

Welcome to our CDP Climate Change Questionnaire 2022

C0. Introduction

C0.1

(C0.1) Give a general description and introduction to your organization.

Merck is a global science and technology company headquartered in Darmstadt, Germany. Our business comprises three business sectors: Healthcare, Life Science, and Electronics (previously: Performance Materials).

Healthcare discovers, develops, manufactures, and markets innovative pharmaceutical and biological prescription drugs to treat cancer, multiple sclerosis (MS), infertility, growth disorders, and certain cardiovascular and metabolic diseases. Healthcare operates in four franchises: Neurology and Immunology, Oncology, Fertility, and General Medicine & Endocrinology. Our R&D pipeline positions us with a clear focus on becoming a global specialty innovator in oncology, immuno-oncology, neurology, and immunology.

In **Life Science**, with our Research Solutions, Process Solutions, and Applied Solutions business units, we are a leading worldwide supplier of tools, high-grade chemicals, and equipment for academic labs, biotech, and biopharmaceutical manufacturers, as well as the industrial sector. Research Solutions provides our academic customers with the chemicals and biological tools needed to make scientific discovery easier and faster. Process Solutions provides drug manufacturers with process development expertise and technologies, such as continuous bioprocessing. Applied Solutions offers analytical workflows and both lab connectivity and digitization solutions to empower the labs of the future. Our complete portfolio comprises more than 300,000 products, ranging from lab water systems to genome-editing tools, antibodies, and cell lines, as well as end-to-end bioprocessing systems to support the manufacturing needs of both emerging biotech and large pharma companies. We have and will continue to play a critical role in aiding the ongoing response to the Covid-19 pandemic, supporting our customers working on combatting the novel virus through our products, services, and expertise. In February 2021, we announced plans to accelerate the supply of urgently needed lipids, which are vital in the production of the Pfizer-BioNTech vaccine for Covid-19. Merck is one of a few companies in the world that are currently able to produce custom lipids in significant quantities. By acquiring AmpTec, a leading mRNA contract manufacturing and developing organization based in Hamburg, Germany, we have further strengthened our capabilities to develop and manufacture mRNA for use in vaccines, treatments, and diagnostics. At the end of 2021, we also signed a definitive agreement to acquire Exelead, a biopharmaceutical contract development and manufacturing organization (CDMO).

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With the acquisition, we aim to provide our customers a unique and truly integrated offering across the mRNA manufacturing process.

Electronics is advancing digital living. Our main focus is on the electronics market with our materials and solutions changing the way we generate, access, store, process, and display information. In addition, our highly specialized, application-driven Surface Solutions business makes life more colorful. Together with our customers, we are discovering the next generation of high-tech materials and solutions. With strong growth trends such as 5G and Big Data, and new applications such as autonomous driving and Internet of Things (IoT), we have set the course for future growth. The business sector consists of three business units: Semiconductor Solutions, Display Solutions and Surface Solutions. We offer innovative solutions especially for the electronics industry - for microchips and displays - and for surfaces of every kind. With the Intermolecular and Versum Materials acquisitions in 2019, we achieved two major milestones to transform our business sector into a strong solutions provider and leading player in the electronic materials market. Effective March 4, 2021, we therefore changed the name of the Performance Materials business sector to Electronics.

Apart from our three business sectors, our financial reporting presents the five regions Europe, North America, Asia-Pacific, Latin America as well as Middle East & Africa. As of December 31, 2021, we had 60,348 employees worldwide, which compares with 58,127 on December 31, 2020. In 2021, our 221 subsidiaries with employees in 66 countries generated sales of € 19,7 billion.

We are embedding the topic of **sustainability into our Group strategy** as an essential component. In 2020, we formulated new, **strategic sustainability goals**. Through our business activities, we want to be economically successful, while at the same time creating value for society. Becoming climate neutral along our entire value chain by 2040 is one of the three overarching goals we have set ourselves. In May 2022, the independent Science Based Targets initiative (SBTi) has confirmed that our near-term goals for 2030 correspond to the current status of climate science. Consequently, Merck is helping to limit global warming to 1.5°C, thus meeting the requirements of the Paris Agreement.

