DMG MORI

AKTIENGESELLSCHAFT

NEUTRAL CARBON FOOTPRINT

As of May 2021

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1. Introduction

Climate change is the greatest social challenge of our time. The atmosphere is heating up, oceans are getting warmer, polar ice caps are melting and sea levels are rising. The scientific findings are clear: climate change is mainly due to human influences. In particular, the burning of fossil fuels emits large amounts of carbon dioxide (CO_2) and is causing the concentration of CO_2 in the atmosphere to be higher than ever before. Against this background, DMG MORI AKTIENGESELLSCHAFT (hereinafter referred to as DMG MORI) assumes responsibility in a holistic manner.[1]

As early as 2020, DMG MORI will be one of the first industrial companies to be climate-neutral in its own value creation.[2] The group avoids emissions in all areas, for example through modern heating, air and cooling concepts. At the same time, DMG MORI uses self-generated renewable energies and has been purchasing green electricity at almost all locations since January 2020. The remaining CO_2 emissions that could not previously be avoided are offset by investments in sustainable, certified climate protection projects.

In addition to its own climate-neutral value creation, from January 2021 it will also offset the CO_2 emissions generated in the supply chain by the manufacture of the preliminary products – for example, in the mining of raw materials.[3] Customers will thus receive climate-neutral machines and automation solutions ("**GREENMACHINE**") from 2021 on.

This document describes the framework conditions underlying the concept of climate-neutral operation or production of machinery. Chapter 2 defines the organizational and operational boundaries of the reporting, based on the Green House Gas Protocol. Building on this, chapter 3 presents the emissions for the 2020 reporting year. Chapter 4 summarizes the most important measures for reducing emissions at DMG MORI, and Chapter 5 describes in detail the procedure for offsetting the emissions that cannot be avoided hitherto. The central aspects of DMG MORI's CO_2 neutrality were confirmed by the independent auditor Pricewaterhouse Coopers as part of the audit of the sustainability report.

1 The statements in this document refer exclusively to DMG MORI AKTIENGESELLSCHAFT. However, the same methodological approach is applied to DMG MORI COMPANY LIMITED.

2 DMG MORI's Company Carbon Footprint refers to Scope 1 and Scope 2 as well as Scope 3 categories 3, 5, 6 and 7 of the Green House Gas Protocol. DMG MORI's specific path to carbon neutrality is explained in detail in chapter 5.

3 DMG MORI's Product Carbon Footprint includes all emissions that are directly attributable to the machines produced. Categories 1 and 4 of Scope 3 are particularly relevant here..

2. Methodology

The calculation and reporting of DMG MORI's carbon footprint is based on the guidelines of the Green House Gas Protocol (GHG Protocol) of the World Resources Institute (WIR) and World Business Council for Sustainable Development (WBCSD). The GHG Protocol is the most widely used standard at international level for preparing greenhouse gas balances. Analogous to accounting, the following principles are taken into account:

1. **Relevance**
2. **Completeness**
3. **Consistency**
4. **Transparency**
5. **Accuracy**

For comparability, all emissions are converted into so-called CO_2 equivalents (CO_{2e}). In addition to nitrogen trifluoride (NF_3), the GHG Protocol takes into account the six main greenhouse gases according to the Kyoto Protocol: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6). For reasons of simplification, however, this document refers exclusively to CO_2 emissions. The conversion to CO_2 equivalents is done using the recognized conversion factors of the Department for Environment, Food & Rural Affairs (DEFRA 2020). For the calculation of some specific emissions (especially due to the production materials used), additional databases such as those of the Federal Office of Economics and Export Control (BAFA) are used.

2.1 Organizational boundaries

DMG MORI's business activities differ in terms of their legal and organizational structure. In addition to wholly-owned subsidiaries, these also include, for example, minority shareholdings or joint ventures. For the calculation of the carbon footprint, DMG MORI applies the control approach and is therefore responsible for 100% of the greenhouse gas emissions from operations and activities over which it has control. Emissions from operations and activities in which there is only a minority shareholding are not included in the balance. Accordingly, DMG MORI's carbon footprint includes nine production plants, 29 sales & service units, four service companies, three digital units and three holding companies with a total of 6,672 employees (as of 31 December 2020).

