackson exercised 30,311 vested stock options. The exercise price of these stock options was €23.82. For the 2016 PSU grants, the three-year vesting period was completed in 2019 and the minimum ROCE over the performance period (2016-2018) met the target set by the Supervisory Board. The relative TSR for the Company resulted in a multiplier of 175% which accordingly allowed the entire 2016 PSU award to vest. The Supervisory Board resolved on November 2, 2016, pursuant to the authority granted under the Remuneration Policy, that the PSU awards granted in 2015 and 2016 would be settled in AMG shares rather than cash, subject to vesting of the awards. As a result, in 2019 the following shares were issued to the following Management Board members as settlement of the 2019 PSU awards:

Heinz Schimmelbusch	276,327 shares AMG
Eric Jackson	81,273 shares AMG
Jackson Dunckel	81,273 shares AMG

In 2019, the Company started and completed a share repurchase program for the purposes of funding future share-based employee compensation programs and returning cash to shareholders. As a result, the Company repurchased a total of

AMG OPTION PLAN		NON-VESTED OPTIONS UNDER THE PLAN				VESTED OPTIONS UNDER THE PLAN		
FOR THE YEAR ENDED DECEMBER 31, 2019	YEAR	DATE OF GRANT	NUMBER OF OPTIONS	PRESENT VALUE AT DATE OF GRANT (€)	VESTING SCHEME	EXERCISE PRICE (€)	NUMBER OF OPTIONS	MARKET VALUE AT 12/31/2019 (€000)
DR. HEINZ SCHIMMELBUSCH	2016	5-4-16	64,885	340,000	50% vested after 3 years, 50% vested after 4 years	9.78	—	N/A
	2017	5-4-17	47,668	340,000	50% vested after 3 years, 50% vested after 4 years	25.50	—	N/A
	2018	5-2-18	17,086	340,000	50% vested after 3 years, 50% vested after 4 years	44.24	—	N/A
	2019	5-13-19	35,602	340,000	50% vested after 3 years, 50% vested after 4 years	31.43	—	N/A
ERIC JACKSON	2016	5-4-16	19,084	100,000	50% vested after 3 years, 50% vested after 4 years	9.78	—	N/A
	2017	5-4-17	14,020	100,000	50% vested after 3 years, 50% vested after 4 years	25.50	—	N/A
	2018	5-2-18	5,026	100,000	50% vested after 3 years, 50% vested after 4 years	44.24	—	N/A
	2019	5-13-19	12,042	115,000	50% vested after 3 years, 50% vested after 4 years	31.43	—	N/A
JACKSON DUNCKEL	2016	5-4-16	38,168	100,000	50% vested after 3 years, 50% vested after 4 years	9.78	19,084	258
	2017	5-4-17	14,020	100,000	50% vested after 3 years, 50% vested after 4 years	25.50	—	N/A
	2018	5-2-18	5,026	100,000	50% vested after 3 years, 50% vested after 4 years	44.24	—	N/A
	2019	5-13-19	10,471	100,000	50% vested after 3 years, 50% vested after 4 years	31.43	—	N/A

2,915,630 shares, of which approximately one-third will be retained and reserved in treasury to fund employee share-based programs in 2020 and beyond.

(VII) PENSIONS AND RETIREMENT BENEFITS

The members of the Management Board are members of a defined contribution plan maintained in the United States. All of them receive additional retirement benefits from Metallurg's Supplemental Executive Retirement Plan (SERP). With respect to Heinz Schimmelbusch, the supplemental benefits are payable commencing at the end of his employment with AMG.

The benefit to be paid under the AMG retirement plan will be reduced by the amounts received under the normal retirement benefit under the Pension Plan of Metallurg Inc. Pursuant to Eric Jackson's and Jackson Dunckel's SERP, it is provided that if one is employed by AMG or remains in AMG's employment until he is 65, he is entitled, whether or not he has terminated his employment, to receive AMG retirement benefits (reduced by amounts received under Metallurg's other pension plans). As Eric Jackson has reached age 65 and remains in AMG's employment, he has begun receiving AMG retirement benefits. Jackson Dunckel's benefits will be reduced if his employment with AMG ends prior to reaching age 65.

(VIII) TOTAL COMPENSATION OF THE MANAGEMENT BOARD IN 2019

(in thousands) FOR THE YEAR ENDED DECEMBER 31, 2019	BASE SALARY	ANNUAL BONUS	OPTION COMPENSATION	PERFORMANCE SHARE UNITS	RETIREMENT BENEFITS & PENSIONS	OTHER REMUNER-ATION[1]	TOTAL
Heinz Schimmelbusch	$1,030	$744	$369	$1,650	$268	$134	$4,195
Eric Jackson	$750	$462	$112	$510	$161	$40	$2,035
Jackson Dunckel	$635	$351	$107	$485	$277	$51	$1,906

Note: These amounts represent the expense recorded by AMG for each component.

1 "Other Remuneration" includes car expenses and additional car insurance paid for by the Company.

Total costs to AMG with respect to the pension and retirement benefits of the Management Board in 2019 are provided in the table in Section VIII, which sets forth total expenses incurred in 2019 for Management Board remuneration.

OTHER BENEFITS

All Management Board members receive benefits that are in line with industry and individual country practice. No loans, advances, or guarantees are granted to any Management Board members.

Total costs to the Company with respect to other remuneration of the Management Board are provided in the table in Section VIII, which sets forth total costs incurred in 2019 for Management Board remuneration.

(IX) SHARES HELD BY MEMBERS OF THE MANAGEMENT BOARD

As of December 31, 2019, Heinz Schimmelbusch held 982,413 AMG shares, Eric Jackson held 308,654 AMG shares and Jackson Dunckel held 41,162 shares.

3.SUPERVISORY BOARD REMUNERATION REPORT 2019

A. BACKGROUND AND STRATEGIC FRAMEWORK

Reference is made to the Remuneration Policy for the Management Board of the Company with respect to a description of the relevance of the Company's values, identity and mission and of the background, strategic framework and ambitions and guiding principles that apply to the Company's remuneration philosophy, all of which equally apply in the context of explaining and reporting about the remuneration of the Company's Supervisory Board members.

As explained in the new Remuneration Policy for the Supervisory Board (to be adopted for the first time during the Annual Meeting in May 2020), Supervisory Board members have a different role than Management Board members and are compensated differently and accordingly are not entitled to variable compensation or long-term incentives. No financial or non-financial performance indicators do apply to the annual compensation for Supervisory Board members.

The Supervisory Board believes that the benchmarks it uses to attract and retain members for the Management Board, should equally apply to the composition and membership of the Supervisory Board. Hence, and given the fast paced and competitive international environment surrounding AMG's operations, competitive reward opportunities are necessary to attract high level qualified Supervisory Board members.

The Supervisory Board therefore has selected and uses an appropriate compensation peer group for benchmarking purposes that is similar to the peer group used for benchmarking the remuneration of the Management Board.

Reference is made to section 2.b above for a description and discussion of the peer group used by the Supervisory Board for setting Supervisory Board compensation for the year 2019. The Supervisory Board targets the total compensation for Board membership services between the 25th percentile and 50th percentile versus all peers collectively, which centers AMG in between its US based peers (higher) and its European based peers (lower).

YEAR ON YEAR % CHANGE (EXCEPT ROCE)	2015	2016	2017	2018	2019
Steve Hanke	-8%	0%	-2%	20%	33%
Willem van Hassel	N/A	N/A	N/A	N/A	5%
Herb Depp	-8%	0%	1%	12%	3%
Donatella Ceccarelli	N/A	0%	1%	2%	10%
Frank Löhner	N/A	N/A	N/A	N/A	N/A
Dagmar Bottenbruch	N/A	N/A	N/A	N/A	N/A
Cash Flow from Operations	-20%	-26%	40%	24%	-52%
Actual ROCE	12.0%	18.8%	21.2%	35.4%	13.7%
Share Price Change	34%	63%	184%	-33%	-23%
Average Remuneration AMG Group Workforce	-7%	3%	4%	3%	-4%

B. REMUNERATION COMPONENTS SUPERVISORY BOARD

Fees paid to Supervisory Board members are not linked to the financial results of the Company. Supervisory Board members receive fixed compensation on an annual basis that is partly payable in shares AMG as explained below. Supervisory Board members do not accrue pension rights and are compensated for travel and lodging expenses incurred as a result of discharging their Supervisory Board duties. They are not entitled to any benefits upon the termination of their appointment.

The individual Supervisory Board members are paid annually:

1. a fixed retainer fee in cash (USD)
2. a fixed Share Award (EUR)

taking into account the level of responsibility of each Supervisory Board member within the Board.

In 2019 the following amounts were paid to the Supervisory Board members:

(in thousands)	CASH	AMG SHARES
Professor Steve Hanke	$103	$58 (1,969 shares)
Mr. Willem van Hassel	$70	$54 (1,845 shares AMG)
Mr. Herb Depp	$80	$39 (1,336 shares AMG)
Dr. Donatella Ceccarelli	$73	$44 (1,506 shares AMG)
Mr. Frank Löhner	$60	$44 (1,506 shares)
Ms. Dagmar Bottenbruch	$40	$29 (1,004 shares)
Mr. Jack Messman	$38	$22 (762 shares)
Ms. Suzanne Folsom	$20	

The amounts above comprise the total remuneration received on an annual basis by Supervisory Board members for their services rendered.

The fixed share award (item 2. above) that is given as compensation to Supervisory Board members comprises a number of AMG shares that is equal to the award amount (referenced under items a. to d. above) divided by the average fair market value of the underlying shares on the last 10 trading days' closing prices, immediately following the publication of the annual results of AMG of the previous year. Shares awarded to and received by Supervisory Board members as compensation are held for long-term investment purposes and shall be held for a period of at least three years from the date of receipt, and for at least one year after the date a Supervisory Board member has retired.

The Supervisory Board acknowledges that by awarding shares to its members as compensation, AMG deviates from best practice provision 3.3.2. of the Dutch Corporate Governance Code (2016). As explained by the Supervisory Board during and as early as the 2009 and 2013 Annual General Meetings of Shareholders, it considers it important to be able to recruit future members from the global marketplace given the size and complexity of the markets AMG is operating in. This merits that part of the remuneration is paid in company shares, in line with US practice (and the general US centric approach for executive compensation as chosen by the Supervisory Board and explained in the Remuneration Policy of the Management Board), where the Company has its operational headquarters. Shares granted as compensation to Supervisory Board members are held as long-term investments and restricted from trading for a period of at least three years from the date of granting. As a result, the Company departs from best practice provision 3.3.2. for reasons explained above. The Supervisory Board expects that this departure will continue to apply indefinitely as it is in place since 2007 and has contributed to the quality of the Supervisory Board and success of AMG. Further, the Supervisory Board holds the view that this departure does not in any way negatively affect good corporate governance at the Company.

The decision by the Supervisory Board to continue its practice to partly compensate its members in AMG shares fully aligns with the long-term share-based incentives granted to the Management Board members under the Management Board Remuneration Policy, as a tool to drive and reward sound business decisions and judgment to support AMG's long-term health that is necessary for achieving its strategic objectives, and to align the interests of its Board members with those of AMG's shareholders.

AMG'S

SUSTAINABLE DEVELOPMENT

This section provides our twelfth annual sustainability report, which evaluates AMG's social and environmental performance.

SITE NAME[1]	LOCATION	COUNTRY	DIVISION
AMG Headquarters	Amsterdam	Netherlands	AMG Corporate
AMG USA Headquarters	Pennsylvania	USA	AMG Corporate
ALD USA	Connecticut	USA	AMG Technologies
ALD France	Grenoble	France	AMG Technologies
ALD Vacuum Technologies	Hanau	Germany	AMG Technologies
ALD Vacuheat	Limbach	Germany	AMG Technologies
ALD TT USA	Michigan	USA	AMG Technologies
ALD Dynatech	Mumbai	India	AMG Technologies
ALD TT Mexico	Ramos Arizpe	Mexico	AMG Technologies
ALD Japan	Tokyo	Japan	AMG Technologies
ALD Thailand	Bangkok	Thailand	AMG Technologies
ALD C&K	Suzho	China	AMG Technologies
ALD Russia	Moscow	Russia	AMG Technologies
AMG Titanium Alloys and Coatings	Brand Erbisdorf	Germany	AMG Technologies
AMG Titanium Alloys and Coatings	Nürnberg	Germany	AMG Technologies
AMG Titanium Alloys and Coatings	Pennsylvania	USA	AMG Technologies
AMG Alpoco	Anglesey	UK	AMG Critical Materials
AMG Alpoco	Minworth	UK	AMG Critical Materials
AMG Superalloys and AMG Aluminum	Rotherham	UK	AMG Critical Materials
AMG Aluminum	Jiaxing	China	AMG Critical Materials
AMG Aluminum	Kentucky	USA	AMG Critical Materials
AMG Aluminum	Washington	USA	AMG Critical Materials
AMG Antimony	Chauny	France	AMG Critical Materials
AMG Antimony	Lucette	France	AMG Critical Materials
Bogala Graphite Lanka	Colombo	Sri Lanka	AMG Critical Materials
AMG Graphite	Kropfmühl	Germany	AMG Critical Materials
AMG Graphite	Mozambique	Africa	AMG Critical Materials
AMG Graphite	Qingdao	China	AMG Critical Materials
AMG Graphite Tyn	Tyn	Czech Republic	AMG Critical Materials
AMG Mineração	Nazareno	Brazil	AMG Critical Materials
AMG Silicon	Pocking	Germany	AMG Critical Materials
AMG Superalloys	São João del Rei	Brazil	AMG Critical Materials
AMG Vanadium	Ohio	USA	AMG Critical Materials

1 The chart indicates which facilities were included in the scope of the sustainable development data. Only data from these facilities are included in this section, which may therefore show inconsistency with other sections of this annual report covering all facilities.

The reporting boundaries have changed since 2018 to include operations in Mozambique, Africa; Pennsylvania, USA; Moscow, Russia; and Bangkok, Thailand. The thirty-three locations reporting in 2019 (in which AMG has a 51% or greater stockholding) are detailed in the table on the previous page. AMG is no longer using estimated data for minor or office facilities but is instead using actual data for those sites. AMG will continue to assess the boundaries of this report on an ongoing basis. Where AMG has made improvements to its 2019 reporting methodology, 2018 results were updated retroactively to provide data that is comparable year-over-year. These improvements include an updated approach to measuring water consumption, CO_2e emissions, and waste.

AMG reporting locations include mining, manufacturing, sales, and administrative offices in fifteen countries across five continents. This report covers AMG's two operating segments: AMG Critical Materials and AMG Technologies. All locations report their performance at the end of the fourth quarter and no forecast data is used.

For the 2019 reporting year, AMG again engaged ERM as its sustainability consultant. ERM assisted AMG with refining its data collection process. AMG anticipates engaging ERM as its primary sustainability consultant again for the 2020 reporting year.

SCOPE OF THIS REPORT

AMG utilizes the Global Reporting Initiative (GRI) as a basis for this report and includes those aspects which are material to its business units, based on the following two dimensions:

- The significance of the organization's economic, environmental, and social impacts;
- Their substantive influence on the assessments and decisions of stakeholders.[2]

In order to ensure consistency in the interpretation of definitions and the source of key performance data, AMG locations utilize a standard template which sites use to report their data. The key performance data for both segments are summarized in the table on page 45.

MEMBERSHIPS AND ASSOCIATIONS

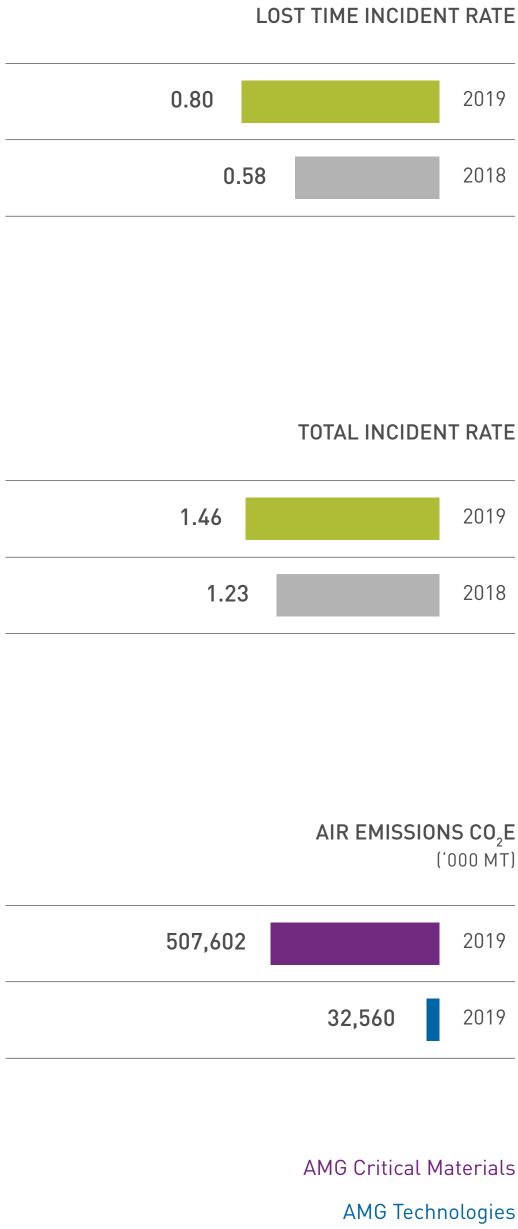
UNITED NATIONS GLOBAL COMPACT

AMG commits its support to the principles of the United Nations Global Compact. The Global Compact, which is overseen by the United Nations, is a strategic policy initiative for businesses that are committed to aligning their operations and strategies with ten universally accepted principles in the areas of human rights, labor, the environment, and anti-corruption. In 2009, the AMG Management Board approved its commitment to the Global Compact and the intent of AMG to support the ten principles of the Global Compact. AMG will reaffirm its support and submit its Communication on Progress in April 2020.

EXTRACTIVE INDUSTRIES TRANSPARENCY INITIATIVE

AMG continues its support of the Extractive Industries Transparency Initiative ("EITI"), a global initiative to improve governance in resource-rich countries through the verification and full publication of Company payments and government revenues from oil, gas, and mining. EITI works to build multi-stakeholder

2 GRI, GRI Standards, GRI 101: Foundation 2016, p.18.



partnerships in developing countries to increase the accountability of governments. Over thirty countries have now committed to the EITI principles and criteria. As of today, AMG has one extractive operation in one EITI-implementing country: Mozambique.

Further information on AMG Sustainable Development and our commitments to these organizations, including our United Nations Global Compact Communication on Progress, can be found on the AMG website (sustainability.amg-nv.com).

ENVIRONMENT

AIR EMISSIONS

GRI STANDARDS 305-1 AND 305-2

AMG facilities emit and report upon both direct ("Scope 1") and indirect ("Scope 2") greenhouse gas ("GHG"). Electricity used for the generation of heat for metallurgical processing is the most significant source of GHG emissions for AMG. Electricity use gives rise to Scope 2 GHG emissions of carbon dioxide equivalent ("CO_2e"), which are dependent on the nature of its generation. Location based GHG emissions have been calculated using local emission factors. AMG collects both location-based and market-based Scope 2 GHG emissions but reports only location-based Scope 2 GHG for the purposes of this report.

Scope 1 GHG emissions result primarily from the combustion of carbon-containing materials as part of the metallurgical process such as using coke as a reductant, but also for the generation of heat, such as burning natural gas in a furnace. Other GHGs occurring from processes other than combustion are minimal for AMG business units. In the spirit of continuous improvement and in the interest of stakeholder engagement, AMG has included mobile combustion emissions and refrigerant emissions in its Scope 1 GHG emissions results. This reporting improvement is aligned with Carbon Disclosure Project ("CDP") guidance.

AMG Critical Materials' GHG emissions (Scope 1 and Scope 2) in 2019 were 507,602 mt of CO_2e. 55% of these emissions are attributed to direct sources (stationary combustion emissions, mobile combustion emissions, processing GHG emissions, and refrigerant emissions). Overall emissions are dominated by the silicon metal production activities which account for 348,603 mt of CO_2e. This activity also dominates AMG's overall GHG emissions, accounting for 65% of total group emissions.

AMG Technologies GHG emissions (Scope 1 and Scope 2) in 2019 were 32,560 mt of CO_2e. 32% of these emissions are associated with operations at the Nuremburg, Germany facility.

Normalized to a revenue basis, AMG Critical Materials emitted 507,602 mt CO_2e, with revenue of $762.5 million, equivalent to 666 mt CO_2e per million USD revenue. AMG Technologies generated 32,560 mt CO_2e and $426.1 million in revenue, or 76 mt CO_2e per million USD revenue. This wide range reflects the diversity of the AMG portfolio.

Total AMG GHG emissions were 540,162 mt CO_2e in 2019 with revenue of $1,188.6 million resulting in a GHG intensity of 454 mt CO_2e per million USD revenue.

GRI STANDARDS 305-6 AND 305-7

Emissions of ozone-depleting substances are generally *de minimis* for AMG. However, in 2019 AMG Technologies reported air emissions from refrigerants of 53 mt CO_2e. The global warming

potential of certain HFC refrigerants is significant, as the actual release of material was 29 kg. AMG Critical Materials' production facilities have other air emissions, including SOx (618 mt), NOx (198 mt) and particulate materials (105 mt). Data is only available for regulated sources where measurements have been made.

ENERGY

GRI STANDARDS 302-1 AND 302-2

High-temperature metallurgical processes and mining operations utilized in AMG Critical Materials are energy intensive and improving energy efficiency is an operational priority at AMG that results in both environmental and economic benefit. The two most significant energy carriers are electricity and natural gas.[3]

The reported electricity use of AMG in 2019 was 2,650 terajoules (TJ). AMG generates renewable energy at its hydroelectric generating facility near São João del Rei, Brazil which generated 61.47 TJ and at AMG Vanadium's solar power system which generated 0.72 TJ.

RESOURCE EFFICIENCY

GRI STANDARDS 301-1 AND 301-2

Resource use varies between AMG business units. Examples include local mining, primary raw material purchase, secondary metal and alloy production from recycled resources, and engineering services.

Furnace technology and engineering services provided by AMG Technologies results in this segment utilizing limited resources. Resources used are mainly complex component parts for furnaces which are routinely measured in units rather than by mass. Unlike the chemicals and alloys business units, this means only limited data are available on resource mass.

AMG Critical Materials uses a much more diverse range of resources including mined ores for tantalum, lithium and graphite production, power plant wastes and spent refinery catalysts to produce vanadium alloys, and metal salts for aluminum alloy production. The segment uses recycled iron, steel, aluminum, and titanium in processes when possible.

WASTEWATER

GRI STANDARDS 306-1 AND 306-3

AMG facilities record the volumes of aqueous effluents including process water and non-sanitary sewer discharges to local water courses. Clean water (typically freshwater used for cooling purposes) is included in the figures given below. Chemical analysis of the effluent is utilized to determine the total mass of primary constituents of the water emissions.

In 2019, 1,720,838 cubic meters of water were disposed to water courses by AMG compared to 2,993,016 cubic meters in 2018. The inclusion of the mine in Mozambique, Africa in the reporting boundary increased water discharge volumes at AMG. The majority of AMG's water discharge results from global mining operations.

The balance of AMG's water is used for cooling purposes and therefore produces clean water discharges. Some wet chemical processes generate aqueous waste streams, including cooling water used by the silicon metal furnaces and mine water from

3 Indirect energy consumption does not include the energy consumed by electricity producers to generate the electricity or transmission losses.

dewatering pumps. In several locations, mine water is utilized for process water before final discharge.

In 2019, there were no significant spills (defined as one which would affect the Company's financial statements because of the ensuing liability) at any AMG site.

SOCIAL

HEALTH AND SAFETY

AMG is pleased to report that no fatal incidents occurred at its operations in 2019. AMG's medium-term aspirational goal is to become a zero lost time incident workplace—we cannot accept that any incident is inevitable. In 2019, internal safety performance in both lost time incidence rate and recordable incidence rate has slightly regressed year-over-year, interrupting a 4-year improvement trend. For AMG, the total lost time incident rate[4] increased 38% from 0.58 in 2018 to 0.80 in 2019. Of the thirty-three locations included in this report, ten achieved zero lost-time incident performance in 2019. The total incident rate[5] increased 19% from 1.23 in 2018 to 1.46 in 2019. Formal safety management systems continue to be important to achieving zero harm to employees and sixteen of AMG's sites are OHSAS 18001 or ISO 45001certified.

DIVERSITY AND INCLUSION

GRI STANDARDS 102-8, 102-41, 403-1, 403-2, AND 404-1

The size of AMG's workforce has been relatively stable over the last year and at year-end 2019 AMG Critical Materials had 1,851 employees and AMG Technologies had 1,394. For the facilities covered by this report, the total AMG workforce was 3,245 (other facilities not yet covered in this section employ a further 62 people). Geographically, these employees were located in Africa (105), Asia (343), Europe (1,763), North America (504), and South America (530).

AMG assesses the diversity of its workforce in terms of gender and age, but not ethnicity. The multinational, and therefore multicultural, nature of AMG's business means that ethnic diversity is significant, but it is not possible to define minority employees in such an environment.

In 2017, the Management Board deployed measures to attract and maintain a diverse workforce at its units, among other things, by linking incentives for unit managers to meaningful results in diversity targets. AMG has also adopted a Diversity Policy in relation to the composition of its Management Board and Supervisory Board. AMG will continue to take its key diversity objectives, including maintaining a proper balance of nationalities and the gender allocation of seats, into account in connection with recruitment, retention of employees, and succession planning.

Of the total employees, 21% are female; 79% are male; 18% are under 30 years of age, 53% are between thirty and fifty, and 29% are over fifty. The Management Board's composition is 100% male. The Supervisory Board's composition is 67% male and 33% female as of the end of 2019.

The rights and freedoms for individual employees to join, or choose not to join, unions, as described in Article 23 of the Universal Declaration of Human Rights, are fully respected by AMG. Once again in 2019, AMG facilities had no strikes or lockouts.

GOVERNANCE

BUSINESS ETHICS

GRI STANDARDS 205-2, 407-1, 408-1, AND 412-2

Protection of internationally proclaimed human rights is an area in which AMG is both highly aware and fully committed. The Company strives to make sure it is not complicit in human rights abuses. Each AMG site is assessed during site visits and with internal audits to identify if there is the possibility of freedom of association or collective bargaining being put at risk because of political or business factors. In 2019, it was found that no sites were at risk, except for China, where the formation of unions remains restricted. Similarly, the Company has reviewed sites to ensure that they are not at risk for employing child labor or exposing young workers to hazards. No sites have been identified that pose a risk at this time. AMG also aims to ensure rights are protected in our supply chain through its Supplier Code of Conduct. Our policy on human rights is included in the AMG Code of Business Conduct and detailed in the Company's human rights policy; all are available on the AMG website.

THE AMG VALUES AND THE AMG CODE OF BUSINESS CONDUCT

We act Safely

We aim to create Value

We respect People

We act with Integrity

These are AMG's Values and they enable AMG's ambition of being a leader in the field of critical materials and engineering services. These values apply to how AMG conducts its operations and how it deals with its employees, business partners, and stakeholders. The AMG Code of Business Conduct and the Speak Up and Reporting Policy, which reference the AMG Values, are prominently displayed in the local language at each place where the AMG companies carry out their operations and where AMG staff are employed.

In 2019, AMG deployed its online general ethics training for all employees who are not involved in manual labor activities. A general ethics training program for employees who are involved in manual labour activities was rolled out in 2018 (after its first deployment in 2015). In 2018, AMG also completed its online general antitrust and competition law principles training for designated staff. The general ethics training, anti-bribery training, and general antitrust and competition law trainings are repeated in three-year cycles.

A network of compliance officers located at all major sites oversees deployment of AMG's ethics training programs and distribution of information concerning AMG's Values and Code

4 Lost time incident frequency rate equals the number of lost time incidents multiplied by 200,000 divided by the total hours worked. Lost time injury was defined using local regulations.

5 Total incident frequency rate equals the number of incidents (including all medically treated injuries) multiplied for 200,000 divided by the total hours worked.

SOCIAL AND ENVIRONMENTAL KEY PERFORMANCE INDICATORS AND GRI CONTENT INDEX

GRI INDICATOR	DESCRIPTION	UNITS	AMG CRITICAL MATERIALS 2018	AMG CRITICAL MATERIALS 2019	AMG TECHNOLOGIES 2018	AMG TECHNOLOGIES 2019	AMG GROUP 2018	AMG GROUP 2019
102-8	Total workforce	Total	1,873	1,851	1,335	1,394	3,208	3,245
403-2	Lost Time Accident Rates	Rate	0.62	0.86	0.67	0.73	0.58	0.80
403-2	Total Incident Rates	Rate	1.35	1.82	1.15	0.92	1.23	1.46
302-1	Direct Electricity Consumption	TJ	37	32	0	0	37	32
302-2	Indirect Electricity Consumption	TJ	2,420	2,421	211	196	2,631	2,617
303-1	Water consumption	'000 cubic meters	8,020	11,384	111	117	8,131*	11,501
305-1	CO_2 equivalent emissions	mt	480,018	507,602	33,768	32,560	513,786*	540,162
305-7	SOx emissions	mt	618	618	0	0	618	618
305-7	NOx emissions	mt	183	198	15	10	198	208
305-7	Particulates discharged to air	mt	105	105	0	0	105	105
306-1	Metals discharged	mt	2	1	9	29	11	30
306-2	Hazardous waste (including recycled)	mt	3,203	2,763	2,423	1,524	5,626*	4,287
306-2	Non-hazardous waste (including recycled)	mt	38,059	31,023	5,579	9,192	43,638*	40,215
306-2	Percent of waste recycled	%	40	46	99	95	49*	58
306-2	Waste disposed to landfill	mt	24,871	18,117	58	533	24,929*	18,650
306-3	Spills	L	0	0	0	0	0	0
307-1	Environmental Fines	'000 USD	0	0	0	0	0	0
205-1	Fines for non-compliance with laws	'000 USD	17	4	0	0	17	4

*AMG has made improvements to its 2019 reporting methodology. Therefore, some of its 2018 results were updated retroactively to provide data that is comparable year-over-year.

of Business Conduct. In February 2020, AMG's Chief Compliance Officer reported to the Management Board and the Supervisory Board about applicable compliance and incident trends at AMG during the year 2019.

During 2019, the number of complaints received under AMG's Speak Up and Reporting policy was well below the available benchmark as published by NAVEX Global (2019 Ethics & Compliance Hotline & Incident Management Benchmark report). No incidents or complaints have been reported to AMG or any public authorities in 2019 to date which would implicate AMG or any of its staff in any bribery scheme involving public officials or agencies.

COMPLIANCE

GRI STANDARDS 307-1

No AMG facility received any significant fine or equivalent penalty for non-compliance with environmental laws in 2019.

PRODUCTS

PRODUCT QUALITY AND SAFETY

GRI STANDARD G4-DMA

AMG continues to comply with its responsibilities under the REACH regulations in Europe. Industry groups continue to focus on developing health and safety knowledge of their products as the regulatory framework grows and expands across the world. AMG units are involved in, among others, the Vanadium International Technical Committee and the International Antimony Association.

RESPONSIBILITIES

AMG's environmental, health, safety, and social performance reporting has been prepared by the management of AMG who are responsible for the collection and presentation of the information.

AMG Advanced Metallurgical Group N.V.

sustainability.amg-nv.com

Contact: **global.sustainability@amg-nv.com**

AMG'S

CORPORATE GOVERNANCE

AMG Advanced Metallurgical Group N.V. is a Dutch company located in the Netherlands which was established in 2006 as the holding company for the AMG group companies. Its shares were first listed on Euronext Amsterdam in July 2007.

In this report, the Company, as a Dutch listed company, sets forth its overall corporate governance structure and the extent to which it applies the provisions of the Dutch Corporate Governance Code, as recently amended and issued on December 8, 2016 (the "2016 Code"). The Dutch Corporate Governance Code can be downloaded at www.mccg.nl. As of January 1, 2017, the 2016 Code is effective in the Netherlands, replacing the 2008 Code. In this annual report, the Company will report on the compliance by the Company with the 2016 Code, as further elaborated in this chapter on Corporate Governance and in the corresponding chapter on the Company's website (amg-nv.com).

The Supervisory Board and the Management Board, which are responsible for the corporate governance structure of the Company, hold the view that the vast majority of principles and best practice provisions set forth in the 2016 Code, as applicable during 2019, are being applied, while certain deviations are discussed and explained hereunder. A full and detailed description of AMG's Corporate Governance structure and AMG's compliance with the Dutch Corporate Governance Code can further be found on AMG's website (amg-nv.com).

AMG Advanced Metallurgical Group N.V., located in the Netherlands, is a company organized under Dutch law that has various subsidiaries in multiple jurisdictions to enable efficient business operations.

The Management Board is responsible for maintaining a culture that is conducive to achieving its strategic objectives with a focus on long-term value creation, as further explained in this chapter as well as other sections of the report of the Management Board.

2019 FINANCIAL STATEMENTS AND DIVIDENDS

The Management Board and the Supervisory Board have approved AMG's audited financial statements for 2019. KPMG audited these financial statements, which will be submitted for adoption to the General Meeting of Shareholders in May 2020.

The Management Board is authorized, subject to approval by the Supervisory Board, to reserve profits wholly or partly. The General Meeting is authorized to distribute and/or reserve any remaining part of the profits. The General Meeting may decide on the disposition of reserves only after a proposal by the Management Board, which must have been approved by the Supervisory Board.

AMG's dividend policy was first revised by the Management Board back in 2015 when AMG started paying dividends to its shareholders. On August 15, 2018, the Management Board, upon approval of the Supervisory Board, decided to implement a further change in dividend policy which targets an annual dividend payout of between 20-40% of net income attributable to shareholders. In line with Dutch corporate governance best practices, the dividend policy will be discussed during AMG's 2020 Annual General Meeting.

The Company intends to propose a full year dividend for 2019 of €0.40 to the General Meeting of Shareholders for approval as part of the adoption of the 2019 Annual Accounts. The interim dividend of €0.20 per ordinary AMG share, paid on August 15, 2019, will be deducted from this amount. The proposed final dividend per ordinary share therefore amounts to €0.20. This dividend payment is in excess of AMG's dividend payout policy, but was determined appropriate by the Management and Supervisory Boards based on current liquidity and long-term prospects. During the May 2020 Annual Meeting, the

Supervisory Board will describe an addendum to the dividend policy that was adopted at the February 26, 2020 Supervisory Board meeting, namely that the dividend should not increase or decrease more than 20% per annum. This amended policy is intended to reflect AMG's desire to pay a consistent year-over-year dividend. Future dividend payments to shareholders will be at the discretion of the Management Board subject to the approval of the Supervisory Board after taking into account various factors, including business prospects, cash requirements, financial performance, expansion plans, the terms of the Company's financing facilities and the compliance with applicable statutory and regulatory requirements.

Additionally, any payment of dividends (whether interim or after adoption of the annual accounts) or other distributions to shareholders may be made only if the Company's shareholders' equity exceeds the sum of the issued share capital plus the reserves required to be maintained by law.

SHARES AND SHAREHOLDERS' RIGHTS

As of December 31, 2019, the total issued share capital of AMG amounted to €627,348.44 consisting of 31,367,422 ordinary shares of €0.02 each. Each ordinary share carries one vote. The ordinary shares are listed on Euronext Amsterdam and are freely transferable.

Pursuant to the Financial Markets Supervision Act (Wet op het financieel toezicht) and the Decree on Disclosure of Major Holdings and Capital Interests in Securities-Issuing Institutions (Besluit melding zeggenschap en kapitaalbelang in uitgevende instellingen), the Netherlands Authority for the Financial Markets (Stichting Autoriteit Financiële Markten) has informed the Company that it was notified of the following substantial holdings (>3%) in ordinary shares of AMG by institutional investors. The information below is based on publications registered with the AFM register before February 26, 2020 (unless otherwise annotated) and therefore may not necessarily reflect the actual holdings as of that date.

AS OF FEBRUARY 28	2020
NN Group N.V.	5.1%
Norges Bank	3.3%
Invesco Limited	2.9%
Acadian Asset Management	2.9%
Sycomore Asset Management	2.8%

SHAREHOLDING	2019	2018
Number of ordinary shares issued	31,367,422	30,581,377
Average daily turnover	452,087	292,886
Highest Closing Price	€35.20	€52.80
Lowest Closing Price	€18.00	€26.74

PREFERENCE SHARES

The General Meeting of Shareholders approved in its meetings of May 12, 2010 and July 6, 2010 that the Articles of Association of the Company would be changed in order to introduce a new class of preference shares, which may be issued and used as a response device in order to safeguard the interests of the Company and its stakeholders in all those situations where the Company's interests and those of its stakeholders are at stake, including but not limited to situations in which non-solicited public offers are made.

The preference shares carry equal voting rights as ordinary shares and are entitled, if distribution to shareholders is permitted, to a fixed dividend equal to the Euro Interbank Offered Rate for deposit loans of one year, increased with a maximum of 400 basis points as determined by the Management Board of the Company and subject to approval by the Supervisory Board. The Articles of Association of the Company were amended on July 6, 2010 to provide for an authorized share capital of 65.0 million ordinary shares and 65.0 million preference shares. Contrary to ordinary shares, preference shares may be issued against partial payment thereon, provided that at least one quarter of the nominal amount is paid-up in full upon subscription. The preference shares are not freely transferable; any transfer thereof is subject to the approval of the Supervisory Board.

STICHTING CONTINUÏTEIT AMG

In line with Dutch law and corporate practice, on July 6, 2010, the Stichting Continuïteit AMG (the Foundation) was established in Amsterdam, having as its main objective to safeguard the interests of the Company and its stakeholders.

The Board of the Foundation is independent from the Company and currently consists of Mr. H. de Munnik, Chairman, and Mr. H. Borggreve and Mr. H. Reumkens as members. The main objective of the Foundation is to represent the interests of the Company and of the enterprises maintained by the Company and the companies affiliated with the Company in a group, in such a way that the interests of the Company and of those enterprises and of all parties involved in this are safeguarded in the best possible way, and that influences which could affect the independence and/or continuity and/or identity of the Company and those enterprises in breach of those interests are deterred to the best of the Foundation's ability.

Under the terms of an option agreement dated December 22, 2010 between the Company and the Foundation, the Foundation has been granted an option pursuant to which it may purchase a number of preference shares up to a maximum of the total number of ordinary shares outstanding at any given time in the event of a threat to the continuity or strategy of AMG.

VOTING RIGHTS

There are no restrictions on voting rights of ordinary and preference shares. Shareholders who hold shares on April 8, 2020 (mandated as the 28th day prior to the day of the General Meeting of Shareholders on May 6, 2020) are entitled to attend and vote at the General Meeting of Shareholders regardless of a sale of shares after such date.

MANAGEMENT BOARD

The executive management of AMG is entrusted to its Management Board, which is chaired by the Chief Executive Officer. The Articles of Association provide that the number of members of the Management Board shall be determined by the Supervisory Board. The members of the Management Board are appointed by the General Meeting of Shareholders for a maximum term of four years and may be reappointed for additional terms not to exceed four years.

The Management Board members are collectively responsible for creating a culture within the AMG Group that is focused on long- term value creation. Each Management Board member shall serve the best interests of the Company with a view to creating long-term value, while carrying out his responsibilities and will take into account the interests of all the Company's stakeholders.