C0.2

(C0.2) State the start and end date of the year for which you are reporting data.

	Start date	End date	Indicate if you are providing emissions data for past reporting years	Select the number of past reporting years you will be providing emissions data for
Reporting year	January 1 2021	December 31 2021	No	<Not Applicable>

C0.3

(C0.3) Select the countries/areas in which you operate.

China
France
Germany
Ireland
Israel
Italy
Japan
Republic of Korea
Taiwan, China
United States of America

C0.4

(C0.4) Select the currency used for all financial information disclosed throughout your response.

EUR

C0.5

(C0.5) Select the option that describes the reporting boundary for which climate-related impacts on your business are being reported. Note that this option should align with your chosen approach for consolidating your GHG inventory.

Operational control

C0.8

(C0.8) Does your organization have an ISIN code or another unique identifier (e.g., Ticker, CUSIP, etc.)?

Indicate whether you are able to provide a unique identifier for your organization	Provide your unique identifier
Yes, an ISIN code	DE0006599905

C1. Governance

C1.1

(C1.1) Is there board-level oversight of climate-related issues within your organization?

Yes

C1.1a

(C1.1a) Identify the position(s) (do not include any names) of the individual(s) on the board with responsibility for climate-related issues.

Position of individual(s)	Please explain
Chief Executive Officer (CEO)	Description of the position and relation to climate issues: The CEO of Merck has the overarching responsibility for climate-related issues as part of the CEO's wider responsibility for Merck's overall sustainability strategy. In this role, the CEO takes care of the development of climate protection targets, monitoring of target performance, promoting measures towards target achievement etc. With their respective area of responsibility, each Executive Board member is also responsible for sustainability. The head of Merck's Corporate Sustainability, Quality & Trade Compliance unit (SQ), which has oversight for all climate-related activities at Merck, reports directly to the CEO. SQ also heads the Corporate Sustainability Council (since 2022: Merck Sustainability Board). Both, Sustainability Council and Sustainability Board, consist of representatives from our business sectors and from key Group functions, such as Procurement, Risk Management and Controlling. The Corporate Sustainability Council steers and monitors the Group-wide implementation of the sustainability strategy. It aligns the strategy with the individual business strategies, defines priorities, specifies globally applicable sustainable guidelines, and recommends corresponding initiatives to the Executive Board. The council is sponsored by the CEO and another member of Merck's Executive Board. Outcomes of the quarterly meetings are reported to the whole Board. Examples of climate-related decisions 2021: The CEO together with the other Board members decided to apply for a Science Based Target. The SBTi approved our 1.5°C target proposal in May 2022. In 2021, Merck's Board decided as well to increase the capacity of a Virtual Power Purchasing Agreement (VPPA) for renewable electricity in the US from 50 to 68 MW.
Chief Financial Officer (CFO)	Description of the position and relation to climate issues: Merck's CFO is responsible for dedicated climate-related issues. Examples are sustainability in our investment processes, management incentives or interlinking sustainability and financial reporting. Examples of climate-related decisions 2021: As head of the CFO area, the CFO triggered projects to develop a framework to consider GHG emissions in Merck's investment processes which also includes a carbon pricing approach. Furthermore, a Sustainability Factor was developed oriented at our sustainability goals that will be included in the long-term incentive plan of the senior management in 2022 (see Long-Term Incentive Plan (LTIP) - Merck Annual Report 2021 (merckgroup.com)). GHG emissions are an important part of this factor.

C1.1b

(C1.1b) Provide further details on the board's oversight of climate-related issues.