When collecting consumption data, DMG MORI pursues a site-specific approach in which the nine largest sites are recorded by means of queries (eight production sites and one DMG MORI Spare Parts site). DMG MORI has already been operating an energy management system according to ISO 50001 for several years. Consequently, valid consumption data is available for the sites. The other sites account for an insignificant share of the total energy demand (<5 %). With the help of a representative sample consisting of four locations (Stuttgart, Hilden, Stollberg, Gothenburg), the consumption for these companies was extrapolated using the headcount. In some cases, data for the entire Group is recorded centrally in the responsible holding companies. This is noted accordingly in the specific explanations in chapter 2.2.

2.2 Operational boundaries

The GHG Protocol distinguishes between Scope 1, 2 and 3 with regard to operational boundaries (see Figure 1). Scope 1 includes all direct emissions of DMG MORI, e.g. from the generation of electricity, heat or steam based on combustion processes. Scope 2 and 3, on the other hand, refer to indirect emissions. Emissions from the purchase of electricity and thermal energy are assigned to Scope 2. All other indirect emission sources are summarized in Scope 3. With regard to Scope 3 emissions, DMG MORI limits itself to the reporting of selected upstream activities. [4]

Emissions from downstream activities are under the control of DMG MORI's customers and are significantly influenced by their individual usage patterns. Accordingly, DMG MORI cannot directly influence these. However, as DMG MORI machines are mainly operated with electrical energy and energy efficiency is already an essential criterion in the development process, the low-emission use of the machines is already possible today. The general recyclability of the machines is ensured by recycling-oriented product development (VDI 2243) and by the materials used.

The specific composition of the various scopes and the underlying calculation approaches and assumptions are described in detail below.

4 For example, emissions associated with capital goods are not reported as they do not make a significant contribution to DMG MORI's total emissions

Scope 1

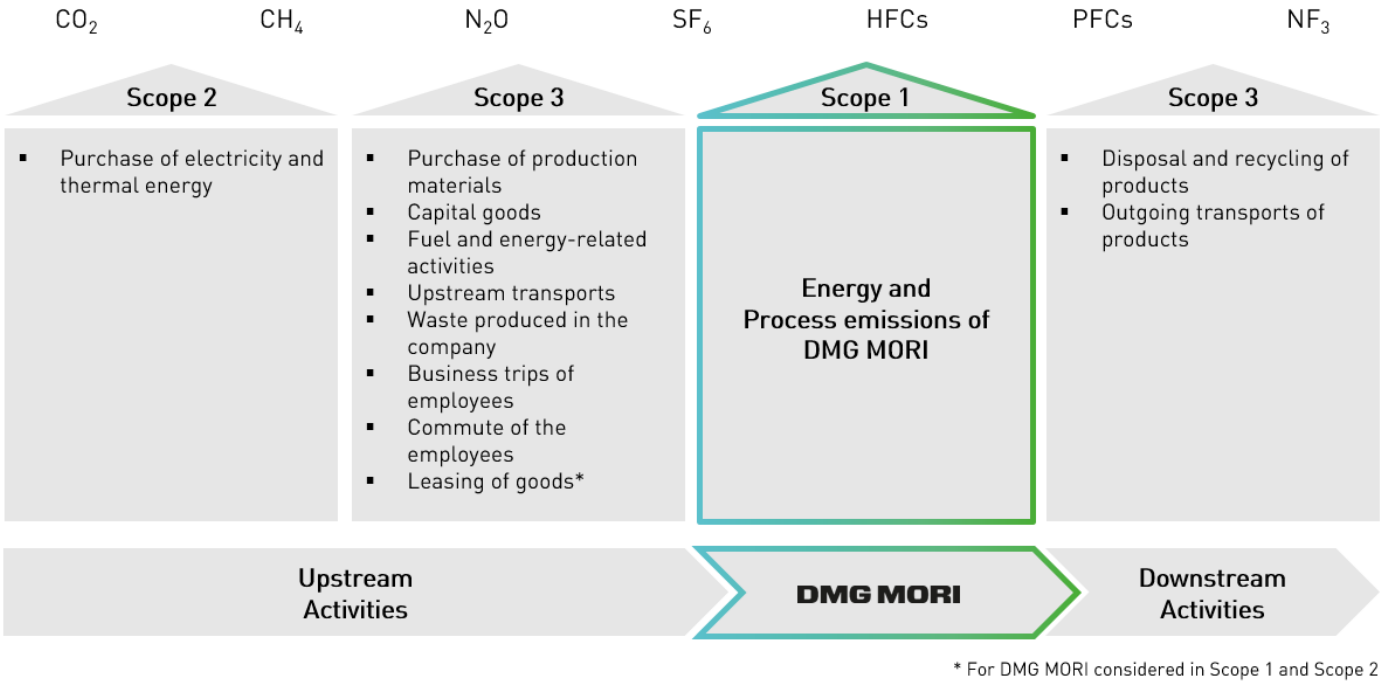
DMG MORI's direct emissions from energy and production processes are recorded by means of a central query from the energy manager. The data quality is checked on a random basis. In addition, plausibility checks are carried out on central parameters such as headcount or turnover. The following direct emission sources are particularly relevant for DMG MORI: Fuels for heat generation and production energy, refrigerants and process emissions, e.g. from the use of argon. Auxiliary materials such as cleaners, adhesives or oils are excluded from this and are not included in the balance. In addition, Scope 1 includes emissions from the fuel consumption of the leasing or pool fleet. This is recorded across the board via fuel cards, which are managed by a central mobility department.