The Management Board has drawn up a code of business conduct, monitors its effectiveness and has established a procedure for reporting actual or suspected irregularities within the Company or its group companies. The Management Board has further adopted values for the Company and the AMG Group ("AMG Values") and is responsible for maintenance of the AMG Values within the Company and its group companies by encouraging behavior that is in keeping with the AMG Values and by leading by example. In this regard, specific attention shall be given to the strategy and the business model, the environment in which the Company and the AMG Group operate and the existing culture within the Company and the AMG Group.

See pages 44-45 of the Sustainability Report for a further review of the application of the AMG Values within the AMG Group and compliance with the AMG Code of Business Conduct during 2019.

The Management Board is responsible for the internal audit function of the AMG Group and the Management Board appoints and dismisses the senior internal auditor upon approval of the Supervisory Board, along with the recommendation of the Audit & Risk Management Committee.

The Supervisory Board is authorized to make a non-binding or binding nomination regarding the appointment of members of the Management Board. A binding nomination means that the General Meeting of Shareholders may appoint the nominated persons, unless the General Meeting of Shareholders rejects the nomination by an absolute majority (more than 50% of the votes cast) representing at least one-third of the issued share capital. In case the absolute majority is reached, however, not representing one-third of issued share capital, a second meeting will be convened in which the resolution may be adopted without a quorum applying. If the Supervisory Board has not made a nomination, the appointment of the members of the Management Board is at the full discretion of the General Meeting of Shareholders. The General Meeting of Shareholders and the Supervisory Board may suspend a member of the Management Board at any time.

A resolution of the General Meeting of Shareholders to suspend or dismiss a member of the Management Board requires an absolute majority (more than 50% of the votes cast),

representing at least one-third of the issued share capital, unless the Supervisory Board has proposed the suspension or dismissal to the General Meeting of Shareholders, in which case an absolute majority is required but without any quorum requirement. The Management Board follows its own rules of procedure concerning meetings, resolutions and similar matters. These rules of procedure are published on the Company's website. The Company has rules to avoid and deal with conflicts of interest between the Company and members of the Management Board.

The Articles of Association state that in the event of a direct or indirect personal conflict of interest between the Company and any of the members of the Management Board, the relevant member of the Management Board shall not participate in the deliberations and decision-making process concerned. If all members of the Management Board are conflicted, and, as a result, no Management Board resolution can be adopted, the Supervisory Board shall adopt the resolution. In addition, it is provided in the rules of procedure of the Management Board that the respective member of the Management Board shall not take part in any decision-making that involves a subject or transaction to which he or she has a conflict of interest with the Company. Such transaction must be concluded on market practice terms and approved by the Supervisory Board. The rules of procedure of the Management Board establish further rules on the reporting of (potential) conflicts of interest.

SUPERVISORY BOARD

The Supervisory Board supervises the general course of business of the Company and the way the Management Board implements the long-term value-creation strategy of the Company. The Supervisory Board regularly discusses the strategy, the implementation of the strategy and the principal risks associated with it. The Supervisory Board assists the Management Board by providing advice. In fulfilling their duties, the Supervisory Directors shall act in the interest of the Company and its affiliated enterprises and the Supervisory Board shall take into account the stakeholder interests that are relevant in this context. The Supervisory Board is responsible for the quality of its own performance and evaluates its own performance and that of the Management Board once per year.

Under the two-tier corporate structure pursuant to Dutch law, the Supervisory Board is a separate body that is independent of the Management Board. Members of the Supervisory Board can be neither members of the Management Board nor employees of the Company.

The Supervisory Board discusses and approves major management decisions as well as the strategy that is developed and implemented by the Management Board. The Supervisory Board has adopted its own rules of procedure concerning its own governance, committees, conflicts of interest, etc. The rules of procedure are published on the Company's website and include the charters of the committees to which the Supervisory Board has assigned certain preparatory tasks, while retaining overall responsibility.

These committees are the Remuneration Committee, the Selection & Appointment Committee and the Audit & Risk Management Committee. The Supervisory Board shall be assisted by the Secretary of the Company, who shall be appointed by the Management Board after approval of the Supervisory Board has been obtained. The number of members of the Supervisory Board will be determined by the General Meeting of Shareholders with a minimum of three members.

A Supervisory Director is appointed for a maximum period of four years and may then be reappointed once for another maximum four-year period. The Supervisory Director may then subsequently be reappointed again for a period of two years, after which point the appointment may be extended by at most two years. In the event of a reappointment after an eight-year period, reasons shall be given in the (annual) report of the Supervisory Board. For any appointment or reappointment, the profile for Supervisory Board candidates, which was drawn up by the Supervisory Board, will be observed.

The Supervisory Board prepares a rotation schedule, which is made generally available and is posted on the Company's website.

The Supervisory Board is authorized to make a binding or non-binding nomination regarding the appointment of the members of the Supervisory Board. In the event of a binding nomination, the General Meeting of Shareholders appoints the members of the Supervisory Board from a nomination made by the Supervisory Board.

A binding nomination means that the General Meeting of Shareholders may appoint the nominated person, unless the General Meeting of Shareholders rejects the nomination by an absolute majority (more than 50% of the votes cast) representing at least one-third of the issued share capital.

In case the absolute majority is reached, however, not representing one-third of issued share capital, a second meeting of record will be convened in which the resolution may be adopted with normal majority, without a quorum applying.

If the Supervisory Board has not made a nomination, the appointment of the members of the Supervisory Board is at the full discretion of the General Meeting of Shareholders. The General Meeting of Shareholders may, at any time, suspend or remove members of the Supervisory Board. A resolution of the General Meeting of Shareholders to suspend or remove members of the Supervisory Board requires an absolute majority (more than 50% of the votes cast) representing at least one-third of the issued share capital, unless the Supervisory Board has proposed the suspension or dismissal, in which case an absolute majority is required, without any quorum requirement.

As required under the 2016 Code and Dutch law, the Company has formalized strict rules to avoid and deal with conflicts of interest between the Company and the members of the Supervisory Board, as further described in the rules of procedure of the Supervisory Board. Further information on the Supervisory Board and its activities is included in the Report of the Supervisory Board (pages 24-31).

Each of the current members of the Supervisory Board is obliged not to transfer or otherwise dispose of any shares awarded as part of their annual remuneration until the earlier of the third anniversary of the date of the award or the first anniversary of the date on which he or she ceases to be a member of the Supervisory Board. Shares in the Company held by the Supervisory Directors shall be held only as long-term investments.

GENERAL MEETING OF SHAREHOLDERS

A General Meeting of Shareholders is held at least once per year. During the Annual Meeting, the Annual Report, including the Report of the Management Board, the annual (consolidated) financial statements, the implementation of the remuneration policy for the Management Board and the Report of the Supervisory Board, are discussed, as well as other matters pursuant to Dutch law or the Company's Articles of Association.

As a separate item on the agenda, the General Meeting of Shareholders is entrusted with the discharge of the members of the Management Board and the Supervisory Board from responsibility for the performance of their duties during the preceding financial year. The General Meeting of Shareholders is held in Amsterdam or Haarlemmermeer (Schiphol Airport) and takes place within six months following the end of the preceding financial year.

Meetings are convened by public notice on the website of the Company and by letter, or by use of electronic means of communication, to registered shareholders. Notice is given at least 42 days prior to the date of the General Meeting of Shareholders. The main powers of the General Meeting of Shareholders are set forth in the Company's Articles of Association, which are published on the Company's website, and the applicable provisions of Dutch law.

On May 1, 2019, the General Meeting of Shareholders resolved to authorize the Management Board for a period of eighteen months from that date (until October 31, 2020) as the corporate body, which, subject to approval by the Supervisory Board, is authorized to issue shares, including any grant of rights to subscribe to shares up to a maximum of 10% of the Company's issued share capital as per December 31, 2018, for general corporate purposes and/or for the purpose of mergers and acquisitions, and/or for strategic alliances and/or financial support arrangements. This authorization also includes the power to restrict or exclude preemptive rights.

On May 1, 2019, the General Meeting of Shareholders resolved to authorize the Management Board for a period of 18 months from that date (until October 31, 2020) as the corporate body which, subject to approval by the Supervisory Board, is authorized to effect acquisitions of its own shares by AMG. The number of shares to be acquired is limited to 10% of the Company's issued share capital as of December 31, 2018, taking into account the shares previously acquired and disposed of at the time of any new acquisition. Shares may be acquired through the stock exchange or otherwise, at a price between par value and 110% of the average stock exchange price for a five-day period prior to the date of acquisition. The stock exchange price referred to in the previous sentence is the average closing price of the shares at Euronext Amsterdam on the five consecutive trading days immediately preceding the day of purchase by, or for, the account of the Company.

ARTICLES OF ASSOCIATION

The Company's Articles of Association can be amended by a resolution of the General Meeting of Shareholders on a proposal from the Management Board that has been approved by the Supervisory Board. A resolution of the General Meeting of Shareholders to amend the Articles of Association that has not been taken on the proposal from the Management Board and the approval of the Supervisory Board, should be adopted by a majority of at least two-thirds of the votes cast in a meeting in which at least 50% of the issued share capital is represented. The Articles of Association have last been amended on June 24, 2015 following approval by the General Meeting of Shareholders in its Extraordinary General Meeting held on June 18, 2015 and are published on the Company's website (amg-nv.com).

CORPORATE SOCIAL RESPONSIBILITY

AMG's Values (safety, value creation, integrity, and respect for people) form the core foundation of AMG's ambition to be a leader in the fields of critical materials and engineering services and to achieve excellence in all that it does. They apply to how AMG and its group companies conduct their operations and how they deal with their employees, business partners and stakeholders.

In being a responsible corporate citizen, AMG endorses and supports the definition of corporate social responsibility as set by the World Business Council for Sustainable Development, being: "...the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large." For AMG and its affiliated companies, this translates into three main sustainable development objectives that the Company has formulated in connection with its financial objectives, technological capabilities and its leading position at the heart of the global metallurgical industry: 1) to provide safe working conditions for our employees and to be responsible stewards of the environment; 2) to meet or exceed regulatory standards by engaging in ethical business practices; and 3) to be a valued member of the local economy, community and society at large by contributing to solutions for addressing some of the fundamental environmental and social challenges facing society today. The Supervisory Board and the Management Board of the Company take continued guidance from these objectives when defining and implementing the Company's strategic objectives.

The Sustainable Development section in this Annual Report (pages 40-45) further elaborates on the application of AMG's Code of Business Conduct and its Speak Up and Reporting Policy.

DECREE ON ARTICLE 10 OF THE TAKEOVER DIRECTIVE

The information required by the Decree on Article 10 of the Takeover Directive is included in this Corporate Governance section and the Report of the Supervisory Board, whose information is incorporated by reference in this Corporate Governance report.

Below is an overview of the significant agreements to which the Company is a party, which are affected, changed or terminated subject to the condition of a change of control, or which contain new restrictions on voting rights attached to shares.

The Company is a party to the following agreements that will be terminated under the condition of a change of control over the Company as a result of a public takeover offer.

The Company has entered into a new credit agreement dated February 1, 2018, which includes a provision that requires the Company to repay the entire outstanding amount under its Credit Agreement upon a change of control, as defined therein. The Company is also a party to the following agreements that will come into force upon a change of control pursuant to a public offer. All members of the Management Board have provisions in their contracts that pertain to a change of control. Additionally, the AMG Option Plan and the AMG Performance Share Unit Plan have provisions that permit the Supervisory Board to cancel or modify the options granted or performance share units awarded to Management Board members and other employees, upon a change of control.

The Company is a party to an option agreement entered into with the Stichting Continuïteit AMG as further explained on page 47.

Finally, under terms of the $307 million municipal bond issued in the US tax-exempt bond market in July 2019 by AMG Vanadium LLC., the holders of the bonds have the right to tender their bonds for purchase by the Company upon a change in control of the Company at a purchase price of 101% of the principal amount of the bonds plus accrued interest.

RISK MANAGEMENT AND INTERNAL CONTROLS

AMG employs a risk management approach that identifies and mitigates risk at all levels of the organization. The Company analyzes risks in formal settings such as scheduled Management Board and Supervisory Board meetings as well as everyday operational situations faced by its global employee base. AMG has implemented a comprehensive risk management program centered on the Company's Risk Assessment Package (RAP), as further explained in detail on page 18 of the chapter on Risk Management and Internal Controls.

As stated above, the Management Board is responsible for the internal audit function of the Company. The Internal Auditor at AMG reports to the Audit & Risk Management Committee and to the Management Board and operates on the basis of an Internal Audit plan approved annually by the Supervisory Board and the

Management Board. The Internal Audit plan is risk-based and comprises all units and subsidiaries of the AMG Group with a focus on financial control, IT risks and compliance.

The Internal Audit function closely cooperates with the external auditors of the Company and attends all meetings of the Audit & Risk Management Committee of the Supervisory Board.

INVESTOR RELATIONS

The Company highly values good relations with its shareholders and is compliant with applicable rules and regulations on non-selective and timely disclosure and equal treatment of shareholders. Apart from communication at the Annual General Meeting of Shareholders, the Company explains its financial results during public quarterly conference calls. Further, the Company publishes annual, semi-annual and quarterly reports and press releases and makes information available through its public website (**amg-nv.com**).

The Company also engages in bilateral communications with investors and, in doing so, adheres to its policy on bilateral contacts, which is published on the Company's website. During these communications, the Company is in general represented by its Investor Relations Officer, occasionally accompanied by a member of the Management Board.

COMPLIANCE WITH THE DUTCH CORPORATE GOVERNANCE CODE 2016

As stated above, AMG is subject to the 2016 Code for the 2019 financial year. Reference is made to the Company's website (amg-nv.com) under the heading Corporate Governance, where the Company has published an extensive discussion on its compliance during 2019 with the principles and provisions set forth in the 2016 Code, as these became effective on January 1, 2017.

As a general statement, the Company fully endorses the new Code's principles and believes that virtually all best practice provisions as included in the 2016 Code are complied with. On certain matters involving the remuneration policy of the Company, specifically b.p.p. 3.2.3 concerning severance payments and b.p.p. 3.3.2 concerning remuneration of the Supervisory Board members in the form of AMG shares, the Company does not comply with the best practice provisions and it believes that it has sound reasons for doing so, which are explained on the Company's website as referred to above.

CONFLICTS OF INTEREST

No conflicts of interest that were of material significance to the Company and/or members of the Management Board and Supervisory Board were reported in the period starting January 1, 2019, up to and including March 11, 2020.

During the period starting January 1, 2019 up to and including March 11, 2020, the Company did not enter into any material transaction with a shareholder holding an interest of 10% or more in the Company's share capital.

Accordingly, the Company has complied with best practice provisions 2.7.3 and 2.7.4 of the 2016 Code.

CORPORATE GOVERNANCE STATEMENT

The Decree of December 23, 2004, adopting further rules regarding the contents of the annual report, most recently amended and extended as of January 1, 2018 ("the Decree"), requires that a statement is published annually by the Company on its compliance with Corporate Governance regulations in the Netherlands. The Company hereby submits that it has fully complied with this requirement by way of publication of this Annual Report and the specific references therein, notably the Report of the Management Board, the Report of the Supervisory Board, the Remuneration Report for 2019, and the chapters on Risk Management and Internal Controls, Sustainable Development and Corporate Governance, all of which are deemed to be incorporated by reference into the Company's statement on corporate governance as required by the Decree.

FINANCIALS

FINANCIAL REVIEW

FINANCIAL STATEMENTS

NOTES TO THE CONSOLIDATED FINANCIAL STATEMENTS

PARENT COMPANY FINANCIAL STATEMENTS

NOTES TO PARENT COMPANY FINANCIAL STATEMENTS

FINANCIAL REVIEW

Amounts in tables in thousands of US dollars

For the year ended December 31	2019	2018
Revenue and expenses		
AMG Critical Materials revenue	762,482	873,440
AMG Technologies revenue	426,089	436,848
Total revenue	1,188,571	1,310,288
Cost of sales	1,070,281	995,113
Gross profit	118,290	315,175
Selling, general and administrative expenses	143,451	143,581
Environmental expense	725	8,757
Other income, net	(164)	(424)
Operating (loss) profit	(25,722)	163,261

REVENUE

Full year 2019 revenue decreased 9% to $1,188.6 million, from $1,310.3 million in 2018. AMG Critical Materials' 2019 revenue decreased by $111.0 million, or 13%, from $873.4 million in 2018, to $762.5 million. The decrease in Critical Materials' revenue is driven mainly by lower vanadium prices during the year. AMG Technologies' 2019 revenue decreased 2% to $426.1 million from $436.8 million due to lower profitability generated from the delivery of heat treatment services, furnaces and lower metal pricing impacting our Titanium Alloys and Coatings business during the year. The order backlog as of December 31, 2019 was $222.6 million. This is an 8% decrease from an order backlog of $241.4 million as of December 31, 2018.

GROSS PROFIT

AMG's gross profit declined by $196.9 million to $118.3 million in the year ended December 31, 2019, a 62% decrease. As a percentage of revenue, gross margin decreased from 24% to 10%.

AMG Critical Materials' gross margin was 3% for the year ending December 31, 2019, down from 23% in 2018. The reduction in gross profit was primarily driven by decreased profitability and significant cost adjustments in our vanadium business, exacerbated by lower profitability across all seven business units. The 2019 gross margin for AMG Technologies declined from 2018, decreasing from 27% to 23% due to lower heat treatment services sales, lower metal prices impacting our Titanium Alloys and Coatings business, and a customer payment related to the early termination of a customer contract recorded in 2018. These declines were partially offset by higher revenue from after-sales services, as well as higher sales of vacuum furnaces such as remelting furnaces.

SELLING, GENERAL AND ADMINISTRATIVE EXPENSES

Selling, general and administrative costs were $143.5 million in the year ended December 31, 2019, as compared to $143.6 million in the year ended December 31, 2018.

Personnel expenses decreased to $78.1 million in the year ended December 31, 2019, from $85.7 million in the year ended December 31, 2018. The most significant driver of this decrease was salary and bonus costs which decreased to $55.6 million in 2019 from $61.3 million in 2018 as a result of lower variable compensation expense. The Company incurs professional fees from global service providers for services including audit, tax planning and compliance and legal consultation. Professional fees increased to $30.3 million in 2019 as compared to $21.5 million in 2018 driven by additional legal expenses in the period. Research and development expense decreased to $5.6 million in the year ended December 31, 2019, as compared to $6.6 million in the year ended December 31, 2018. Other SG&A expenses, such as travel and entertainment, insurance, occupancy, communication and bank fees were $29.5 million in the year ended December 31, 2019, versus $29.8 million in the year ended December 31, 2018.

NET (LOSS) INCOME TO EBITDA RECONCILIATION

For the year ended December 31	2019	2018
Net (loss) income	(48,586)	94,781
Income tax (benefit) expense	(5,119)	44,971
Net finance cost *	27,626	22,949
Equity-settled share-based payment transactions	5,514	7,499
Restructuring expense	3,265	2,052
Inventory cost adjustment	87,792	—
Asset impairment expense	4,519	3,333
Environmental provision	725	8,757
Exceptional legal expense	3,133	—
Others	546	(243)
EBIT	79,415	184,099
Depreciation and amortization	41,967	33,034
EBITDA	121,382	217,133

*Excludes foreign exchange loss.

2019 was particularly impacted by an unusual market price development in vanadium. Market prices climbed consistently from the beginning of 2018 into the first quarter of 2019 and then declined for the remainder of the year. This resulted in a significant impact to our profitability as our inventory position experienced cost adjustments due to the declining market prices which eliminated the profitability on sales for the remainder of the year.

In 2019, the largest portion of the restructuring expense related to a production facility in one of our businesses in the United States, as well as restructuring expenses and severance payments in two of our European operations which resulted in a headcount reduction of 64. Additional expenses included headcount reductions of 37 due to the reorganization of our Brazil operations. Restructuring expense in 2018 was related to expenses incurred due to reorganizations in Germany and China and the early termination of a customer contract. The 2019 asset impairment expense was primarily associated with the write-off of capitalized engineering costs of Spodumene II.

In 2018, asset impairments were associated with a customer contract early termination offset by additional recoveries related to the fire at the Company's Mibra mine. Exceptional legal expense in 2019 was related to litigation for breach of contract with a former customer. The 2019 environmental expense was related to a sewer rehabilitation in Germany. The environmental expense in 2018 was driven by an increase to the overall scope of remediation efforts related to a closed facility in the US.

OPERATING (LOSS) PROFIT

AMG's operating (loss) profit of ($25.7) million for the year ended December 31, 2019, was a decrease of $189.0 million from the operating profit of $163.3 million reported for the year ended December 31, 2018. The decrease in operating profit was the result of the decrease in gross profit noted above offset slightly by lower environmental expenses in 2019.

NET FINANCE COST

The table below sets forth AMG's net finance costs for the years ended December 31, 2019 and 2018. Finance cost increased over the prior year, due to increased levels of gross debt and AMG's long-term credit facility being outstanding for the entire year.

For the year ended December 31	2019	2018
Finance income	(4,728)	(3,721)
Finance cost	32,711	27,230
Net finance cost	27,983	23,509

INCOME TAXES

The Company recorded an income tax benefit of $5.1 million for the year ended December 31, 2019, compared to an income tax expense of $45.0 million for the year ended December 31, 2018. The tax benefit in the current year is driven by lower levels of profitability and the recognition operating loss carryforwards. The effective tax rate for 2019 was 10%, as compared to the 32% effective tax rate for 2018.

NET (LOSS) INCOME

The Company recorded a net (loss) attributable to shareholders of ($48.3) million in the year ended December 31, 2019, as compared to net income attributable to shareholders of $94.6 million in the year ended December 31, 2018. This variance was driven by the decline in operating profit and higher net finance costs offset partially by lower income tax expense.

EQUITY ATTRIBUTABLE TO SHAREHOLDERS

The Company's equity attributable to shareholders decreased 50% during the year from $319.9 million as of December 31, 2018 to $160.5 million as of December 31, 2019. This decrease was mainly driven by the Company returning $106.0 million to shareholders in 2019 through its share repurchase program and dividend payments, net (loss) attributable to shareholders of ($48.3) million in the year ended December 31, 2019, movements in other reserves related to pensions, foreign currency translation, investments, and cash flow hedges as well as the issuance of shares during the year for share-based compensation.

WORKING CAPITAL

The Company's working capital decreased significantly during the year driven by lower raw material pricing. Inventory decreased 36% from $316.7 million as of December 31, 2018 to $204.2 million as of December 31, 2019, primarily as a result of lower vanadium prices.

LIQUIDITY AND CAPITAL RESOURCES

SOURCES OF LIQUIDITY

The Company's sources of liquidity include cash and cash equivalents, cash from operations and amounts available under credit facilities. At December 31, 2019, the Company had $226.2 million in cash and cash equivalents and $169.9 million available on its revolving credit facility. Changes in liquidity were primarily due to the Company's new municipal bond, changes in cash from operations during the year, capital investments for the vanadium and lithium expansion projects and the share repurchase program.

The table below summarizes the Company's liquidity for the years ended December 31, 2019 and 2018.

For the year ended December 31	2019	2018
Senior secured debt	366,682	368,757
Cash & equivalents	226,218	381,900
Senior secured net debt (cash)	140,464	(13,143)
Other debt	12,144	12,687
Net debt excluding municipal bond	152,608	(456)
Municipal bond debt	319,911	—
Restricted cash	(309,581)	—
Net debt (cash)	162,938	(456)

The Company was subject to one maintenance debt covenant in its current revolving credit facility. Violating this covenant would limit the Company's access to liquidity. The Company was fully in compliance with this debt covenant as of December 31, 2019. See note 21 of the financial statements for additional information.

The table below summarizes the Company's net cash provided by or used in its operating activities, investing activities and financing activities for the years ended December 31, 2019 and 2018.

For the year ended December 31	2019	2018
Net cash from operating activities	46,573	97,422
Net cash used in investing activities	(409,879)	(71,319)
Net cash from financing activities	208,703	182,699

Cash from operating activities was $46.6 million for the year ended December 31, 2019, compared to cash from operating activities of $97.4 million in 2018. The decrease is primarily attributable to lower profitability in 2019, offset partially by lower working capital levels.

Cash used in investing activities was $409.9 million for the year ended December 31, 2019. This balance is mainly driven by the restriction of cash generated from the municipal bond raised during the year for usage in constructing the plant in Ohio. Additionally, the Company had $79.4 million of capital expenditures during the year and acquired a company for $25.4 million. The largest growth capital expenditures were related to the vanadium and lithium expansion projects.

Cash from financing activities was $208.7 million for the year ended December 31, 2019, as the Company had net proceeds from debt of $325.1 million, mainly associated with the municipal bond, offset partially by the share repurchase program and dividends paid during the year.

OUTLOOK

It is extremely difficult to provide firm guidance for 2020. Temporary disruptions in the aerospace supply chain resulting from the Boeing 737 MAX issues and the uncertain impact of the coronavirus continue to infuse unpredictable variables into the current market. On the bright side, we note AMG Technologies' backlog at the end of January 2020 is at its highest level in over a decade. In addition, critical material prices appear to have reached a bottom as early 2020 market pricing is showing signs of improvement from the depressed pricing experienced throughout 2019. Specifically, vanadium pricing is already up over 30% in the early part of 2020.

As a result of all of these factors, our target for 2020 is unchanged: we expect to improve profitability relative to 2019.

CONSOLIDATED INCOME STATEMENT

For the year ended December 31	Note	2019	2018
In thousands of US dollars			
Continuing operations			
Revenue	5	1,188,571	1,310,288
Cost of sales		1,070,281	995,113
Gross profit		118,290	315,175
Selling, general and administrative expenses		143,451	143,581
Environmental expense	6, 25	725	8,757
Other expenses	6	19	20
Other income	6	(183)	(444)
Net other operating expense	6	561	8,333
Operating (loss) profit		(25,722)	163,261
Finance income	8	(4,728)	(3,721)
Finance cost	8, 21	32,711	27,230
Net finance cost	8	27,983	23,509
(Loss) profit before income tax		(53,705)	139,752
Income tax (benefit) expense	9	(5,119)	44,971
(Loss) profit for the year		(48,586)	94,781
(Loss) profit attributable to:			
Shareholders of the Company		(48,283)	94,616
Non-controlling interests		(303)	165
(Loss) profit for the year		(48,586)	94,781
(Loss) earnings per share			
Basic (loss) earnings per share	19	(1.64)	3.12
Diluted (loss) earnings per share	19	(1.64)	2.97

The notes are an integral part of these consolidated financial statements.

CONSOLIDATED STATEMENT OF OTHER COMPREHENSIVE INCOME

For the year ended December 31	Note	2019	2018
In thousands of US dollars			
(Loss) profit for the year		(48,586)	94,781
Other comprehensive (loss) income			
Items of other comprehensive (loss) income that may be reclassified to profit or loss in subsequent periods:			
Exchange differences on translation of foreign operations		(1,340)	(4,826)
Cash flow hedges, effective portion of changes in fair value		6,726	(26,150)
Cash flow hedges reclassified to profit or loss		(1,843)	10,745
Cost of hedging reserve, changes in fair value		3,894	(1,659)
Income tax (expense) benefit on cash flow hedges	9	(1,477)	3,588
Net increase (decrease) on cash flow hedges		7,300	(13,476)
Net other comprehensive income (loss) that may be reclassified to profit or loss in subsequent periods		5,960	(18,302)
Items of other comprehensive (loss) income not to be reclassified to profit or loss in subsequent periods:			
Exchange difference on translation of foreign operations – non-controlling interest		(388)	(1,334)
Actuarial losses on defined benefit plans	23	(28,135)	(3,374)
Income tax benefit on actuarial losses	9	7,612	433
Net loss on defined benefit plans		(20,523)	(2,941)
Change in fair value of equity investments classified as fair value through other comprehensive income	12, 18	2,363	(8,513)
Net other comprehensive loss not being reclassified to profit or loss in subsequent periods		(18,548)	(12,788)
Other comprehensive loss for the year, net of tax		(12,588)	(31,090)
Total comprehensive (loss) income for the year, net of tax		(61,174)	63,691
Total comprehensive (loss) income attributable to:			
Shareholders of the Company		(60,246)	64,790
Non-controlling interest		(928)	(1,099)
Total comprehensive (loss) income for the year, net of tax		(61,174)	63,691

The notes are an integral part of these consolidated financial statements.

CONSOLIDATED STATEMENT OF FINANCIAL POSITION

As at December 31	Note	2019	2018
In thousands of US dollars			
Assets			
Property, plant and equipment	10	429,993	327,951
Goodwill and other intangible assets	11	41,923	35,130
Derivative financial instruments	29	922	7,592
Other investments	12, 29	23,565	21,452
Deferred tax assets	9	60,945	34,112
Restricted cash	16	309,581	1,715
Other assets	15	11,072	11,266
Total non-current assets		878,001	439,218
Inventories	13	204,152	316,715
Derivative financial instruments	29	2,693	1,335
Trade and other receivables	14	119,052	138,530
Other assets	15	33,860	39,570
Current tax assets	9	7,980	3,668
Cash and cash equivalents	17	226,218	381,900
Total current assets		593,955	881,718
Total assets		1,471,956	1,320,936
Equity			
Issued capital		831	812
Share premium		489,546	462,891
Treasury shares		(83,880)	(347)
Other reserves	18	(116,358)	(104,274)
Retained earnings (deficit)		(129,626)	(39,158)
Equity attributable to shareholders of the Company		160,513	319,924
Non-controlling interests	20	23,893	24,119
Total equity		184,406	344,043
Liabilities			
Loans and borrowings	21	669,497	356,997
Lease liabilities	31	46,490	—
Employee benefits	23	175,870	149,217
Provisions	25	28,984	32,527
Other liabilities	26	3,629	4,371
Derivative financial instruments	29	4,289	5,148
Deferred tax liabilities	9	4,300	7,930
Total non-current liabilities		933,059	556,190
Loans and borrowings	21	21,740	8,947
Lease liabilities	31	4,227	—
Short-term bank debt	22	7,500	15,500
Other liabilities	26	61,479	61,120
Trade and other payables	27	157,108	230,939
Derivative financial instruments	29	4,037	8,267
Advance payments from customers	5	57,650	50,210
Current tax liability	9	18,299	19,675
Provisions	25	22,451	26,045
Total current liabilities		354,491	420,703
Total liabilities		1,287,550	976,893
Total equity and liabilities		1,471,956	1,320,936

The notes are an integral part of these consolidated financial statements.

CONSOLIDATED STATEMENT OF CHANGES IN EQUITY

	Equity attributable to shareholders of the Company							
In thousands of US dollars	Issued capital	Share premium	Treasury shares	Other reserves	Retained deficit	Total	Non-controlling interests	Total equity
	(note 18)		(note 18)	(note 18)			(note 20)	
Balance at December 31, 2017	796	432,844	(3,461)	(72,880)	(99,343)	257,956	24,633	282,589
Adjustment on initial application of IFRS 15 (net of tax)	—	—	—	—	(771)	(771)	—	(771)
Adjusted balance at January 1, 2018	796	432,844	(3,461)	(72,880)	(100,114)	257,185	24,633	281,818
Foreign currency translation	—	—	—	(4,826)	—	(4,826)	(1,334)	(6,160)
Change in fair value of equity investments classified as fair value through other comprehensive income	—	—	—	(8,513)	—	(8,513)	—	(8,513)
Loss on cash flow hedges, net of tax	—	—	—	(13,474)	—	(13,474)	(2)	(13,476)
Actuarial loss, net of tax	—	—	—	(3,013)	—	(3,013)	72	(2,941)
Net loss recognized through other comprehensive income	—	—	—	(29,826)	—	(29,826)	(1,264)	(31,090)
Profit for the year	—	—	—	—	94,616	94,616	165	94,781
Total comprehensive (loss) income for the year	—	—	—	(29,826)	94,616	64,790	(1,099)	63,691
Issuance of common shares	16	30,047	—	—	—	30,063	—	30,063
Purchase of common shares	—	—	(12,388)	—	—	(12,388)	—	(12,388)
Re-issuance of treasury shares	—	—	12,268	—	—	12,268	—	12,268
Equity-settled share-based payments	—	—	3,234	—	(22,567)	(19,333)	—	(19,333)
Transfer to retained deficit	—	—	—	(1,568)	1,568	—	—	—
Change in non-controlling interests	—	—	—	—	(569)	(569)	585	16
Dividend	—	—	—	—	(12,092)	(12,092)	—	(12,092)
Balance at December 31, 2018	812	462,891	(347)	(104,274)	(39,158)	319,924	24,119	344,043
Balance at January 1, 2019	812	462,891	(347)	(104,274)	(39,158)	319,924	24,119	344,043
Foreign currency translation	—	—	—	(1,340)	—	(1,340)	(388)	(1,728)
Change in fair value of equity investments classified as fair value through other comprehensive income	—	—	—	2,363	—	2,363	—	2,363
Gain on cash flow hedges, net of tax	—	—	—	7,303	—	7,303	(3)	7,300
Actuarial loss, net of tax	—	—	—	(20,289)	—	(20,289)	(234)	(20,523)
Net loss recognized through other comprehensive income	—	—	—	(11,963)	—	(11,963)	(625)	(12,588)
Loss for the year	—	—	—	—	(48,283)	(48,283)	(303)	(48,586)
Total comprehensive loss for the year	—	—	—	(11,963)	(48,283)	(60,246)	(928)	(61,174)
Issuance of common shares	19	26,655	—	—	—	26,674	—	26,674
Purchase of common shares	—	—	(92,073)	—	—	(92,073)	—	(92,073)
Re-issuance of treasury shares	—	—	3,100	—	(298)	2,802	—	2,802
Equity-settled share-based payments	—	—	5,440	—	(24,946)	(19,506)	—	(19,506)
Transfer to retained deficit	—	—	—	(121)	121	—	—	—
Change in non-controlling interests	—	—	—	—	(359)	(359)	702	343
Dividend	—	—	—	—	(16,703)	(16,703)	—	(16,703)
Balance at December 31, 2019	831	489,546	(83,880)	(116,358)	(129,626)	160,513	23,893	184,406

The notes are an integral part of these consolidated financial statements.

CONSOLIDATED STATEMENT OF CASH FLOWS

For the year ended December 31	Note	2019	2018
In thousands of US dollars			
Cash from operating activities			
(Loss) profit for the year		(48,586)	94,781
Adjustments to reconcile net (loss) profit to net cash flows:			
Non-cash:			
Income tax (benefit) expense	9	(5,119)	44,971
Depreciation and amortization	10, 11	41,967	33,034
Asset impairment expense	10, 11, 13	4,519	3,333
Net finance cost	8	27,983	23,509
Gain on sale or disposal of property, plant and equipment	10	(69)	(720)
Equity-settled share-based payment transactions	24	5,514	7,499
Movement in provisions, pensions and government grants	23, 25	(8,053)	3,724
Working capital and deferred revenue adjustments			
Change in inventories		124,890	(164,446)
Change in trade and other receivables		25,199	(11,314)
Change in prepayments		7,633	4,121
Change in trade payables and other liabilities		(82,305)	97,998
Change in deferred revenue		(373)	(286)
Other		1,125	820
Cash generated from operating activities		94,325	137,024
Finance cost paid	8	(27,619)	(21,545)
Finance income received	8	4,467	3,272
Income tax paid, net	9	(24,600)	(21,329)
Net cash from operating activities		46,573	97,422
Cash used in investing activities			
Proceeds from sale of property, plant and equipment	10	421	1,660
Insurance proceeds on property, plant and equipment	10	—	1,300
Acquisition of property, plant and equipment and intangibles	10, 11	(79,442)	(73,031)
Acquisition of subsidiaries	30	(25,435)	—
Change in restricted cash	16	(307,866)	(923)
Capitalized borrowing cost	10	2,437	—
Other		6	(325)
Net cash used in investing activities		(409,879)	(71,319)
Cash from financing activities			
Proceeds from issuance of debt	21, 22	325,093	353,087
Payment of transaction costs related to the issuance of debt	21	(4,981)	(9,238)
Repayment of borrowings	21, 22	(3,911)	(155,423)
Proceeds from issuance of common shares	18	2,915	15,923
Net repurchase of common shares	18	(89,881)	(9,558)
Dividends paid	18	(16,703)	(12,092)
Payment of lease liabilities	31	(3,829)	—
Net cash from financing activities		208,703	182,699
Net (decrease) increase in cash and cash equivalents		(154,603)	208,802
Cash and cash equivalents at January 1		381,900	178,800
Effect of exchange rate fluctuations on cash held		(1,079)	(5,702)
Cash and cash equivalents at December 31	17	226,218	381,900

The notes are an integral part of these consolidated financial statements.

NOTES TO THE CONSOLIDATED FINANCIAL STATEMENTS

1. REPORTING ENTITY

The consolidated financial statements of AMG Advanced Metallurgical Group N.V. (herein referred to as "the Company", "AMG NV" or "AMG") for the year ended December 31, 2019, were authorized for issuance in accordance with a resolution of the Supervisory Board on March 11, 2020.

AMG is domiciled in the Netherlands. The address of the Company's registered office is WTC Amsterdam, Toren C, Strawinskylaan 1343, 1077 XX Amsterdam. The consolidated financial statements of the Company as of and for the year ended December 31, 2019, comprise the Company and the companies that comprise its subsidiaries (together referred to as the "Group") and the Company's interest in associates and jointly controlled entities.

AMG was incorporated in the Netherlands as a public limited liability company and its outstanding shares are listed on Euronext, Amsterdam, the Netherlands.

The parent company financial statements are prepared in accordance with part 9, Book 2, article 362.8 of the Netherlands Civil Code.

The consolidated financial statements of the Company include the accounts of all entities in which a direct or indirect controlling interest exists through voting rights or qualifying joint ventures and associates at the reporting dates. No entities in which the Company has less than a 50% interest are consolidated in the Company's financial statements. The following table includes all material operating entities in which AMG has an ownership interest. The Company has filed a complete list of entities in which AMG has an ownership interest with the Dutch Chamber of Commerce.

		Percentage held (directly or indirectly) by the Company	
Name	Country of incorporation	**December 31, 2019**	December 31, 2018
ALD Thermal Treatment, Inc.	United States	100	100
ALD Tratamientos Termicos S.A.	Mexico	100	100
ALD Vacuum Technologies GmbH	Germany	100	100
AMG Aluminum UK Limited	United Kingdom	100	100
AMG Vanadium LLC	United States	100	100
AMG Mineração S.A.	Brazil	100	100
GfE Gesellschaft für Elektrometallurgie GmbH	Germany	100	100
GfE Metalle und Materialien GmbH	Germany	100	100
Graphit Kropfmühl GmbH	Germany	60	60
AMG Aluminum North America, LLC	United States	100	100
AMG Superalloys UK Limited	United Kingdom	100	100
LSM Brasil S.A.	Brazil	100	100
RW Silicium GmbH	Germany	100	100
Société Industrielle et Chimique de l'Aisne S.A.S.	France	100	100
VACUHEAT GmbH	Germany	100	100

Graphit Kropfmühl GmbH, GK Bergbau GmbH, RW Silicium GmbH, AMG Invest GmbH, ALD Vacuum Technologies GmbH, VACUHEAT GmbH and VACUHEAT Verwaltungs GmbH exercise the exemption of Sec. 264 (3) HGB "Handelsgesetzbuch".