Frequency with which climate-related issues are a scheduled agenda item	Governance mechanisms into which climate-related issues are integrated	Scope of board-level oversight	Please explain
Scheduled – some meetings	Reviewing and guiding strategy Reviewing and guiding major plans of action Reviewing and guiding risk management policies Reviewing and guiding annual budgets Reviewing and guiding business plans Setting performance objectives Monitoring implementation and performance of objectives Overseeing major capital expenditures, acquisitions, and divestitures Monitoring and overseeing progress against goals and targets for addressing climate-related issues	<Not Applicable>	The CEO of Merck has the overarching responsibility for climate-related issues as part of the CEO's wider responsibility for Merck's overall sustainability strategy. In this role, the CEO takes care of the development of climate protection targets, monitoring of target performance, promoting measures towards target achievement etc. Overall Board oversight over climate-related issues is safeguarded via different channels. for instance: - The head of Merck's Corporate Sustainability, Quality & Trade Compliance unit (SQ), represents the highest responsibility for the overall governance for climate-related issues below Merck's Executive Board (= delegation of governance from Board). SQ coordinates and steers activities to implement Merck's climate protection program to reach Merck's climate targets 2030 and 2040. SQ monitors GHG emissions regularly using a central IT platform and monitors the implementation of energy efficiency and GHG reduction projects. The head of SQ reports directly to the CEO and informs the whole Board regularly on the current state and next steps of our climate protection program. In case, action on climate protection by the Board is needed, top management decisions, such as corporate environmental goal setting, are prepared. - The head of Merck's Corporate Sustainability, Quality & Trade Compliance unit also heads the Corporate Sustainability Council (since 2022: Merck Sustainability Board). SQ also heads the Corporate Sustainability Council (since 2022: Merck Sustainability Board). Both, Sustainability Council and Sustainability Board, consist of representatives from our business sectors and from key Group functions, such as Procurement, Risk Management and Controlling. The Corporate Sustainability Council steers and monitors the Group-wide implementation of the sustainability strategy. It aligns the strategy with the individual business strategies, defines priorities, specifies globally applicable sustainable guidelines, and recommends corresponding initiatives to the Executive Board. The council is sponsored by the CEO and another member of Merck's Executive Board. Outcomes of the quarterly meetings are reported to the whole Board. - In the context of Merck's risk management, Group

			Controlling & Risk Management informs the Board twice a year about the aggregated opportunity/risk exposure of Merck, including climate-related risks. - Decisions by the Board on major capital expenditures in the area of renewable electricity procurement (e.g., on Virtual Power Purchasing Agreements) are prepared by Corporate Procurement.
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C1.1d

(C1.1d) Does your organization have at least one board member with competence on climate-related issues?

	Board member(s) have competence on climate-related issues	Criteria used to assess competence of board member(s) on climate-related issues	Primary reason for no board-level competence on climate-related issues	Explain why your organization does not have at least one board member with competence on climate-related issues and any plans to address board-level competence in the future
Row 1	Yes	As climate change and its impacts are in the focus of many different stakeholders like investors, customers, politics etc. and are discussed in high-level groups, each Executive Board member needs competence on climate-related issues. Internally, sustainability topics and climate-related issues are discussed on a regular basis within Merck's Board. In the past years many decisions with regard to these topics have been taken by the Board as a whole and by single Board members. Examples are: - Sustainability Strategy - Climate goals and decision to go for science-based targets - Renewable electricity procurement - Reduction of process-related GHG emissions - Integration of sustainability in investment process/internal carbon price - Integration of climate goals in the long-term incentive plan of the senior management Based on all this, each Board member gained knowledge and competence on climate-related issues.	<Not Applicable>	<Not Applicable>

C1.2

(C1.2) Provide the highest management-level position(s) or committee(s) with responsibility for climate-related issues.

Name of the position(s) and/or committee(s)	Reporting line	Responsibility	Coverage of responsibility	Frequency of reporting to the board on climate-related issues
Sustainability committee	<Not Applicable>	Both assessing and managing climate-related risks and opportunities	<Not Applicable>	Quarterly
President	<Not Applicable>	Both assessing and managing climate-related risks and opportunities	<Not Applicable>	Quarterly

C1.2a

(C1.2a) Describe where in the organizational structure this/these position(s) and/or committees lie, what their associated responsibilities are, and how climate-related issues are monitored (do not include the names of individuals).