In addition, emissions resulting from the use of industrial trucks are recorded. The CO_2 factors applied do not take upstream emissions into account, as these are reported at DMG MORI under Scope 3 – Category 3.

Scope 2

The recording of indirect emissions from the secondary purchase of energy follows the procedure already described for Scope 1. The following special features must be taken into account: Due to the approach already presented in chapter 2.1 for extrapolating the emissions of all Sales & Service units, local consumption data is not available for all companies. For this reason, the emission factor of the German electricity mix is applied across the board for the conversion into CO_2 equivalents, also for reasons of comparability.[5] This is based on the assumption that Germany still feeds in a high proportion of coal-fired electricity compared to other countries (approx. 40 % – see Federal Statistical Office 2019). Thus, any reduction in emissions due to an excessively low emission factor can be ruled out. Only the Pleszew site is considered separately and offset against Poland's national electricity mix, as Poland uses a significantly higher proportion of coal-fired electricity of approx. 81 % (see Federal Statistical Office 2019). As of 01.01.2020, DMG MORI switched the majority of its sites to green electricity, so that in 2020 more than 75% of the purchased electricity was generated from renewable sources. The green electricity is taken into account in Scope 2 with an emission factor of 0. The upstream emissions of electricity (incl. self-generation and green electricity) are accounted for under Scope 3 (Category 3) and are not taken into account under Scope 2. The accounting is thus closely based on the GHG Protocol. In addition to electricity consumption, district heating is also used in some Sales & Service units. This is extrapolated to all companies in accordance with the procedure already described.

5 DMG MORI's carbon footprint therefore does not yet differentiate between „location-based" and „market-based" and deviates from the requirements of the GHG Protocol with regard to this aspect.



1 | Operational boundaries according to the GHG Protocol (Source: Own representation based on the GHG Protocol)

Scope 3

Scope 3 focuses on the reporting of upstream emissions from the relevant upstream categories. Specifically, these are the following emission sources:

- *Category 1: Purchase of production materials*
- *Category 3: Fuel- and energy-related activities*
- *Category 4: Upstream transport and distribution*
- *Category 5: Waste generated in the company*
- *Category 6: Business trips by employees*
- *Category 7: Work routes of the employees*

Category 2 (capital goods) is not explicitly reported as the emissions of this category do not account for a significant share of DMG MORI's total emissions. In addition, the related primary data are not available in sufficient quality. Category 8 (leasing of goods), which also belongs to the upstream categories, is reported under Scope 1 at DMG MORI due to its high significance for the business activities (see leasing fleet).