As of December 31, 2019, there were 3,307 employees at the Company (2018: 3,329). There were 3 employees located in the Netherlands as of December 31, 2019 (2018: 3). All other employees are located outside the Netherlands.

2. BASIS OF PREPARATION

(A) STATEMENT OF COMPLIANCE

EU law (IAS Regulation EC 1606/2002) requires that the annual consolidated financial statements of the Company for the year ending December 31, 2019, be prepared in accordance with accounting standards adopted and endorsed by the European Union ("EU") further to the IAS Regulation (EC 1606/2002) (further referred to as "IFRS, as endorsed by the EU").

The consolidated financial statements of AMG NV and its subsidiaries have been prepared in accordance with International Financial Reporting Standards ("IFRS") as of December 31, 2019, as endorsed by the EU and article 2.362.9 of the Netherlands Civil Code.

(B) BASIS OF MEASUREMENT

The consolidated financial statements have been prepared on the historical cost basis except for the following items, which are measured on an alternative basis on each reporting date. The methods used to measure fair values are discussed further in note 3.

Derivative financial instruments	Fair value
Non-derivative financial instruments at fair value through profit or loss	Fair value
Non-derivative financial instruments, including restricted cash, at fair value through other comprehensive income	Fair value
Net defined benefit (asset) liability	Fair value of plan assets less the present value of the defined benefit obligation, limited as explained in note 3

(C) MEASUREMENT OF FAIR VALUES

A number of the Company's accounting policies and disclosures require the measurement of fair values, for both financial and non-financial assets and liabilities. The Company has an established control framework with respect to the measurement of fair values. This includes overseeing all significant fair value measurements, including Level 3 fair values.

The Company regularly reviews significant unobservable inputs and valuation adjustments. If third party information, such as broker quotes or pricing services, is used to measure fair values, then the Company assesses the evidence obtained from the third parties to support the conclusion that these valuations meet the requirements of IFRS, including the level in the fair value hierarchy in which the valuations should be classified.

Significant valuation issues are reported to the Company's audit committee.

When measuring the fair value of an asset or a liability, the Company uses observable market data as far as possible. Fair values are categorized into different levels in a fair value hierarchy based on the inputs used in the valuation techniques as follows:

Level 1: quoted prices (unadjusted) in active markets for identical assets or liabilities;

Level 2: inputs other than quoted prices included in Level 1 that are observable for the asset or liability, either directly (i.e. as prices) or indirectly (i.e. derived from prices); and

Level 3: inputs for the asset or liability that are not based on observable market data (unobservable inputs).

If the inputs used to measure the fair value of an asset or a liability fall into different levels of the fair value hierarchy, then the fair value measurement is categorized in its entirety in the same level of the fair value hierarchy as the lowest level input that is significant to the entire measurement.

The Company recognizes transfers between levels of the fair value hierarchy at the end of the reporting period during which the change has occurred.

Further information about the assumptions made in measuring fair values is included in the following notes:

- note 12 – measurement of other investments
- note 24 – share-based payments
- note 29 – measurement of financial instruments
- note 30 – business combination

(D) USE OF ESTIMATES AND JUDGMENTS

The preparation of financial statements requires management to make judgments, estimates and assumptions that affect the application of accounting policies and the reported amounts of assets, liabilities, income and expenses. Actual results may differ from these estimates.

Estimates and underlying assumptions are reviewed on an ongoing basis. Revisions to accounting estimates are recognized in the period in which the estimate is revised and in any future periods affected.

Key uses of judgments

Information related to critical judgments made in applying accounting policies that have the most significant effects on the amounts recognized in the Company's consolidated financial statements are included in the following notes:

- notes 3 and 5 – Revenue from contracts with customers: determination of revenue recognition from furnace construction contracts
- notes 3 and 31 – Leases: determination of the lease term for some lease contracts which include renewal options

Assumptions and estimation uncertainty

Information about assumptions and estimation uncertainties that may have a significant risk of resulting in a material adjustment to the carrying amounts of assets and liabilities within the next financial year are included in the following notes:

- note 9 – Income tax: recognition of income taxes and deferred tax assets
- note 10 – Property, plant and equipment: determination of useful lives of mining-related assets

- note 11 – Goodwill and other intangible assets: measurement of the recoverable amounts of assets and cash-generating units for purposes of impairment testing
- note 12 – Other investments; the assumptions and model used to determine fair value
- note 23 – Employee benefits: measurement of plan obligations and actuarial assumptions
- note 24 – Share-based payments: the assumptions and model used to determine fair value
- note 25 – Provisions: determination of amounts recorded based on expected payments and any regulatory framework
- note 29 – Financial instruments: fair value determination based on present value of future cash flows
- note 30 – Acquisition of subsidiary: fair value of the assets acquired and liabilities assumed, measured on a provisional basis

3. SIGNIFICANT ACCOUNTING POLICIES

These consolidated financial statements as of December 31, 2019, present the consolidated financial position, results of operations and cash flows of the Company and its subsidiaries. The Company has consistently applied the following accounting policies to all periods presented in these consolidated financial statements.

(A) BASIS OF CONSOLIDATION

(i) Business combinations

The Company accounts for business combinations using the acquisition method once control is gained by the Company. Consideration transferred and separately identifiable net assets acquired in the acquisition are measured at fair value. Consideration transferred does not include amounts related to the settlement of pre-existing relationships, which are recognized in profit or loss. Any goodwill that arises is tested annually for impairment. In the event of a bargain purchase, any gain is recognized in profit or loss immediately. Transaction costs are expensed as incurred, unless related to the issuance of debt or equity securities.

Contingent consideration is measured at fair value at the date of acquisition. If an obligation to pay contingent consideration meets the definition of a financial instrument classified as equity, then it is not remeasured, and settlement is accounted for within equity. Other contingent consideration is remeasured at fair value at each reporting date, with subsequent changes in the fair value of the contingency being recognized through profit or loss.

If share-based payment awards are required to be exchanged for awards held by the acquiree's employees, then all or a portion of the amount of the acquirer's replacement awards is included in measuring the consideration transferred in the business combination. This determination is based on the market-based measure of replacement awards compared with the market-based measure of the acquiree's awards and the extent to which the replacement awards relate to pre-combination service.

(ii) Subsidiaries

Subsidiaries are entities controlled by the Company. The Company controls an entity when it is exposed to, or has rights to, variable returns from its involvement with the entity and has the ability to affect those returns through its power over the entity. The financial statements of subsidiaries are included in the consolidated financial statements from the date on which control commences until the date on which control ceases.

(iii) Non-controlling interests

Non-controlling interests are measured at their proportionate share of the acquiree's identifiable net assets at the date of acquisition.

Changes in the Company's interest in a subsidiary that do not result in a loss of control are accounted for as equity transactions.

(iv) Loss of control

When the Company loses control over a subsidiary, it derecognizes the assets and liabilities of the subsidiary, and any related non-controlling interest and other components of equity. Any resulting gain or loss is recognized in profit or loss. Any interest retained in the former subsidiary is measured at fair value when control is lost.

(v) Interests in equity-accounted investees

The Company's interests in equity-accounted investees comprise interests in associates and joint ventures.

Associates are those entities in which the Company has significant influence, but not control or joint control, over the financial and operating policies. A joint venture is an arrangement in which the Company has joint control, whereby the Company has rights to the net assets of the arrangement, rather than rights to its assets and obligations for its liabilities.

Interests in associates and joint ventures are accounted for using the equity method. They are initially recognized at cost, including transaction costs. Subsequent to initial recognition, the consolidated financial statements include the Company's share of the profit or loss and OCI of equity-accounted investees, until the date on which significant influence or joint control ceases.

(vi) Transactions eliminated on consolidation

Intergroup balances and transactions, and any unrealized income and expenses arising from intergroup transactions, are eliminated. Unrealized gains arising from transactions with equity-accounted investees are eliminated against the investment to the extent of the Company's interest in the investee. Unrealized losses are eliminated similarly, to the extent there is no evidence of impairment.

(B) FOREIGN CURRENCY

(i) Functional and presentation currency

These consolidated financial statements are presented in US dollars ($), which is the Company's functional and presentation currency.

All financial information is presented in US dollars and has been rounded to the nearest thousand, unless otherwise stated.

The local currency is the functional currency for the Company's significant operations outside the United States (US), except certain operations in the UK and Brazil, where the US dollar is used as the functional currency. The determination of functional currency is based on appropriate economic and management indicators.

(ii) Foreign currency transactions

Transactions in foreign currencies are translated to the respective functional currencies of the Company's entities at exchange rates at the dates of the transactions. Monetary assets and liabilities denominated in foreign currencies are retranslated at the functional currency rate of exchange at the reporting date. Non-monetary assets and liabilities that are measured at fair value in a foreign currency are translated into the functional currency at the exchange rate when the fair value was determined. Non-monetary items that are measured based on historical cost in a foreign currency are translated at the exchange rate at the date of the transaction. Foreign currency differences are recognized in profit or loss.

Foreign currency differences arising from the translation of the following items are recognized in other comprehensive income:

- Equity investments classified as fair value through other comprehensive income (except on impairment, in which case foreign currency differences that have been recognized in other comprehensive income are reclassified to profit or loss);
- A financial liability designated as a hedge of the net investment in a foreign operation to the extent that the hedge is effective; and
- Qualifying cash flow hedges to the extent that the hedges are effective.

(iii) Foreign operations

The assets and liabilities of foreign operations, including goodwill and fair value adjustments arising on acquisition, are translated to US dollars at exchange rates at the reporting date. The income and expenses of foreign operations are translated to US dollars at the average exchange rates calculated at the reporting date.

Foreign currency differences are recognized in other comprehensive income and accumulated in the foreign currency translation reserve, except to the extent that the translation difference is allocated to non-controlling interest. When a foreign operation is disposed of, in its entirety or partially such that control, significant influence, or joint control is lost, the cumulative amount in the translation reserve related to that foreign operation is reclassified to profit or loss as part of the gain or loss on disposal. If the Company disposes of part of its interest in a subsidiary but retains control, then the relevant proportion of the cumulative amount is reattributed to non-controlling interest. When the Company disposes of only part of an associate or joint venture while retaining significant influence or joint control, the relevant proportion of the cumulative amount is reclassified to profit or loss.

(C) REVENUE FROM CONTRACTS WITH CUSTOMERS

(i) Goods sold

The Company's contracts for goods sold typically contain a single performance obligation. The timing of when a customer obtains control over goods sold varies depending on the individual terms of the sales agreement. In satisfying the Company's performance obligation to its customers, transfer of control typically occurs when title and risk of loss pass to the customer. In the case of export sales, control of the goods sold may pass when the product reaches a foreign port. Invoices are generally issued according to contractual terms and are usually payable within 30-90 days. The transaction price of goods sold is typically based on contractual terms or market pricing and is not subject to variable consideration.

(ii) Furnace construction contracts

Furnace construction contract revenue results from the development of furnaces for some of the Company's furnace in the Technologies segment. These furnaces are constructed based on specifically negotiated contracts with customers. Contract revenues includes the initial amount agreed in the contract plus any variations in contract work, claims and incentive payments, to the extent that it is probable that they will result in revenue and can be measured reliably. Invoices are generally issued according to contractual terms and are usually payable within 30-90 days.

The performance obligations in the Company's furnace construction contracts are mainly recognized over time. The Company's furnace construction contracts require the Company to develop highly specialized assets that meet the customer's specific needs. The assets do not have an alternative use to the Company, and the Company has a legal right to payment for its services rendered to date for all furnace construction arrangements. The Company recognizes contract revenue over time in proportion to the stage of completion of the contract. The stage of completion is assessed with reference to costs incurred to date and estimated total cost. Otherwise, contract revenue is recognized only to the extent of contract costs incurred that are likely to be recoverable.

Contract expenses are recognized as incurred unless they create an asset related to future contract activity. An expected loss on a contract is recognized immediately in profit or loss.

Amounts expected to be collected from customers for contract work performed is measured at costs incurred plus profits recognized to date, less progress billings and recognized losses.

In the statement of financial position, construction contracts in progress for which costs incurred plus recognized profits exceed progress billings and recognized losses are presented as trade and other receivables. Contracts for which progress billings and recognized losses exceed costs incurred plus recognized profits are presented as deferred revenues and included with advanced payments.

(iii) Heat treatment services

The Company offers heat treatment services on a tolling basis using its internally developed furnace and process technology that is owned and operated by the Technologies segment. The Company's performance obligations under these tolling contracts require the Company to apply this technology to the customer's materials at a contractually agreed upon cost per unit. The Company recognizes revenues for heat treatment services completed to date that the Company has a contractual right to invoice its customers for the related services.

(iv) Commissions

If the Company acts in the capacity of an agent rather than as the principal in a transaction, then the revenue recognized is the net amount of commission made by the Company.

(v) Warranty obligations

The Company typically provides warranties for general repairs of defects that existed at the time of sale, as required by law. These assurance-type warranties are not considered to be separate performance obligations and are accounted for under IAS 37 Provisions, Contingent Liabilities and Contingent Assets as described in our accounting policy for provisions.

(vi) Variable consideration

If the consideration in a contract includes a variable amount, the Company estimates the amount of consideration to which it will be entitled in exchange for transferring the goods to the customer. The variable consideration is estimated at contract inception and constrained until it is highly probable that a significant revenue reversal in the amount of cumulative revenue recognized will not occur when the associated uncertainty with the variable consideration is subsequently resolved.

(D) FINANCE INCOME AND COST

Finance income comprises interest income on funds invested, changes in the discount on provisions, foreign currency gains and gains on derivatives and hedging instruments. Interest income is recognized as it is earned, using the effective interest method.

Finance cost comprises interest expense on borrowings and interest rate caps and swaps, amendment fees on borrowings, amortization of loan issuance costs, interest expense on lease liabilities, commitment fees on borrowings, changes in the discount on provisions, interest on tax liabilities, foreign currency losses, losses on derivatives and hedging instruments, fees for letters of credit/guarantees, interest for accounts receivable factoring and any loss recorded on debt extinguishment. All transaction costs are recognized in profit or loss using the effective interest method when the costs are related to actual borrowings on the facility or using the straight-line method when they are related to the revolving credit facility.

(E) INCOME TAX EXPENSE

Income tax expense comprises current and deferred tax. It is recognized in profit or loss except to the extent that it relates to a business combination, or items recognized directly in equity or in other comprehensive income.

Interest and penalties related to income taxes, including uncertain tax treatments, are accounted for under IAS 37 Provisions, Contingent Liabilities and Contingent Assets.

(i) Current tax

Current tax comprises the expected tax payable or receivable on the taxable income or loss for the year and any adjustment to the tax payable or receivable in respect of previous years. The amount of current tax payable or receivable is the best estimate of the tax amount expected to be paid or received that reflects uncertainty related to income taxes, if any. It is measured using tax rates enacted or substantively enacted at the reporting date. Current tax also includes any tax arising from dividends.

Current tax assets and liabilities are offset only if certain criteria are met.

(ii) Deferred tax

Deferred tax is recognized in respect of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for taxation purposes. Deferred tax is not recognized for:

- temporary differences on the initial recognition of assets or liabilities in a transaction that is not a business combination and that affects neither accounting nor taxable profit or loss;
- temporary differences related to investments in subsidiaries, associates and joint ventures to the extent that the Company is able to control the timing of the reversal of the temporary differences and it is probable that they will not reverse in the foreseeable future; and
- taxable temporary differences arising on the initial recognition of goodwill.

Deferred tax assets are recognized for unused tax losses, unused tax credits and deductible temporary differences to the extent that it is probable that future taxable profits will be available against which they can be used. Future taxable profits are determined based on business plans for individual subsidiaries in the Company and the reversal of temporary differences. If the amount of taxable temporary differences is insufficient to recognize a deferred tax asset in full, then future taxable profits, adjusted for reversals of existing temporary differences, are considered, based on the business plans for individual subsidiaries in the Company. Deferred tax assets are reviewed at each reporting date and are reduced to the extent that it is no longer probable that the related tax benefit will be realized; such reductions are reversed when the probability of future taxable profits improves.

Unrecognized deferred tax assets are reassessed at each reporting date and recognized to the extent that it has become probable that future taxable profits will be available against which they can be used.

Deferred tax is measured at the tax rates that are expected to be applied to temporary differences when they reverse, using tax rates enacted or substantively enacted at the reporting date.

The measurement of deferred tax reflects the tax consequences that would follow from the manner in which the Company expects, at the reporting date, to recover or settle the carrying amount of its assets and liabilities.

Deferred tax assets and liabilities are offset only if certain criteria are met.

(iii) Sales and other taxes

Revenues, expenses and assets are recognized net of the amount of sales tax except:

- where the sales tax incurred on a purchase of assets or services is not recoverable from the taxation authority, in which case the sales tax is recognized as part of the cost of acquisition of the asset or as part of the expense item as applicable; and
- receivables and payables that are stated with the amount of sales tax included.

The net amount of sales tax recoverable from, or payable to, the taxation authority is included as part of receivables or payables in the statement of financial position.

Additional income taxes that arise from the distribution of dividends are recognized at the same time as the liability to pay the related dividend is recognized.

(F) FINANCIAL INSTRUMENTS

A financial instrument is any contract that gives rise to a financial asset of one entity and a financial liability or equity instrument of another entity.

(i) Financial assets

Initial recognition and measurement

Financial assets are classified, at initial recognition, as subsequently measured at amortised cost, fair value through other comprehensive income (OCI), and fair value through profit or loss.

The classification of financial assets at initial recognition depends on the financial asset's contractual cash flow characteristics and the Company's business model for managing them. With the exception of trade receivables that do not contain a significant financing component or for which the Company has applied the practical expedient, the Company initially measures a financial asset at its fair value plus, in the case of a financial asset not at fair value through profit or loss, transaction costs. Trade receivables that do not contain a significant financing component or for which the Company has applied the practical expedient are measured at the transaction price as disclosed in section (c) Revenue from contracts with customers.

In order for a financial asset to be classified and measured at amortised cost or fair value through OCI, it needs to give rise to cash flows that are 'solely payments of principal and interest (SPPI)' on the principal amount outstanding. This assessment is referred to as the SPPI test and is performed at an instrument level. Financial assets with cash flows that are not SPPI are classified and measured at fair value through profit or loss, irrespective of the business model.

The Company's business model for managing financial assets refers to how it manages its financial assets in order to generate cash flows. The business model determines whether cash flows will result from collecting contractual cash flows, selling the financial assets, or both. Financial assets classified and measured at amortized cost are held within a business model with the objective to hold financial assets in order to collect contractual cash flows while financial assets classified and measured at fair value through OCI are held within a business model with the objective of both holding to collect contractual cash flows and selling.

Purchases or sales of financial assets that require delivery of assets within a time frame established by regulation or convention in the marketplace (regular way trades) are recognized on the trade date, i.e., the date that the Company commits to purchase or sell the asset.

Subsequent measurement

For purposes of subsequent measurement, financial assets are classified in four categories:

- Financial assets at amortized cost (debt instruments)
- Financial assets at fair value through OCI with recycling of cumulative gains and losses (debt instruments)
- Financial assets designated at fair value through OCI with no recycling of cumulative gains and losses upon derecognition (equity instruments)
- Financial assets at fair value through profit or loss

Financial assets at amortized cost (debt instruments)

Financial assets at amortized cost are subsequently measured using the effective interest method and are subject to impairment. Gains and losses are recognized in profit or loss when the asset is derecognized, modified or impaired.

The Company's financial assets at amortized cost includes trade receivables.

Financial assets designated at fair value through OCI (equity instruments)

Upon initial recognition, the Company can elect to classify irrevocably its equity investments as equity instruments designated at fair value through OCI when they meet the definition of equity under IAS 32 Financial Instruments: Presentation and are not held for trading. The classification is determined on an instrument-by-instrument basis.

Gains and losses on these financial assets are never recycled to profit or loss. Dividends are recognised as other income in the statement of profit or loss when the right of payment has been established, except when the Company benefits from such proceeds as a recovery of part of the cost of the financial asset, in which case, such gains are recorded in OCI. Equity instruments designated at fair value through OCI are not subject to impairment assessment.

The Company elected to classify irrevocably its other investments (note 12) and restricted cash (note 16) under this category.

Financial assets at fair value through profit or loss

Financial assets at fair value through profit or loss are carried in the statement of financial position at fair value with net changes in fair value recognized in the statement of profit or loss.

This category includes the Company's derivative instruments that have not been designated for hedge accounting.

A derivative embedded in a hybrid contract, with a financial liability or non-financial host, is separated from the host and accounted for as a separate derivative if: the economic characteristics and risks are not closely related to the host; a separate instrument with the same terms as the embedded derivative would meet the definition of a derivative; and the hybrid contract is not measured at fair value through profit or loss. Embedded derivatives are measured at fair value with changes in fair value recognized in profit or loss. Reassessment only occurs if there is either a change in the terms of the contract that significantly modifies the cash flows that would otherwise be required or a reclassification of a financial asset out of the fair value through profit or loss category. The Company does not currently have any embedded derivatives that are accounted for separately from the host.

Derecognition

A financial asset (or, where applicable, a part of a financial asset or part of a group of similar financial assets) is primarily derecognized (i.e., removed from the Company's consolidated statement of financial position) when the rights to receive cash flows from the asset have expired or when the Company has transferred its rights to receive cash flows from the asset or has assumed an obligation to pay the received cash flows in full without material delay to a third party under a 'pass-through' arrangement. In order for a pass-through arrangement to qualify for derecognition, the Company must have transferred substantially all the risks and rewards of the asset, or the Company has neither transferred nor retained substantially all the risks and rewards of the asset, but has transferred control of the asset.

When the Company has transferred its rights to receive cash flows from an asset or has entered into a passthrough arrangement, it evaluates if, and to what extent, it has retained the risks and rewards of ownership. When it has neither transferred nor retained substantially all of the risks and rewards of the asset, nor transferred control of the asset, the Company continues to recognize the transferred asset to the extent of its continuing involvement. In that case, the Company also recognizes an associated liability. The transferred asset and the associated liability are measured on a basis that reflects the rights and obligations that the Company has retained.

Continuing involvement that takes the form of a guarantee over the transferred asset is measured at the lower of the original carrying amount of the asset and the maximum amount of consideration that the Company could be required to repay.

Impairment

The Company recognizes an allowance for expected credit losses ("ECL's") for all debt instruments not held at fair value through profit or loss. ECL's are based on the difference between the contractual cash flows due in accordance with the contract and all the cash flows that the Company expects to receive, discounted at an approximation of the original effective interest rate. The expected cash flows will include cash flows from the sale of collateral held or other credit enhancements that are integral to the contractual terms.

ECLs are recognized in two stages. For credit exposures for which there has not been a significant increase in credit risk since initial recognition, ECL's are provided for credit losses that result from default events that are possible within the next 12 months (a 12-month ECL). For those credit exposures for which there has been a significant increase in credit risk since initial recognition, a loss allowance is required for credit losses expected over the remaining life of the exposure, irrespective of the timing of the default (a lifetime ECL).

For trade receivables and contract assets, the Company applies a simplified approach in calculating ECL's. Therefore, the Company does not track changes in credit risk, but instead recognizes a loss allowance based on lifetime ECL's at each reporting date. The Company has established a provision matrix that is based on its historical credit loss experience, adjusted for forward-looking factors specific to the debtors and the economic environment.

The Company considers a financial asset to be in default when internal or external information indicates that the Company is unlikely to receive the outstanding contractual amounts in full before considering any credit enhancements held by the Company. A financial asset is written-off when there is no reasonable expectation of recovering the contractual cash flows.

(ii) Financial liabilities

Initial recognition and measurement

Financial liabilities are classified, at initial recognition, as financial liabilities at fair value through profit or loss, loans and borrowings, payables, or as derivatives designated as hedging instruments in an effective hedge, as appropriate.

All financial liabilities are recognized initially at fair value and, in the case of loans and borrowings and payables, net of directly attributable transaction costs.

The Company's financial liabilities include trade and other payables, loans and borrowings, short-term bank debt and derivative financial instruments.

Subsequent measurement

For purposes of subsequent measurement, financial liabilities are classified in two categories:

- Financial liabilities at fair value through profit or loss
- Financial liabilities at amortized cost (loans and borrowings)

Financial liabilities at fair value through profit or loss

Financial liabilities at fair value through profit or loss include financial liabilities held for trading and financial liabilities designated upon initial recognition as at fair value through profit or loss.

Financial liabilities are classified as held for trading if they are incurred for the purpose of repurchasing in the near term. This category also includes derivative financial instruments entered into by the Company that are not designated as hedging instruments in hedge relationships as defined by IFRS 9. Separated embedded derivatives are also classified as held for trading unless they are designated as effective hedging instruments.

Gains or losses on liabilities held for trading are recognized in the statement of profit or loss.

Financial liabilities designated upon initial recognition at fair value through profit or loss are designated at the initial date of recognition, and only if the criteria in IFRS 9 are satisfied. The Company has not designated any financial liability as at fair value through profit or loss.

Financial liabilities at amortized cost (loans and borrowings)

This is the category most relevant to the Company. After initial recognition, interest-bearing loans and borrowings are subsequently measured at amortized cost using the effective interest rate method. Gains and losses are recognized in profit or loss when the liabilities are derecognized as well as through the effective interest rate amortization process.

Amortized cost is calculated by taking into account any discount or premium on acquisition and fees or costs that are an integral part of the effective interest rate. The effective interest rate amortization is included as finance costs in the statement of profit or loss.

This category generally applies to interest-bearing loans and borrowings (note 21) and short-term bank debt (note 22).

Derecognition

A financial liability is derecognized when the obligation under the liability is discharged or cancelled or expires. When an existing financial liability is replaced by another from the same lender on substantially different terms, or the terms of an existing liability are substantially modified, such an exchange or modification is treated as the derecognition of the original liability and the recognition of a new liability. The difference in the respective carrying amounts is recognized in the statement of profit or loss.

(iii) Offsetting of financial instruments

Financial assets and financial liabilities are offset and the net amount is reported in the consolidated statement of financial position if there is a currently enforceable legal right to offset the recognized amounts and there is an intention to settle on a net basis, to realize the assets and settle the liabilities simultaneously.

(iv) Derivative financial instruments and hedge accounting

The Company uses derivative financial instruments, such as forward currency contracts, interest rate caps and swaps and forward commodity contracts, to hedge its foreign currency risks, interest rate risks and commodity price risks, respectively. Such derivative financial instruments are initially recognized at fair value on the date on which a derivative contract is entered into and are subsequently remeasured at fair value. Derivatives are carried as financial assets when the fair value is positive and as financial liabilities when the fair value is negative.

The Company designates certain derivatives as hedging instruments to hedge the variability in cash flows associated with highly probable forecast transactions arising from changes in foreign exchange rates, commodity prices and interest rates.

At inception of designated hedging relationships, the Company documents the risk management objective and strategy for undertaking the hedge. The Company also documents the economic relationship between the hedged item and the hedging instrument, including whether the changes in cash flows of the hedged item and hedging instrument are expected to offset each other.

Cash flow hedges

When a derivative is designated as a cash flow hedging instrument, the effective portion of changes in the fair value of the derivative is recognized in other comprehensive income and accumulated in the hedging reserve. Any ineffective portion of changes in the fair value of the derivative is recognized immediately in profit or loss.

The Company designates only the change in fair value of the spot element of forward exchange contracts as the hedging instrument in cash flow hedging relationships. The change in fair value of the forward element of forward exchange contracts is separately accounted for as a cost of hedging and recognized in a cost of hedging reserve within equity.

When the hedged forecast transaction subsequently results in the recognition of a non-financial item such as inventory, the amount accumulated in the hedging reserve and the cost of hedging reserve is included directly in the initial cost of the non-financial item when it is recognized.

For all other hedged forecast transactions, the amount accumulated in the hedging reserve and the cost of hedging reserve is reclassified to profit or loss in the same period or periods during which the hedged expected future cash flows affect profit or loss.

If the hedge no longer meets the criteria for hedge accounting or the hedging instrument is sold, expires, is terminated or is exercised, then hedge accounting is discontinued prospectively. When hedge accounting for cash flow hedges is discontinued, the amount that has been accumulated in the hedging reserve remains in equity until, for a hedge of a transaction resulting in the recognition of a non-financial item, it is included in the non-financial item's cost on its initial recognition or, for other cash flow hedges, it is reclassified to profit or loss in the same period or periods as the hedged expected future cash flows affect profit or loss.

If the hedged future cash flows are no longer expected to occur, then the amounts that have been accumulated in the hedging reserve and the cost of hedging reserve are immediately reclassified to profit or loss.

(G) EMPLOYEE BENEFITS

(i) Short-term benefits

Short-term employee benefits are expensed as the related service is provided. A liability is recognized for the amount expected to be paid if the Company has a present legal or constructive obligation to pay this amount as a result of past service provided by the employee and the obligation can be estimated reliably.

(ii) Share-based payment transactions

The grant date fair value of equity-settled share-based payment arrangements granted to employees is generally recognized as an expense, with a corresponding increase in equity, over the vesting period of the awards. The amount recognized as an expense is adjusted to reflect the number of awards for which the related service and non-market performance conditions are expected to be met, such that the amount ultimately recognized is based on the number of awards that meet the related service and non-market performance conditions at the vesting date. For share-based payment awards with non-vesting conditions, the grant date fair value of the share-based payment is measured to reflect such conditions and there is no true-up for differences between expected and actual outcomes.

(iii) Defined contribution plans

Obligations for contributions to defined contribution plans are expensed as the related service is provided. Prepaid contributions are recognized as an asset to the extent that a cash refund or a reduction in future payments is available.

(iv) Defined benefit plans

The Company's net obligation in respect of defined benefit plans is calculated separately for each plan by estimating the amount of future benefit that employees have earned in the current and prior periods, discounting that amount and deducting the fair value of any plan assets.

The calculation of defined benefit obligations is performed annually by a qualified actuary using the projected unit credit method. When the calculation results in a potential asset for the Company, the recognized asset is limited to the present value of economic benefits available in the form of any future refunds from the plan or reductions in future contributions to the plan. To calculate the present value of economic benefits, consideration is given to any applicable minimum funding requirements.

Remeasurements of the net defined benefit liability, which comprise actuarial gains and losses, the return on plan assets (excluding interest) and the effect of the asset ceiling (if any, excluding interest), are recognized immediately in other comprehensive income. The Company determines the net interest expense (income) on the net defined benefit liability (asset) for the period by applying the discount rate used to measure the defined benefit obligation at the beginning of the annual period to the then net defined benefit liability (asset), taking into account any changes in the net defined benefit liability (asset) during the period as a result of contributions and benefit payments. Net interest expense and other expenses related to defined benefit plans are recognized in profit or loss.

When the benefits of a plan are changed or when a plan is curtailed, the resulting change in benefit that relates to past service or the gain or loss on curtailment is recognized immediately in profit or loss. The Company recognizes gains and losses on the settlement of a defined benefit plan when the settlement occurs.

(v) Other long-term employee benefits

The Company's net obligation in respect of long-term employee benefits is the amount of future benefit that employees have earned in return for their service in the current and prior periods. That benefit is discounted to determine its present value. Remeasurements are recognized in profit or loss in the period in which they arise.

(vi) Termination benefits

Termination benefits are expensed at the earlier of when the Company can no longer withdraw the offer of those benefits and when the Company recognizes costs for a restructuring. If benefits are not expected to be settled wholly within 12 months of the reporting date, then they are discounted.

(H) PROPERTY, PLANT AND EQUIPMENT

(i) Recognition and measurement

Items of property, plant and equipment are measured at cost, which includes capitalized borrowing costs, less accumulated depreciation and any accumulated impairment losses.

Costs associated with developing mine reserves are recognized in property, plant and equipment when they are established as commercially viable. These costs can include amounts that were previously recognized as intangible assets during the evaluation phase of the mine development.

Borrowing costs directly attributable to the acquisition, construction or production of an asset that necessarily takes a substantial period of time to get ready for its intended use or sale are capitalized as part of the cost of the respective assets. All other borrowing costs are expensed in the period they occur. Borrowing costs consist of interest and other costs that an entity incurs in connection with the borrowing of funds.

If significant parts of an item of property, plant and equipment have different useful lives, then they are accounted for as separate items (major components) of property, plant and equipment.

Any gain or loss on disposal of an item of property, plant and equipment is recognized in profit or loss.

(ii) Subsequent expenditures

Subsequent expenditure is capitalized only if it is probable that the future economic benefits associated with the expenditure will flow to the Company.

(iii) Depreciation

Depreciation is calculated to write-off the cost of items of property, plant and equipment less their estimated residual values using the straight-line method over their estimated useful lives and is generally recognized in the income statement. Prior to the adoption of IFRS 16 on January 1, 2019, leased assets were depreciated over the shorter of the lease term and their useful lives unless it is reasonably certain that the Company will obtain ownership by the end of the lease term. Land is not depreciated.

The estimated useful lives of property, plant and equipment for current and comparative periods are as follows:

- mining costs 3-20 years
- buildings and improvements 2-50 years
- machinery and equipment 2-20 years
- furniture and fixtures 2-20 years

Depreciation methods, useful lives and residual values are reviewed at each reporting date and adjusted if appropriate.

The depreciation of certain mining costs is linked to production levels. Therefore, these assets are amortized using a units of production basis. The Company's mine in Brazil is currently the only mine asset being depreciated using this basis and approximates a 27-year remaining life of the mine based on updated geology studies. Other mining assets are depreciated on a straight-line basis ranging from 3-20 years, depending on useful life.

(I) GOODWILL AND OTHER INTANGIBLE ASSETS

(i) Goodwill

Goodwill arising on the acquisition of subsidiaries is measured at cost less accumulated impairment losses.

(ii) Research and development

Expenditure on research activities is recognized in profit or loss when incurred.

Development expenditures are capitalized if and only if the following criteria are met:

- the expenditure can be measured reliably;
- the product or process is technically and commercially feasible;
- future economic benefits are probable; and
- the Company intends to and has sufficient resources to complete development and to use or sell the asset.

Research and development costs that do not qualify as assets are shown within selling, general and administrative expenses in the consolidated income statement. Subsequent to initial recognition, development expenditure is measured at cost less accumulated amortization and any accumulated impairment losses.

(iii) Mining assets

Mining assets which are included in intangible assets include exploration, evaluation and development expenditures. See significant accounting policies section (k) for additional information on the accounting for mining assets.

(iv) Other intangible assets

Other intangible assets, including customer relationships, patents and trademarks that are acquired by the Company and have finite useful lives are measured at cost less accumulated amortization and any accumulated impairment losses.

(v) Subsequent expenditure

Subsequent expenditure is capitalized only when it increases the future economic benefits embodied in the specific asset to which it relates. All other expenditure, including expenditure on internally generated goodwill, is recognized in the income statement as incurred.

(vi) Amortization

Amortization is calculated to write-off the cost of intangible assets less their estimated residual values using the straight-line method over their estimated useful lives, and is generally recognized in profit or loss. Goodwill is not amortized. Amortization methods, useful lives and residual values are reviewed at each reporting date and adjusted if appropriate.

The estimated useful lives for current and comparative periods are based on expected futures sales for the related asset and are as follows:

- customer relationships 4-20 years
- development costs 5-20 years
- mining assets 3-15 years
- other intangibles 3-13 years

(J) INVENTORIES

Inventories are measured at the lower of cost and net realizable value. The cost of inventories is determined based on the average cost and specific identification methods, and includes expenditures incurred in acquiring the inventories and bringing them to their existing location and condition. In the case of finished goods inventory and work in process, cost includes materials and labor as well as an appropriate share of production overhead based on normal operating capacity.

(K) MINING ASSETS

(i) Exploration, evaluation and development expenditures

Exploration and evaluation expenditures relate to costs incurred on the exploration and evaluation of potential mineral resources. These costs are recorded as intangible assets while exploration is in progress. When commercially recoverable reserves are determined, and such development receives the appropriate approvals, capitalized exploration and evaluation expenditures are transferred to construction in progress. Upon completion of development and commencement of production, capitalized development costs as well as exploration and evaluation expenditures are transferred to mining assets in property, plant and equipment and depreciated over their estimated useful life.

(ii) Deferred stripping costs

The Company is following IFRIC 20 for all surface mine accounting. The Interpretation only applies to stripping costs incurred during the production phase of a surface mine (production stripping costs). Costs incurred in undertaking stripping activities are considered to create two possible benefits – the production of inventory in the current period and/or improved access to ore to be mined in a future period. Where the benefits are realized in the form of inventory produced, the production stripping costs are to be accounted for in accordance with IAS 2. Where the benefit is improved access to ore to be mined in the future, these costs are to be recognized as a non-current asset.

Production stripping costs are capitalized as part of an asset when the Company can demonstrate: a) it is probable that future economic benefit associated with the stripping activity will flow to the entity; b) the entity can identify the component of an ore body for which access has been improved; and c) the costs can be reliably measured. These costs are amortized over the life of the component ore body identified.

(L) LEASES

The Company has applied IFRS 16 using the modified retrospective approach and therefore the comparative information has not been restated and continues to be reported under IAS 17 and IFRIC 4. The details of accounting policies under IAS 17 and IFRIC 4 are disclosed separately.

Policy applicable from January 1, 2019

At inception of a contract, the Company assesses whether a contract is, or contains, a lease. A contract is, or contains, a lease if the contract conveys the right to control the use of an identified asset for a period of time in exchange for consideration. To assess whether a contract conveys the right to control the use of an identified asset, the Company uses the definition of a lease in IFRS 16.

This policy is applied to contracts entered into, on or after January 1, 2019.

(i) As a lessee

At commencement or on modification of a contract that contains a lease component, the Company allocates the consideration in the contract to each lease component on the basis of its relative stand-alone prices.

The Company recognizes a right-of-use asset and a lease liability at the lease commencement date. The right-of-use asset is initially measured at cost, which comprises the initial amount of the lease liability adjusted for any lease payments made at or before the commencement date, plus any initial direct costs incurred and an estimate of costs to dismantle and remove the underlying asset or to restore the underlying asset or the site on which it is located, less any lease incentives received.

The right-of-use asset is subsequently depreciated using the straight-line method from the commencement date to the end of the lease term, unless the lease transfers ownership of the underlying asset to the Company by the end of the lease term or the cost of the right-of-use asset reflects that the Company will exercise a purchase option. In that case the right-of-use asset will be depreciated over the useful life of the underlying asset, which is determined on the same basis as those of property and equipment. In addition, the right-of-use asset is periodically reduced by impairment losses, if any, and adjusted for certain remeasurements of the lease liability.

The lease liability is initially measured at the present value of the lease payments that are not paid at the commencement date, discounted using the interest rate implicit in the lease or, if that rate cannot be readily determined, the Company's incremental borrowing rate. Generally, the Company uses its incremental borrowing rate as the discount rate.

The Company determines its incremental borrowing rate by obtaining interest rates from various external financing sources and makes certain adjustments to reflect the terms of the lease and type of the asset leased.

The lease liability is subsequently increased by the interest cost of the lease liability and decreased by payments of the lease.

Lease payments included in the measurement of the lease liability comprise the following:

- fixed payments, including in-substance fixed payments;
- variable lease payments that depend on an index or a rate, initially measured using the index or rate as at the commencement date;
- amounts expected to be payable under a residual value guarantee; and
- the exercise price under a purchase option that the Company is reasonably certain to exercise, lease payments in an optional renewal period if the Company is reasonably certain to exercise an extension option, and penalties for early termination of a lease unless the Company is reasonably certain not to terminate early.