The head (**President**) of Corporate Sustainability, Quality & Trade Compliance unit (SQ), represents the highest responsibility for the overall governance for climate-related issues below Merck's Executive Board (= delegation of governance from Board). SQ coordinates and steers activities to implement Merck's climate protection program to reach Merck's climate targets 2030 and 2040. SQ monitors GHG emissions regularly using a central IT platform and monitors the implementation of energy efficiency and GHG reduction projects. The head of SQ reports directly to the CEO and informs the whole Board regularly on the current state and next steps of our climate protection program. In case, action on climate protection by the Board is needed, top management decisions, such as corporate environmental goal setting, are prepared.

SQ also heads the Corporate Sustainability Council (since 2022: Merck Sustainability Board). SQ also heads the Corporate Sustainability Council (since 2022: Merck Sustainability Board). Both, Sustainability Council and Sustainability Board, consist of representatives from our business sectors and from key Group functions, such as Procurement, Risk Management and Controlling. Council members from various countries provide input on regional sustainability aspects. The Corporate Sustainability Council steers and monitors the Group-wide implementation of the sustainability strategy. It aligns the strategy with the individual business strategies, defines priorities, specifies globally applicable sustainable guidelines, and recommends corresponding initiatives to the Executive Board.

Moreover, the Corporate Sustainability Council ensures that the initiatives of our various business sectors, Group functions and subsidiaries align with our Group-wide sustainability strategy. The measures adopted by the Corporate Sustainability Council are implemented by our line managers as well as by interdisciplinary project teams. To achieve our operational sustainability goals and depending on the topic, responsibility is assigned to specific teams, functions and business units. Those responsible for implementation exchange ideas and coordinate actions in an

overarching committee. They identify synergies between the projects and tailor their direction to our sustainability goals.

C1.3

(C1.3) Do you provide incentives for the management of climate-related issues, including the attainment of targets?

	Provide incentives for the management of climate-related issues	Comment
Row 1	Yes	Incentives for management of climate-related issues are managed on various levels.

C1.3a

(C1.3a) Provide further details on the incentives provided for the management of climate-related issues (do not include the names of individuals).

Entitled to incentive	Type of incentive	Activity incentivized	Comment
Environment/Sustainability manager	Monetary reward	Emissions reduction project Energy reduction project Efficiency project	Environment/Sustainability managers in various positions within Merck receive monetary incentives related to climate protection and energy saving/efficiency activities.
Energy manager	Monetary reward	Energy reduction project Efficiency project	Energy managers receive financial incentives with regard to climate protection and energy saving/efficiency (e.g., for detecting energy saving potentials or implementing energy saving projects).
Facilities manager	Monetary reward	Energy reduction project Efficiency project	Facility managers receive financial incentives with regard to climate protection and energy saving/efficiency (e.g., for detecting energy saving potentials or implementing energy saving projects).
Process operation manager	Monetary reward	Emissions reduction project Efficiency project	Process operations managers receive financial incentives with regard to climate protection and energy saving/efficiency (e.g., for detecting energy saving potentials or implementing energy saving projects).
Other, please specify (Employees)	Monetary reward	Emissions reduction project Energy reduction project Efficiency project	At our largest manufacturing site Darmstadt, the employee suggestion scheme financially rewards good ideas on energy efficiency and emission reduction.