Category 1: Purchase of production materials

The emissions associated with the purchase of production materials were evaluated using six representative reference machines. These form a valid average of DMG MORI's existing product portfolio with regard to production technology, machine size, number of units, etc. The starting point for the analysis is the parts lists of the reference machines. The starting point for the analysis is the parts lists of the reference machines, which were expanded at individual part level to include the following information:

- Material: specification, weight, machining activities (e.g. milling), share of electronics
- Transports: Country of origin of raw material, transport mode to 1st tier supplier, location of 1st tier supplier, transport mode to production plant (see Scope 3 – Category 4).

Due to the high complexity, the analyses are limited to 80 % of the total weight of the machine tool. The missing 20 % are compensated for by extrapolations. In order to exclude statistical distortions due to small parts with a high footprint, the weight of the electronic components was additionally estimated and multiplied by a conservative CO_2 factor. The emission volume of the necessary processing activities was also estimated and taken into account with a conservative safety margin of 15 % of the total emissions.

Due to the large number of different materials, all applied CO_2 factors are not presented in this document. The sources are largely the established databases ecoinvent and ProBas. For the result transfer of the six reference machines to the entire production program of DMG MORI, a linear approach based on the number of units as well as the order intake was chosen.[6] The validity of this approach was confirmed with the help of several correlation analyses. In summary, it can be stated that DMG MORI covers more than 60 % of the total purchasing volume with the production materials considered in this way. In addition, a conservative estimate of DMG MORI's paper consumption was established based on the ordering behavior.

Category 3: Fuel and energy-related activities

The starting point for the assessment of this category is the energy consumption shown in Scope 1 (natural gas, heating oil, LPG, diesel and petrol) and the emissions associated with Scope 2 (supply chain of purchased electricity incl. green electricity and self-generated electricity). The CO_2 factors of the supply chain from DEFRA are used to calculate the associated emissions.

Category 4: Upstream transport and distribution

The analysis of the upstream transports is based on six reference machines, analogous to category 1. With the help of the parts list, the transports of the components, which account for 80 % of the machine weight, were analyzed in detail and then extrapolated to the entire machine. The conversion of the „tonne-kilometres" generated in this way into CO_2 equivalents is carried out with the help of DEFRA's CO_2 factors and the EcoTransIT database. The transfer of transport emissions from the six reference machines to the entire DMG MORI product portfolio is based on the linear approach already presented in Category 1. The restriction that the transports assessed in this way relate to 61% of DMG MORI's total purchasing volume also applies to category 4 emissions. The transports associated with non-production materials are not taken into account in DMG MORI's reporting.

Category 5: Waste generated in the company

The waste quantities from the respective disposal systems are queried centrally via the energy management system and randomly checked on the basis of the receipts. The consumption data for fresh water and waste water are also determined on the basis of the actual receipts. The calculation is made using DEFRA's conversion factors.

6 The extrapolation on the basis of incoming orders and the purchasing volume of production materials leads to comparable results, taking into account a certain time offset. Due to the higher data quality and the associated comparability to the emissions of DMG MORI COMPANY LIMITED, the extrapolation is made on the basis of order intake in combination with the corresponding number of units.

Category 6: Business trips by employees

This category includes in particular air travel and rental cars. Business trips with company vehicles are reported in Scope 1. Flight bookings are managed centrally by the mobility department and booked through an external travel agency. The travel agency has evaluations regarding the selected flight class and the distance travelled per flight. DMG MORI obtains rental cars from two external agencies. These provide evaluations of the selected vehicle categories and the kilometers travelled with them.

Category 7: Work routes of the employees

Employees' commutes and the resulting emissions were determined at DMG MORI in 2019 with the help of a quantitative survey and carried forward to 2020. Feedback from 1,070 employees was evaluated and the emissions conservatively calculated based on this.[7] 12 % of all employees at DMG MORI own a company car.

The emissions from these vehicles are reported in Scope 1 at DMG MORI. A further 66 % of all employees travel alone by car. Vehicles with different drive concepts are used (54 % petrol, 43 % diesel, 3 % hybrid and electric). 6 % organize their daily commute by carpooling. 16% of employees actively avoid emissions and come to work by public transport, bicycle or on foot. The emissions generated by public transport are not included in the report due to the low volume.