The lease liability is measured at amortized cost using the effective interest method. It is remeasured when there is a change in future lease payments arising from a change in an index or rate, if there is a change in the Company's estimate of the amount expected to be payable under a residual value guarantee, if the Company changes its assessment of whether it will exercise a purchase, extension or termination option or if there is a revised in-substance fixed lease payment.

When the lease liability is remeasured in this way, a corresponding adjustment is made to the carrying amount of the right-of-use asset or is recorded in profit or loss if the carrying amount of the right-of-use asset has been reduced to zero.

The Company presents right-of-use assets that do not meet the definition of investment property in property, plant and equipment and lease liabilities are presented as a separate line item in the statement of financial position.

Short-term leases and leases of low-value assets

The Company has elected not to recognize right-of-use assets and lease liabilities for leases of low-value assets and short-term leases. The Company recognizes the lease payments associated with these leases as an expense on a straight-line basis over the lease term.

Policy applicable before January 1, 2019

(i) Determining whether an arrangement contains a lease

At inception of an arrangement, the Company determines whether the arrangement is or contains a lease.

At inceptions or on reassessment of an arrangement that contains a lease, the Company separates payments and other consideration required by the arrangement into those for the lease and those for other elements on the basis of their relative fair values. If the Company concludes for a finance lease that it is impracticable to separate the payments reliably, then an asset and a liability are recognized at an amount equal to the fair value of the underlying asset; subsequently, the liability is reduced as payments are made and an imputed finance cost on the liability is recognized using the Company's incremental borrowing rate.

(ii) Leased assets

Leases of property, plant and equipment that transfer to the Company substantially all of the risks and rewards of ownership are classified as finance leases. The leased assets are measured initially at an amount equal to the lower of their fair value and the present value of the minimum lease payments. Subsequent to initial recognition, the assets are accounted for in accordance with the accounting policy applicable to that asset.

Assets held under other leases are classified as operating leases and are not recognized in the Company's statement of financial position.

(iii) Lease payments

Payments made under operating leases are recognized in the income statement on a straight-line basis over the term of the lease. Lease incentives received are recognized as an integral part of the total lease expense, over the term of the lease.

Minimum lease payments made under finance leases are apportioned between the finance cost and the reduction of the outstanding liability. The finance cost is allocated to each period during the lease term so as to produce a constant periodic rate of interest on the remaining balance of the liability.

(M) ASSETS HELD FOR SALE

Non-current assets, or disposal groups comprising assets and liabilities, are classified as held for sale if it is highly probable that they will be recovered primarily through sale rather than through continuing use.

Such assets, or disposal groups, are generally measured at the lower of their carrying amount and fair value less costs to sell. Any impairment loss on a disposal group is allocated first to goodwill, and then to the remaining assets and liabilities on a pro rata basis, except that no loss is allocated to inventories, financial assets, deferred tax assets, employee benefit assets, investment property or biological assets, which continue to be measured in accordance with the Company's other accounting policies. Impairment losses on initial classification as held for sale or held for distribution and subsequent gains and losses on remeasurement are recognized in the income statement.

Once classified as held for sale, intangible assets and property, plant and equipment are no longer amortized or depreciated, and any equity-accounted investee is no longer equity accounted.

(N) IMPAIRMENT OF NON-FINANCIAL ASSETS

At each reporting date, the Company reviews the carrying amounts of its non-financial assets (other than inventories, contract assets and deferred tax assets) to determine whether there is any indication of impairment. If any such indication exists, then the asset's recoverable amount is estimated. Goodwill is tested annually for impairment.

For impairment testing, assets are grouped together into the smallest group of assets that generates cash inflows from continuing use that are largely independent of the cash inflows of other assets or cash generating units. Goodwill arising from a business combination is allocated to cash generating units or groups of cash generating units that are expected to benefit from the synergies of the combination.

The recoverable amount of an asset or cash generating unit is the greater of its value in use and its fair value less costs to sell. Value in use is based on the estimated future cash flows, discounted to their present value using a pre-tax discount rate that reflects current market assessments of the time value of money and the risks specific to the asset or cash generating unit.

An impairment loss is recognized if the carrying amount of an asset or cash generating unit exceeds its recoverable amount.

Impairment losses are recognized in the income statement. They are allocated first to reduce the carrying amount of any goodwill allocated to the cash generating unit, and then to reduce the carrying amounts of the other assets in the cash generating unit on a pro rata basis.

An impairment loss in respect of goodwill is not reversed. For other assets, an impairment loss is reversed only to the extent that the asset's carrying amount does not exceed the carrying amount that would have been determined, net of depreciation or amortization, if no impairment loss had been recognized.

(O) PROVISIONS

Provisions are recognized when:

- the Company has a present obligation (legal or constructive) as a result of a past event;
- it is probable that an outflow of resources embodying economic benefits will be required to settle the obligation; and
- a reliable estimate can be made for the amount of the obligation.

If the effect of the time value of money is material, provisions are discounted using a current pre-tax rate that reflects current market assessments of the time value of money and the risks specific to the liability. The unwinding of the discount is recognized as finance cost.

(i) Environmental remediation costs and recoveries

Certain subsidiaries of the Company are faced with a number of issues relating to environmental clean-up requirements, largely resulting from historical solid and hazardous waste handling and disposal practices at their facilities. In accordance with the Company's environmental policy and applicable legal requirements, provisions associated with environmental remediation obligations are accrued when such losses are deemed probable and reasonably estimable. Such accruals generally are recognized no later than the completion of the remedial feasibility study and are adjusted as further information develops or circumstances change.

A provision is made for shutdown, restoration and environmental rehabilitation costs in the financial period when the related environmental disturbance occurs, based on the estimated future costs using information available at the reporting date. The provision is discounted using a current market-based pre-tax discount rate and any change in the discount is included in finance cost. The provision is reviewed on an annual basis for changes to obligations, legislation or discount rates that may lead to changes in cost estimates or the expected timeline for payments.

Where the Company expects some or all of an environmental provision to be reimbursed, for example using a trust account, the reimbursement is recognized as a separate asset but only when the reimbursement is virtually certain. The expense relating to any provision is presented in the income statement net of any reimbursement. The subsidiaries of the Company have been required, in certain instances, to create trust funds for the environmental rehabilitation. Once established, the subsidiaries have a 100% interest in these funds. Rehabilitation and restoration trust funds holding monies committed for use in satisfying environmental obligations are included on a discounted basis within other non-current assets on the statement of financial position, only to the extent that a liability exists for these obligations.

Environmental expense recoveries are generally recognized in profit upon final settlement with the Company's insurance carriers.

Additional environmental remediation costs and provisions may be required if the Company were to decide to close certain of its sites. Certain of the Company's restructuring programs have involved closure of sites. Remediation liabilities are recognized when the site closure has been announced. In the opinion of the Company, it is not possible to estimate reliably the costs that would be incurred on the eventual closure of its continuing sites, where there is no present obligation to remediate, because it is neither possible to determine a time limit beyond which the sites will no longer be operated, nor what remediation costs may be required on their eventual closure.

(ii) Restructuring

A provision for restructuring is recognized when the Company or a subsidiary of the Company has approved a detailed and formal restructuring plan, and the restructuring either has commenced or has been announced publicly. Provisions are not made for future operating costs. The timing of recording of portions of the restructuring provision is dependent on receiving social plan approval in certain jurisdictions. Changes in the estimate of costs related to restructuring plans are included in profit or loss in the period when the change is identified.

(iii) Warranty

A provision for warranty is recognized when the Company or a subsidiary of the Company has determined that it has a basis for recording a warranty provision based on historical returns for warranty work. The estimate of warranty-related costs is updated and revised at each reporting date.

(iv) Partial retirement

In an effort to reduce unemployment and create jobs for younger job-seekers, Germany implemented certain regulations in 1996 to enable employees to take early retirement. Although the law is no longer in effect, the Company's German subsidiaries have made provisions for those employees who are eligible per their employment contracts. According to German law, the Company is required to pay a deposit for partial retirements to secure payments to the employees in the case of insolvency. The Company records the related deposits and provisions on a net basis.

The collective agreements for retirement indemnities on our French subsidiary and the corresponding commitments are updated and revised at each reporting date.

(v) Cost estimates

As part of its process to provide reliable estimations of profitability for long-term contracts, the Company makes provisions for cost estimates for completed contracts. These provisions are developed on a contract by contract basis and are based on contractor estimates and are utilized or derecognized depending on actual performance of the contracts. The cost estimates are updated and revised at each reporting date.

(vi) Restoration, rehabilitation and decommissioning costs

Restoration, rehabilitation and decommissioning costs arising from the installation of plant and other site preparation work, discounted to their net present value, are provided for and capitalized at the time such an obligation arises. The costs are charged to the income statement over the life of the operation through depreciation of the asset and the unwinding of the discount on the provision.

Mine rehabilitation costs will be incurred by the Company at the end of the operating life of some of the Company's facilities and mine properties. The Company assesses its mine rehabilitation provision at each reporting date. The ultimate rehabilitation costs are uncertain, and cost estimates can vary in response to many factors, including estimates of the extent and costs of rehabilitation activities, technological changes, regulatory changes, cost increases as compared to the inflation rates, and changes in discount rates. The provision recorded at each reporting date represents management's best estimate of the present value of the future rehabilitation costs required.

Costs for restoration of subsequent site disturbance, which is created on an ongoing basis during production, are provided for at their net present values and charged to the income statement as extraction progresses.

(P) NEW AND AMENDED STANDARDS AND INTERPRETATIONS

The Company initially applied IFRS 16 Leases from January 1, 2019. A number of other new standards are also effective from January 1, 2019 but they do not have a material effect on the Group's financial statements.

IFRS 16 Leases

IFRS 16 introduced a single, on-balance sheet accounting model for lessees. As a result, the Company, as a lessee, has recognized right-of-use assets representing its rights to use the underlying assets and lease liabilities representing its obligation to make lease payments. Lessor accounting remains similar to previous accounting policies.

The Company applied IFRS 16 using the modified retrospective approach, under which the cumulative effect of initial application is recognized in retained earnings at January 1, 2019. Accordingly, the comparative information presented for 2018 has not been restated and is presented, as previously reported, under IAS 17 and related interpretations. The details of the changes in accounting policies are disclosed below.

(i) Definition of a lease

Previously, the Company determined at contract inception whether an arrangement was or contained a lease under IFRIC 4 *Determining Whether an Arrangement contains a Lease*. The Company now assesses whether a contract is or contains a lease based on the new definition of a lease. Under IFRS 16, a contract is, or contains, a lease if the contract conveys a right to control the use of an identified asset for a period of time in exchange for consideration.

On transition to IFRS 16, the Company elected to apply the practical expedient to grandfather the assessment of which transactions are leases. It applied IFRS 16 only to contracts that were previously identified as leases. Contracts that were not identified as leases under IAS 17 and IFRIC 4 were not reassessed. Therefore, the definition of a lease under IFRS 16 has been applied only to contracts entered into or changed on or after January 1, 2019.

(ii) Lessee arrangements

The Company leases a variety of assets which are primarily comprised of buildings, equipment, machinery and automobiles.

As a lessee, the Company previously classified leases as operating or finance leases based on its assessment of whether the lease transferred substantially all of the risks and rewards of ownership. Under IFRS 16, the Company recognizes right-of-use assets and lease liabilities for most leases resulting in recognition of these amounts on the balance sheet.

Transition

Previously, the Company classified property leases as operating leases under IAS 17. These include leases for office space, facilities and equipment. Some leases include an option to renew the lease.

Upon transition to IFRS 16, lease liabilities were measured at the present value of the remaining lease payments for all leases that had previously been classified as operating leases under IAS 17. The future lease payments were discounted at the Company's incremental borrowing rate at January 1, 2019. Right-of-use assets were measured at an amount equal to the lease liability and adjusted by the amount of any prepaid or accrued lease payments as well as any previously recognized onerous lease provisions.

The Company used the following practical expedients when applying IFRS 16 to leases that had previously been classified as operating leases under IAS 17:

- Applied the exemption not to recognize right-of-use assets and liabilities for leases with less than 12 months remaining on the lease term at the date of adoption.
- Excluded initial direct costs from measuring right-of-use assets at the date of initial application.
- Used hindsight when determining the lease term if the contract contains options to extend or terminate the lease.
- Relied on previous assessments for the determination of onerous leases and adjusted the carrying amount of the right-of-use asset at the date of initial application by the previous carrying amount of its onerous lease provision.

The Company leases a number of items of production equipment. Some of these leases had previously been classified as finance leases under IAS 17. For these leases, the carrying amount of the right-of-use asset and the lease liability at January 1, 2019 were determined at the carrying amount of the lease asset and lease liability under IAS 17 immediately before the date of adoption.

(iii) Impacts on financial statements

On transition to IFRS 16, the Company recognized additional right-of-use assets and lease liabilities. The right-of-use assets were offset by the value of accrued rent amounts that had been classified in other liabilities. Leases that were previously classified within loans and borrowings as finance leases were included in the lease liabilities at their carrying amount as of January 1, 2019. The impact upon transition is summarized as follows:

	January 1, 2019
Right-of-use assets presented in property, plant and equipment	37,355
Lease liabilities	37,372
Loans and borrowings	(23)
Other liabilities	(17)

When measuring lease liabilities for leases that were previously classified as operating leases, the Company discounted lease payments using the implicit lease rate, if determinable, or its incremental borrowing rate at January 1, 2019. The weighted average rate applied was 3.74%.

Operating lease commitments as at December 31, 2018	44,187
Weighted average rate at January 1, 2019	3.74%
Discounted operating lease commitments at January 1, 2019	36,310
Less:	
Commitments relating to short-term leases	213
Commitments relating to leases of low value assets	180
Add:	
Payments in optional extension periods not recognized as at December 31, 2018	1,432
Additional lease liabilities recognized as at January 1, 2019	37,349
Commitments related to leases previously classified as finance leases	23
Total lease liabilities as at January 1, 2019	37,372

(Q) STANDARDS ISSUED BUT NOT YET EFFECTIVE

A number of new standards are effective for annual periods beginning after January 1, 2019 and earlier application is permitted; however, the Company has not early adopted the new or amended standards in preparing these consolidated financial statements. The following amended standards and interpretations are not expected to have a significant impact on the Company's consolidated financial statements.

- Amendments to References to Conceptual Framework in IFRS Standards.
- Definition of a Business (Amendments to IFRS 3).
- Definition of Material (Amendments to IAS 1 and IAS 8).
- IFRS 17 Insurance Contracts.

4. SEGMENT REPORTING

Beginning on January 1, 2019, the Company created AMG Technologies, a new operating division that comprised AMG's former Engineering and Titanium Alloys businesses. As a result of this realignment, the Company changed its organizational structure and the composition of its operating segments, which resulted in a change in reportable segments. AMG Technologies replaced the former Engineering segment, and the Critical Materials segment is now comprised of seven operating units: Vanadium, Superalloys, Tantalum & Lithium, Graphite, Silicon, Aluminum and Antimony. Accordingly, the Company restated the previously reported segment information for the year ended December 31, 2018.

Management monitors the operating results of its segments separately for the purpose of making decisions about resource allocation and performance assessment. Segment performance is evaluated based on operating profit or loss and is measured consistently with operating profit or loss in the consolidated financial statements. The Company's headquarters costs, financing (including finance cost and finance income) and assets are managed on a group basis and are allocated to operating segments. Transfer prices between operating segments are on an arm's length basis in a manner similar to transactions with third parties.

AMG Critical Materials

AMG Critical Materials develops and produces specialty metals, alloys, chemicals and high performance materials. AMG Critical Materials is a significant producer of specialty metals, such as ferrovanadium, ferronickel-molybdenum, aluminum master alloys and powders, chromium metal, tantalum, antimony, lithium, natural graphite, and silicon metal for energy, aerospace, infrastructure and specialty metal and chemicals applications. AMG Critical Materials has major production facilities in the UK, the US, Germany, France, China, and Brazil.

AMG Technologies

AMG Technologies designs, engineers and produces advanced vacuum furnace systems and operates vacuum heat treatment facilities and develops titanium aluminides and titanium alloys, primarily for the aerospace and energy (including solar and nuclear) industries. Furnace systems produced by AMG Technologies include vacuum remelting, vacuum induction melting, vacuum heat treatment and high pressure gas quenching, turbine blade coating and sintering. AMG Technologies also provides vacuum case-hardening heat treatment services on a tolling basis. AMG Technologies has production facilities that are located in Germany, France, Mexico, India, China and the US.

AMG Corporate headquarters costs and assets are allocated sixty-five percent to AMG Critical Materials and thirty-five percent to AMG Technologies in 2019 and 2018 based on an estimation of services provided to the operating segments.

Year ended December 31, 2019	AMG Critical Materials	AMG Technologies	Eliminations[a]	Total
Revenue				
Revenue from external customers	762,482	426,089	—	1,188,571
Intersegment revenue	2,457	5,432	(7,889)	—
Total revenue	764,939	431,521	(7,889)	1,188,571
Segment results				
Depreciation and amortization	27,352	14,615	—	41,967
Restructuring	1,315	1,950	—	3,265
Asset impairment	5,873	(1,354)	—	4,519
Write-downs of inventory to net realizable value	83,273	5,128	—	88,401
Environmental	—	725	—	725
Operating (loss) profit	(59,318)	33,596	—	(25,722)
Statement of financial position				
Segment assets	1,049,653	398,738	—	1,448,391
Other investments	23,565	—	—	23,565
Total assets	1,073,218	398,738	—	1,471,956
Segment liabilities	774,060	286,185	—	1,060,245
Employee benefits	68,103	107,767	—	175,870
Provisions	37,266	14,169	—	51,435
Total liabilities	879,429	408,121	—	1,287,550
Other information				
Capital expenditures for expansion – tangible assets	45,567	10,858	—	56,425
Capital expenditures for maintenance – tangible assets	14,215	7,054	—	21,269
Capital expenditures – intangible assets	226	1,522	—	1,748

Year ended December 31, 2018	AMG Critical Materials	AMG Technologies	Eliminations[a]	Total
Revenue				
Revenue from external customers	873,440	436,848	—	1,310,288
Intersegment revenue	2,197	4,258	(6,455)	—
Total revenue	875,637	441,106	(6,455)	1,310,288
Segment results				
Depreciation and amortization	22,470	10,564	—	33,034
Restructuring	1,040	1,012	—	2,052
Asset impairment	(824)	4,157	—	3,333
Write-downs of inventory to net realizable value	1,183	4,599	—	5,782
Environmental	8,012	745	—	8,757
Operating profit	114,494	48,767	—	163,261
Statement of financial position				
Segment assets	948,763	350,721	—	1,299,484
Other investments	21,452	—	—	21,452
Total assets	970,215	350,721	—	1,320,936
Segment liabilities	524,777	244,327	—	769,104
Employee benefits	54,007	95,210	—	149,217
Provisions	42,460	16,112	—	58,572
Total liabilities	621,244	355,649	—	976,893
Other information				
Capital expenditures for expansion – tangible assets	36,631	8,471	—	45,102
Capital expenditures for maintenance – tangible assets	21,440	5,174	—	26,614
Capital expenditures – intangible assets	450	865	—	1,315

[a] Eliminations column includes intersegment trade eliminations. The intersegment revenue eliminates against the intersegment cost of sales.

GEOGRAPHICAL INFORMATION

Geographical information for the Company is provided below. Revenues are based on the shipping location of the customer while non-current assets are based on the physical location of the assets.

	Year ended December 31, 2019		Year ended December 31, 2018	
	Revenues	Non-current assets	Revenues	Non-current assets
United States	388,841	113,590	453,113	63,434
Germany	184,879	173,028	264,085	120,752
China	98,589	1,202	78,743	1,209
France	61,491	19,972	52,375	21,890
United Kingdom	61,469	17,849	55,613	16,520
Italy	46,959	—	38,798	—
Japan	45,170	44	42,237	18
Brazil	41,874	138,943	42,174	131,352
Austria	29,945	—	34,757	—
South Korea	21,963	—	22,906	—
India	21,200	276	20,936	88
Mexico	16,729	4,553	16,359	5,213
Belgium	14,959	—	16,068	—
Russia	13,841	20	4,147	8
Sweden	10,808	—	13,329	—
Spain	10,562	124	9,589	208
Poland	9,924	—	8,903	—
Canada	9,361	—	11,822	—
Turkey	8,203	—	12,027	—
Netherlands	7,815	—	8,828	—
Kazakhstan	7,082	—	9,449	—
Czech Republic	6,792	7	5,177	1,531
Australia	5,452	—	8,250	—
Switzerland	4,989	—	4,836	—
Taiwan	4,573	—	5,326	—
Thailand	3,648	36	2,485	—
Argentina	1,801	—	2,047	—
Singapore	1,257	—	1,377	—
Mozambique	—	9,927	—	10,412
Other	48,395	3,417	64,532	1,712
Total	1,188,571	482,988	1,310,288	374,347

Non-current assets for this purpose consist of property, plant and equipment; goodwill and other intangible assets; and other assets.

5. REVENUE

Revenue from sales of goods, furnace construction contracts and heat treatment services during the year ended December 31, 2019 was $1,188,571 (2018: $1,310,288). For revenue by segment and by geographical basis, see note 4.

The following tables show the Company's total revenues disaggregated based on the timing of revenue recognition:

Year ended December 31, 2019	AMG Critical Materials	AMG Technologies	Total
Products transferred at a point in time	762,482	247,319	1,009,801
Products and services transferred over time	—	178,770	178,770
Total revenue	762,482	426,089	1,188,571

Year ended December 31, 2018	AMG Critical Materials	AMG Technologies	Total
Products transferred at a point in time	873,440	243,703	1,117,143
Products and services transferred over time	—	193,145	193,145
Total revenue	873,440	436,848	1,310,288

The following table includes revenues recognized over time as well as the related contract assets and liabilities for furnace construction contracts:

	2019	2018
Contract revenue recognized	178,770	193,145
Contract expenses recognized	154,156	152,301
Recognized profits	24,614	40,844
Contract costs incurred and recognized profits	221,750	222,923
Progress billings and advances received	253,802	248,974
Net amount due to customers	(32,052)	(26,051)
Gross amount due from customers for contract work (note 14)	25,598	24,159
Gross amount due to customers for contract work (shown as advance payments in consolidated statement of financial position)	(57,650)	(50,210)
Net amount due to customers	(32,052)	(26,051)

The Company recognized revenues of $74,592 (2018: $84,396) that were included in the balance of contract liabilities as of December 31, 2018. The amount of revenues recognized during the year that pertained to performance obligations that were satisfied in a previous year is $484 (2018: nil).

The transaction price allocated to the remaining performance obligations (unsatisfied or partially satisfied) as of December 31, 2019 and 2018 are as follows:

	2019	2018
Within one year	171,485	174,523
More than one year*	41,913	51,261
Within two years	39,532	35,998
Within three years	2,381	15,264

* The remaining performance obligations expected to be recognized in more than one year relate to the construction of furnaces.

6. OTHER INCOME AND EXPENSE

	2019	2018
Grant income	69	73
Insurance proceeds	57	14
Other miscellaneous income	56	285
Income from sale of asset	1	72
Other income	183	444
Other expense	19	20
Environmental expenses	725	8,757
Net other operating expense	561	8,333

7. PERSONNEL EXPENSES

	Note	2019	2018
Wages and salaries		173,714	183,152
Contributions to defined contribution plans	23	4,169	4,212
Expenses related to defined benefit plans	23	5,970	6,326
Social security and other benefits		40,742	40,608
Performance share units	24	4,927	6,903
Stock options	24	587	529
Restricted stock awards	24	—	67
Total		230,109	241,797
Included in the following lines of the consolidated income statement:			
Cost of sales		152,012	156,090
Selling, general and administrative expenses		78,097	85,707
Total		230,109	241,797

8. FINANCE INCOME AND COST

	2019	2018
Interest income on bank deposits	4,044	3,229
Discounting on provisions	383	7
Interest income on escrow deposits	27	1
Interest income on tax refunds	14	72
Other	260	412
Finance income	4,728	3,721
Interest expense on loans, borrowings and related derivative instruments	24,127	21,306
Discount on long-term assets, provisions and retirement obligations	2,202	1,044
Amortization of loan issuance costs	1,945	1,640
Interest expense related to lease liabilities	1,368	—
Commitment/unutilized fees	962	968
Interest expense on accounts receivable factoring	745	683
Guarantees	411	392
Other	594	637
Foreign exchange loss	357	560
Finance cost	32,711	27,230
Net finance cost	27,983	23,509

See note 10 for additional information on capitalized borrowing costs. See note 21 for additional information on loans and borrowings as well as related fees. See note 33 for additional information on bank charges for guarantees. See note 29 for additional information on financial instruments.

9. INCOME TAX

Significant components of income tax expense for the years ended:

CONSOLIDATED INCOME STATEMENT

	2019	2018
Current tax expense		
Current period	19,726	35,198
Adjustment for prior periods	(381)	11
Total current taxation charges for the year	19,345	35,209
Deferred tax expense		
Origination and reversal of temporary differences	(23,695)	5,641
Changes in previously unrecognized tax losses, tax credits and unrecognized temporary differences	(473)	(4,458)
Changes in previously recognized tax losses, tax credits and recognized temporary differences for changes in enacted tax rates and currency effects	(465)	8,187
Derecognition of previously recognized tax losses, tax credits and temporary differences	131	303
Adjustment for prior period	38	89
Total deferred taxation for the year	(24,464)	9,762
Total income tax (benefit) expense reported in consolidated income statement	(5,119)	44,971
Consolidated statement of other comprehensive income		
Income tax related to items recognized in OCI in the year:		
Cash flow hedges, effective portion of changes in fair value	(1,477)	3,588
Actuarial losses on defined benefit plans	7,612	433
Income tax benefit charged to OCI	6,135	4,021

RECONCILIATION OF EFFECTIVE TAX RATE

A reconciliation of income tax expense applicable to accounting profit before income tax at the weighted average statutory income tax rate of 21.26% (2018: 24.34%) to the Company's effective income tax rate for the years ended is as follows:

	2019	2018
(Loss) profit before income tax from continuing operations	(53,705)	139,752
Income tax using the Company's weighted average tax rate	(11,418)	34,016
Non-deductible expenses	4,268	3,740
Tax exempt income	(458)	(2,184)
Current year losses for which no deferred tax asset was recognized and changes in unrecognized temporary differences	3,321	4,978
Recognition of previously unrecognized tax losses, tax credits and temporary differences of a prior year	(507)	(4,648)
Derecognition of previously recognized tax losses, tax credits and temporary differences	131	303
Changes in previously recognized tax losses, tax credits and recognized temporary differences for changes in enacted tax rates	(92)	41
Changes in previously recognized tax losses, tax credits and recognized temporary differences for changes in currency effects	(582)	6,706
(Over)/under provided in prior periods	(343)	105
State and local taxes	397	2,537
Other	164	(623)
Income tax (benefit) expense reported in consolidated income statement	(5,119)	44,971

The weighted average statutory income tax rate is the average of the statutory income tax rates applicable in the countries in which the Company operates, weighted by the profit (loss) before income tax of the subsidiaries in the respective countries as included in the consolidated accounts. Some entities have losses for which no deferred tax assets have been recognized.

During the years ended December 31, 2019 and 2018, the income tax benefits related to the current year losses of certain US, Dutch, French, Belgium, German and African entities were not recognized. In total, $3,321 and $4,978 were not recognized in 2019 and 2018, respectively, as it is not probable that these amounts will be realized.

During the years ended December 31, 2019 and 2018, certain income tax benefits related to previously unrecognized tax losses and temporary differences related to certain US, Mexican and French entities were recognized. In total, $507 and $4,648 were recognized in 2019 and 2018, respectively, through an increase to the net deferred tax asset. Of the total benefit recognized, $507 (2018: $3,569) related to the French jurisdictions. These benefits were recognized due to financial performance in recent years and forecasted taxable profits.

The main factors considered in assessing the realizability of deferred tax benefits were improved profitability, higher forecasted taxable profitability and carryforward period of the tax losses. After assessing these factors, the Company determined that it is probable that the deferred tax benefit of the tax losses and temporary differences will be realized in the foreseeable future.

Also, during the year ended December 31, 2019, the net recognized deferred tax assets (liabilities) were adjusted for changes in the enacted tax rates in France. The net impact of the tax rate changes was a decrease to income tax expense of $92. The net recognized deferred tax assets (liabilities) were also adjusted to reflect changes in currency rates in Brazil. The impact of the tax rate changes, and currency rates was an increase (decrease) to income tax expense of ($582) (2018: $6,706).

During the year 2019, an income tax expense (benefit) of $164 (2018: ($623)) was recorded to other in the effective tax rate reconciliation.

There were no income tax consequences attached to the payment of dividends in either 2019 or 2018 by AMG to its shareholders.

DEFERRED TAX ASSETS AND LIABILITIES

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes, as well as tax loss and tax credit carryforwards.

Deferred tax assets are recognized to the extent it is probable that the temporary differences, unused tax losses and unused tax credits will be realized. The realization of deferred tax assets is reviewed each reporting period and includes the consideration of historical operating results, projected future taxable income exclusive of reversing temporary differences and carryforwards, the scheduled reversal of deferred tax liabilities and potential tax planning strategies.

RECOGNIZED DEFERRED TAX ASSETS AND LIABILITIES

Deferred tax assets and liabilities have been recognized in respect of the following roll forward:

		2019 Activity			December 31, 2019		
	December 31, 2018 Net tax asset and liability	Deferred benefit (expense)	Other comprehensive income	Currency translation adjustment/other	Net tax asset and liability	Assets	Liabilities
Inventories	967	4,972	—	24	5,963	6,337	374
Long-term contracts	(11,849)	1,101	—	435	(10,313)	—	10,313
Prepaids and other current assets	(111)	—	—	114	3	3	—
Property, plant, and equipment	(5,512)	(12,311)	—	(440)	(18,263)	322	18,585
Deferred charges and non-current assets	(10,237)	2,065	(1,415)	2,228	(7,359)	3,239	10,598
Accruals and reserves	5,925	12,541	—	(1,999)	16,467	16,570	103
Environmental liabilities	6,391	(3,322)	—	2,019	5,088	5,338	250
Retirement benefits	29,951	(466)	7,612	(510)	36,587	36,587	—
Tax loss and tax credit carryforwards	10,657	19,884	—	(2,069)	28,472	28,472	—
Total	26,182	24,464	6,197	(198)	56,645	96,868	40,223
Set off of tax						(35,923)	(35,923)
Net tax assets and liabilities						60,945	4,300

During the year ended December 31, 2019, the Company recorded deferred income tax (expense) benefit of ($1,415) (2018: $3,442) related to cash flow hedges and $7,612 (2018: $433) related to actuarial losses on defined benefit plans to other comprehensive income.

UNRECOGNIZED DEFERRED TAX ASSETS

The net deferred tax assets are fully recognized for each of the jurisdictions in which we operate with the exception of the following: (1) a German entity did not recognize the specific deferred tax asset recorded for the impact of assets impaired for book purposes; (2) a US entity did not recognize a portion of their state tax loss carryforwards; (3) certain Dutch holding companies and operating companies in the France, Africa and Mexico do not recognize benefits for their loss carryforward deferred tax assets because management has determined that they will not be able to generate future taxable profits in the foreseeable future for these respective entities.

Certain deferred tax assets have not been recognized in respect of tax loss carryforwards and temporary differences as they may not be used to offset taxable profits elsewhere in the Company and they have arisen in subsidiaries that have been loss-making for some time.

Deferred tax assets and liabilities have not been recognized in respect of the following items:

	Assets	
	2019	2018
Deferred charges and non-current assets	8,942	9,127
Environmental liabilities	1,805	1,022
Tax loss and tax credit carryforwards	24,094	30,685
Net tax assets – unrecognized	34,841	40,834

At December 31, 2019, net operating loss and tax credit carryforwards for which no deferred tax assets have been recognized in the balance sheet, expire as follows:

2020	7,988
2021	5,903
2022	7,353
2023	7,330
2024	34,073
2025-2028	30,700
Unlimited	1,728
Total	95,075

10. PROPERTY, PLANT AND EQUIPMENT

COST	Mining costs	Land, buildings and improvements	Machinery and equipment	Furniture and fixtures	Construction in progress	Finance leases	Total
Balance at January 1, 2018	38,073	149,930	377,042	26,159	71,245	2,954	665,403
Additions	653	8,558	11,066	3,012	43,695	—	66,984
Retirements and transfers	5,281	22,024	53,521	175	(87,431)	—	(6,430)
Impairments	—	—	(2,797)	(42)	(259)	—	(3,098)
Effect of movements in exchange rates	(877)	(3,681)	(7,572)	(1,008)	(199)	(113)	(13,450)
Balance at December 31, 2018	43,130	176,831	431,260	28,296	27,051	2,841	709,409
Initial impact due to adoption of IFRS 16	—	36,613	2,739	844	—	(2,841)	37,355
Adjusted Balance at January 1, 2019	43,130	213,444	433,999	29,140	27,051	—	746,764
Additions	110	11,688	11,241	5,338	67,100	—	95,477
Acquired through business combinations	—	9,651	3,262	8	362	—	13,283
Capitalized borrowings	—	47	31	—	5,061	—	5,139
Retirements and transfers	(825)	15,574	3,630	(72)	(31,481)	—	(13,174)
Impairments	—	(81)	1,418	17	(6,047)	—	(4,693)
Effect of movements in exchange rates	(255)	(2,347)	(2,330)	(385)	(117)	—	(5,434)
Balance at December 31, 2019	42,160	247,976	451,251	34,046	61,929	—	837,362
DEPRECIATION							
Balance at January 1, 2018	(15,292)	(59,600)	(275,659)	(14,333)	—	(1,979)	(366,863)
Depreciation for the year	(1,050)	(5,009)	(21,584)	(3,394)	—	(352)	(31,389)
Retirements and transfers	—	2,233	6,038	1,255	—	—	9,526
Effect of movements in exchange rates	385	1,326	4,987	490	—	80	7,268
Balance at December 31, 2018	(15,957)	(61,050)	(286,218)	(15,982)	—	(2,251)	(381,458)
Reclassification due to adoption of IFRS 16	—	—	—	—	—	2,251	2,251
Balance at January 1, 2019	(15,957)	(61,050)	(286,218)	(15,982)	—	—	(379,207)
Depreciation for the year	(1,557)	(9,504)	(25,089)	(4,242)	—	—	(40,392)
Retirements and transfers	(191)	(262)	9,433	1,081	—	—	10,061
Effect of movements in exchange rates	80	465	1,449	175	—	—	2,169
Balance at December 31, 2019	(17,625)	(70,351)	(300,425)	(18,968)	—	—	(407,369)
Carrying amounts							
At January 1, 2018	22,781	90,330	101,383	11,826	71,245	975	298,540
At December 31, 2018	27,173	115,781	145,042	12,314	27,051	590	327,951
Reclassification due to adoption of IFRS 16	—	36,613	2,739	844	—	(590)	39,606
At January 1, 2019	27,173	152,394	147,781	13,158	27,051	—	367,557
At December 31, 2019	24,535	177,625	150,826	15,078	61,929	—	429,993

PROPERTY, PLANT AND EQUIPMENT UNDER CONSTRUCTION

During the years ended December 31, 2019 and 2018, the subsidiaries of the Company embarked on several different expansion projects as well as certain required maintenance projects. The largest of these expansion projects currently underway is the construction of a catalyst recycling facility in Ohio and expansion projects in Brazil. Costs incurred up to December 31, 2019, which are included in construction in progress, totaled $61,929 (2018: $27,051).

BORROWING COSTS

The Company capitalized borrowing costs of $5,139 during 2019 which included $7,576 of capitalized interest related to the construction of AMG Vanadium's catalyst recycling facility in Ohio, net of $2,762 of cash interest received from the restricted cash generated from AMG Vanadium's municipal bond and $325 of capitalized interest for other AMG facilities (2018: nil).

PROPERTY, PLANT AND EQUIPMENT ADDITIONS

At December 31, 2019, the Company had $95,477 in additions, including $12,173 in accounts payable, lease additions of $11,571 and a non-cash transfer of $327 from the provision for restoration costs related to asset retirement obligations. At December 31, 2018, the Company had $66,984 in additions, including $6,288 in accounts payable and a non-cash transfer of $173 from the provision for restoration costs related to asset retirement obligation.

FINANCE LEASES

At December 31, 2018, the Company had $590 of finance leases for equipment and software. These leased items have been reclassified due to the adoption of IFRS 16 on January 1, 2019. For additional information see note 3(p).

DEPRECIATION OF PROPERTY, PLANT AND EQUIPMENT

Depreciation expense for the year ended December 31, 2019 was $40,392 (2018: $31,389). Depreciation expense is recorded in the following line items in the consolidated income statement:

	2019	2018
Cost of sales	36,900	29,785
Selling, general and administrative expenses	3,492	1,604
Total	40,392	31,389

SALE OF PROPERTY, PLANT AND EQUIPMENT

Certain land and equipment were sold in the years ended December 31, 2019 and 2018. In those years, the Company received proceeds of $421 and $1,660, respectively. In 2019, the proceeds were more than the book value of the assets and a gain of $69 (2018: $720) was recognized during the year.

IMPAIRMENT TESTING

IAS 36 requires that assets be carried at a value no greater than their recoverable amount. To meet this standard, the Company is required to test tangible and intangible assets for impairment when indicators of impairment exist, or at least annually, for goodwill and intangible assets with indefinite useful lives. During the year ended December 31, 2019, the Company recorded $4,693 in asset impairments on property, plant and equipment, in which $6,047 related to the Spodumene expansion project and other impairment expenses of $81. Impairment expense was partially offset by a reversal of $1,435 related to a prior year impairment due to an early termination of a customer contract. During the year ended December 31, 2018, the Company recorded $3,098 of asset impairments on property, plant and equipment primarily related to the early termination of a customer contract in the amount of $2,839 and other impairment expenses of $259. Impairment expense was partially offset by insurance proceeds of $1,000.

SECURITY

At December 31, 2019, properties with a carrying amount of $143,342 (2018: $122,908) are pledged as collateral to secure certain bank loans.