Entitled to incentive	Type of incentive	Activity incentivized	Comment
Board/Executive board	Monetary reward	Company performance against a climate-related sustainability index	Merck's sustainability strategy is taken into account in 2021 in the individual adjustment factor within the framework of the profit sharing. Sustainability criteria will be firmly implemented in the LTIP (Long Term Incentive Plan) from 2022 onwards via the sustainability factor and backed by concrete targets for the 2022 tranche. One of the three pillars of Merck's sustainability strategy is 'Reducing our ecological footprint'. Here, the reduction of greenhouse gas emissions (scope 1 & 2) will be one element.
All employees	Non-monetary reward	Emissions reduction project Energy reduction project Efficiency project	In our Healthcare business sector, we recognize projects who contribute to Environment, Health & Safety excellence. Projects on climate-related issues are an important part of this.
Procurement manager	Monetary reward	Supply chain engagement Other (please specify) (Procurement of renewable electricity)	Various procurement managers got monetary rewards for setting up Merck's Supplier Decarbonization Program as well as for driving Merck's renewable electricity procurement strategy incl. renewable electricity purchase. In 2021 the foundation was laid to set broader GHG related targets for our sourcing managers in 2022.

C2. Risks and opportunities

C2.1

(C2.1) Does your organization have a process for identifying, assessing, and responding to climate-related risks and opportunities?

Yes

C2.1a

(C2.1a) How does your organization define short-, medium- and long-term time horizons?

	From (years)	To (years)	Comment
Short-term	0	2	Short-term horizon in line with group risk management processes.
Medium-term	2	5	Mid-term horizon in line with group risk management processes. For standard risk reporting, we're focusing on the current and the following four calendar years. Risks have to be reported with impact and likelihood in yearly time-slices for each calendar year.
Long-term	5	20	In order to get an understanding of the mid- to long-term risk profile, relevant risks should be identified and described qualitatively (and where possible also quantitatively). Based on that, a risk map with relevant trends and threats is developed and monitored. The long-term horizon in line with group risk management processes is 10

	From (years)	To (years)	Comment
			years. Nevertheless, in line with Merck's updated sustainability strategy, in relevant cases, a longer risk horizon shall be applied, e.g., up to 20 years with respect to the objective to achieve climate neutrality until 2040.

C2.1b

(C2.1b) How does your organization define substantive financial or strategic impact on your business?

The definition for substantive financial or strategic impact is outlined in our group-wide risk management guidelines. We provide a solid basis to evaluate risks from quantitative and/or qualitative point of view, whereby two separate but aligned matrices are used.

The **quantitative** risk matrix shows the individual risks and their significance to the Group. Risks are clustered based on their maximum impact and probability in any year.

Degree of impact:

- > € 500 million - Critical negative impact on the net asset, financial position, and results of operations
- € 100 – 500 million - Substantial negative impact on the net asset, financial position, and results of operations
- € 25 – 100 million - Moderate negative impact on the net asset, financial position, and results of operations
- € 10 – 25 million - Minor negative impact on the net asset, financial position, and results of operations
- < € 10 million - Immaterial negative impact on the net asset, financial position, and results of operations

Probability of occurrence:

- < 1% - Highly improbable
- 1 – 5% - Improbable
- 5 – 20% - Possible
- 20 – 50% - Likely
- > 50% - More than likely

The combination of impact and likelihood in a 5x5 risk matrix visualizes the potential severity of a single risk. Following cluster relations lead to substantial/significant risk evaluation:

- a. € 25–100 million & > (20-50%)
- b. € 100–500 million & > (5 – 20%)
- c. > € 500 million & all probability clusters (>0%)

The **qualitative** risk matrix is structured in risk clusters (Reputation, ESG, Strategy, etc). Furthermore, a similar impact classification is defined from low up to critical.

All substantial, critical (and selected moderate) topics are regularly presented to respective management and committees.

C2.2

(C2.2) Describe your process(es) for identifying, assessing and responding to climate-related risks and opportunities.

Value chain stage(s) covered

Direct operations

Upstream

Downstream

Risk management process

Integrated into multi-disciplinary company-wide risk management process

Frequency of assessment

More than once a year

Time horizon(s) covered

Short-term

Medium-term

Long-term

Description of process

Identify

Company level: Merck's Group-wide risk management processes are based on our risk management guideline. The business heads, managing directors of Merck subsidiaries, and the heads of Group functions are specified as employees with responsibility for risks. Every six months, the risk owners assess their risks and report their risk portfolio to Risk Management. Besides, risks have to be reported on an ad hoc basis when they arise and meet certain thresholds. For regular reporting, all risks above a € 10 million thresholds have to be reported (before mitigation impact). For ad-hoc reporting, the reporting threshold is € 25 million. Risks below these thresholds are steered independently within the business sectors or on local level.