Based on the product of kilometers travelled and the average fuel consumption per vehicle, the absolute fuel consumption was determined at the individual level. With the help of the headcount, this consumption was extrapolated to all the companies considered.

7 The extrapolation to all employees is based on the personnel statistics at the end of 2019 (7,245 employees).

3. Greenhouse gas emissions

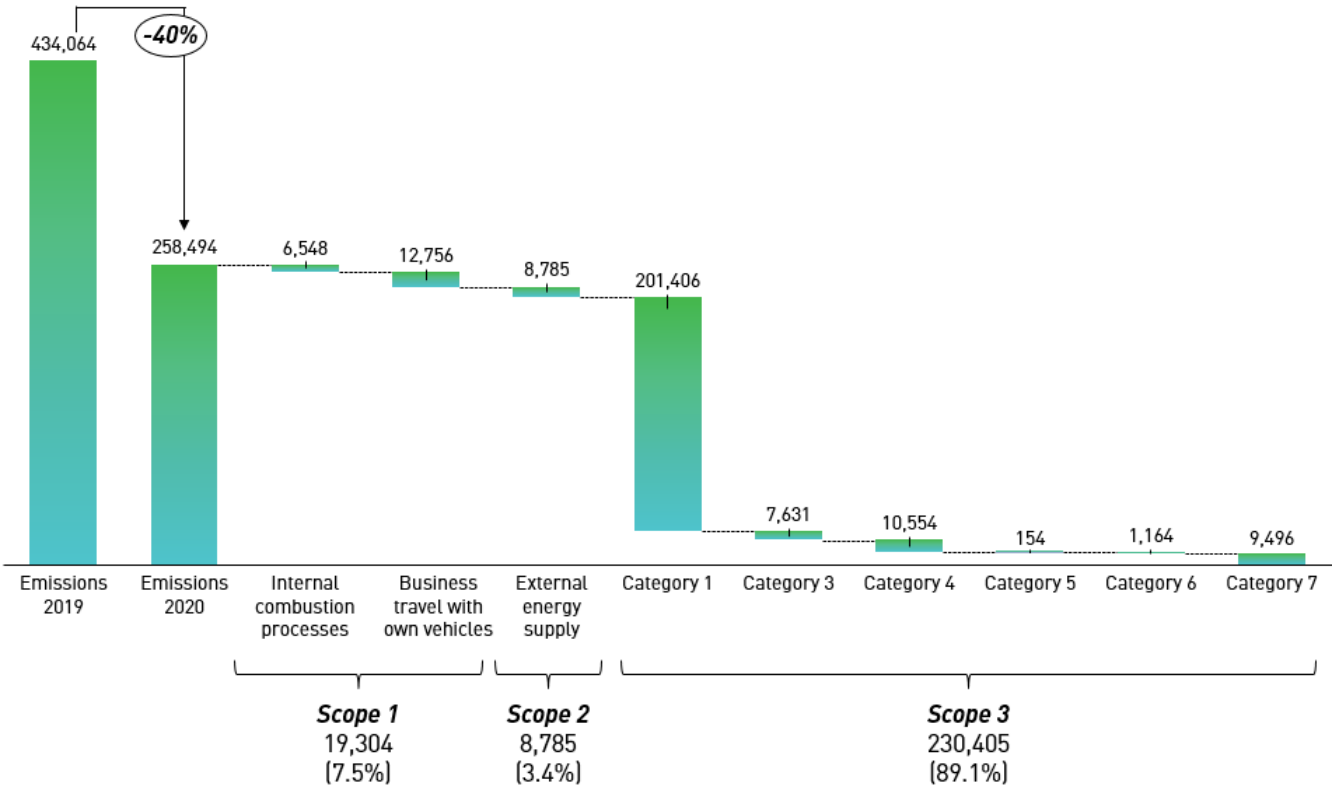
In 2020, DMG MORI's CO_2 emissions along the value chain (cradle to gate) amounted to 258,494 t CO_2 (see Figure 2 and 3 here and below). Compared to 2019, this corresponds to a reduction of 175,570 t CO_2 (-40.45%). However, due to the Corona crisis and the associated decline in incoming orders, the emissions of 2020 and 2019 can only be compared with limitations. 89.13% of the total emissions in 2020 are attributable to Scope 3 (upstream categories).