11. GOODWILL AND OTHER INTANGIBLE ASSETS

COST	Goodwill	Customer relationships	Capitalized development costs	Mining assets	Other intangible assets	Total goodwill and intangible assets
Balance at January 1, 2018	34,978	10,612	6,085	6,587	27,236	85,498
Additions	—	—	177	138	1,000	1,315
Effect of movements in exchange rates	(1,248)	(378)	(218)	(298)	(1,101)	(3,243)
Balance at December 31, 2018	33,730	10,234	6,044	6,427	27,135	83,570
Balance at January 1, 2019	33,730	10,234	6,044	6,427	27,135	83,570
Acquired through business combinations	4,202	1,026	—	—	2,053	7,281
Additions	—	—	81	—	1,667	1,748
Disposals, reversals and transfers	—	—	(1,333)	19	(100)	(1,414)
Effect of movements in exchange rates	(454)	(229)	(94)	(124)	(447)	(1,348)
Balance at December 31, 2019	37,478	11,031	4,698	6,322	30,308	89,837
AMORTIZATION AND IMPAIRMENT						
Balance at January 1, 2018	(9,941)	(8,983)	(2,959)	(2,448)	(23,057)	(47,388)
Amortization	—	(176)	(442)	(78)	(949)	(1,645)
Impairment	—	—	(1,318)	—	—	(1,318)
Effect of movements in exchange rates	393	327	130	83	978	1,911
Balance at December 31, 2018	(9,548)	(8,832)	(4,589)	(2,443)	(23,028)	(48,440)
Balance at January 1, 2019	(9,548)	(8,832)	(4,589)	(2,443)	(23,028)	(48,440)
Amortization	—	(184)	(68)	(257)	(1,066)	(1,575)
Disposals, reversals and transfers	—	—	1,333	—	100	1,433
Effect of movements in exchange rates	—	133	65	49	421	668
Balance at December 31, 2019	(9,548)	(8,883)	(3,259)	(2,651)	(23,573)	(47,914)
Carrying amounts						
At January 1, 2018	25,037	1,629	3,126	4,139	4,179	38,110
At December 31, 2018	24,182	1,402	1,455	3,984	4,107	35,130
At January 1, 2019	24,182	1,402	1,455	3,984	4,107	35,130
At December 31, 2019	27,930	2,148	1,439	3,671	6,735	41,923

AMORTIZATION OF INTANGIBLE ASSETS

Amortization expense for the year ended December 31, 2019 was $1,575 (2018: $1,645). Amortization expense is recorded in the following line items in the consolidated income statement:

	2019	2018
Cost of sales	294	289
Selling, general and administrative expenses	1,281	1,356
Total	1,575	1,645

RESEARCH COSTS

Research and development expenses are included in selling, general and administrative expenses and were $5,606 and $6,572 in the years ended December 31, 2019 and 2018, respectively.

IMPAIRMENT TESTING FOR INTANGIBLE ASSETS

(i) Goodwill

For the purposes of impairment testing, goodwill has been allocated to the Company's cash-generating units as follows:

	Segment	2019	2018
AMG Antimony cash-generating unit	Critical Materials	8,872	9,053
AMG Superalloys UK cash-generating unit	Critical Materials	1,510	1,510
ALD cash-generating unit	Technologies	13,433	13,619
TAC cash-generating unit	Technologies	4,115	—
Goodwill at cash-generating units		27,930	24,182

Key assumptions

The calculations of value in use are most sensitive to the following assumptions:

- Global metals pricing - Estimates are obtained from published indices. The estimates are evaluated and are generally used as a guideline for future pricing.
- Discount rate - Discount rates reflect the current market assessment of the time value of money and the risks specific to the asset, based on a comparable peer group.
- Expected future cash flows - Expected future cash flows are based on management's best estimates of future business conditions but cannot be guaranteed as the Company does not have fixed revenues or costs.
- Growth rate - Growth rates are based on management's interpretation of published industry research in order to extrapolate cash flows beyond the business plan period. As most businesses follow economic trends, an inflationary factor of 1% was utilized.

It is possible that the key assumptions used in the business plan will differ from actual results. However, management does not believe that any possible changes will cause the carrying amount to exceed the recoverable amount. The values assigned to the key assumptions represent management's assessment of future trends in the metallurgical industry and are based on both external sources and internal sources (historical data).

For the impairment tests for AMG Antimony, AMG Superalloys UK, ALD and TAC's cash-generating units, the recoverable amounts are the value in use. The value in use was determined using the discounted cash flow method. In 2019 and 2018, the carrying amounts of the AMG Antimony and AMG Superalloys, ALD and TAC's cash-generating units were determined to be lower than their recoverable amounts and no impairment losses were recognized.

[1] AMG Antimony's value in use was determined by discounting the future cash flows generated from the continuing use of the unit and was based on the following key assumptions:

- Cash flows were projected based on actual operating results and the 3-year business plan, which covers the next three calendar years following the impairment test date. Metal prices used in the projections are generally at current market prices at the time the plan is prepared.
- The growth rate of 1% was used to extrapolate cash flow projections beyond the period covered by the most recent business plans. Management believes that this growth rate does not exceed the long-term average growth rate for the metallurgical industry in Europe.
- Revenue projections were based on an internal 3-year business plan.
- Pre-tax discount rates of 11.18% and 13.94% were applied in determining the recoverable amount of the unit for the years ended December 31, 2019 and 2018, respectively. The discount rates were derived from a group of comparable companies (peer group).

Sensitivities related to the value in use calculation for AMG Antimony would imply that a 1% increase in the discount rate or using a 0% growth rate would not have created an impairment.

[2] AMG Superalloys UK's value in use was determined by discounting the future cash flows generated from the continuing use of the unit and was based on the following key assumptions:

- Cash flows were projected based on actual operating results and the 3-year business plan, which covers the next three calendar years following the impairment test date. Metal prices used in the projections are generally at current market prices at the time the plan is prepared.
- The growth rate of 1% was used to extrapolate cash flow projections beyond the period covered by the most recent business plans. Management believes that this growth rate does not exceed the long-term average growth rate for the metallurgical industry in Europe.
- Revenue projections were based on an internal 3-year business plan.
- Pre-tax discount rates of 10.23% and 11.44% were applied in determining the recoverable amount of the unit for the years ended December 31, 2019 and 2018, respectively. The discount rates were derived from a group of comparable companies (peer group).

Sensitivities related to the value in use calculation for AMG Superalloys UK would imply that a 1% increase in the discount rate or using a 0% growth rate would not have created an impairment.

[3] ALD's value in use was determined by discounting the future cash flows generated from the continuing use of the unit and was based on the following key assumptions:

- Cash flows were projected based on actual operating results and the 3-year business plan, which covers the next three calendar years following the impairment test date.
- The growth rate of 1% was used to extrapolate cash flow projections beyond the period covered by the most recent business plans. Management believes that this growth rate does not exceed the long-term average growth rate for the capital equipment sector of the metallurgical industry.
- Revenue projections were based on an internal 3-year business plan.
- Pre-tax discount rates of 10.34% and 14.47% were applied in determining the recoverable amount of the unit for the years ended December 31, 2019 and 2018, respectively. The discount rates were derived from a group of comparable companies (peer group).

Sensitivities related to the value in use calculation for ALD would imply that a 1% increase in the discount rate or using a 0% growth rate would not have created an impairment.

[4] TAC's value in use was determined by discounting the future cash flows generated from the continuing use of the unit and was based on the following key assumptions:

- Cash flows were projected based on actual operating results and the 3-year business plan, which covers the next three calendar years following the impairment test date.
- The growth rate of 1% was used to extrapolate cash flow projections beyond the period covered by the most recent business plans. Management believes that this growth rate does not exceed the long-term average growth rate for the capital equipment sector of the metallurgical industry.
- Revenue projections were based on an internal 3-year business plan.
- A pre-tax discount rates of 11.71% was applied in determining the recoverable amount of the unit for the year ended December 31, 2019. The discount rate was derived from a group of comparable companies (peer group).

Sensitivities related to the value in use calculation for TAC would imply that a 1% increase in the discount rate or using a 0% growth rate would not have created an impairment.

(ii) Intangibles with finite lives

The determination of whether long-lived assets are impaired requires an estimate of the recoverable amount of the cash-generating unit or group of cash-generating units to which the long-lived assets have been allocated. The recoverable amount is defined as the higher of a cash-generating unit's fair value less costs of disposal and its value in use. For each of the cash-generating units which tested long-lived assets for recoverability, the recoverable amount was determined as the value in use or fair value less costs to sell as appropriate. The value in use requires the entity to estimate the future cash flows expected to arise from the cash-generating units or group of cash-generating units and to discount these cash flows with a risk adjusted discount rate. Expected future cash flows are based on management's best estimates of future business conditions but cannot be guaranteed as the Company does not have fixed revenues or costs. The risk adjusted discount rate is estimated using a comparison of peers but can vary based on changes in the debt or equity markets or risk premiums assigned to countries or industries.

There were intangible asset impairments of $1,318 during the year ended December 31, 2018, related to development costs associated with a specific product from an early termination of a customer contract during the year.

12. OTHER INVESTMENTS

During the year ended December 31, 2015, the Company amended a contract with one of its customers, Global Advanced Metals U.S.A., Inc. ("GAM"). As part of the amendment, the Company received a 10% ownership interest in GAM. During the year ended December 31, 2016, the Company purchased an additional 4% ownership interest in GAM. The investment is being designated as a financial instrument measured at fair value through other comprehensive income because the Company has not gained significant influence over GAM through the 11.3% (2018: 13.3%) ownership interest.

The investment had a value of $7,854 at December 31, 2019 (2018: $7,002). The fair value of this investment is estimated by management with reference to the relevant available information which is limited due to legal disputes between the Companies. The Company relied on the current financial results of the investment including the current financial statements and current year revenue estimates to determine a fair value for the investment. The Company did not have the relevant data to complete a discounted cash flow model. There was a lack of marketability discount applied of 17.5%. Changes in the valuation methodologies or assumptions could lead to different measurements of fair value. The Company recorded investment gain (loss) of $852 and ($8,045) related to the investment during the years ended December 31, 2019 and 2018, respectively, which is included in other comprehensive income.

Also included in other investments are assets of $15,711 (2018: $14,450) which are designated to fund the non-qualified pension liability. These assets consist of debt securities, equity securities, and insurance contracts which are held at fair value. These assets have been designated as Level 1 and partially Level 3 financial instruments on the fair value hierarchy. The Level 3 investments consist of insurance contracts valued at $4,424 (2018: $3,417). These insurance contracts have been valued using unobservable inputs based on the best available information in the circumstances. The investments are held in a Rabbi Trust and are restricted for use in pension funding. The Company recorded an investment gain (loss) of $1,511 (2018: ($468)) related to the investment during the year ended December 31, 2019, which is included in other comprehensive income. See notes 23 and 29 for additional information.

13. INVENTORIES

	2019	2018
Raw materials	57,037	133,556
Work in process	45,272	46,434
Finished goods	90,034	126,339
Other	11,809	10,386
Total	204,152	316,715

Other inventory primarily includes spare parts that are maintained for operations.

In 2019, raw materials, changes in finished goods and work in process contributed to cost of sales by $684,624 (2018: $703,157). In the year ended December 31, 2019, the net adjustment to net realizable value amounted to a write-down of $88,401 (2018: $5,782) and was included in cost of sales. The net realizable value write-downs were primarily related to inventory costing adjustments due to variability in metals pricing. Additionally, AMG offset overrun costs of $9,300 with a liquidated damages settlement received due to production inefficiencies and plant delays as a reduction of cost of sales and also incurred a ($174) reversal of asset impairment expense on inventory during the year ended December 31, 2019 (2018: $217).

Inventory in the amount of $103,245 (2018: $214,077) is pledged as collateral to secure the bank loans of certain subsidiaries (see note 21).

14. TRADE AND OTHER RECEIVABLES

	2019	2018
Trade receivables, net of allowance for doubtful accounts	93,454	114,371
Gross amount due from customers for contract work	194,403	191,700
Less: progress payments received	(168,805)	(167,541)
Net receivable from contract work (note 5)	25,598	24,159
Total	119,052	138,530

At December 31, 2019 and 2018, trade receivables include receivables from customers who have received direct shipments or services from the Company and receivables from customers who have utilized inventory on consignment. Amounts billed to furnace construction contracts customers are also included in the trade and other receivables line item in the statement of financial position. The carrying amount of trade receivables approximates their fair value due to their short-term nature. Trade receivables are generally non-interest bearing and are generally on 30-90 day terms.

At December 31, 2019, receivables in the amount of $43,673 (2018: $56,836) are pledged as collateral to secure the term loan credit facility of the Company (see note 21).

As of December 31, the analysis of trade receivables that were past due but not impaired is as follows:

		Neither past due nor	Past due but not impaired				
	Total	impaired	<30 days	30-60 days	60-90 days	90-120 days	>120 days
2019	119,052	107,768	6,957	1,824	1,264	322	917
2018	138,530	116,065	19,739	1,656	171	326	573

At December 31, 2019, trade receivables are shown net of expected credit losses of $2,025 (2018: $3,031) arising from customer unwillingness or inability to pay. Bad debt charges in the amount of $92 and $46 were recorded in the years ended December 31, 2019 and December 31, 2018, respectively. These charges are recorded in selling, general and administrative expenses in the consolidated income statement. Refer to note 3(f) for additional details on the Company's policy for the calculation of expected credit losses.

Movements in the provision for impairment of receivables were as follows:

	2019	2018
At January 1	3,031	3,404
Charge for the year	92	46
Amounts written-off	(199)	(179)
Amounts recovered/collected	(839)	(114)
Foreign currency adjustments	(60)	(126)
At December 31	2,025	3,031

FACTORING OF RECEIVABLES

As of December 31, 2019 and 2018, the Company had total receivables factored and outstanding of $30,974 and $38,220, respectively. The Company maintains accounts receivable facilities with banks and credit insurance companies in Germany, France and the US. The Company sold receivables in the amount of $183,559 throughout the year which includes security deposits of $1,352 and cash proceeds of $175,183. During 2019, the Company incurred costs of $954 in conjunction with the sale of these receivables of which $745 were included in finance cost, $144 were recorded to selling, general and administrative expenses, and $65 were recorded to sales on the consolidated income statement. This activity is included in cash from operating activities during the year ended December 31, 2019.

In 2018, the Company sold receivables in the amount of $202,166 which includes security deposits of $3,194 and cash proceeds of $193,578. During 2018, the Company incurred costs of $918 in conjunction with the sale of these receivables of which $683 were included in finance cost, $58 were recorded to selling, general and administrative expenses, and $177 were recorded to sales on the consolidated income statement. This activity is included in cash from operating activities during the year ended December 31, 2018.

15. OTHER ASSETS

Other assets are comprised of the following:

	2019	2018
Prepaid taxes (indirect)	15,335	18,473
Prepaid inventory	14,156	17,028
Insurance	4,176	2,776
Environmental trusts	2,729	2,336
Deposits	2,112	4,122
Pension prepayment	1,542	429
Deferred issuance cost	1,085	1,606
Maintenance and subscriptions	894	921
Asset held for sale	140	144
Other miscellaneous assets	2,763	3,001
Total	44,932	50,836
Thereof:		
Current	33,860	39,570
Non-current	11,072	11,266

Prepaid inventory includes prepayments on inventories as well as advanced payments to suppliers for specific furnace construction contracts.

In the year ended December 31, 2019, $1,352 (2018: $3,194) was included in deposits related to factoring agreements as discussed in note 14.

The Company's US subsidiaries have established trust funds for future environmental remediation payments. The recognized values of the trust funds at December 31, 2019 were $2,729 (2018: $2,336). See note 25 for additional details.

16. RESTRICTED CASH

Restricted cash at December 31, 2019, is $309,581 (2018: $1,715). The restricted cash primarily relates to proceeds from the Company's municipal bond offering issued by AMG Vanadium LLC, which are restricted for use in the construction of a new catalyst recycling facility in Ohio. Refer to note 21 for details regarding these proceeds. Additionally, certain balances are also held by financial institutions to provide security to those institutions for the issuance of letters of credit or other forms of credit on behalf of the Company. These letters of credit serve two primary purposes: to provide financial backing for advance payments made by our customers of the Technologies segment and to provide financial assurance to banks, vendors and regulatory agencies to whom the Company is obligated.

17. CASH AND CASH EQUIVALENTS

The Company had bank balances at December 31, 2019, of $226,218 (2018: $381,900). Bank balances earn interest at floating rates based on daily bank deposit rates. The Company periodically utilizes time deposits; they have maturities of approximately three months or less depending on the immediate cash needs of the Company and earn interest at the respective short-term rates. At December 31, 2019, the Company had nil time deposits (2018: $30,408).

At December 31, 2019, the Company had $169,921 available liquidity (2018: $169,605) on undrawn committed borrowing facilities.

18. CAPITAL AND RESERVES

SHARE CAPITAL

At December 31, 2019, the Company's authorized share capital was comprised of 65,000,000 ordinary shares (2018: 65,000,000) with a nominal share value of €0.02 (2018: €0.02) and 65,000,000 preference shares (2018: 65,000,000) with a nominal share value of €0.02 (2018: €0.02).

At December 31, 2019, the issued and outstanding share capital was comprised of 28,373,859 ordinary shares (2018: 30,573,597), with a nominal value of €0.02 (2018: €0.02) which were fully paid. No preference shares were outstanding at December 31, 2019 (2018: nil). The nominal value of the outstanding shares as of December 31, 2019, was $636 (2018: $700) as compared to the value using historical exchange rates which was $831 (2018: $812).

The preference shares carry equal voting rights as ordinary shares and are entitled, if distribution to shareholders is permitted, to a fixed dividend equal to EURIBOR for deposit loans of one year increased with maximum of 400 basis points as determined by the Management Board of the Company and subject to approval by the Supervisory Board. AMG's dividend policy is to evaluate liquidity needs for alternative uses including funding growth opportunities and funding dividend payments to shareholders. Payment of future dividends to shareholders will be at the discretion of the Management Board subject to the approval of the Supervisory Board after taking into account various factors and is subject to limitations based on the Company's revolving credit facility. Additionally, payment of future dividends or other distributions to shareholders may be made only if the Company's shareholders' equity exceeds the sum of the issued share capital plus the reserves required to be maintained by law.

A roll forward of the total shares outstanding is noted below:

Balance at January 1, 2018	29,784,516
Shares issued for share-based compensation	673,330
Shares repurchased	(277,446)
Re-issuance of treasury shares	277,446
Treasury shares delivered for share-based compensation	108,222
Treasury shares delivered to Supervisory Board	7,529
Balance at December 31, 2018	30,573,597
Shares issued for share-based compensation	786,045
Shares repurchased	(3,234,615)
Re-issuance of treasury shares	91,372
Treasury shares delivered for share-based compensation	147,530
Treasury shares delivered to Supervisory Board	9,928
Balance at December 31, 2019	28,373,857

SHARES ISSUED OR DELIVERED FOR SHARE-BASED COMPENSATION

During the year ended December 31, 2019, 933,577 (2018: 781,552) shares were issued or delivered related to share-based compensation to management. Refer to note 24 for details regarding these plans.

TREASURY SHARES

On April 8, 2019, the Company announced a share repurchase program for the purposes of returning cash to shareholders and funding future share-based employee compensation programs. The Company completed this repurchase plan on August 9, 2019. The Company repurchased a total of 2,915,630 shares for a total consideration of $81,057. The activity related to this share repurchase program is included in the table below. The shares are held in treasury for the delivery upon exercise of options and performance share programs and are accounted for as a reduction of shareholders' equity. Treasury shares are recorded at cost, representing the market price on the acquisition date. When issued, shares are removed from treasury shares on a first-in, first-out (FIFO) basis. When treasury shares are reissued under the Company's option plans, the difference between the cost and the cash received is recorded in retained earnings. When treasury shares are reissued under the Company's share plans, the difference between the market price of the shares issued and the cost is recorded in retained earnings. The following table shows the movements in the outstanding number of shares over the last two years:

A roll forward of the treasury share balance is noted below:

Balance at January 1, 2018	123,531
Shares repurchased	277,446
Re-issuance of treasury shares	(277,446)
Treasury shares delivered for share-based compensation	(108,222)
Treasury shares delivered to Supervisory Board	(7,529)
Balance at December 31, 2018	7,780
Shares repurchased	3,234,615
Re-issuance of treasury shares	(91,372)
Treasury shares delivered for share-based compensation	(147,530)
Treasury shares delivered to Supervisory Board	(9,928)
Balance at December 31, 2019	2,993,565

SUPERVISORY BOARD REMUNERATION

During the years ended December 31, 2019 and 2018, 9,928 and 7,529 shares were delivered, respectively, as compensation to its Supervisory Board members for services provided in 2019 and 2018. These shares were awarded as part of the remuneration policy approved by the Annual General Meeting.

OTHER RESERVES

	Foreign currency translation reserve	Hedging reserve	Cost of hedging reserve	Capitalized development expenditures reserve	Defined benefit obligation reserve	Fair value reserve	Total
Balance at January 1, 2018	(21,387)	3,929	—	3,128	(59,938)	1,388	(72,880)
Currency translation differences	(6,671)	—	—	—	1,845	—	(4,826)
Loss on FVOCI investments	—	—	—	—	—	(8,513)	(8,513)
Movement on cash flow hedges	—	(15,403)	(1,659)	—	—	—	(17,062)
Tax effect on net movement on cash flow hedges	—	3,239	349	—	—	—	3,588
Actuarial losses on defined benefit plans	—	—	—	—	(3,446)	—	(3,446)
Tax effect on net movement on defined benefit plans	—	—	—	—	433	—	433
Transfer from retained deficit	—	—	—	(1,568)	—	—	(1,568)
Balance at January 1, 2019	(28,058)	(8,235)	(1,310)	1,560	(61,106)	(7,125)	(104,274)
Currency translation differences	(1,712)	—	—	—	372	—	(1,340)
Gain on FVOCI investments	—	—	—	—	—	2,363	2,363
Movement on cash flow hedges	—	4,887	3,894	—	—	—	8,781
Tax effect on net movement on cash flow hedges	—	(926)	(552)	—	—	—	(1,478)
Actuarial losses on defined benefit plans	—	—	—	—	(27,901)	—	(27,901)
Tax effect on net movement on defined benefit plans	—	—	—	—	7,612	—	7,612
Transfer to retained deficit	—	—	—	(121)	—	—	(121)
Balance at December 31, 2019	(29,770)	(4,274)	2,032	1,439	(81,023)	(4,762)	(116,358)

FOREIGN CURRENCY TRANSLATION RESERVE

The translation reserve comprises all foreign currency differences arising from the translation of the financial statements of foreign subsidiaries. There are two primary functional currencies used within the Company: the US dollar and the euro.

Resulting translation adjustments were reported in foreign currency translation reserve through other comprehensive income.

The movement in the foreign currency translation reserve was largely driven by the strengthening of the USD in relation to the euro during 2019. During the year ended December 31, 2019, the USD continued to strengthen resulting in a 2% decrease in the euro to USD exchange rate of 1.1215 which impacted the currency translation reserve. The euro to USD exchange rate decreased 4.5% from 1.1979 at December 31, 2017 to 1.1444 at December 31, 2018.

HEDGING RESERVE

The hedging reserve comprises the effective portion of the cumulative net change in the fair value of cash flow hedging instruments related to hedged transactions that have not yet occurred. For further discussion of the cash flow hedges and the amounts that were realized in the income statement, see note 29.

COST OF HEDGING RESERVE

The cost of hedging reserve reflects gain or loss on the portion excluded from the designated hedging instrument that relates to the forward element of forward contracts. It is initially recognized in OCI and accounted for similarly to gains or losses in the hedging reserve.

DEFINED BENEFIT OBLIGATION RESERVE

The reserve for defined benefit plans decreased other reserves ($19,917) and ($1,168), net of tax, for the years ended December 31, 2019 and 2018, respectively.

FAIR VALUE RESERVE

The fair value reserve increased $2,363 and decreased ($8,513) for the years ended December 31, 2019 and 2018, respectively, as a result of gains and losses on equity investments through other comprehensive income during the year.

RESTRICTIONS ON DISTRIBUTIONS

Certain restrictions apply on equity of the Company due to Dutch legal requirements. Please see note 12 in the parent company financial statements for additional details.

DIVIDENDS

Dividends of $16,703, or €0.50 per share, were paid during the year ended December 31, 2019. Dividends of $12,092, or €0.40 per share, were paid during the year ended December 31, 2018.

19. EARNINGS PER SHARE

BASIC EARNINGS PER SHARE

Basic earnings per share amounts are calculated by dividing net profits for the year attributable to ordinary equity holders of the parent by the weighted average of ordinary shares outstanding during the year. As of December 31, 2019 and 2018, the calculation of basic earnings per share is performed using the weighted average shares outstanding for 2019 and 2018, respectively.

DILUTED EARNINGS PER SHARE

Diluted earnings per share are calculated by dividing the net profit attributable to the ordinary equity holders of the parent by the weighted average number of ordinary shares outstanding during the year plus the weighted average number of ordinary shares that would be issued on the conversion of all the dilutive potential ordinary shares into ordinary shares. The only category of potentially dilutive shares at December 31, 2019 and 2018 are AMG's share options, AMG's performance share unit plans and other share-based compensation plans. The diluted earnings per share calculation includes the number of shares that could have been acquired at fair value given the exercise price attached to the outstanding options. The calculated number of shares is then compared with the number of shares that would have been issued assuming the exercise of the share options.

Earnings	2019	2018
Net (loss) profit attributable to equity holders for basic and diluted earnings per share	(48,283)	94,616
Number of shares (in 000's)		
Weighted average number of ordinary shares for basic earnings per share	29,416	30,307
Dilutive effect of stock options and other share-based compensation	—	278
Dilutive effect of performance share units	—	1,263
Weighted average number of ordinary shares adjusted for effect of dilution	29,416	31,848
Basic (loss) earnings per share	(1.64)	3.12
Diluted (loss) earnings per share	(1.64)	2.97

For the year ended December 31, 2018, 11 shares that could potentially dilute basic EPS were not included in the computation of dilutive EPS because the effect would have been anti-dilutive for the periods presented.

As a result of the Company's net loss for the year ended December 31, 2019, the dilutive effect of 179 shares related to stock-based compensation and 285 shares of performance share units have not been included in the calculation of diluted EPS because the effect would have been anti-dilutive for the period presented. Additionally, there were 64 shares related to outstanding stock options that could potentially further dilute basic EPS in future periods but were anti-dilutive in 2019 due to the strike price of the options relative to the average price of the Company's shares for the year.

20. NON-CONTROLLING INTERESTS

As of December 31, 2019, non-controlling interests was $23,893 (2018: $24,119).

On March 30, 2015, the Company sold a 40% equity interest in a German subsidiary, Graphit Kropfmühl GmbH ("AMG Graphite"). This sale resulted in the Company owning 60% of this subsidiary and a non-controlling interest of 40%. The Company has maintained control of the subsidiary and continues to consolidate the financial results. The non-controlling interest has rights to the financial position and results of AMG Graphite in proportion with their ownership. The non-controlling interest also has certain protective rights which prevent fundamental changes to AMG Graphite as well as restrictions on the ability to transfer cash out of the subsidiary.

The summarized financial information of this subsidiary is provided below. This information is based on amounts before intercompany eliminations:

Summarized financial information as of December 31:	2019	2018
Revenues	58,206	69,504
Current assets	47,923	53,149
Non-current assets	43,322	43,643
Current liabilities	12,638	17,233
Non-current liabilities	15,218	14,719
Total equity	63,389	64,840
Attributable to:		
Equity holders of parent	39,342	40,482
Non-controlling interest	24,047	24,358

The Company has additional non-controlling interest as of December 31, 2019, included in equity attributable to non-controlling interest of ($154) (2018: ($239)). No dividends were paid to non-controlling interest during the years ended December 31, 2019 and 2018.

21. LOANS AND BORROWINGS

This note provides information about the contractual terms of the Company's interest-bearing loans and borrowings. For more information about the Company's exposure to interest rate and foreign currency risk, see note 28.

Non-current	Effective interest rate	Maturity	2019	2018
Term Loan B	LIBOR +3.0%	2/1/2025	333,182	335,258
Municipal bond	4.6%	7/1/2049	319,911	—
Subsidiary debt	4.1% - 8.5%	7/2020 - 8/2023	16,404	21,731
Finance lease obligations*	3.0% - 12.0%	3/2019 - 12/2020	—	8
Total			669,497	356,997

Current	Effective interest rate	Maturity	2019	2018
Term Loan B	LIBOR +3.0%	2/1/2025	3,500	3,500
Subsidiary debt	4.1% - 8.5%	7/2020 - 8/2023	18,240	5,432
Finance lease obligations*	3.0% - 12.0%	3/2019 - 12/2020	—	15
Total			21,740	8,947

*The Company applied IFRS 16 using the modified retrospective approach and therefore the comparative information has not been restated and continues to be reported under IAS 17 and IFRIC 4. See note 31 for additional information on lease obligations.

TERM LOAN AND REVOLVING CREDIT FACILITY

As of February 1, 2018, the Company entered into a $350,000, seven-year senior secured Term Loan B facility and a $200,000 five-year senior secured revolving credit facility. Proceeds from the facility were used to repay AMG's previous credit facility. In addition, AMG Engineering entered into €85,000 of bilateral letter of credit facilities which replaced its letter of credit facilities under the previous syndicated credit facility. AMG is using the excess proceeds of the term loan to provide capital to fund strategic expansion projects.

As of December 31, 2019, the total balance outstanding on the term loans was $343,000 (2018: $346,500). As of December 31, 2019, available revolver capacity was $169,921 (2018: $169,605). Interest on the Revolving Credit Facility is based on current LIBOR (or in the case of any loans denominated in euros, EURIBOR) plus a margin that is dependent on AMG's corporate credit rating. At December 31, 2019 and 2018, the margin was 2.5%. As part of obtaining the revolving credit facility the Company is responsible for maintaining Net Debt to EBITDA not to exceed 3.5:1.0. Interest on the Term Loan is based on current LIBOR plus a margin of 3.0%.

To mitigate interest rate risk, in February 2018 the Company entered into interest rate caps totaling $250,000, and interest rate swaps totaling $100,000 in connection with the execution of the Term Loan B and revolving credit facility. In March 2019, the Company unwound its interest rate swaps and replaced those instruments with interest rate caps. This determination was made as part of the ongoing risk management process. The interest rate caps have an equivalent notional value as the previous instruments and mitigate the interest rate risk on the Company's credit facility. See note 29 for additional information on the interest rate hedging activities.

The credit facility is subject to several affirmative and negative covenants including, but not limited to, the following: Net Debt to EBITDA not to exceed 3.5:1.0. EBITDA and Net Debt are defined in the credit facility agreement. The definitions per the credit facility agreement may be different from management definitions. The credit facility limits the amount of cash that can be included in the calculation of net debt. AMG's current cash balance is significantly in excess of the credit facility limit. As a result, the Net Debt to EBITDA ratio as defined by the credit facility as of December 31, 2019 was 1.7:1.0. As of December 31, 2019, the Company was in compliance with all of its debt covenants.

Mandatory repayment of the credit facility is required upon the occurrence of (i) a change of control or (ii) the sale of all or substantially all of the business and/or assets of the Company whether in a single transaction or a series of related transactions. If the Company were not in compliance with all covenants under the credit facility, the loan could become due in full or the Company could be subject to significant amendment fees.

DEBT ISSUANCE COSTS

In connection with the term loan and revolving credit facility that were refinanced in 2018, the Company incurred issuance costs of $9,238, which were deducted from the proceeds of the debt from the term loan or paid by the Company. The amounts have been allocated to the term loans and revolving credit facility based on the amount which would have been incurred if the facilities were obtained separately.

The amount allocated to the term loans of $7,155 is shown net against the outstanding term loan balance and are amortized using the effective interest method. The Company recorded amortization expense of $1,152 (2018: $934) during the year ended December 31, 2019 related to these costs. The balance of unamortized costs net against the book value of the term loan was $5,069 (2018: $6,221) as of December 31, 2019.

The amount allocated to the revolving credit facility of $2,083 is included in other assets because there were no borrowings outstanding. This amount is being amortized on a straight-line basis over the life of the facility. The Company has recorded amortization expense of $521 (2018: $477) during 2019 related to these costs. The balance of unamortized costs recorded in other assets related to the revolving credit facility was $1,085 (2018: $1,606) as of December 31, 2019.

During the year ending December 31, 2018, the Company recorded amortization of $2,886 related to issuance cost from the previous credit facility.

ORIGINAL ISSUE DISCOUNT

The term loan included an original issue discount (OID) of 50 basis points of $1,750 which is shown net against the outstanding term loan balance and is amortized using the effective interest method. The Company has recorded amortization expense of $272 (2018: $229) during the year ended December 31, 2019. The balance of unamortized costs recorded was $1,249 (2018: $1,521) as of December 31, 2019.

MUNICIPAL BOND

On July 11, 2019, the Company entered into a $307,200 municipal bond in the US tax-exempt bond market generating proceeds of $325,000 as the bond was issued by AMG Vanadium LLC at a premium. The bond was issued through the Ohio Air Quality Development Authority for the purpose of constructing a new catalyst recycling facility in Ohio. The bonds have a coupon rate of 5.0% and an effective interest rate of 4.6% maturing on July 1, 2049. The bonds are fully guaranteed by the Company. There are no financial covenants related to the bonds. The bonds are unsecured and subordinated to the term loan B and revolving credit facility.

Under the terms of the loan agreement with the bondholders, the proceeds of the bonds are restricted for the purpose of financing a portion of the cost of the acquisition, construction and equipping of the new spent catalyst recycling facility; paying certain construction period interest on the bonds; and paying certain issuance costs of the bond, which are defined as any financial, legal, administrative and other fees incurred by the Company. The funds are held by a third-party trustee and invested in cash and highly liquid money market funds (notes 16 and 28). While the project is under construction, the Company has classified the proceeds of the bonds as restricted cash as a non-current asset in the statement of financial position.

The bonds have several redemption provisions. The Company has an optional redemption whereby it can redeem the bonds beginning on July 1, 2029 through the date of maturity for the par value plus accrued interest at the date of redemption. If upon completion of the project there are excess funds, then the loan agreement indicates that a mandatory redemption of the excess funds shall be used to redeem an equivalent amount of the outstanding bonds. Additionally, the Company will also be required to repay a pro rata amount of the original issue premium in the event of a mandatory redemption. The repayment of the premium is calculated as the number of remaining years until the ten-year call date (July 1, 2029) divided by ten years and multiplied by the amount of the original issue premium on the redeemed bonds. There is also an extraordinary redemption which occurs in the event of a casualty loss resulting in the destruction of the facility, the exercise of the power of eminent domain by a governmental authority that prevents the facility from operating, an inability to obtain the necessary permits on or before July 21, 2021 (the Company must make commercially reasonable efforts to obtain said permits), or as a result of changes in the constitution of the United States or the state or a related legislative or administrative action that invalidates the loan agreement. The extraordinary redemption is calculated in the same fashion as the mandatory redemption.

The municipal bond also grants the holders of the bonds the right to tender their bonds for purchase by the Company upon a change in control of the Company at a purchase price of 101% of the principal amount of the bonds plus accrued interest.

Debt issuance costs

In connection with the issuance of the municipal bonds in July 2019, the Company incurred issuance costs of $4,981, which were deducted from the proceeds of the municipal bonds. These issuance costs are presented net against the outstanding municipal bond balance and are amortized using the effective interest method. The Company recorded amortization expense of $36 during the year ended December 31, 2019 related to these costs. The balance of unamortized costs was $4,945 as of December 31, 2019.

Bond issuance premium

The municipal bond included a premium of $17,800 which is shown with the outstanding municipal bond balance and is amortized using the effective interest method. The Company recorded amortization of $144 during the year ended December 31, 2019. The balance of unamortized premium recorded was $17,656 as of December 31, 2019.

SUBSIDIARY DEBT

During 2019, a Chinese subsidiary obtained a revolving credit facility which is denominated in Chinese Yuan Renminbi. The facility carries an interest rate of 6.0% and had a balance of $95 as of December 31, 2019.

As of December 31, 2018, a Brazilian subsidiary had $22,000 of fixed rate USD denominated debt facilities outstanding. During 2019, the Company refinanced short-term debt of $8,000 to loans and borrowings increasing the outstanding balance on these facilities to $30,000 as of December 31, 2019. These arrangements consist of loans which carry a fixed interest rate of 4.1% and mature in 2020 and 2021. The borrowings under these facilities reduce the Company's borrowing capacity on its revolving credit facility. In 2018, a Brazilian subsidiary obtained an additional financing arrangement for $4,837. This arrangement is denominated in Brazilian reais, carries a variable interest rate and matures in 2023. To mitigate currency exposure and interest rate risk the Company entered into a USD cross-currency interest rate swap which fixed the interest rate at 8.5%. See note 29 for additional information on hedging activities. The balance outstanding on this arrangement was $4,549 as of December 31, 2019.

FINANCE LEASE OBLIGATIONS

As of December 31, 2018, AMG subsidiaries had finance leases outstanding to finance machinery. The Company had finance lease obligations of $23 related to this machinery. These balances were reclassified to the overall lease liability as a result of the adoption of IFRS 16 on January 1, 2019. See note 31 for additional information.

DEBT REPAYMENTS

The Company made debt repayments of $3,911 during 2019. The payments included $3,500 repayment of the term loans and additional payments of $411 made to various banks related to other debt repayments. During 2018, the Company made finance lease and debt repayments of $155,423. The payments included $154,612 repayment of the term loans and additional payments of $811 made to various banks related to finance leases and other debt repayments.

RECONCILIATION OF MOVEMENTS OF LIABILITIES TO CASH FLOWS ARISING FROM FINANCING ACTIVITIES

	Loans and borrowings	Finance lease liabilities*	Total
Balance at January 1, 2018	173,550	58	173,608
Changes from financing cash flows:			
Proceeds from loans and borrowings	353,087	—	353,087
Transaction costs related to loans and borrowings	(7,155)	—	(7,155)
Repayment of borrowings	(155,397)	—	(155,397)
Payment of finance lease liabilities	—	(26)	(26)
Total changes from financing cash flows	190,535	(26)	190,509
The effect of changes in foreign exchange rates	(469)	(9)	(478)
Amortization of transaction costs related to loans and borrowings	2,305	—	2,305
Balance at December 31, 2018	365,921	23	365,944
Reclassification on initial application of IFRS 16*	—	(23)	(23)
Balance at January 1, 2019*	365,921	—	365,921
Changes from financing cash flows:			
Proceeds from loans and borrowings	325,093	—	325,093
Transaction costs related to loans and borrowings	(4,981)	—	(4,981)
Repayment of borrowings	(3,911)	—	(3,911)
Total changes from financing cash flows	316,201	—	316,201
The effect of changes in foreign exchange rates	(201)	—	(201)
Amortization of premiums, discounts and transaction costs related to loans and borrowings	1,316	—	1,316
Refinancing of short-term debt to loans and borrowings	8,000	—	8,000
Balance at December 31, 2019	691,237	—	691,237

*The Company applied IFRS 16 using the modified retrospective approach and therefore the comparative information has not been restated and continues to be reported under IAS 17 and IFRIC 4. See note 31 for additional information on lease obligations.

22. SHORT-TERM BANK DEBT

The Company's Brazilian subsidiaries maintain short-term borrowing arrangements with various banks. Borrowings under these arrangements are recognized as short-term debt on the consolidated statement of financial position when it is due to be settled within 12 months from inception and aggregated $7,500 at December 31, 2019 (2018: $15,500), at a weighted-average interest rate of 4.2% (2018: 4.3%). During the year ended December 31, 2019, the Company refinanced short-term debt of $8,000 to loans and borrowings.

23. EMPLOYEE BENEFITS

DEFINED CONTRIBUTION PLANS

Tax qualified defined contribution plans are offered which cover substantially all of the Company's salaried and hourly employees at US subsidiaries. All contributions, including a portion that represents a company match, are made in cash into mutual fund accounts in accordance with the participants' investment elections. The assets of the plans are held separately, under the control of trustees, from the assets of the subsidiaries. When employees leave the plans prior to vesting fully in the Company contributions, the contributions or fees payable by the Company are reduced by the forfeited contributions.

In Europe, the employees are members of state-managed retirement benefit plans operated by the governments in the countries where the employees work. The subsidiaries are required to contribute a specified percentage of payroll costs to the retirement benefit scheme to fund the benefits. The only obligation of the subsidiaries with respect to the retirement benefit plan is to make the specified contributions.

The total expense as of December 31, 2019, recognized in the consolidated income statement of $4,169 (2018: $4,212) represents contributions paid and payable to these plans.

DEFINED BENEFIT PLANS

North America plans

The Company offers tax-qualified, non-contributory defined benefit pension plans for certain salaried and hourly employees at US subsidiaries. The plans generally provide benefit payments using a formula based on an employee's compensation and length of service. These plans are funded in amounts at least equal to the minimum funding requirements of the US Employee Retirement Income Security Act.

Non-qualified additional supplemental executive retirement plans (SERPs) also cover four of the Company's current and former executive officers. Pursuant to the terms of the agreements, these officers earn additional retirement benefits for continued service with the Company. The amounts payable under the SERPs are guaranteed by AMG.

Actuarial assumptions

A majority of the North America plans are frozen to new entrants. As a result, the principal actuarial assumptions for these plans are the rate of discount and mortality rates. The rate of discount utilized as of December 31, 2019 (expressed as a weighted average) was 3.02% (2018: 4.03%). The SERP plan assumptions are developed using specific assumptions about the individual participants.

Assumptions regarding future mortality are based on published statistics and the mortality tables developed by the Society of Actuaries for private sector plans in the United States using MP-2019 as published in October 2019. The valuation was prepared on a going-plan basis. The valuation was based on members in the Plan as of the valuation date and did not take future members into account. No provisions for future expenses were made.

Medical cost trend rates are not applicable to these plans.

The best estimate of contributions to be paid to the plans for the year ending December 31, 2020 is $1,040.

European plans

The Company's European plans include qualified defined benefit plans in Germany, the UK and France. The plans in Germany and France are partially funded or unfunded while the UK plan is partially funded. Benefits under these plans are based on years of service and the employee's compensation. Benefits are paid either from plan assets or, in certain instances, directly by AMG. Substantially all plan assets are invested in listed stocks and bonds.

Non-qualified additional supplemental executive retirement plan (SERP) also covers one of the Company's current executive officer. Pursuant to the terms of the agreement, this officer earns additional retirement benefits for continued service with the Company. The amounts payable under the SERP are guaranteed by AMG.

Actuarial assumptions

Principal actuarial assumptions at the reporting date (expressed as weighted averages) are presented below.

	2019	2018
	% per annum	% per annum
Salary increases	1.20	1.26
Rate of discount at December 31	1.89	2.23
Pension payments increases	2.35	2.41

Assumptions regarding future mortality are based on published statistics and mortality tables including the RT 2018G and S2PxA mortality tables.

The best estimate of contributions to be paid to the primary plans for the year ending December 31, 2020 is $6,624.

Presented below are employee benefits disclosures for plans aggregated by geographical location into the North American and European groups.

2019 changes in the defined benefit obligation and fair value of plan assets:

	North America			Europe			Total		
	Fair Value of Plan Assets	Defined Benefit Obligation	Total	Fair Value of Plan Assets	Defined Benefit Obligation	Total	Fair Value of Plan Assets	Defined Benefit Obligation	Total
January 1, 2019	34,959	(51,836)	(16,877)	92,150	(224,490)	(132,340)	127,109	(276,326)	(149,217)
Service costs	—	(428)	(428)	—	(1,784)	(1,784)	—	(2,212)	(2,212)
Net interest	1,202	(2,025)	(823)	2,382	(5,317)	(2,935)	3,584	(7,342)	(3,758)
Subtotal included in profit or loss	1,202	(2,453)	(1,251)	2,382	(7,101)	(4,719)	3,584	(9,554)	(5,970)
Benefits paid	(2,851)	2,851	—	(7,143)	10,700	3,557	(9,994)	13,551	3,557
Amounts included in OCI (see following table)	5,317	(5,126)	191	10,275	(38,601)	(28,326)	15,592	(43,727)	(28,135)
Contributions by employer	907	—	907	1,890	—	1,890	2,797	—	2,797
Effect of movements in foreign exchange rates	—	—	—	3,062	(828)	2,234	3,062	(828)	2,234
Change in the fair value of defined benefit plans that are in net asset position as of December 31, 2019 [a]	(1,136)	—	(1,136)	—	—	—	(1,136)	—	(1,136)
Net liability for defined benefits obligations at December 31, 2019	38,398	(56,564)	(18,166)	102,616	(260,320)	(157,704)	141,014	(316,884)	(175,870)

(a) $1,319 included in non-current assets in the Statement of Financial Positions.

2019 subtotal included in OCI:

	North America			Europe			Total		
	Fair Value of Plan Assets	Defined Benefit Obligation	Total	Fair Value of Plan Assets	Defined Benefit Obligation	Total	Fair Value of Plan Assets	Defined Benefit Obligation	Total
Return on plan assets (excluding amounts included in net interest expense)	5,317	—	5,317	10,275	—	10,275	15,592	—	15,592
Actuarial changes arising from changes in demographic assumptions	—	380	380	—	(3,828)	(3,828)	—	(3,448)	(3,448)
Actuarial changes arising from changes in financial assumptions	—	(5,508)	(5,508)	—	(28,757)	(28,757)	—	(34,265)	(34,265)
Experience adjustments	—	2	2	—	(6,016)	(6,016)	—	(6,014)	(6,014)
Subtotal included in OCI	5,317	(5,126)	191	10,275	(38,601)	(28,326)	15,592	(43,727)	(28,135)

2018 changes in the defined benefit obligation and fair value of plan assets:

	North America			Europe			Total		
	Fair Value of Plan Assets	Defined Benefit Obligation	Total	Fair Value of Plan Assets	Defined Benefit Obligation	Total	Fair Value of Plan Assets	Defined Benefit Obligation	Total
January 1, 2018	37,874	(57,455)	(19,581)	106,017	(242,629)	(136,612)	143,891	(300,084)	(156,193)
Service costs	—	(477)	(477)	—	(2,012)	(2,012)	—	(2,489)	(2,489)
Net interest	1,138	(1,907)	(769)	2,509	(5,577)	(3,068)	3,647	(7,484)	(3,837)
Subtotal included in profit or loss	1,138	(2,384)	(1,246)	2,509	(7,589)	(5,080)	3,647	(9,973)	(6,326)
Benefits paid	(3,224)	3,224	—	(7,419)	11,330	3,911	(10,643)	14,554	3,911
Amounts included in OCI (see following table)	(2,952)	4,779	1,827	(7,414)	2,213	(5,201)	(10,366)	6,992	(3,374)
Contributions by employer	1,282	—	1,282	2,096	—	2,096	3,378	—	3,378
Effect of movements in foreign exchange rates	—	—	—	(6,049)	12,185	6,136	(6,049)	12,185	6,136
Change in the fair value of defined benefit plans that are in net asset position as of December 31, 2018 [a]	841	—	841	2,410	—	2,410	3,251	—	3,251
Net liability for defined benefits obligations at December 31, 2018	34,959	(51,836)	(16,877)	92,150	(224,490)	(132,340)	127,109	(276,326)	(149,217)

(a) $184 included in non-current assets in the Statement of Financial Positions.

2018 subtotal included in OCI:

	North America			Europe			Total		
	Fair Value of Plan Assets	Defined Benefit Obligation	Total	Fair Value of Plan Assets	Defined Benefit Obligation	Total	Fair Value of Plan Assets	Defined Benefit Obligation	Total
Return on plan assets (excluding amounts included in net interest expense)	(2,952)	—	(2,952)	(7,414)	—	(7,414)	(10,366)	—	(10,366)
Actuarial changes arising from changes in demographic assumptions	—	1,634	1,634	—	(1,873)	(1,873)	—	(239)	(239)
Actuarial changes arising from changes in financial assumptions	—	3,231	3,231	—	4,119	4,119	—	7,350	7,350
Experience adjustments	—	(86)	(86)	—	(33)	(33)	—	(119)	(119)
Subtotal included in OCI	(2,952)	4,779	1,827	(7,414)	2,213	(5,201)	(10,366)	6,992	(3,374)

Plan assets consist of the following:

	North America plans		European plans		Total	
	2019	2018	**2019**	2018	**2019**	2018
Equity securities and ownership of equity funds	7,736	6,199	60,261	49,494	67,997	55,693
Fixed Income	31,470	28,289	—	—	31,470	28,289
Insurance contracts and other	511	655	42,355	42,656	42,866	43,311
Total	39,717	35,143	102,616	92,150	142,333	127,293

The assets of funded plans are generally held in separately administered trusts, either as specific assets or as a proportion of a general fund or insurance contracts. Assets are invested in different classes in order to maintain a balance between risk and return. Investments are diversified to limit the financial effect of the failure on any individual investment. For many of the funded plans, asset-liability matching strategies are not in place, however the fixed income assets are held in investments with varying term lengths.

The assets included in equity securities in the table above consists of securities held at market value. The fixed income assets consist primarily of investment grade and corporate bonds at market value. The insurance contracts and other consist of insurance contracts and other investment vehicles held at market value.

The expense is recognized in the following line items in the income statement:

	North America plans		European plans		Total	
	2019	2018	**2019**	2018	**2019**	2018
Cost of sales	407	405	1,780	2,014	2,187	2,419
Selling, general and administrative expenses	844	841	2,939	3,066	3,783	3,907
Total	1,251	1,246	4,719	5,080	5,970	6,326

A quantitative sensitivity analysis for significant assumptions as of December 31, 2019 is as shown below:

Assumptions	Discount rate		Future salary increases		Future pension cost increase	
Sensitivity level	**1% increase**	1% decrease	**1% increase**	1% decrease	**0.5% increase**	0.5% decrease
Impact on the net defined benefit obligation North American Plans	(5,419)	6,451	96	(103)	119	(121)
Impact on the net defined benefit obligation European Plans	(37,759)	45,076	5,472	(4,802)	11,176	(10,251)
Total impact on the net defined benefit obligation	(43,178)	51,527	5,568	(4,905)	11,295	(10,372)

The sensitivity analyses above have been determined based on a method that extrapolates the impact on net defined benefit obligation as a result of reasonable changes in key assumptions occurring at the end of the reporting period.

The following payments are expected to be made in the future years out of the defined benefit plan obligation for the year ending December 31:

	North America Plans	European Plans	Total
2020	3,110	9,931	13,041
2021	3,110	10,158	13,268
2022	3,720	10,345	14,065
2023	3,720	10,524	14,244
2024	3,720	10,720	14,440
2025-2029	18,000	54,823	72,823

The average duration of the defined benefit plan obligation at the end of the reporting period is 16 years (2018: 16 years).

These defined benefit plans expose the Company to actuarial risks, such as longevity risk, currency risk, interest rate risk and market (investment) risk.

24. SHARE-BASED PAYMENTS

EQUITY-SETTLED STOCK OPTIONS

On June 26, 2007, the Management Board established the AMG Option Plan ("2007 Plan"), which is eligible to members of the Management Board, Supervisory Board, employees, and consultants of the Company. Each option issued under the plan entitles the holder to acquire shares at a future date at a price equal to the fair market value of the share at the date on which the option was granted. All outstanding options granted under this plan are fully vested. This vesting is not subject to any performance conditions. The options expire on the tenth anniversary of their grant date.

At December 31, 2019, there were no options exercised, expired or forfeited under the 2007 Plan. During the year ended December 31, 2018, options exercised were 145,000 under the 2007 Plan. Expired or forfeited options under this plan were 90,000. All options under the 2007 Plan are equity-settled, in accordance with IFRS 2, by award of options to acquire ordinary shares or award of ordinary shares.

On May 13, 2009, the Annual General Meeting approved an option plan for the Management Board, the 2009 AMG Option Plan ("2009 Plan"). Each option issued under the 2009 Plan entitles the holder to acquire shares at a future date at a price equal to the fair market value of the share at the date on which the option was granted. One half of the options granted to each option holder on any date will vest on each of the third and fourth anniversaries of the grant date. The vesting is subject to performance conditions related to return on capital employed and share price appreciation. The options expire on the tenth anniversary of their grant date.

During the year ended December 31, 2019, options exercised were 133,368 (2018: 100,426) under the 2009 Plan. Total grants under the 2009 Plan during 2019 were 58,115 (2018: 27,136). During the year ended December 31, 2019, there were no grants expired or forfeited (2018: nil). All options under the 2009 Plan are equity-settled, in accordance with IFRS 2, by award of options to acquire ordinary shares or award of ordinary shares. The fair value of these awards has been calculated at the date of grant of the award. The fair value, adjusted for an estimate of the number of awards that will eventually vest, is expensed using a graded vesting methodology. The fair value of the options granted was calculated using a Black-Scholes model. Changes in the assumptions can affect the fair value estimate of a Black-Scholes model. The assumptions used in the calculation are set out below.

During the year ended December 31, 2019, AMG recorded compensation expense from equity-settled option transactions of $587 (2018: $529) which is included in selling, general and administrative expenses in the income statement.

Movements

In thousands of options	2019 Number of options (in 000s)	2019 Weighted average exercise price (in €)	2018 Number of options (in 000s)	2018 Weighted average exercise price (in €)
Outstanding at January 1	358	15.48	667	21.95
Granted during the year	58	31.43	27	44.24
Exercised during the year	(133)	9.15	(246)	27.14
Forfeited or expired during the year	—	—	(90)	40.28
Outstanding at December 31	283	21.73	358	15.48
Exercisable at December 31	19	9.78	—	—

At December 31, 2019, the number of common shares subject to options outstanding and exercisable was as follows:

Price range	Outstanding options	Weighted average exercise price (in €)	Weighted average remaining life (in years)	Exercisable options	Weighted average exercise price (in €)
€9.78	122,137	9.78	6.34	19,084	9.78
€25.50 to €31.43	133,822	28.08	8.15	—	—
€44.24	27,136	44.24	8.34	—	—

At December 31, 2018, the number of common shares subject to options outstanding and exercisable was as follows:

Price range	Outstanding options	Weighted average exercise price (in €)	Weighted average remaining life (in years)	Exercisable options	Weighted average exercise price (in €)
€8.08 to €9.78	255,505	9.45	7.15	—	—
€25.50	75,707	25.50	8.34	—	—
€44.24	27,136	44.24	9.34	—	—

The maximum number of options that can be granted under either the 2007 Plan or the 2009 Plan is 10% of total shares outstanding up to a maximum of 50,000,000. As of December 31, 2019, there were no options outstanding under the 2007 Plan (2018: nil), and the total options outstanding under the 2009 Plan were 283,095 (2018: 358,348).

Assumptions

The following table lists the inputs into the model used to calculate the fair value of the share-based payment options that were granted in 2019 and 2018 under the 2009 Plan:

	2019	2018
Exercise price	€31.43	€44.24
Share price at date of grant	€31.43	€44.24
Contractual life (years)	10	10
Expected volatility	44.03%	44.25%
Life of option (years)	10	10
Weighted average fair value	€9.55	€19.90

The expected volatility was calculated using the average share volatility of the Company (over a period equal to the expected term of the options). The life of the options is ten years, and they are valued as Bermudan options. The 2009 Plan options vest 50% each on the third and fourth anniversary of the grant date. There are performance requirements for vesting of these options. The risk-free rate of return is the yield from EBC Eurozone interest curves for instruments whose maturities approximate the vesting period of the options.

AMG's option expense is recorded in equity (refer to note 18).

Performance share units

In May 2009, the Annual General Meeting approved a remuneration policy that utilizes share-based payments as a part of compensation. In the year ended December 31, 2019, the Company issued 147,033 (2018: 117,498) performance share units ("PSUs") to certain employees which are share-settled. As these awards will be equity-settled, the balance is recorded in equity rather than as a liability in accordance with IFRS 2.

AMG utilized a Monte Carlo simulation to develop a valuation of the PSU awards. This calculation was performed on the date of issuance. The following table lists the inputs into the model used to calculate the fair value of the equity-settled performance share units that were granted 2017 through 2019:

	2019 Grant	2018 Grant	2017 Grant
Share price at date of grant	€31.43	€37.72	€24.70
Contractual life at issuance (years)	3.0	3.0	3.0
Expected volatility	40.03%	38.04%	35.57%
Expected departures at grant	8%	16%	16%

The expected volatility was calculated using the average share volatility of the Company (over a period equal to the expected term of the shares). The expected life is the time at which shares will vest. For the risk-free rate, the Company utilized the US Treasury yield for the 2019 grants and three-year zero rate from the EURIBOR swap curve for the 2018 and 2017 grants. The risk free rate does not have a significant impact on the valuation of the awards.

The Company recorded expense of $4,927 (2018: $6,903) related to these awards during the year. AMG's expense related to equity-settled awards is recorded in equity (refer to note 18).

In the year ended December 31, 2019, 9,793 PSUs were forfeited (2018: 6,506). The total number of equity-settled PSUs outstanding as of December 31, 2019 was 412,148 (2018: 707,171).

During the year ended December 31, 2019, the Company adjusted the forfeiture rate on the 2017 awards from 8% to 7%, which approximates the actual departures to date. The 2019 and 2018 awards continue to apply an 8% forfeiture assumption given the historical rate of departures. The impact on the income statement as a result of these adjustments was an increase in stock-based compensation expense of $65 (2018: $889) during the year ended December 31, 2019. During the year ended December 31, 2018, the expected departures for the 2018 and 2017 awards were adjusted from 16% and 12%, respectively, to 8% as a result of actual departures less than the expectation to date. The actual departures for the 2016 awards were adjusted from 12% to 6%, which approximated the actual departures.

The PSU awards include a performance multiplier which can range from 0x – 1.75x the target award based on the Company's share price performance relative to its peers. The Company achieved 1.75x for the 2016 grant which was settled in 2019 (2018: 1.75x). During the year ended December 31, 2019, 786,045 shares (2018: 673,330) were paid out with respect to the vesting of equity-settled performance share units granted in 2016.

Other share-based compensation

During the year ended December 31, 2016, the Company awarded the Chief Financial Officer restricted share-based compensation as part of his initial compensation package. These shares are expensed using a graded vesting methodology. The total expense recognized in 2019 was nil (2018: $67).

25. PROVISIONS

	Environmental remediation costs and recoveries	Restructuring	Warranty	Cost estimates	Partial retirement	Restoration costs	Other	Total
Balance at January 1, 2018	26,542	2,234	8,837	5,813	1,259	10,628	955	56,268
Provisions made during the period	8,757	2,052	2,996	5,266	1	10	5,576	24,658
Provisions reversed during the period	—	—	(5,540)	(2,338)	(14)	—	(537)	(8,429)
Provisions used during the period	(3,178)	(1,929)	(655)	(1,027)	(77)	—	(4,603)	(11,469)
Increase due to discounting	244	—	—	—	—	200	—	444
Currency and transfers	(175)	(1,102)	(364)	(316)	(51)	(838)	(54)	(2,900)
Balance at December 31, 2018	32,190	1,255	5,274	7,398	1,118	10,000	1,337	58,572
Balance at January 1, 2019	32,190	1,255	5,274	7,398	1,118	10,000	1,337	58,572
Provisions made during the period	725	3,374	3,259	3,207	3	—	991	11,559
Provisions reversed during the period	—	(109)	(3,105)	(1,788)	(404)	(1)	(556)	(5,963)
Provisions used during the period	(7,737)	(2,388)	(825)	(1,903)	—	—	(864)	(13,717)
Increase due to discounting	1,418	—	—	—	—	646	—	2,064
Currency and transfers	(69)	(738)	(108)	(146)	(21)	31	(29)	(1,080)
Balance at December 31, 2019	26,527	1,394	4,495	6,768	696	10,676	879	51,435
Non-current	20,948	—	—	—	1,118	10,000	461	32,527
Current	11,242	1,255	5,274	7,398	—	—	876	26,045
Balance at December 31, 2018	32,190	1,255	5,274	7,398	1,118	10,000	1,337	58,572
Non-current	17,389	—	—	—	696	10,364	535	28,984
Current	9,138	1,394	4,495	6,768	—	312	344	22,451
Balance at December 31, 2019	26,527	1,394	4,495	6,768	696	10,676	879	51,435

ENVIRONMENTAL REMEDIATION COSTS AND RECOVERIES

The Company makes provisions for environmental clean-up requirements, largely resulting from historical solid and hazardous waste handling and disposal practices at its facilities. Environmental remediation provisions exist at the following sites and are discounted according to the timeline of expected payments. Due to timing and low interest rates, the undiscounted and discounted liability amounts do not differ significantly, except for with respect to the liabilities in the US.

Cambridge, OH USA

The most significant items at the Cambridge, Ohio site relate to a 1997 permanent injunction consent order ("PICO") entered into with the State of Ohio and Cyprus Foote Mineral Company, the former owner of the site. While AMG's US subsidiary and Cyprus Foote are jointly liable, the Company has agreed to perform and be liable for the remedial obligations. The site contains two on-site slag piles that are the result of many years of production. These slag piles were capped in 2009, in accordance with the PICO requirements, thereby lowering the radioactive emissions from the piles.

The PICO also required 1,000 years of operations and maintenance expenses ("O&M") through the year 3009 at the site. The Company has reserved for ongoing O&M which is expected to cost $43,906 on an undiscounted basis and $2,104 (2018: $1,722) on a discounted basis. Annual payments for O&M are expected to be $59 for the next 17 years, declining from that point on. These amounts will be paid out of an environmental trust and annuity which have already been established by the Company. The total value of these trust and annuity assets is $4,315 of which $2,211 has not been recognized due to the liability amount recorded being less than the value of the assets. One additional provision relates to groundwater monitoring. This project is expected to create cash outflows of $110 ($131 on an undiscounted basis), and is expected to be completed within the next 16 years. Discount rates of 1.59% - 2.25% (depending on the expected timing of payments) were used in determining the liabilities recorded.

There were no environmental expenses recorded in the years ended December 31, 2019 and 2018 related to the Cambridge site.

Newfield, NJ USA

The United States Environmental Protection Agency (the "US EPA") exercises authority over another of the Company's US subsidiaries. The US EPA has established three operable units (each an "OU") addressing (i) non-perchlorate groundwater contamination (OU-1); (ii) non-perchlorate soil and sediment contamination (OU-2); and perchlorate contamination in groundwater and/or soil (OU-3), and many of the obligations have been completed.

Similar to the Cambridge, Ohio facility, Newfield conducted operations that created a substantial slag pile with low-level radioactive materials. AMG has completed negotiations with the NJDEP regarding a removal plan for the Newfield Site. The plan consists of both the removal and transportation of the material to a proper disposal site. Management has recorded an accrual for $22,026 (2018: $28,250) ($22,713 on an undiscounted basis) which represents its best estimate of the cost of removal, at this stage. The estimated amounts have also been reviewed and approved by the NJDEP. These costs would be paid over the next 4 years, subject to negotiations with the NJDEP. There was no environmental expense recorded related to the Newfield site during the year ended December 31, 2019 (2018: $8,012).

In addition to the removal of the slag pile the Company has agreed to an operations and maintenance agreement (O&M) provision of $138 at December 31, 2019 (2018: $134).

Remediation trust funds

The Company's US subsidiaries have established trust funds for future environmental remediation payments. The amounts are kept by commercial banks, which are responsible for making investments in equity and money market instruments. The trust funds are to be used according to the terms of the trust deed which require that these funds be used for O&M at the two US sites. Amounts are paid out following completion and approval of rehabilitation work. The assets are not available for general use. The trust funds are discounted and are shown within other non-current assets in the consolidated statement of financial position. The recognized values of the trust funds at December 31, 2019 were $2,729 (2018: $2,336). The total amount of the trusts as of December 31, 2019 were $4,940 (2018: $4,733).

Pocking, Germany

An environmental remediation liability exists with respect to the silicon metal operation and its waste storage. As of December 31, 2019, the liability for the remediation of this site is valued at $436 (2018: $452). There were payments of $7 (2018: $6) made during 2019. There are expected payments in 2020 of $436. A discount rate of 0.0% was used to determine the liability recorded.

Nuremberg, Germany

Over time, damage to the sewer lines from the plant in Nuremberg, Germany has occurred. Management is working with German authorities in order to clean-up the leakage from the sewer and repair the sewer lines to eliminate any future leakage. In the year ended December 31, 2019, there was an expense of $725 (2018: $745). The expected liability for continued work on the sewer rehabilitation project is $1,712 (2018: $1,516). Payments for this project are expected to occur over the next 4 years with spending taking place in a relatively consistent pattern over those years. Discount rates of 0.58% - 0.84% (depending on the expected timing of payments) were used in determining the liabilities recorded.

RESTRUCTURING

During the year ended December 31, 2019, the Company recorded a restructuring expense made of an additional provision of $3,374 (2018: $2,052) and reversal of ($109) (2018: nil). The largest portion of the expense by the amount of $2,571 related to a production facility in one of our businesses in the United States as well as restructuring expenses and severance payments in two of our European operations which resulted in a headcount reduction of 64. Additional net expenses of $694 mainly included headcount reductions of 37 due to the reorganization of our Brazil operations.

WARRANTY

The Company's Engineering segment offers certain warranties related to their furnace operations. These warranties are only provided on certain contracts and the provisions are made on a contract by contract basis. Each contractual warranty is expected to be utilized or derecognized within twelve months. The provisions for these warranties are based on the historical return percentages. Warranty payments of $825 were made and warranty provisions included an expense of $3,082 and reversal of ($3,064) recorded in the year ended December 31, 2019. The additional provisions were primarily related to new projects in the turbine blade coating field and plasma melting technologies as well as several special furnaces for various heat treatment and metallurgy applications that were finalized during 2019. The significant increase in reversal related to expired warranty periods. Warranty payments of $619 were made and warranty provisions included an expense of $2,952 and reversal of ($5,540) recorded during the year ended December 31, 2018. The additional provisions were primarily related to new projects in the turbine blade coating field, heat treatment, plasma melting technologies as well as several special furnaces for various heat treatment and metallurgy applications. During 2018, the significant increase in reversal related to expired warranty periods.

Two other German subsidiaries provide warranties for certain products. The provisions are based on actual claims made by customers. There were provisions made of an additional expense of $177 (2018: $44), a reversal of ($41) (2018: nil) and there were no payments recorded during 2019 (2018: $36).

COST ESTIMATES

AMG Engineering builds a project cost provision for long-term contracts that are completed. The provision is developed on a contract by contract basis and is based on contractor estimates. The provision is utilized or derecognized depending on actual performance of the contracts and expected total of project costs. A provision made of an additional expense of $3,207 (2018: $5,266) and reversal of ($1,788) (2018: ($2,338)) was recorded in 2019 related to new projects related to the turbine blade coating field and plasma melting technologies as well as several special furnaces for various heat treatment and metallurgy applications while $1,903 (2018: $1,027) of provisions were used.

PARTIAL RETIREMENT

In an effort to reduce unemployment and create jobs for younger job-seekers, Germany implemented certain regulations in 1996 to enable employees to take early retirement. Although the law is no longer in effect, the Company's German subsidiaries have made provisions for those employees who are eligible per their employment contracts. During 2019, there was an additional expense recorded of $3 (2018: $1), reversal of ($367) (2018: ($14)) and there were no payments (2018: $77). Discount rate of (0.15%) was used by the Company's German subsidiary to determine the liabilities recorded. Our last partial retirement obligation expired during 2019, which resulted on the termination of the program.

The collective agreements for retirement indemnities on our French subsidiary and the corresponding commitments have been valued as of December 31, 2019. There was no additional expense recorded (2018: nil), reversal of ($37) (2018: nil) and there were no payments (2018: nil). Additional payments of approximately $190 are expected to occur over the next 5 years. Discount rate of 1.30% was used by the Company's French subsidiary to determine the liabilities recorded. Furthermore, 10 of our partial retirement obligations expired during 2019.

RESTORATION, REHABILITATION AND DECOMMISSIONING COSTS

Decommissioning provisions represent the accrued cost required to provide adequate restoration and rehabilitation upon the completion of extraction activities. These amounts will be settled when rehabilitation is undertaken, generally at the end of the project's life.

Hauzenberg, Germany

The Company maintains a recultivation provision related to its graphite mine in Germany. There were no additions to t he provision recorded in 2019 (2018: nil). The total restoration liability for this mine was $5,380 as of December 31, 2019 (2018: $5,345). A discount rate of 0.5% was used to determine the liability recorded.

Nazareno, Brazil

During the year ended December 31, 2019, there was a net increase in the liability of $641, which totaled $5,296 as of December 31, 2019 (2018: $4,655). A discount rate of 5.25% was used to determine the liability recorded. The following table summarizes the activity as of December 31, 2019:

	Brazil restoration costs
Balance at January 1, 2018	5,036
Provisions made during the period	10
Increase in fixed assets	173
Increase due to discounting	198
Translation loss	(762)
Reclassification to current environmental liability	—
Balance at December 31, 2018	4,655
Balance at January 1, 2019	4,655
Provisions reversed during the period	(1)
Increase in fixed assets	327
Increase due to discounting	510
Translation loss	(195)
Balance at December 31, 2019	5,296
Non-current	4,655
Current	—
Balance at December 31, 2018	4,655
Non-current	4,984
Current	312
Balance at December 31, 2019	5,296

OTHER

Other is comprised of additional accruals including certain guarantees made to various customers. As of December 31, 2019, the other liability is valued at $879 (2018: $1,337) which mainly relates to one of our German subsidiaries.

26. OTHER LIABILITIES

Other liabilities are comprised of the following:

	2019	2018
Accrued interest	9,733	3,025
Accruals for operational costs	9,628	9,820
Other benefits and compensation	8,913	9,171
Accrued bonus	8,346	14,310
Accrued professional fees	7,555	5,824
Accrued employee payroll expenses	6,429	6,683
Fiscal contingency	2,796	2,686
Taxes, other than income	2,540	3,381
Non-controlling interest dividend	1,410	1,438
Sales commission	1,034	1,012
Deferred revenue	965	1,338
Claims	834	1,132
Government grants	206	311
Other miscellaneous liabilities	4,719	5,360
Total	65,108	65,491
Thereof:		
Non-current	3,629	4,371
Current	61,479	61,120

27. TRADE AND OTHER PAYABLES

	2019	2018
Trade payables	136,577	218,210
Trade payables – contract work	20,531	12,729
Total	157,108	230,939

The Company has limited exposure to payables denominated in currencies other than the functional currency, and where significant exposure exists enters into appropriate foreign exchange contracts.

- Trade payables are generally non-interest bearing and are normally settled on 30 or 60 day terms except for payables related to furnace construction contracts that settle between one month and twelve months. Other payables are non-interest bearing and have an average term of six months.
- Interest payable is normally settled quarterly or semi-annually throughout the financial year.
- For terms and conditions relating to related parties, refer to note 34.

As of December 31, 2019, the Company has outstanding supply chain financing of $8,950 (2018: $7,260).

28. FINANCIAL RISK MANAGEMENT OBJECTIVES AND POLICIES

The Company's principal financial liabilities, other than derivatives, are comprised of loans and borrowings, short-term bank debt and trade payables. The main purpose of these financial instruments is to provide capital for the Company's operations, including funding working capital, capital maintenance and expansion. The Company has various financial assets such as trade and other receivables, and (restricted) cash, which arise directly from its operations.

The Company enters into derivative financial instruments, primarily interest rate swaps, interest rate caps, cross-currency interest rate swaps, foreign exchange forward contracts and commodity forward contracts. The purpose of these instruments is to manage interest rate, currency and commodity price risks. The Company does not enter into any contracts for speculative purposes.

The Supervisory Board has overall responsibility for the establishment of the Company's risk management framework while the Management Board is responsible for oversight and compliance within this framework. The Company's risk management policies are established to identify and analyze the risks faced by the Company, to set appropriate risk limits and controls, and to monitor risks and adherence to limits. Risk management policies and systems are reviewed regularly to reflect changes in market conditions and the Company's activities.

The main risks arising from the Company's financial instruments are: credit, liquidity and market risks.

CREDIT RISK

The Company's exposure to credit risk with respect to trade and other receivables is influenced mainly by the individual characteristics of each customer. The demographics of the Company's customer base, including the default risk of the industry and country in which customers operate, has less of an influence on credit risk. No single customer accounts for more than 10% of the Company's revenue. There are no geographic concentrations of credit risk. It is the Company's policy that all customers who wish to trade on credit terms are subject to credit verification procedures which ensure their creditworthiness. In addition, receivable balances are monitored on an ongoing basis to ensure that the Company's exposure to impairment losses is not significant. Collateral is generally not required for trade receivables, although the Company's furnace construction contracts do often require advance payments. The Company's maximum exposure is t he carrying amount as discussed in note 14.

With respect to credit risk arising from the other financial assets of the Company, which comprises cash and cash equivalents, restricted cash and certain derivative instruments, the Company's exposure to credit risk arises from the default of the counterparty, with a maximum exposure equal to the carrying amount of the instruments. The Company's treasury function monitors the location of cash and cash equivalents, restricted cash and the counterparties to hedges and monitors the strength of those banks. The Company's financial assets are held with bank and financial institution counterparties, which all carry investment-grade credit ratings. Impairment on cash and cash equivalents has been measured on a 12-month expected loss basis and reflects the short maturities of the exposures. The Company considers that its cash and cash equivalents have low credit risk based on the external credit ratings of the counterparties. The amount of impairment allowance at December 31, 2019 is $1 (2018: $1).

The Company's maximum exposure is the carrying amounts as discussed in notes 16, 17 and 29.

LIQUIDITY RISK

Liquidity risk is the risk that the Company will not be able to meet its financial obligations as they fall due. The Company's approach to managing liquidity is to ensure, as far as possible, that it will always have sufficient liquidity to meet its liabilities when due, under both normal and stressed conditions, without incurring unacceptable losses or risking damage to the Company's reputation.

The Company monitors cash flows at varying levels. At the Company level, this monitoring is done on a bi-weekly basis. However, at certain subsidiaries, this type of monitoring is done daily. Typically, the Company ensures that it has sufficient cash on demand to meet expected operational expenses for a period of eight weeks, including the servicing of financial obligations. In addition, the Company maintains various borrowing facilities for working capital and general corporate purposes. The Company's primary facility includes the following:

- $350,000 term loan B facility and a $200,000 revolving credit facility with a syndicate of banks that is secured by certain assets of the material subsidiaries of the Company. Interest is payable at a base rate plus a spread based on a leverage ratio.

The table below summarizes the maturity profile of the Company's financial liabilities at December 31, 2019, based on contractual undiscounted payments. The financial derivatives obligations are presented on a net basis for balances where it is appropriate to net the obligation position within a subsidiary for the respective period.

2019	Contractual cash flows	< 3 months	3-12 months	2021	2022	2023	2024	>2024
Term loan/revolver	343,000	—	3,500	3,500	3,500	3,500	3,500	325,500
Cash interest on term loan	83,271	—	16,732	16,560	16,388	16,216	16,044	1,331
Municipal bond	307,200	—	—	—	—	—	—	307,200
Cash interest on municipal bond	460,800	7,680	7,680	15,360	15,360	15,360	15,360	384,000
Other loans and borrowings	34,644	310	17,930	14,241	1,240	828	—	95
Cash interest on other loans and borrowings	2,053	25	1,783	245	—	—	—	—
Financial derivatives	8,711	1,179	3,920	2,275	1,166	171	—	—
Lease liabilities	69,497	1,445	4,666	5,414	4,598	4,307	4,111	44,956
Trade and other payables	157,108	124,447	32,661	—	—	—	—	—
Short-term bank debt	7,500	—	7,500	—	—	—	—	—
Total	1,473,784	135,086	96,372	57,595	42,252	40,382	39,015	1,063,082

The table below summarizes the maturity profile of the Company's financial liabilities at December 31, 2018 based on contractual undiscounted payments.

2018	Contractual cash flows	< 3 months	3-12 months	2020	2021	2022	2023	>2023
Term loan/revolver	346,500	—	3,500	3,500	3,500	3,500	3,500	329,000
Cash interest on term loan	104,715	—	17,039	17,904	16,860	16,587	16,315	20,010
Other loans and borrowings	27,163	—	5,431	18,290	1,290	1,290	862	—
Financial derivatives	13,415	2,692	5,770	2,590	1,167	—	1,196	—
Financial lease liabilities	25	7	10	8	—	—	—	—
Trade and other payables	230,939	207,833	23,106	—	—	—	—	—
Short-term bank debt	15,500	—	15,500	—	—	—	—	—
Total	738,257	210,532	70,356	42,292	22,817	21,377	21,873	349,010

The difference between the contractual cash flows and the carrying amount of the term loan noted above is attributable to issuance costs and an original issue discount in the amount of $6,318 and $7,742 as of December 31, 2019 and 2018, respectively, which are offset against the carrying amount of the debt.

The difference between the contractual cash flows and the carrying amount of the municipal bond noted above is attributable to issuance costs and a premium in the amount of $12,711 as of December 31, 2019, which are included in the carrying amount of the debt.

MARKET RISK

Market risk is the risk that the fair value of future cash flows of a financial instrument will fluctuate because of changes in market prices. Market prices comprise three types of risk: interest rate, foreign currency, and commodity price risk. Financial instruments affected by market risk include loans and borrowings, derivative financial instruments, trade and other receivables, and trade and other payables.

The sensitivity analyses in the following sections relate to the positions as of December 31, 2019 and 2018.

The sensitivity analyses have been prepared on the basis that the amount of net debt, the ratio of fixed to floating interest rates of the debt and derivatives and the proportion of financial instruments in foreign currencies are all constant and on the basis of the hedge designations in place at December 31, 2019.

The analyses exclude the impact of movements in market variables on the carrying value of pension and other post-retirement obligations, provisions and on the non-financial assets and liabilities of foreign operations.

The following assumptions have been made in calculating the sensitivity analyses:

- The statement of financial position sensitivity relates to derivatives.
- The sensitivity of the relevant income statement item is the effect of the assumed changes in respective market risks.

This is based on the financial assets and financial liabilities held at December 31, 2019 and 2018, including the effect of hedge accounting.

INTEREST RATE RISK

Interest rate risk is the risk that changes in interest rates will affect the Company's income or the value of its holdings of financial instruments. The Company's fixed rate borrowings are exposed to a risk of change in their fair value due to changes in interest rates. The Company's floating rate borrowings are exposed to a risk of change in cash flows due to changes in interest rates. Short-term receivables and payables are not exposed to interest rate risk.

The Company's policy is to maintain at least 75% of its borrowings as fixed or capped rate borrowings. The Company either enters into fixed rate debt or strives to limit the variability of certain floating rate instruments through the use of interest rate swaps or caps. These are designed to hedge underlying debt obligations. At December 31, 2019 and 2018, after considering the effect of interest rate swaps and caps, all of the Company's borrowings are at a fixed or capped rate of interest.

The following table demonstrates the sensitivity to a reasonably possible change in interest rates adjusting for multiple interest rate caps and swaps effective as of December 31, 2019 and 2018, with all other variables held constant, of the Company's profit before tax (through the impact on floating rate borrowings). There is no impact on the Company's equity.

2019	Increase/decrease in basis points	Effect on profit before tax
US dollar	+10	(343)
Brazilian reais	+10	(5)
US dollar	−10	343
Brazilian reais	−10	5

2018	Increase/decrease in basis points	Effect on profit before tax
US dollar	+10	(369)
Brazilian reais	+10	(5)
US dollar	−10	369
Brazilian reais	−10	5

See note 21 for loans and borrowings explanations.