DMG MORI's direct emissions are responsible for 7.47 % of the total emissions (see Scope 1). A further 3.40 % of the total emissions result from the secondary purchase of energy (see Scope 2). In line with the GHG Protocol, Scope 3 comprises the purchase of production materials (Category 1), which accounts for the largest share of total emissions at 201,406 t CO_2 (78 %). In addition, at DMG MORI, supply chain transport activities (4% – category 4) and employee business travel (4% – category 7) are the highest emitting items in Scope 3. The fuel supply chain (category 3) and business travel (category 6), which is not carried out with company-owned vehicles, are responsible for 3% and 0.5% of total emissions respectively.

In particular, the reduction in business travel emissions (-4,010 t CO_2) is due to the restrictions imposed by the Corona crisis. The disposal of waste or water (category 5) makes a comparatively small contribution to the total emissions with 154 t CO_2.

In Scope 2, the majority of emissions are attributable to the provision of electricity (3 %). District heating is only used at a few Sales & Service locations, so that the associated emissions have a marginal share of DMG MORI's total emissions (< 0.5 %).

The biggest driver of DMG MORI's Scope 1 emissions is the use of its own vehicle fleet. Approx. 5 % of the total emissions are attributable to journeys with leased or pool vehicles. Internal combustion processes also cause a significant share with a total of 6,548 t CO_2. This corresponds to 2.53 % of DMG MORI's total emissions.



2 | Emissions (t CO_2) of DMG MORI 2020 (source: own representation)

Scope	Source of Emission	Category	2019 t CO_2	2019 Share	2020 t CO_2	2020 Share	2019 vs. 2020 t CO_2	2019 vs. 2020 %
Scope1	Internal Combustion	Natural Gas	7,475	1.7%	6,088	2.4%	-1,387	-18.6%
		Fuel Oil	188	<0.1%	214	0.1%	26	13.8%
		Other Gases	106	<0.1%	100	<0.1%	-6	-5.7%
		Coolant	7	<0.1%	146	0.1%	139	>100.0%
	Business Travel with own Vehicles	Pool	201	0.1%	46	<0.1%	-155	-77.1%
		Leasing	15,735	3.63%	12,710	4.9%	-3,025	-19.2%
Scope 2	External provision of Energy	Electricity	24,244	5.59%	8,353	3.2%	-15,891	-65.6%
		District Heat	549	0.1%	432	0.2%	-117	-21.3%
Scope 3	Category 1: Purchased Material	Production Material	339,422	78.2%	200,518	77.3%	-138,904	-40.9%
		Paper	939	0.2%	888	0.3%	-51	-5.5%
	Category 3: Upstream Processes	e.g. Supply Chain of fuels / gases	9,511	2.2%	7,631	3.0%	-1,880	-19.8%
	Category 4: Transports	e.g. Ship & Truck	17,864	4.1%	10,554	4.1%	-7,310	-40.9%
	Category 5: Garbage	Waste & Water	189	<0.1%	154	<0.1%	-35	-18.5%
	Category 6: Business Travel	Flights	4,339	1.0%	816	0.3%	-3,523	-81.2%
		Rental Cars	835	0.2%	348	0.1%	-487	-58.3%
	Category 7: Employees Commute	e.g., Cars & Public Transport	12,460	2.9%	9,496	3.7%	-2,964	-23.8%
TOTAL Footprint			**434,064**	**100.0%**	**258,494**	**100.0%**	**-175,570**	**-40.5%**
TOTAL Company Carbon Footprint			**76,778**	**17.7%**	**47,422**	**18.3%**	**-29,356**	**-38.2%**
TOTAL Product Carbon Footprint			**357,286**	**82.3%**	**211,072**	**81.7%**	**-146,214**	**-40.9%**

3 | Emissions of DMG MORI 2019 & 2020 – detailed view (source: own representation)

4. Greenhouse gas reduction

The active reduction of greenhouse gas emissions is a top priority for DMG MORI. Our direct CO_2 emissions arise from the consumption of energy in our production, assembly, sales and service processes. This also applies to our suppliers. Our reduction measures take a holistic approach: We control our own energy consumption and emissions with our energy management system, and we commit suppliers to energy-saving and environmentally compatible processes. We also plan to join the Science Based Targets Initiative in 2021. This involves a long-term commitment to scientifically based targets for emissions reduction.