At December 31, 2019, the Company's interest rate derivatives had a fair value of ($2,954) (2018: $5,068). Per the interest rate cap agreements, the Company has capped the variable rate of interest for a $350,000 notional value of debt at 3%. A 10 basis point increase or decrease will not have a significant impact on the value of the interest rate derivatives.

FOREIGN CURRENCY RISK

Foreign currency risk is the risk that changes in foreign exchange rates will affect the Company's income or the value of its holdings of financial instruments. Many of the Company's subsidiaries are located outside the US. Individual subsidiaries execute their operating activities in their respective functional currencies which are primarily comprised of the US dollar and euro. Since the financial reporting currency of the Company is the US dollar, the financial statements of those non-US dollar operating subsidiaries are translated so that the financial results can be presented in the Company's consolidated financial statements.

Each subsidiary conducting business with third parties that leads to future cash flows denominated in a currency other than its functional currency is exposed to the risk from changes in foreign exchange rates. It is the Company's policy to use forward currency contracts to minimize the currency exposures on net cash flows. For certain subsidiaries, this includes managing balance sheet positions in addition to forecast and committed transactions. For these contracts, maturity dates are established at the end of each month matching the net cash flows expected for that month. Another subsidiary hedges all sales transactions in excess of a certain threshold. For this subsidiary, the contracts mature at the anticipated cash requirement date. Most forward exchange contracts mature within twelve months and are predominantly denominated in US dollars, euros, British pound sterling and Brazilian reais. When established, the forward currency contract must be in the same currency as the hedged item. It is the Company's policy to negotiate the terms of the hedge derivatives to closely match the terms of the hedged item to maximize hedge effectiveness. The Company seeks to mitigate this risk by hedging a range of 60% to 90% of transactions that occur in a currency other than the functional currency.

In respect of monetary assets and liabilities denominated in foreign currencies, the Company ensures that its net exposure is kept to an acceptable level by buying or selling foreign currencies at spot rates when necessary to address short-term imbalances.

The Company deems its primary currency exposures to be in US dollars and euros. The following table demonstrates the sensitivity to a reasonably possible change in the two primary functional currencies of the Company: US dollar and euro exchange rates with all other variables held constant, of the Company's profit before tax (due to changes in the fair value of monetary assets and liabilities) and the Company's equity (due to changes in the fair value of forward exchange contracts). Changes in sensitivity rates reflect various changes in the economy year-over-year.

2019	Strengthening/ weakening in functional rate	Effect on profit before tax	Effect on equity before tax
US dollar	+5%	1,610	1,504
Euro	+5%	(3,338)	(24)
US dollar	–5%	(1,610)	(1,504)
Euro	–5%	3,338	24

2018	Strengthening/ weakening in functional rate	Effect on profit before tax	Effect on equity before tax
US dollar	+5%	2,136	2,348
Euro	+5%	(2,370)	(113)
US dollar	–5%	(1,715)	(2,348)
Euro	–5%	2,370	113

COMMODITY PRICE RISK

Commodity price risk is the risk that certain raw materials prices will increase and negatively impact the gross margins and operating results of the Company. The Company is exposed to volatility in the prices of raw materials used in some products and uses forward contracts to manage these exposures for exchange-traded metals when possible. For these exchange-traded metals, the Company aims to maintain a greater than 50% hedged position in order to avoid undue volatility in the sales prices and purchase costs attained in the normal course of business. Commodity forward contracts are generally settled within twelve months of the reporting date. However, most of the metals, alloys and chemicals that the Company processes and sells such as vanadium, chrome metal, tantalum, graphite, niobium, and antimony trioxide, cannot be hedged on an exchange. For these materials, the Company mitigates its price exposure by aligning raw materials purchases with sales orders and ensuring that it is managing working capital in a manner that minimizes commodity price exposure.

CAPITAL MANAGEMENT

The primary objective of the Company is to maintain strong capital ratios in order to support its business and maximize shareholder value.

The Company manages its capital structure and makes adjustments to it, in light of economic conditions. Its policy is to ensure that the debt levels are manageable to the Company and that they are not increasing at a level that is in excess of the increases that occur within equity. During the planning process, the expected cash flows of the Company are evaluated and the debt to equity and debt to total capital ratios are evaluated in order to ensure that levels are improving year-over-year. Debt to total capital is a more appropriate measure for the Company due to its initial equity values of the subsidiaries from the combination in 2007. Management deems total capital to include all debt (including short-term and long-term) as well as the total of the equity of the Company, including non-controlling interests.

	2019	2018
Loans and borrowings	691,237	365,944
Short-term bank debt	7,500	15,500
Less: cash and cash equivalents and restricted cash	535,799	381,900
Net debt (cash)	162,938	(456)
Net debt (cash)	162,938	(456)
Total equity	184,406	344,043
Total capital	347,344	343,587
Debt to total capital ratio	46.9%	(0.1%)

29. FINANCIAL INSTRUMENTS

FAIR VALUES

The carrying amounts presented in the financial statements approximate the fair values for all of the Company's financial instruments.

The fair value of the financial assets and liabilities are included at the price that would be received to sell the instrument in an orderly transaction in the principal (or most advantageous) market at the measurement date under current market conditions.

- Current assets and liabilities approximate their carrying amounts largely due to the short-term maturities of these instruments.
- The calculation of fair value for derivative financial instruments depends on the type of instruments: Derivative interest rate contracts are estimated by discounting expected future cash flows using current market interest rates and yield curves over the remaining term of the instrument; Derivative currency and commodity contracts are based on quoted forward exchange rates and commodity prices, respectively.
- Floating and fixed rate loans and borrowings and notes receivable maintain a floating interest rate and approximate fair value. Fair value of the Company's floating rate loans and borrowings are estimated by discounting expected future cash flows using a discount rate that reflects the Company's borrowing rate at December 31, 2019.
- The consideration of non-performance risk did not significantly impact the fair values for fixed and floating rate loans and borrowings.

FAIR VALUE HIERARCHY

The Company uses the following hierarchy for determining and disclosing the fair value of financial instruments by valuation technique:

Level 1: quoted (unadjusted) prices in active markets for identical assets or liabilities

Level 2: other techniques for which all inputs which have a significant effect on the recorded fair value are observable, either directly or indirectly

Level 3: techniques which use inputs which have a significant effect on the recorded fair value that are not based on observable market data

As of December 31, 2019, the Company held the following financial instruments measured at fair value:

Assets measured at fair value

December 31, 2019	Total	Level 1	Level 2	Level 3
Non-current financial assets				
Restricted cash	309,581	309,581	—	—
Equity investments classified as FVOCI (note 12)	7,854	—	—	7,854
Other investments (note 12)	15,711	11,287	—	4,424
Forward contracts – hedged	911	—	911	—
Interest rate derivatives	11	—	11	—
Current financial assets				
Forward contracts - hedged	2,599	—	2,599	—
Interest rate derivatives	94	—	94	—

Liabilities measured at fair value

December 31, 2019	Total	Level 1	Level 2	Level 3
Non-current financial liabilities				
Forward contracts – hedged	1,230	—	1,230	—
Interest rate derivatives	3,059	—	3,059	—
Current financial liabilities				
Forward contracts - hedged	4,037	—	4,037	—
Interest rate derivatives		—	—	—

As of December 31, 2018, the Company held the following financial instruments measured at fair value:

Assets measured at fair value

December 31, 2018	Total	Level 1	Level 2	Level 3
Non-current financial assets				
Forward contracts – hedged	1,184	—	1,184	—
Equity investments classified as FVOCI (note 12)	7,002	—	—	7,002
Other investments (note 12)	14,450	11,033	—	3,417
Interest rate derivatives	6,408	—	6,408	—
Current financial assets				
Forward contracts – hedged	1,335	—	1,335	—

Liabilities measured at fair value

December 31, 2018	Total	Level 1	Level 2	Level 3
Non-current financial liabilities				
Forward contracts – hedged	3,905	—	3,905	—
Interest rate derivatives	1,243	—	1,243	—
Current financial liabilities				
Forward contracts – hedged	8,170	—	8,170	—
Interest rate derivatives	97	—	97	—

During the years ended December 31, 2019 and 2018, there were no transfers between Level 1, Level 2, and Level 3 fair value measurements.

The following table shows a reconciliation from the opening balances to the closing balances for Level 3 fair values.

	Other investments	Equity investments at FVOCI
Balance at January 1, 2018	2,410	15,047
Purchase of other investments	990	—
Change in fair value of FVOCI investment	17	(8,045)
Balance at December 31, 2018	3,417	7,002
Purchase of other investments	990	—
Change in fair value of FVOCI investment	17	852
Balance at December 31, 2019	4,424	7,854

HEDGING ACTIVITIES

Interest rate hedges

In February of 2018, the Company entered into derivative contracts with two financial institutions in connection with the execution of its Term Loan B and revolving credit facility. The contracts included interest rate caps, interest rate swaps, and a cross-currency interest rate swap. The interest rate cap and swaps were executed so that the Company could hedge its exposure to changes in the benchmark interest rate on the term loan B facility as well as fluctuations in the exchange rate between the euro and the US dollar. The Company designated the interest rate swaps and the cross-currency interest rate swap as effective cash flow hedges. In March 2019, the Company unwound its interest rate swaps and its cross-currency interest rate swap and replaced those instruments with interest rate caps having an equivalent notional value to the previous instruments. This determination was made as part of the Company's ongoing risk management process. At the time that the interest rate derivatives were unwound, there was ($608) of costs deferred in equity. These costs will be amortized into finance cost on a straight-line basis over the remaining term of the Company's credit facility.

The Company has not designated its interest rate cap instruments for hedge accounting, and all gains and losses are recognized in profit and loss. During the year ended December 31, 2019, $1,907 (2018: $988) of expense related to the outstanding interest rate cap instruments was recorded as finance cost in the consolidated statement of income. The amount from interest rate hedges included in equity was ($530) and ($1,733) in the years ended December 31, 2019 and 2018, respectively. The amount included in equity is anticipated to impact the income statement through February 2023, which is the term of the contracts. During the year ended December 31, 2019, $908 (2018: $7,681) was transferred from equity to the income statement as an increase to finance costs. There was no ineffectiveness for contracts designated as cash flow hedges during the years ended December 31, 2019 and 2018, respectively.

Commodity forward contracts

The Company is exposed to volatility in the prices of raw materials used in some products and uses commodity forward contracts to manage these exposures. Such contracts generally mature within twelve months. Certain commodity forward contracts have been designated as cash flow hedges and contracts not designated as cash flow hedges are immediately recognized in cost of sales.

The open commodity forward contracts as of December 31, 2019 are as follows:

	Metric tons	Average price	Fair value assets	Fair value liabilities
US dollar denominated contracts to purchase commodities:				
Aluminum forwards	3,950	1,791	94	—

The open commodity forward contracts as of December 31, 2018 are as follows:

	Metric tons	Average price	Fair value assets	Fair value liabilities
US dollar denominated contracts to purchase commodities:				
Aluminum forwards	4,900	1,994	—	(526)

The amount from the commodity cash flow hedges included in equity was $85 and ($438) in the years ended December 31, 2019 and 2018, respectively. The amount included in equity is anticipated to impact the income statement over the next 12 months. During the years ended December 31, 2019 and 2018, $609 and ($20), respectively, were transferred from equity to the income statement as increases (decreases) to cost of sales. There was no ineffectiveness for contracts designated as cash flow hedges during the years ended December 31, 2019 and 2018.

Foreign currency forward contracts

At any point in time, the Company also uses foreign exchange forward contracts to hedge a portion of its estimated foreign currency exposure in respect of forecasted sales and purchases, and intergroup loans that will be repaid in different functional currencies. The Company has also hedged significant capital expenditure projects and operating costs in Brazil which will be settled in different functional currencies. These contracts are negotiated to match the terms of the commitments and generally mature within one year. When necessary, these contracts are rolled over at maturity. Foreign exchange forward contracts that are not part of a hedge relationship are held at fair value with fair value changes recognized through profit and loss.

The open foreign exchange forward sales contracts as of December 31, 2019 are as follows:

Exposure	Notional amount	Contract rate	Fair value assets	Fair value liabilities
Cash Flow Hedges				
Euro (versus USD)	€15.6 million	0.89	95	(194)
USD (versus Euro)	$104.4 million	1.159	677	(1,366)

The open foreign exchange forward sales contracts as of December 31, 2018 are as follows:

Exposure	Notional amount	Contract rate	Fair value assets	Fair value liabilities
Cash Flow Hedges				
Euro (versus USD)	€20.7 million	0.855	356	(73)
USD (versus Euro)	$58.4 million	1.212	143	(2,267)

The open foreign exchange forward purchase contracts as of December 31, 2019 are as follows:

Exposure	Notional amount	Contract rate	Fair value assets	Fair value liabilities
Cash Flow Hedges				
USD (versus Euro)	$15.7 million	1.111	1	(148)
GBP (versus USD)	£21.1 million	1.282	928	(47)
BRL (versus USD)	R$273.3 million	3.966	1,702	(3,509)
CNY (versus USD)	¥10.1 million	0.126	13	(3)

The open foreign exchange forward purchase contracts as of December 31, 2018 are as follows:

Exposure	Notional amount	Contract rate	Fair value assets	Fair value liabilities
Cash Flow Hedges				
USD (versus Euro)	$22.9 million	1.149	137	(40)
GBP (versus USD)	£21.7 million	1.350	13	(1,389)
BRL (versus USD)	R$404.4 million	3.791	1,869	(7,776)
CNY (versus USD)	¥7.6 million	0.127	—	(3)

The amounts from the foreign currency cash flow hedges included in equity were ($1,797) and ($7,373) in the years ended December 31, 2019 and 2018, respectively. The amount included in equity is anticipated to impact the income statement over the next three years. During the years ended December 31, 2019 and 2018, ($3,360) and $3,193, respectively, were transferred from equity to the income statement as (decreases) increases to cost of sales and selling, general, and administrative expenses. There was no expense (2018: nil) recognized in profit or loss during the year ended December 31, 2019 due to ineffectiveness.

30. ACQUISITION OF SUBSIDIARY

On November 15, 2019, the Company completed an asset purchase agreement to acquire certain assets and assume certain liabilities of International Specialty Alloys ("ISA") located in New Castle, PA. ISA is a producer of titanium master alloys and other binary alloys for the aerospace market. The acquisition of ISA provides an opportunity for the Company to increase its market position in these key products for the aerospace market in North America and Europe. The acquired entity will be included within the AMG Technologies segment. For the period ended December 31, 2019, ISA contributed $3,211 of revenues to the Company's results. The Company acquired ISA for $25,435 of cash.

The Company incurred acquisition-related costs of $472 on legal fees and due diligence costs. These costs have been included in selling, general and administrative expenses.

The following table summarizes the recognized amounts of assets acquired and liabilities assumed at the date of acquisition:

	Note	
Property, plant and equipment, including right-of-use assets	10	13,283
Intangible assets	11	3,079
Inventories	13	11,804
Lease liabilities	31	(6,933)
Total identifiable net assets acquired		21,233

The valuation techniques used for measuring the fair value of material assets acquired were as follows:

- Property, plant and equipment - *market comparison technique and cost technique*: The valuation model considers market prices for similar items when they are available, and depreciated replacement cost when appropriate. Depreciated replacement cost reflects adjustments for physical deterioration as well as functional and economic obsolescence.
- Intangible assets - *relief-from-royalty method, with or without income approach and multi-period excess earnings method*: The relief-from-royalty method considers the discounted estimated royalty payments that are expected to be avoided as a result of the technologies being owned. The with or without income approach analyzes the impact or harm that could occur absent the covenant not to compete as compared to the results with the covenant not to compete in place. The multi-period excess earnings method considers the present value of net cash flows expected to be generated by the customer relationships, by excluding any cash flows related to contributory assets.
- Inventories - *market comparison technique*: The fair value is determined based on the estimated selling price in the ordinary course of business less the estimated costs of completion and sale, and a reasonable profit margin based on the effort required to complete and sell the inventories

Given the timing of the acquisition, the fair values have been measured on a provisional basis. If new information obtained within one year of the date of acquisition about facts and circumstances that existed at the date of acquisition identifies adjustments to the above amounts, or any additional provisions that existed at the date of acquisition, then the accounting for the acquisition will be revised.

The Company has recognized $4,202 of goodwill which is the difference between the consideration transferred and the fair value of the identifiable net assets acquired. The goodwill is attributable mainly to the skills and technical talent of ISA's workforce and the synergies expected to be achieved from integrating ISA into the Company's existing Technologies business. The goodwill recognized is expected to be deductible for tax purposes.

31. LEASES

LEASES AS LESSEE (IFRS 16)

The Company has entered into leases for office space, facilities and equipment. The leases generally provide that the Company pays the tax, insurance and maintenance expenses related to the leased assets. These leases have an average life of 5-7 years with renewal terms at the option of the lessee and lease payments based on market prices at the time of renewal. There are no restrictions placed upon the lessee by entering into these leases.

Information about leases for which the Company is a lessee is presented below.

Set out below are the carrying amounts of the Company's right-of-use assets, which are included in property, plant and equipment in the statement of financial position, and lease liabilities as well as the movements during the period:

	Right-of-use assets				
	Land, buildings and improvements	Machinery and equipment	Furniture and fixtures	Total	Lease liabilities
January 1, 2019	33,772	2,739	844	37,355	37,372
Additions	10,401	894	276	11,571	10,822
Acquired through business combination	6,245	688	—	6,933	6,933
Retirements and transfers	(638)	(1)	(21)	(660)	—
Depreciation expense	(3,194)	(852)	(315)	(4,361)	—
Interest expense	—	—	—	—	1,368
Payments	—	—	—	—	(5,197)
Foreign currency translation	(522)	(163)	(19)	(704)	(581)
December 31, 2019	46,064	3,305	765	50,134	50,717

The Company recognized rent expense from short-term leases of $1,176 and leases of low-value assets of $440 for the year ended December 31, 2019.

OPERATING LEASES AS LESSEE UNDER IAS 17

Future minimum lease payments under non-cancellable operating leases as of December 31, 2018 were as follows:

	2018
Less than one year	5,825
Between one and five years	18,298
More than five years	20,064
Total	44,187

During the year ended December 31, 2018, $7,085 was recognized as an expense in the income statement in respect of operating leases.

FINANCE LEASES AS LESSEE UNDER IAS 17

Certain subsidiaries of the Company had finance leases as defined by IAS 17 for equipment and software. These non-cancellable leases had remaining terms between one and five years. Future minimum lease payments under finance leases were as follows:

	2018
Less than one year	15
Between one and five years	8
Total minimum lease payments	23
Less amounts representing finance charges	—
Present value of minimum lease payments	23

32. CAPITAL COMMITMENTS

The Company's capital expenditures include projects to improve the Company's operations and productivity, replacement projects and ongoing environmental requirements (which are in addition to expenditures discussed in note 25). As of December 31, 2019, the Company had committed to capital requirements in the amount of $66,459 (2018: $18,648). These capital commitments related primarily to the construction of AMG Vanadium's catalyst recycling facility in Ohio.

33. CONTINGENCIES

GUARANTEES

The following table outlines the Company's off-balance sheet guarantees and letters of credit for the benefit of third parties as of December 31, 2019 and 2018:

	Guarantees	Letters of credit	Total
2019			
Total amounts committed:	117,840	4,717	122,557
Less than 1 year	46,517	4,553	51,070
2–5 years	41,119	164	41,283
After 5 years	30,204	—	30,204

	Guarantees	Letters of credit	Total
2018			
Total amounts committed:	72,740	4,678	77,418
Less than 1 year	47,452	149	47,601
2–5 years	20,307	—	20,307
After 5 years	4,981	4,529	9,510

In the normal course of business, the Company has provided indemnifications in various commercial agreements which may require payment by the Company for breach of contractual terms of the agreement. Counterparties to these agreements provide the Company with comparable indemnifications. The indemnification period generally covers, at maximum, the period of the applicable agreement plus the applicable limitations period under the law. The maximum potential amount of future payments that the Company would be required to make under these indemnification agreements is not reasonably quantifiable as certain indemnifications are not subject to limitation. However, the Company enters into indemnification agreements only when an assessment of the business circumstances would indicate that the risk of loss is remote.

The Company has agreed to indemnify its current and former directors and officers to the extent permitted by law against any and all charges, costs, expenses, amounts paid in settlement and damages incurred by the directors and officers as a result of any lawsuit or any other judicial administrative or investigative proceeding in which the directors and officers are sued as a result of their service. These indemnification claims will be subject to any statutory or other legal limitation period. The nature of such indemnification prevents the Company from making a reasonable estimate of the maximum potential amount it could be required to pay to counterparties. The Company has $125,000 in directors' and officers' liability insurance coverage.

ENVIRONMENTAL

In 2006, a US subsidiary of the Company entered into a fixed price remediation contract with an environmental consultant, whereby that consultant became primarily responsible for certain aspects of the environmental remediation. This subsidiary of the Company is still a secondary obligor for this remediation, in the event that the consultant does not perform. The US subsidiary is also still subject to remediate any contamination associated with perchlorate contamination work which commenced in 2019.

The Company has other contingent liabilities related to certain environmental regulations at certain locations. Environmental regulations in France require monitoring of wastewater and potential clean-up to be performed at one of the French subsidiary's plant sites in Chauny. Although the extent of these issues is not yet known, there is a possibility that the Company could incur remediation costs. At a US subsidiary, a provision has been recorded for the low-level radioactive slag pile (see note 25) which we expect will be decommissioned within the next four years. In 2016, the Company reached an agreement on a removal plan with the NJDEP for this decommissioning. The estimated accrual for $22,026 represents the discounted amount of anticipated remediation costs, and has been approved by the NJDEP.

As discussed in note 25, a German subsidiary of the Company has a sewer system liability, which is in the process of being resolved via a sewer replacement project. Based on the liability associated with the sewer, it is also believed that there may be a groundwater contamination issue. This German subsidiary has performed remediation feasibility trials but has not received a demand from the government with respect to any potential wider groundwater treatment and it has recorded no provision for this, but it is possible that some remediation will eventually be required. The Company believes that the maximum exposure related to this contamination is $10,000.

TAXATION

There is one outstanding tax case with a subsidiary in Brazil whereby the federal tax authorities claim that $6,000 is due in unpaid PIS COFINS taxes and penalties. The Brazilian subsidiary disputed the claim and is awaiting a court date. The Brazil subsidiary has accrued $70 as of December 31, 2019 as the probability to pay the majority of the claim is remote.

LITIGATION

One of the Company's subsidiaries in Germany entered into a joint venture in 1999 for the purpose of extracting vanadium from the residues of oil refineries in Italy. The joint venture did not occur, and the counterparty raised claims against the German subsidiary. During the first half of 2018, an appeals court in Sicily ruled in favor of the German subsidiary, and the counterparty filed an appeal to Italy's Supreme Court. Our counsel has advised that, for various legal reasons, it appears most likely that the counterparty´s appeal will be dismissed as being without merits, i.e. that the Supreme Court will confirm the decision of the appeals court favorable for the German subsidiary. Therefore, the Company has not recognized a provision related to these claims as of December 31, 2019.

On March 28, 2017, AMG Vanadium LLC ("AMG Vanadium") filed a complaint for breach of contract against Global Advanced Metals U.S.A., Inc. ("GAM") in the Complex Commercial Division of the Delaware Superior Court, alleging that GAM breached a multi-year contract by which GAM agreed to purchase from AMG Vanadium 100% of the tantalum concentrate output produced from a mine in Brazil operated by AMG Mineração S.A. ("AMG Mineração"), an affiliate of AMG Vanadium (the "Supply Agreement").

GAM filed an answer and four counterclaims (the "Counterclaims") against AMG Vanadium, the Company and AMG Mineração (collectively "AMG") alleging in pertinent part that GAM is owed a portion ($14,847) of the consideration it provided to AMG in connection with the Third Amendment to the Supply Agreement, and that AMG overcharged GAM for tantalum concentrate sold under the Supply Agreement, and that GAM is entitled to recover such amounts ($1,399). The Company did not recognize a provision related to GAM's counterclaims as of December 31, 2019. See note 35 for additional details.

OTHER

One of the Company's subsidiaries closed a pension plan in 2005, prior to becoming part of AMG. The Company has been made aware that there are potential flaws in the paperwork which substantiates the closure, which could make this closure invalid. If a claim was made on this basis, the potential liability could approximate $10,000. Due to the length of time since the closure, the Company does not believe that any claim is likely, and no provision has been made for this contingency.

34. RELATED PARTIES

TRANSACTIONS WITH KEY MANAGEMENT PERSONNEL

Key management personnel compensation

The Company considers the members of the Management Board and the Supervisory Board to be the key management personnel as defined in IAS 24 Related parties. For remuneration details of the Management Board and the Supervisory Board, see below.

The compensation of the Management Board of the Company comprised:

For the year ended December 31, 2019	Salaries and bonus	Share-based compensation	Post-employment benefits including contributions to defined contribution plans	Other remuneration [a]	Total
Heinz Schimmelbusch	1,774	2,019	268	134	4,195
Eric Jackson	1,212	622	161	40	2,035
Jackson Dunckel	986	592	277	51	1,906
Total	3,972	3,233	706	225	8,136

[a] Other remuneration includes car expenses and insurance paid for by the Company.

For the year ended December 31, 2018	Salaries and bonus	Share-based compensation	Post-employment benefits including contributions to defined contribution plans	Other remuneration [a]	Total
Heinz Schimmelbusch	3,711	2,716	292	71	6,790
Eric Jackson	1,891	799	160	34	2,884
Jackson Dunckel[b]	1,891	850	291	51	3,083
Total	7,493	4,365	743	156	12,757

[a] Other remuneration includes car expenses and insurance paid for by the Company.
[b] Share-based compensation includes $67 of expense related to a share-based signing bonus.

Each member of the management board has an employment contract with the Company which provides for severance in the event of termination without cause. The maximum severance payout is limited to two years base salary and two years of target annual bonus.

The compensation of the Supervisory Board of the Company comprised:

For the year ended December 31, 2019	Cash remuneration	Share-based remuneration	Total compensation
Jack L. Messman[1]	38	22	60
Steve Hanke	103	58	161
Willem van Hassel	70	54	124
Herb Depp	80	39	119
Donatella Ceccarelli	73	44	117
Frank Löhner	60	44	104
Dagmar Bottenbruch	40	29	69
Suzanne Folsom[3]	20	—	20
Total	484	290	774

For the year ended December 31, 2018	Cash remuneration	Share-based remuneration	Total compensation
Jack L. Messman[1]	107	60	167
Norbert Quinkert[2]	38	22	60
Guy de Selliers[2]	20	15	35
Steve Hanke	80	41	121
Herb Depp	73	43	116
Donatella Ceccarelli	60	46	106
Robert Meuter[2][4]	20	15	35
Suzanne Folsom[3]	60	27	87
Willem van Hassel	68	50	118
Total	526	319	845

(1) Jack L. Messman stepped down from the Supervisory Board effective May 1, 2019.
(2) Norbert Quinkert, Guy de Selliers and Robert Meuter stepped down from the Supervisory Board effective May 7, 2018.
(3) Suzanne Folsom stepped down from the Supervisory Board effective August 2, 2018.
(4) Robert Meuter received $111 during 2018 related to a consulting agreement with the Company.

Total Management Board and Supervisory Board Compensation for the year ended:	Cash remuneration	Share-based compensation	Post-employment benefits including contributions to defined contribution plans	Other remuneration[a]	Total
December 31, 2019	4,456	3,523	706	225	8,910
December 31, 2018	8,019	4,684	743	156	13,602

(a) Other remuneration includes car expenses and insurance paid for by the Company.

ENTITIES WITH SIGNIFICANT INFLUENCE OVER THE COMPANY

Foundation

In July 2010, the foundation "Stichting Continuiteit AMG" ("Foundation") was established following the resolution adopted at its Annual Meeting on May 12, 2010. The board of the Foundation consists of three members, all of whom are independent of AMG. The purpose of the Foundation is to safeguard the interests of the parent company, the enterprise connected therewith and all the parties having an interest therein and to exclude as much as possible influences which could threaten, amongst other things, the continuity, independence and identity of the parent company contrary to such interests.

By agreement on December 22, 2010, between the parent company and the Foundation, the Foundation has been granted a call option pursuant to which it may purchase a number of preference shares up to a maximum of the number of ordinary shares issued and outstanding with third parties at the time of exercise of the option. The agreement cannot be terminated by the Company as long as the Company has not cancelled, or repurchased preferences shares acquired by the Foundation.

The Company entered into a cost compensation agreement with the Foundation dated December 22, 2010. As per the agreement, the Company is required to provide funds to the Foundation for the costs incurred in connection with the fulfilment of the objectives of the Foundation. These costs include costs for establishing the Foundation, remuneration and out of pocket expenses for the members of the board of the Foundation, commitment fees, advisory fees and certain other costs. During the year ended December 31, 2019, the amounts paid by the Company to or on behalf of the Foundation were $56 (2018: $57).

35. SUBSEQUENT EVENTS

Subsequent to year-end, GAM and AMG agreed to settle the litigation filled on March 28, 2017 as described in note 33. The settlement does not have a significant financial effect.

PARENT COMPANY FINANCIAL STATEMENTS

AMG ADVANCED METALLURGICAL GROUP, N.V. — PARENT COMPANY STATEMENT OF FINANCIAL POSITION
(AFTER PROFIT APPROPRIATION)

For the year ended December 31	Note	2019	2018
In thousands of US dollars			
Fixed assets			
Intangible assets	6	163	163
Tangible fixed assets	5	1,221	240
Financial fixed assets			
Investments in subsidiaries	7	304,100	321,063
Loans due from subsidiaries	7	95,117	176,678
Deposits and other assets	8	838	1,231
Derivative financial instruments	16	—	6,156
Financial fixed assets		400,055	505,128
Total fixed assets		401,439	505,531
Related party receivables	9	4,662	7,311
Loans due from subsidiaries	7	1,000	1,000
Prepayments and other assets	10	279	279
Cash and cash equivalents	11	5,085	56,261
Total current assets		11,026	64,851
Total assets		412,465	570,382
Equity			
Issued capital	12	831	812
Share premium	12	489,546	462,891
Foreign currency translation reserve	12	(29,770)	(28,058)
Hedging reserve	12	(4,274)	(8,235)
Capitalized development expenditures reserve	12	1,439	1,560
Defined benefit obligation reserve	12	(81,023)	(61,106)
Fair value reserve	12	(4,762)	(7,125)
Cost of hedging reserve	12	2,032	(1,310)
Treasury shares	12	(83,880)	(347)
Retained earnings (deficit)	12	(129,626)	(39,158)
Total equity attributable to shareholders of the Company		160,513	319,924
Long-term liabilities			
Long-term debt	13	237,992	240,272
Lease liabilities	17	624	—
Derivative financial instruments	16	1,737	801
Long-term liabilities		240,353	241,073
Short-term liabilities			
Current portion long-term debt	13	2,500	2,100
Lease liabilities	17	467	—
Amounts due to subsidiaries	15	4,860	311
Other payables	14	3,772	6,974
Short-term liabilities		11,599	9,385
Total liabilities		251,952	250,458
Total equity and liabilities		412,465	570,382

The notes are an integral part of these financial statements.

AMG ADVANCED METALLURGICAL GROUP, N.V. — PARENT COMPANY INCOME STATEMENT

For the year ended December 31	Note	2019	2018
In thousands of US dollars			
General and administrative expenses		26,410	29,619
Other income	2	(11,454)	(13,148)
Net other operating income		(11,454)	(13,148)
Operating loss		(14,956)	(16,471)
Finance income	3	(8,997)	(8,680)
Finance cost	3	18,848	16,276
Net finance cost		9,851	7,596
Loss before income tax		(24,807)	(24,067)
Income tax expense	4	—	—
Loss after tax		(24,807)	(24,067)
(Loss) income from subsidiaries		(23,476)	118,683
Net (loss) income		(48,283)	94,616

The notes are an integral part of these financial statements.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

For details of the Company and its principal activities, reference is made to the consolidated financial statements.

The parent company financial statements have been prepared in accordance with Part 9 of Book 2 of the Netherlands Civil Code, as generally accepted in the Netherlands. In accordance with the provisions of article 362-8 of Book 2 of the Netherlands Civil Code, the accounting policies used in the financial statements are the same as the accounting policies used in the notes to the consolidated financial statements, prepared under IFRS as endorsed by the European Union. Investments in subsidiaries are valued at their net equity value including allocated goodwill.

For a listing of all material operating entities in which the Company has an ownership interest, please refer to note 1 in the consolidated financial statements. The Company has filed a complete list of entities in which AMG has an ownership interest, with the Dutch Chamber of Commerce.

PARTICIPATING INTERESTS IN GROUP COMPANIES

Group companies are all entities in which the Company has direct or indirect control. The Company controls an entity when it is exposed, or has rights, to variable returns from its involvement with the group company and has the ability to affect those returns through its power over the group company. Group companies are recognized from the date on which control is obtained by the Company and derecognized from the date that control by the Company over the group company ceases. Participating interests in group companies are accounted for in the separate financial statements according to the equity method with the principles for the recognition and measurement of assets and liabilities and determination of results as set out in the notes to the consolidated financial statements.

Participating interests with a negative net asset value are valued at nil. This measurement also covers any receivables provided to the participating interests that are, in substance, an extension of the net investment. In particular, this relates to loans for which settlement is neither planned nor likely to occur in the foreseeable future. A share in the profits of the participating interest in subsequent years will only be recognized if and to the extent that the cumulative unrecognized share of loss has been absorbed. If the Company fully or partially guarantees the debts of the relevant participating interest, or if it has the constructive obligation to enable the participating interest to pay its debts (for its share therein), then a provision is recognized accordingly to the amount of the estimated payments by the Company on behalf of the participating interest.

SHARE OF RESULT OF PARTICIPATING INTERESTS

The share in the result of participating interests consists of the share of the Company in the result of these participating interests. Results on transactions involving the transfer of assets and liabilities between the Company and its participating interests and mutually between participating interests themselves, are eliminated to the extent that they can be considered as not realized.

The Company makes use of the option to eliminate intragroup expected credit losses against the book value of loans and receivables from the Company to participating interests, instead of elimination against the equity value / net asset value of the participating interests.

As of December 31, 2019, non-monetary assets and liabilities have been converted to USD using a conversion rate of EUR:USD of 1.1215 (2018: 1.1444).

2. OTHER INCOME AND EXPENSES

Other income during the year ended December 31, 2019, includes income from management fees charged to subsidiaries of $11,454 (2018: $13,148). The services provided for these fees include general management services and other professional services.

3. FINANCE INCOME AND COST

Finance income during the year ended December 31, 2019, includes interest income from loans to subsidiaries of $8,495 (2018: $8,618) and interest income from bank deposits $502 (2018: $62). See note 7 for additional details. Finance cost during the year ended December 31, 2019, includes interest expense on loans due to subsidiaries of nil (2018: $64), interest expense on external debt of $18,352 (2018: $15,728) and other items of $496 (2018: $484). See note 8 in the consolidated financial statements for additional details.

4. INCOME TAXES

AMG Advanced Metallurgical Group N.V. is head of the fiscal unity that exists for Dutch corporate income tax purposes. In the income statement in 2019 and 2018, the Company reported an income tax expense of nil. The taxable loss is reduced by non-deductible expenses of $14,910 and $8,017 in 2019 and 2018 respectively, and is primarily related to share-based compensation expenses.

During the years ended December 31, 2019 and 2018, the income tax benefits related to the current year losses of the fiscal unity were not recognized. In total, $2,470 and $3,947 were not recognized in 2019 and 2018, respectively, as it is not probable that these amounts will be realized.

Deferred tax assets are recognized to the extent it is probable that the temporary differences, unused tax losses and unused tax credits will be realized. The realization of deferred tax assets is reviewed each reporting period and includes the consideration of historical operating results, projected future taxable income and potential tax planning strategies. At December 31, 2019, net operating loss and tax credit carryforwards for which no deferred tax assets have been recognized in the balance sheet amount to $87,768 (2018: $99,288).

5. TANGIBLE FIXED ASSETS

Tangible fixed assets of $1,221 (2018: $240) consists primarily of leasehold improvements, leases and office furniture and fixtures due to the adoption of IFRS 16 on January 1, 2019. See note 17 for additional details. These are carried at cost less accumulated depreciation and are depreciated over their anticipated useful life. The depreciation during the year ended December 31, 2019, was $523 (2018: $91). All tangible fixed assets are pledged as collateral under the AMG Credit Facility. Refer to note 10 of the consolidated financial statements for additional information.

6. INTANGIBLE ASSETS

Intangible assets of $163 (2018: $163) includes computer and software licenses. They are carried at cost less accumulated amortization and are amortized over their anticipated useful life. The amortization during the year ended December 31, 2019 was $68 (2018: $56).

7. FINANCIAL FIXED ASSETS

INVESTMENTS IN SUBSIDIARIES

The movement in subsidiaries was as follows:

	Investment in subsidiaries
Balance at January 1, 2018	267,842
Investment in companies	578
Profit (loss) for the period	118,683
Change in non-controlling interest	(569)
Changes in hedges and fair value hedges	(11,741)
(Loss) gain on FVOCI investments	(8,513)
Actuarial (losses) gains	(1,168)
Effect of movements in exchange rates	(6,671)
Non-cash dividend declared	(26,500)
Equity-settled share-based payments	(7,804)
Movement of negative participation to loans	(3,074)
Balance at December 31, 2018	321,063
Balance at January 1, 2019	321,063
Dividend to parent	(350)
(Loss) profit for the period	(23,476)
Change in non-controlling interest	(359)
Changes in hedges and fair value hedges	6,100
Gain (loss) on FVOCI investments	2,363
Actuarial (losses) gains	(19,917)
Effect of movements in exchange rates	(1,712)
Equity-settled share-based payments	(5,964)
Movement of negative participation to loans	26,352
Balance at December 31, 2019	304,100

CHANGES IN HEDGES AND FAIR VALUE HEDGES

This represents the effect of the Company's subsidiaries recording the changes in their equity from the effective portion of the cumulative net change in the fair value of cash flow hedging instruments related to hedged transactions that have not yet occurred.

EQUITY-SETTLED SHARE-BASED PAYMENTS

Subsidiaries are locally recording the effect of share-based payments for their employees in their equity. The equity balance of the subsidiaries is comprised of the value of equity-settled share-based payments provided to employees (and outside consultants), including key management personnel, as part of their remuneration. The change in the Company's investment in subsidiary balance is equal to the change recognized in retained earnings at the subsidiaries.

LOANS DUE FROM SUBSIDIARIES

	Non-current loans due from subsidiaries	Current loans due from subsidiaries	Total
Balance at January 1, 2018	3,000	97,895	100,895
Loans	95,008	—	95,008
Repayments	(17,330)	—	(17,330)
Loan reclassification	99,969	(99,969)	—
Accrual of interest	(561)	—	(561)
Movement of negative participation	—	3,074	3,074
Currency translation adjustment	(3,408)	—	(3,408)
Balance at December 31, 2018	176,678	1,000	177,678
Balance at January 1, 2019	176,678	1,000	177,678
Loans	29,500	—	29,500
Repayments	(83,259)	(1,000)	(84,259)
Loan reclassification	(1,000)	1,000	—
Movement of negative participation	(26,352)	—	(26,352)
Currency translation adjustment	(450)	—	(450)
Balance at December 31, 2019	95,117	1,000	96,117

There were three non-current loans due from subsidiaries of the Company as of December 31, 2019. Two of the non-current loans were due from two subsidiaries in Brazil, totaling $70,500 and one loan classified as current loan in 2019 by the amount of $1,000 (2018: $1,000). The third non-current loan is due in the United States with a loan amount of $50,969 (2018: $95,969). During the year ended December 31, 2019, a non-current loan from a subsidiary in Germany was paid in full (2018: $38,709). All loans had an interest rate range of 4.5% – 6.0% at December 31, 2019 (4.5% - 6.0% at December 31, 2018).

LOANS DUE TO SUBSIDIARIES

The non-current loan due to a German subsidiary, which is a holding company for several German companies within the group was paid in full by the Company as of December 31, 2018.

8. DEPOSITS AND OTHER ASSETS

The deposit and other assets account include debt issuance costs related to the undrawn amounts on the revolving credit facility and security deposits for the Amsterdam and Frankfurt office locations of the Company. See note 13 for additional information.

9. RELATED PARTY RECEIVABLES

Related party receivables of $4,662 (2018: $7,311) primarily represents interest owed to the Company on loans due from subsidiaries of $3,208 (2018: $1,399), management fees owed of $1,306 (2018: $3,539) and amounts owed by subsidiaries that represent expenses paid for by AMG and billed back to the subsidiaries of $148 (2018: $2,373).

10. PREPAYMENTS AND OTHER ASSETS

At December 31, 2019 and 2018, prepayments primarily represent prepaid insurance for the Company of $279 (2018: $203). At December 31, 2019, the Company had other receivables of nil (2018: $76).

11. CASH AND CASH EQUIVALENTS

Bank balances earn interest at floating rates based on daily bank deposit rates.

12. SHAREHOLDERS' EQUITY AND OTHER CAPITAL RESERVES

	Equity attributable to shareholders of the parent					
	Issued capital	Share premium	Treasury shares	Other reserves	Retained deficit	Total
Balance at January 1, 2018	796	432,844	(3,461)	(72,880)	(100,114)	257,185
Foreign currency translation	—	—	—	(4,826)	—	(4,826)
Change in fair value of equity investments classified as fair value through other comprehensive income	—	—	—	(8,513)	—	(8,513)
Loss on cash flow hedges, net of tax	—	—	—	(13,474)	—	(13,474)
Actuarial loss, net of tax	—	—	—	(3,013)	—	(3,013)
Net loss recognized through other comprehensive income	—	—	—	(29,826)	—	(29,826)
Profit for the year	—	—	—	—	94,616	94,616
Total comprehensive (loss) income for the year	—	—	—	(29,826)	94,616	64,790
Issuance of common shares	16	30,047	—	—	—	30,063
Purchase of common shares	—	—	(12,388)	—	—	(12,388)
Re-issuance of treasury shares	—	—	12,268	—	—	12,268
Equity-settled share-based payments	—	—	3,234	—	(22,567)	(19,333)
Transfer to retained deficit	—	—	—	(1,568)	1,568	—
Change in non-controlling interests	—	—	—	—	(569)	(569)
Dividend	—	—	—	—	(12,092)	(12,092)
Balance at December 31, 2018	812	462,891	(347)	(104,274)	(39,158)	319,924
Balance at January 1, 2019	812	462,891	(347)	(104,274)	(39,158)	319,924
Foreign currency translation	—	—	—	(1,340)	—	(1,340)
Change in fair value of equity investments classified as fair value through other comprehensive income	—	—	—	2,363	—	2,363
Gain on cash flow hedges, net of tax	—	—	—	7,303	—	7,303
Actuarial loss, net of tax	—	—	—	(20,289)	—	(20,289)
Net loss recognized through other comprehensive income	—	—	—	(11,963)	—	(11,963)
Loss for the year	—	—	—	—	(48,283)	(48,283)
Total comprehensive loss for the year	—	—	—	(11,963)	(48,283)	(60,246)
Issuance of common shares	19	26,655	—	—	—	26,674
Purchase of common shares	—	—	(92,073)	—	—	(92,073)
Re-issuance of treasury shares	—	—	3,100	—	(298)	2,802
Equity-settled share-based payments	—	—	5,440	—	(24,946)	(19,506)
Transfer to retained deficit	—	—	—	(121)	121	—
Change in non-controlling interests	—	—	—	—	(359)	(359)
Dividend	—	—	—	—	(16,703)	(16,703)
Balance at December 31, 2019	831	489,546	(83,880)	(116,358)	(129,626)	160,513

OTHER RESERVES

	Legal reserves						
	Foreign currency translation reserve	Hedging reserve	Cost of hedging reserve	Capitalized development expenditures reserve	Fair value reserve	Defined benefit obligation reserve	Total
Balance at January 1, 2018	(21,387)	3,929	—	3,128	1,388	(59,938)	(72,880)
Currency translation differences	(6,671)	—	—	—	—	1,845	(4,826)
Loss on FVOCI investment	—	—	—	—	(8,513)	—	(8,513)
Movement on cash flow hedges	—	(15,403)	(1,659)	—	—	—	(17,062)
Tax effect on net movement on cash flow hedges	—	3,239	349	—	—	—	3,588
Actuarial losses on defined benefit plans	—	—	—	—	—	(3,446)	(3,446)
Tax effect on net movement on defined benefit plans	—	—	—	—	—	433	433
Transfer from retained deficit	—	—	—	(1,568)	—	—	(1,568)
Balance at December 31, 2018	(28,058)	(8,235)	(1,310)	1,560	(7,125)	(61,106)	(104,274)
Balance at January 1, 2019	(28,058)	(8,235)	(1,310)	1,560	(7,125)	(61,106)	(104,274)
Currency translation differences	(1,712)	—	—	—	—	372	(1,340)
Gain on FVOCI investment	—	—	—	—	2,363	—	2,363
Movement on cash flow hedges	—	4,887	3,894	—	—	—	8,781
Tax effect on net movement on cash flow hedges	—	(926)	(552)	—	—	—	(1,478)
Actuarial losses on defined benefit plans	—	—	—	—	—	(27,901)	(27,901)
Tax effect on net movement on defined benefit plans	—	—	—	—	—	7,612	7,612
Transfer to retained deficit	—	—	—	(121)	—	—	(121)
Balance at December 31, 2019	(29,770)	(4,274)	2,032	1,439	(4,762)	(81,023)	(116,358)

EQUITY-SETTLED SHARE-BASED PAYMENTS

The value of equity-settled share-based payments provided to employees, including key management personnel, as part of their remuneration is recognized in equity. The amount reserved for share-based payments is recorded within retained earnings.

LEGAL RESERVES

AMG is a company incorporated under Dutch law. In accordance with the Dutch Civil Code, legal reserves have to be established in certain circumstances. The legal reserves consisted of the cumulative translation adjustment reserve, the unrealized losses on derivatives reserve, the legal participation reserve, the investment reserve and the capitalized development expenditures reserve. Legal reserves are non-distributable to the Company's shareholders.

DEFINED BENEFIT OBLIGATION RESERVE

The reserve for defined benefit plans for the year ended December 31, 2019, decreased other reserves ($19,917) (2018: ($1,168)).

DIVIDENDS

Dividends of $16,703 have been declared and paid during the year ended December 31, 2019. Dividends of $12,092 have been declared and paid during the year ended December 31, 2018.

APPROPRIATION OF NET PROFIT

Pursuant to section 26 of the Articles of Association, the Management Board shall, subject to the approval of the Supervisory Board, be authorized to reserve the profits in whole or in part. The General Meeting is authorized to distribute and/or reserve any remaining part of the profits.

Effective August 2, 2018, AMG's Supervisory Board approved a change in dividend policy which targets an annual dividend payout of between 20-40% of net income attributable to shareholders and in line with Dutch corporate governance best practices. AMG intends to declare a dividend of €0.40 per ordinary share over the financial year 2019. The interim dividend of €0.20, paid on August 15, 2019, will be deducted from the amount to be distributed to shareholders. The proposed final dividend per ordinary share therefore amounts to €0.20.

Preference shares

In July 2010, the foundation "Stichting Continuiteit AMG" ("Foundation") was established following the resolution adopted at its Annual Meeting on May 12, 2010. The board of the Foundation consists of three members, all of whom are independent of AMG. The purpose of the Foundation is to safeguard the interests of the parent company, the enterprise connected therewith and all the parties having an interest therein and to exclude as much as possible influences which could threaten, amongst other things, the continuity, independence and identity of the parent company contrary to such interests.

By agreement on December 22, 2010, between the parent company and the Foundation, the Foundation has been granted a call option pursuant to which it may purchase a number of preference shares up to a maximum of the number of ordinary shares issued and outstanding with third parties at the time of exercise of the option. The agreement cannot be terminated by the Company as long as the Company has not cancelled, or repurchased preferences shares acquired by the Foundation.

13. LONG-TERM DEBT

As of February 1, 2018, the Company, Metallurg, Inc. and AMG Invest GmbH entered into a new $350,000, seven-year senior secured term loan B facility and a $200,000 five-year senior secured revolving credit facility. Proceeds from the facility were used to repay AMG's previous credit facility. In addition, AMG Engineering entered into €85,000 of bilateral letter of credit facilities which replaced its letter of credit facilities under the previous syndicated credit facility. As of December 31, 2019, the total balance on the term loans was $240,492 (2018: $242,372).

AMG Advanced Metallurgical Group N.V. is a borrower under the revolving credit facility. Refer to note 21 in the consolidated financial statements for additional information relating to the long-term debt.

As of December 31, 2019, there was an asset of $775 (2018: $1,147) related to debt issuance costs incurred on the undrawn portion of the revolving credit facility. This is included in deposits and other assets on the statement of financial position. See note 8 for additional details.

The Company directly borrowed $250,000 of the $350,000 senior secured term loan B facility. To mitigate interest rate risk, in February 2018 the Company entered into interest rate caps totaling $150,000 and interest rate swaps totaling $100,000. In March 2019, the Company unwound its interest rate swaps and replaced those instruments with interest rate caps. This determination was made as part of the ongoing risk management process. The interest rate caps have an equivalent notional value as the previous instruments and mitigate the interest rate risk on the Company's credit facility. See note 29 in the consolidated financial statements for additional information on the interest rate hedging activities.

14. OTHER PAYABLES

Trade and other payables represent amounts owed to professional service firms, accrued employee costs and accrued interest. There was $152 payable to Dutch tax authorities for wage taxes as of December 31, 2019 (2018: $184).

15. AMOUNTS DUE TO SUBSIDIARIES

Certain payroll, travel and entertainment and other expenses are paid directly by one subsidiary and billed to the Company at cost. As of December 31, 2019 and 2018, these amounted to $4,860 and $311, respectively.

16. DERIVATIVE FINANCIAL INSTRUMENTS

Please refer to notes 28 and 29 in the consolidated financial statements for more information on financial instruments and risk management policies.

INTEREST RATE HEDGES

In February of 2018, the Company entered into derivative contracts with two financial institutions in connection with the execution of its new credit facility. The contracts include interest rate caps, interest rate swaps, and a cross-currency interest rate swap. The interest rate cap and swaps were executed so that the Company could hedge its exposure to changes in the benchmark interest rate on the term loan B facility as well as fluctuations in the exchange rate between the euro and the US dollar. The Company designated the interest rate swaps and the cross-currency interest rate swap as effective cash flow hedges. In March 2019, the Company unwound its interest rate swaps and replaced those instruments with interest rate caps which resulted on $7,219 cash settlement. This determination was made as part of the ongoing risk management process. The interest rate caps have an equivalent notional value as the previous instruments and mitigate the interest rate risk on the Company's credit facility. See note 29 in the consolidated financial statements for additional information on the interest rate hedging activities.

The amount from interest rate hedges included in equity was ($530) and ($1,733) in the years ended December 31, 2019 and 2018, respectively. The amount included in equity is anticipated to impact the income statement through February 2023, which is the term of the contracts. During the year ended December 31, 2019, $908 (2018: $7,681) was transferred from equity to the income statement as a decrease to finance costs. There was no ineffectiveness for contracts designated as cash flow hedges during the years ended December 31, 2019 and 2018, respectively.

The Company did not designate the interest rate caps for hedge accounting. During the year ended December 31, 2019, $2,600 (2018: $593) of expense related to these instruments was recorded as finance cost in the parent company statement of income. At December 31, 2019, a balance of nil (2018: $6,156) was related to the cross-currency interest rate swap was recorded as a non-current derivative asset, and $1,737 (2018: $801) related to the interest rate caps and swaps was recorded as a non-current derivative liability.

17. LEASES

The Company has entered into leases for office space in Amsterdam and Frankfurt. The Amsterdam lease term originally had a termination date of March 31, 2013, but it has since been extended through March 2023. The Frankfurt lease term has an unlimited term but can be cancelled with six months' notice beginning December 31, 2012.

The Company applied IFRS 16 (lease accounting) for the first time as of January 1, 2019. The Company recognized new assets and liabilities for its operating leases which are primarily comprised of buildings, equipment and automobiles. See note 31 in the consolidated financial statements for additional information on leases.

Set out below are the carrying amounts of the Company's right-of-use assets, which are included in property, plant and equipment in the statement of financial position, and lease liabilities as well as the movements during the period:

	Right-of-use assets				
	Land, buildings and improvements	Machinery and equipment	Furniture and fixtures	Total	Lease liabilities
January 1, 2019	1,317	49	61	1,427	1,450
Additions	—	77	—	77	—
Depreciation expense	(404)	(34)	(22)	(460)	—
Interest expense	—	—	—	—	66
Payments	—	—	—	—	(425)
December 31, 2019	913	92	39	1,044	1,091

When measuring lease liabilities for leases that were previously classified as operating leases, the Company discounted lease payments using the implicit lease rate, if determinable, or its incremental borrowing rate at January 1, 2019. The weighted average rate applied was 5.15%.

Operating lease commitments as at December 31, 2018	2,241
Weighted average rate at January 1, 2019	5.15%
Discounted operating lease commitments at January 1, 2019	1,450
Less:	
Commitments relating to short-term leases	—
Commitments relating to leases of low value assets	—
Add:	
Payments in optional extension periods not recognized as at December 31, 2018	—
Additional lease liabilities recognized as at January 1, 2019	1,450
Commitments related to leases previously classified as finance leases	—
Total lease liabilities as at January 1, 2019	1,450

18. RELATED PARTIES

Key management compensation data is disclosed in note 34 of the consolidated financial statements.

The Company entered into a cost compensation agreement with the Foundation dated December 22, 2010 (see note 12). As per the agreement, the Company is required to provide funds to the Foundation for the costs incurred in connection with the fulfilment of the objectives of the Foundation. These costs include costs for establishing the Foundation, remuneration and out-of-pocket expenses for the members of the board of the Foundation, commitment fees, advisory fees and certain other costs. During the year ended December 31, 2019, the Company funded $56 (2018: $57).

19. EMPLOYEES

At December 31, 2019, the Company had 29 employees (2018: 27), of which 3 are employed in the Netherlands.

20. AUDIT FEES

KPMG has served as our independent auditor for the year ending December 31, 2019 and 2018. The following table sets out the aggregate fees for professional audit services and other services rendered by KPMG and their member firms and/or affiliates in 2019:

	2019			2018		
	KPMG Accountants N.V. USD' 000	KPMG Network USD' 000	Total	KPMG Accountants N.V. USD' 000	KPMG Network USD' 000	Total
Group financial statements	756	1,059	1,815	798	982	1,780
Audit of statutory financial statements	—	342	342	—	290	290
Other assurance services*	84	30	114	—	—	—
Total	840	1,431	2,271	798	1,272	2,070

*The other assurance services relate to consent letter procedures performed in connection with the Company's municipal bond offering and quality assurance procedures due to the new consolidation system totaling $80 and $30, respectively.

AMSTERDAM, MARCH 11, 2020

MANAGEMENT BOARD
AMG ADVANCED METALLURGICAL
AMSTERDAM, MARCH 11, 2020

Dr. Heinz Schimmelbusch
Eric Jackson
Jackson Dunckel

AMSTERDAM, MARCH 11, 2020

SUPERVISORY BOARD
AMG ADVANCED METALLURGICAL
AMSTERDAM, MARCH 11, 2020

Steve Hanke, Chairman
Willem van Hassel, Vice Chairman
Herb Depp
Donatella Ceccarelli
Frank Löhner
Dagmar Bottenbruch

OTHER INFORMATION

Article 25 and 26 of the Articles of Association

25. Adoption of Annual Accounts

25.1 The annual accounts shall be adopted by the general meeting.

25.2 Without prejudice to the provisions of article 23.2, the company shall ensure that the annual accounts, the annual report and the additional information that should be made generally available together with the annual accounts pursuant to or in accordance with the law, are made generally available from the day of the convocation of the general meeting at which they are to be dealt with.

25.3 The annual accounts cannot be adopted if the general meeting has not been able to take notice of the auditor's report, unless a valid ground for the absence of the auditor's report is given under the other additional information referred to in article 25.2.

26.1 The management board shall, subject to the approval of the supervisory board, be authorized to reserve the profits wholly or partly.

Independent Auditor's Report

To: the General Meeting of Shareholders and the Supervisory Board of AMG Advanced Metallurgical Group N.V.

Report on the audit of the financial statements 2019 included in the annual report

Our opinion

In our opinion:

— the accompanying consolidated financial statements give a true and fair view of the financial position of AMG Advanced Metallurgical Group N.V. as at December 31, 2019 and of its result and its cash flows for the year then ended, in accordance with International Financial Reporting Standards as adopted by the European Union (EU-IFRS) and with Part 9 of Book 2 of the Dutch Civil Code

— the accompanying company financial statements give a true and fair view of the financial position of AMG Advanced Metallurgical Group N.V. as at December 31, 2019 and of its result for the year then ended in accordance with Part 9 of Book 2 of the Dutch Civil Code.

What we have audited

We have audited the financial statements 2019 of AMG Advanced Metallurgical Group N.V. (the Company or AMG) based in Amsterdam. The financial statements include the consolidated financial statements and the company financial statements.

The consolidated financial statements comprise:

1 the consolidated statement of financial position as at December 31, 2019;

2 the following consolidated statements for the year 2019: the income statement, the statement of comprehensive income, statement of changes in equity and statement of cash flows; and

3 the notes comprising a summary of the significant accounting policies and other explanatory information.

The company financial statements comprise:

1 the parent company statement of financial position as at December 31, 2019;

2 the parent company income statement for the year 2019; and

3 the notes comprising a summary of the accounting policies and other explanatory information.

Basis for our opinion

We conducted our audit in accordance with Dutch law, including the Dutch Standards on Auditing. Our responsibilities under those standards are further described in the 'Our responsibilities for the audit of the financial statements' section of our report.

We are independent of AMG in accordance with the 'Verordening inzake de onafhankelijkheid van accountants bij assurance-opdrachten' (ViO, Code of Ethics for Professional Accountants, a regulation with respect to independence) and other relevant independence regulations in the Netherlands. Furthermore, we have complied with the 'Verordening gedrags- en beroepsregels accountants' (VGBA, Dutch Code of Ethics).

We believe the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Audit approach

Summary

Materiality

— Materiality of $3.5 million
— 4.5% of averaged and normalized profit before income tax

Group audit

— 96% coverage of total assets with audit of complete reporting package and audit of specific items
— 98% coverage of revenue with audit of complete reporting package and audit of specific items
— All significant components have been in scope for audit procedures

Key audit matters

— Inventory valuation AMG Vanadium
— Valuation of lithium concentrate plant
— Investments in, recoverability of vanadium plant and related financing
— Revenue recognition for sale of goods and projects

Opinion

— Unqualified

Materiality

Based on our professional judgement we determined the materiality for the financial statements as a whole at $3.5 million (2018: $5 million). The materiality is determined with reference to a 3 year average of profit before income tax, excluding the inventory cost adjustment for AMG Vanadium of $76 million in 2019. Averaging and normalizing has been applied due to the negative profit before income tax in the current year and the volatility in profit before tax over the recent years. The materiality of $3.5 million represents 4.5% of averaged and normalized profit before income tax. We consider profit before income tax as the most appropriate benchmark because the main stakeholders are primarily focused on profit before income tax. We have also taken into account misstatements and/or possible misstatements that, in our opinion, are material for the users of the financial statements for qualitative reasons.

We agreed with the Supervisory Board that unadjusted misstatements in excess of $175 thousand (2018: $ 250 thousand), would be reported to them, as well as smaller misstatements that in our view must be reported on qualitative grounds.

Scope of the group audit

AMG is at the head of a group of components. The financial information of this group is included in the financial statements of AMG.

Our group audit mainly focused on significant components that are (i) of individual financial significance to the group, or (ii) that, due to their specific nature or circumstances, are likely to include significant risks of material misstatement of the group financial statements.

We have considered in this respect AMG's business volatility and geographical presence. Our group audit covered AMG's business segments AMG Critical Materials, AMG Technologies and the corporate entities.

We have selected 11 components where we performed an audit of the complete reporting package (10 components) and audit of specific items (1 component and corporate entities).

We have:

— performed audit procedures at group level in respect of the valuation of goodwill, United States of America ('US') and the Netherlands tax position, other investments, US environmental provisions, share-based payments and loans and borrowings. In addition, we performed audit of specific items for corporate entities in the Netherlands and the US;

— made use of the work of other KPMG auditors for the audit of components and corporate entities in Germany, France, the United Kingdom, the United States , and Brazil. We have sent detailed instructions to all component auditors, covering significant areas including the relevant risks of material misstatement and set out the information required to be reported to the group audit team. For all components in scope of the group audit, we held conference calls and/or physical meetings with the auditors of the components. We visited component locations and we performed reviews of the audit files of the local KPMG auditors in Germany, the US and Brazil. During these meetings and calls we discussed in more detail the planning and risk assessment phase, the procedures performed including the findings and observations. Based on this meetings and calls we as group auditor assessed the sufficiency of the audit procedures performed;

— for the remaining components we performed desktop analytical procedures in order to corroborate our assessment that there are no risks of material misstatements.

By performing the procedures mentioned above at group components, together with additional procedures at group level, we have been able to obtain sufficient and appropriate audit evidence about the group's financial information to provide an opinion about the financial statements.

The audit coverage as stated in the section summary can be further specified as follows:

Total assets

81%	15%
Audit of the complete reporting package	Audit of specific items

Revenue

88%	10%
Audit of the complete reporting package	Audit of specific items

Audit scope in relation to fraud

In accordance with the Dutch standards on auditing we are responsible for obtaining a high (but not absolute) level of assurance that the financial statements taken as a whole are free from material misstatement, whether caused by fraud or error.

As part of our risk assessment process we have evaluated events or conditions that indicate an incentive or pressure to commit fraud or provide an opportunity to commit fraud ('fraud risk factors') to determine whether fraud risks are relevant to our audit. During this risk assessment we made use of our own forensic specialist.

In accordance with the auditing standard we evaluated the fraud risks that are relevant to our audit:

— fraud risk in relation to revenue recognition, specifically on fraudulent (non-routine) journal entries around year-end (a presumed risk)

— fraud risk in relation to management override of controls (a presumed risk)

We communicated identified fraud risks throughout our team and remained alert to any indications of fraud throughout the audit. This included communication from the group to component audit teams of relevant fraud risks identified at group level.

Our audit procedures included an evaluation of the design and implementation of internal controls relevant to mitigate these fraud risks and supplementary substantive audit procedures.

This included inquiries of management, detailed testing of high risk journal entries and an evaluation of key estimates and judgement by management. Furthermore, in relation to the correct recognition of revenues for the period prior to the financial year-end, we carried out inspection and testing of documentation such as agreements with customers and shipping documents.

In determining the audit procedures we made use of the Company's evaluation in relation to fraud risk management (prevention, detections and response), including the set up of ethical standards to create a culture of honesty.

As part of our evaluation of instances of fraud, we inquired the Company's Compliance Officers regarding reported incidents and/or speak-up reports and, if applicable, follow up by management.

We communicated our risk assessment and audit response to management and the Audit Committee of the Supervisory Board. Our audit procedures differ from a specific forensic fraud investigation, which investigation often has a more in-depth character. Our procedures to address fraud risk related to revenue recognition are included in the key audit matter.

We do note that our audit is based on the procedures described in line with applicable auditing standards and are not primarily designed to detect fraud.

Audit scope in relation to non-compliance with laws and regulations

We have evaluated facts and circumstances in order to assess laws and regulation relevant to the company. In this evaluation we made use of our own forensic specialist.

We identified laws and regulations that could reasonably be expected to have a material effect on the financial statements based on our general understanding and sector experience, through discussion with relevant management and those charged with governance, and evaluating the policies and procedures regarding compliance with laws and regulations.

We communicated identified laws and regulations throughout our team and remained alert to any indications of non-compliance throughout the audit. This included communication from the group to component audit teams of relevant laws and regulations identified at group level. The potential effect of these laws and regulations on the financial statements varies considerably:

- AMG is subject to laws and regulations that directly affect the financial statements including taxation and financial reporting standards (including related company legislation). We assessed the extent of compliance with these laws and regulations as part of our procedures on the related financial statement items; and
- AMG is subject to many other laws and regulations where the consequences of non-compliance could have an indirect material effect on amounts recognized or disclosures provided in the financial statements, or both, for instance through the imposition of fines or litigation.

Based on the Company's nature of operations and their geographical spread, the area's that we identified as those most likely having such an indirect effect include laws and regulations regarding competition, employment, health and safety and environmental.

Auditing standards limit the required audit procedures to identify non-compliance with laws and regulations that have an indirect effect to inquiring of relevant management and inspection of board minutes and regulatory and legal correspondence, if any. Through these procedures, we did not identify any actual or suspected non-compliance. We considered the effect of actual or suspected non-compliance as part of our procedures on provisions and disclosures of contingent liabilities.

Our procedures to address compliance with laws and regulations did not result in the identification of a key audit matter.

Our audit is not primarily designed to detect non-compliance with laws and regulations and that management is responsible for such internal control as management determines is necessary to enable the preparation of the financial statements that are free from material misstatement, whether due to fraud or error, including compliance with laws and regulations.

The more non-compliance with indirect laws and regulations (irregularities) is distant from the events and transactions reflected in the financial statements, the less likely the inherently limited procedures required by auditing standards would identify such instances.

Our key audit matters

Key audit matters are those matters that, in our professional judgement, were of most significance in our audit of the financial statements. We have communicated the key audit matters to the Supervisory Board. The key audit matters are not a comprehensive reflection of all matters discussed.

These matters 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. In comparison to prior year's audit the investment in the Vanadium plant is a new key audit matter. There are no other changes in the key audit matters.

Inventory valuation AMG Vanadium

Description

AMG Vanadium has recorded inventory write-offs in 2019 of $76 million due to significant decreases in the price of vanadium from approximately $50 per pound to approximately $10 per pound at year-end. This expense is recognized if the cost of inventory exceeds net realizable value. Inventory of AMG Vanadium amounted to $31 million at the end of 2019 ($120 million as at the end of 2018). The valuation of inventory at AMG Vanadium is considered to be significant to our audit due to the size of the inventory write-off and contains a significant risk of error.

Our response

With involvement of our local KPMG auditor in the US, our procedures for inventory included, amongst others:

- Evaluation of controls set up by management to determine the correctness of the net realizable value of inventory at AMG Vanadium;
- Verification of the existence of inventory by observing inventory counts and performing test counts at AMG Vanadium;
- Verification of the accuracy of inventory cost recorded by inspection of documents related to raw material purchases;
- Verification of the inventory costing methods applied by recalculation. We determine that the inventory is valued at the lower of cost or net realizable value by assessing the net realizable value of inventory based on market data and most recent sales prices available;

- Verification of the accuracy of the inventory write-off of $76 million recorded in cost of sales; and
- Evaluation of the related disclosure (note 13) in relation to the requirements of EU-IFRS.

Our observation

Based on our procedures performed on inventory balances at AMG Vanadium we consider that the accounting for inventory at AMG Vanadium is satisfactory and in accordance with EU-IFRS. We determined that the related disclosure (note 13) meets the requirements of EU-IFRS.

Valuation of lithium concentrate plant

Description

The ramp-up and commissioning of the lithium concentrate plant were completed in 2019 and the plant is fully operational since August 2019. During 2019 demand for lithium decreased, resulting in lower prices. Impairment indicators for the lithium concentrate plant in AMG Mineração were identified, hence an impairment analysis was performed by management. As such, the valuation of the lithium concentrate plant in AMG Mineração is considered to be significant to our audit due to management judgement involved in the assumptions used and contains a significant risk of error.

Our response

With involvement of our local KPMG auditor in Brazil, our procedures for the valuation of the property, plant and equipment included, amongst others:

- Evaluation of controls set up by management to determine the correctness of the recoverability of property, plant and equipment at AMG Mineração;
- Evaluation of management's assessment for existence of impairment indicators;
- Verification and evaluation of management's impairment analysis with a focus on forecasted volumes, and lithium prices used by management in the calculation of the recoverable amount by comparison with market studies;
- Involvement of specialists to verify the impairment model and the WACC used based on comparative market data and analyzing sensitivities;
- Evaluation of the related disclosure (note 10) in relation to the requirements of EU-IFRS.

Our observation

Based on our procedures performed at AMG Mineração we consider management's key assumptions and estimates to be within a reasonable range, the accounting for property, plant and equipment is satisfactory and in accordance with EU-IFRS. We determined that the related disclosure (note 10) meets the requirements of EU-IFRS.

Investment in, recoverability of vanadium plant and related financing

Description

AMG Vanadium has commenced the construction of a new vanadium plant that will double its spent catalyst recycling capacity. Capital expenditures in property, plant and equipment to an amount of $33 million were made in 2019. The investment in and valuation of the vanadium plant are considered to be significant to our audit due the decrease in the vanadium prices in 2019 and contains a significant risk of error.

To finance the investment in the vanadium plant, the Company has closed a US tax-exempt municipal bond. The municipal bond generated a total of $325 million in proceeds that are restricted to be used for financing the construction of the vanadium plant. The recognition, measurement and presentation of the transaction in relation to the municipal bond and related proceeds were considered to be significant to our audit due to its non-routine character.

Our response

With involvement of our local KPMG auditor in the US, our procedures for the additions and valuation of property, plant and equipment included, amongst others:

- Evaluation of controls set up by management related to the correctness of the additions and valuation of property, plant and equipment at AMG Vanadium;
- Inspection of a sample of documents to verify the existence and accuracy of additions to the spent catalyst recycling facility, including the eligibility for capitalization;
- Evaluation of management's assessment for the existence of impairment indicators in relation to the projected volume and price development as well as the operational performance of the new vanadium plant;
- Review of new catalyst spent supply contract including revised tipping fees and review of existing sales contracts in place used in forecasting;
- Evaluation of the related disclosure (note 10) in relation to the requirements of EU-IFRS.

With involvement of our local KPMG auditor in the US, our procedures for the recognition, measurement and presentation of the municipal bond and related proceeds included, amongst others:

- Verification of the existence and accuracy of the carrying amount of the bond liability by inspection of documents related to the US tax-exempt bonds;
- Verification of the effective interest rate by recalculation;
- Evaluation of management's assessment to capitalize borrowing costs for qualifying assets financed by specific borrowings;
- Verification of the existence, accuracy and restricted nature of the bond proceeds classified as restricted cash by inspection of documents;
- Evaluation of the presentation of the municipal bonds and related proceeds on the statements of financial position and – cash flows and related disclosures (notes 10, 16 and 21) in relation to the requirements of EU-IFRS.

Our observation

Based on our procedures performed at AMG Vanadium we consider management's key assumptions and estimates to be within a reasonable range, the accounting for property, plant and equipment is satisfactory and in accordance with EU-IFRS. We determined that the related disclosure (Note 10) meets the requirements of EU-IFRS.

Based on our procedures performed at AMG Vanadium we consider that the accounting for the municipal bonds and related proceeds at AMG Vanadium is satisfactory and in accordance with EU-IFRS. We determined that the related disclosures (note 10, 16 and 21) meet the requirements of EU-IFRS.

Revenue recognition for sale of goods and projects

Description

Revenue for sales of goods is recognized at the amount of the consideration to which the Company expects to be entitled at the point in time at which it transfers control of the good to the customer. Revenue related to furnace construction contracts is recorded over time based on the progress made towards complete satisfaction of the contract as determined by the management. Revenue is recognized based on an overall engineering design plan and management's estimate of the progress made over time towards complete satisfaction of the project, based on work performed in-house and by sub-suppliers. The determination of the progress made or whether the control of the good transferred to the customer requires judgement. Revenue recognition is significant to our audit and contains a risk of fraud in respect of cut-off around period-end.

Our response

With involvement of our local KPMG auditors, our procedures for revenue included, amongst others, assessment of the revenue recognition method per revenue category based on IFRS 15. We evaluated the controls set up by management surrounding the correctness of the determination of the progress made for furnace contracts and the correctness of transfer of control of the goods sold in respect of cut-off. Detailed procedures were performed, including testing on a sample basis underlying evidence of revenue recognized. Both contracts and other documentation (amongst others sales orders, shipping documents, third party confirmations) were assessed to determine accurate revenue recognition in relation to the existence of revenue. Sales transactions taking place before and/or after year-end were assessed to ensure that revenue was recognized in the appropriate period.

Our observation

Based on our procedures performed for revenue recognition we consider that the accounting for revenue is satisfactory and in accordance with EU-IFRS.

Report on the other information included in the annual report

In addition to the financial statements and our auditor's report thereon, the annual report contains other information.

Based on the following procedures performed, we conclude that the other information:

— is consistent with the financial statements and does not contain material misstatements; and

— contains the information as required by Part 9 of Book 2 of the Dutch Civil Code.

We have read the other information. Based on our knowledge and understanding obtained through our audit of the financial statements or otherwise, we have considered whether the other information contains material misstatements.

By performing these procedures, we comply with the requirements of Part 9 of Book 2 of the Dutch Civil Code and the Dutch Standard 720. The scope of the procedures performed is less than the scope of those performed in our audit of the financial statements.

The Board of Management is responsible for the preparation of the other information, including the information as required by Part 9 of Book 2 of the Dutch Civil Code.

Report on other legal and regulatory requirements

Engagement

We were engaged by the Annual General Meeting of Shareholders as auditor of AMG on May 4, 2016, as of the audit for the year 2016 and have operated as statutory auditor ever since that financial year.

No prohibited non-audit services

We have not provided prohibited non-audit services as referred to in Article 5(1) of the EU Regulation on specific requirements regarding statutory audits of public-interest entities.

Description of responsibilities regarding the financial statements

Responsibilities of The Board of Management and the Supervisory Board for the financial statements

The Board of Management is responsible for the preparation and fair presentation of the financial statements in accordance with EU-IFRS and Part 9 of Book 2 of the Dutch Civil Code. Furthermore, The Board of Management is responsible for such internal control as management determines is necessary to enable the preparation of the financial statements that are free from material misstatement, whether due to fraud or error.

As part of the preparation of the financial statements, The Board of Management is responsible for assessing the Company's ability to continue as a going concern. Based on the financial reporting frameworks mentioned, The Board of Management should prepare the financial statements using the going concern basis of accounting unless the Board of Management either intends to liquidate the Company or to cease operations, or has no realistic alternative but to do so. The Board of Management should disclose events and circumstances that may cast significant doubt on the company's ability to continue as a going concern in the financial statements.

The Supervisory Board is responsible for overseeing the Company's financial reporting process.

Our responsibilities for the audit of the financial statements

Our objective is to plan and perform the audit engagement in a manner that allows us to obtain sufficient and appropriate audit evidence for our opinion.

Our audit has been performed with a high, but not absolute, level of assurance, which means we may not detect all material errors and fraud during our audit.

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. The materiality affects the nature, timing and extent of our audit procedures and the evaluation of the effect of identified misstatements on our opinion.

A further description of our responsibilities for the audit of the financial statements is included in the appendix of this auditor's report. This description forms part of our auditor's report.

Amstelveen, March 11, 2020
KPMG Accountants N.V.

T. van der Heijden RA

Appendix: Description of our responsibilities for the audit of the financial statements.

We have exercised professional judgement and have maintained professional scepticism throughout the audit, in accordance with Dutch Standards on Auditing, ethical requirements and independence requirements. Our audit included among others:

- identifying and assessing the risks of material misstatement of the financial statements, whether due to fraud or error, designing and performing audit procedures responsive to those risks, and obtaining audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud or non-compliance is higher than the risk resulting from error, as fraud or non-compliance may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control;
- obtaining an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control;
- evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by The Board of Management;
- concluding on the appropriateness of The Board of Management's use of the going concern basis of accounting, and based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on Company's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause a company to cease to continue as a going concern;
- evaluating the overall presentation, structure and content of the financial statements, including the disclosures; and
- evaluating whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We are solely responsible for the opinion and therefore responsible to obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the group to express an opinion on the financial statements. In this respect we are also responsible for directing, supervising and performing the group audit.

We communicate with the Supervisory Board regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant findings in internal control that we identify during our audit. In this respect we also submit an additional report to the audit committee in accordance with Article 11 of the EU Regulation on specific requirements regarding statutory audits of public-interest entities. The information included in this additional report is consistent with our audit opinion in this auditor's report.

We provide the Supervisory Board with a statement that we have complied with relevant ethical requirements regarding independence, and to communicate with them all relationships and other matters that may reasonably be thought to bear on our independence, and where applicable, related safeguards.

From the matters communicated with the Supervisory Board, we determine the key audit matters: those matters that were of most significance in the audit of the financial statements. We describe these matters in our auditor's report unless law or regulation precludes public disclosure about the matter or when, in extremely rare circumstances, not communicating the matter is in the public interest.

SHAREHOLDER INFORMATION

MANAGEMENT BOARD

Dr. Heinz Schimmelbusch
Chairman and Chief Executive Officer

Eric Jackson
Chief Operating Officer

Jackson Dunckel
Chief Financial Officer

SUPERVISORY BOARD

Steve Hanke
Chairman
Selection & Appointment Committee (Chair)

Willem van Hassel
Vice Chairman
Audit & Risk Management Committee

Herb Depp
Remuneration Committee (Chair)

Donatella Ceccarelli
Audit & Risk Management Committee (Chair)
Selection & Appointment Committee

Frank Löhner
Audit & Risk Management Committee

Dagmar Bottenbruch
Remuneration Committee

LISTING AGENT

ABN AMRO

PAYING AGENT

ABN AMRO

EURONEXT: AMG

Trade Register

TRADE REGISTER

AMG Advanced Metallurgical Group N.V. is registered with the trade register in the Netherlands under no. 34261128

COPIES OF THE ANNUAL REPORT

and further information can be obtained from the Investor Relations Department of the Company or by accessing the Company's website:

EMAIL

info@amg-nv.com

WEBSITE

amg-nv.com

AMG ADVANCED
METALLURGICAL GROUP N.V.

Head Office—Netherlands

WTC Amsterdam
Toren C
Strawinskylaan 1343
1077 XX Amsterdam
Netherlands

T: +31 20 7147 140

United States Office

Building 200
435 Devon Park Drive
Wayne, PA 19087
United States

T: +1 610 293 2501

amg-nv.com