DMG MORI has been operating an energy management system in accordance with ISO 50001 since the 2015 financial year. Since 2019, this has focused on the sites that are significant for energy consumption.[8] TÜV SÜD Management Service GmbH has again certified effective energy management for DMG MORI in the 2019 financial year. A central energy manager coordinates all energy-related activities and is supported by local energy management teams and officers.

In our energy management system, we analyze the energy consumption of our locations, taking into account local specifics. In doing so, we identify the main causes of energy demand and define targeted measures to reduce our consumption and the associated emissions.

8 The eight European production sites and one spare parts site (out of a total of 69 sites) as well as the vehicle fleet are significant for energy consumption.

As early as 2020, DMG MORI will be one of the first industrial companies to operate climate-neutrally in its own value creation. The group avoids emissions in all areas, for example through modern heating, air and cooling concepts. In the 2020 financial year, DMG MORI implemented increased energy standards in new buildings and conversions – for example in Pfronten.

At the same time, DMG MORI uses regenerative energy that it generates itself and purchases only green electricity at almost all locations. Thus, 76.6 % of the purchased electricity is generated from renewable sources. With its „Energy Policy", which was most recently revised in August 2019, DMG MORI is committed to the responsible use of energy and resources and the associated reduction of CO_2 emissions.

Some examples for the avoidance or reduction of emissions at DMG MORI are:

1. Combined heat and power plant with absorption chiller in FAMOT
   ~1.600 t CO_2 per year
2. Energy-efficient new building in FAMOT (2019)
   ~383 t CO_2 per year
3. Optimization of heating control in Bielefeld
   ~300 t CO_2 per year
4. Optimization of plant control in Bielefeld
   ~174 t CO_2 per year
5. Optimization of paint shop in Seebach
   (plant technology, insulation, LEDs, ...)
   ~171 t CO_2 per year
6. Heating optimization in Geretsried
   ~70 t CO_2 per year
7. Compressor exchange in Geretsried
   ~27 t CO_2 per year
8. Compressor exchange in Stipshausen
   ~11 t CO_2 per year

5. Greenhouse gas compensation

DMG MORI is actively working to reduce its greenhouse gas emissions and aims to completely eliminate its Scope 1 and 2 emissions in the long term. But DMG MORI is also taking responsibility in the short term and has already been climate-neutral in its own value creation since January 2020. The company carbon footprint emissions of 47,422 t CO_2 that could not yet be avoided in 2020 were offset by means of certified and internationally recognized climate protection projects (Gold Standard, Verified Carbon Standard, UN Certified Emission Reduction).[9] For example, DMG MORI is supporting the construction of a biogas plant in Liucheng (China) and a wind farm in Akbuk (Turkey).

From 2021, DMG MORI will go one step further and offset not only the company carbon footprint but also the product carbon footprint.[10] This means that from 2021, all machines sold by DMG MORI will be manufactured in a climate-neutral way - from the extraction of raw materials to delivery to the customer. This approach is unique in the machine tool industry.

To ensure that emissions are balanced before they occur, DMG MORI makes a forecast for emissions in 2021 based on the 2020 data and balances them immediately. At the end of the reporting year 2021, the forecast made is reviewed and readjusted if necessary. This ensures that DMG MORI is climate neutral at all times in 2021, both in the company carbon footprint and in the product carbon footprint.

9 DMG MORI's Company Carbon Footprint refers to Scope 1 and Scope 2 as well as Scope 3 categories 3, 5, 6 and 7 of the Green House Gas Protocol.

10 DMG MORI's Product Carbon Footprint includes all emissions that are directly attributable to the machines produced. Categories 1 and 4 of Scope 3 are particularly relevant here.

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