Assess

Likewise, risk-mitigating measures are reported and assessed. These are key for an appropriate management of the risks and are steps to either transfer risks or to reduce impact and/or probability. For relevant risks (and according to the respective reporting thresholds and levels), mitigations have to be evaluated. The description should contain an outline of planned or conducted activities with responsibilities, applicable deadlines (expected implementation date), costs and a mitigation effect on either impact or probability. The calculation of anticipated effects and the underlying assumptions shall be stated and explained.

Respond

All actions must be classified by its implementation status: planned, initiated or implemented. The requirement to report mitigation measures applies to all reported risks. The effectiveness of these measures and the planned implementation time frame are monitored by the risk owner/champion and Group Risk Management.

The focus time horizon for risk reporting is five years. Beside this risk reporting, potential longer-term climate-related risks are evaluated by the businesses and Group functions. Group Risk Management reports directly to the Group Chief Financial Officer and uses the information reported to determine the current risk portfolio for the Merck Group, presenting this in a report to the Executive Board, the Supervisory Board and the Finance Committee with detailed explanations twice per year. Risks are categorized into:

- Business-related risks,
- Financial risks,
- Tax risks,
- Legal risks,
- Human resources risks,
- Information technology risks,
- Risks of the divestment, acquisition and integration of companies and businesses,
- Environmental, climate-related, and safety risks.

As a Group function Corporate Sustainability, Quality & Trade Compliance (SQ) is integrated in the risk management process. SQ regularly assesses environmental incl. climate-related risks to our operation units and business. We monitor regulatory risks in connection with the transition to a low-carbon economy, which could materialize in the mid- and long-term through rising carbon prices through emissions trading systems, taxes or energy legislation. We mitigate those risks with our energy and carbon management measures. We classify these as possible risks based on which a substantial impact on the financial position cannot be ruled out. Long-term risks are also discussed in the group-wide Sustainability Council. Merck's group-wide Business Continuity Management is a further component to assess risks and ensure the uninterrupted availability of all key business and mission-critical business activities, even in case of a disaster. Hereby, long-term risks such as climate-related risks are covered as well. Within Business Continuity Management the whole up- and downstream value chain as well as direct operations are considered.

Asset level: As part of their daily work and as an integral part of their ISO 14001 and ISO 50001 certification our site EHS and Facility Management evaluate climate-related risks. Hereby, the direct impact on the sites is assessed as well as the up- and downstream value chain. Regulatory and other risks are considered as well as opportunities (e.g., by using incentive systems). Additionally, the assets play an important role in Business Continuity Management as they provide the basis of the overall process (e.g., business impact analyses, risk assessments/mitigation, recovery and response measures). The tool 'Site Risk Inventory' is used to evaluate risks on site level. This inventory covers climate-related risks (short-, medium, long-term) as well. As the site EHS Management reports directly via dotted line to the Group function Corporate Sustainability, Quality & Trade Compliance (SQ) it is safeguarded that all relevant risks throughout the Merck Group are known, can be further assessed, and passed on to the group-wide risk management.

Moreover, in 2022, to comply with TCFD disclosure requirements, we will conduct a

detailed climate risk assessment and we expect to have qualitative scenario analysis by end of 2022 and quantitative analysis in 2023. Hereby, climate-related risks and opportunities (physical/transitional) will be covered.

C2.2a

(C2.2a) Which risk types are considered in your organization's climate-related risk assessments?

	Relevance & inclusion	Please explain
Current regulation	Relevant, always included	Merck considers the risk from current regulation, e.g. the impact of cap and trade schemes like the EU Emissions Trading Scheme (ETS). With power plants at the Darmstadt and Gernsheim sites in Germany, Merck is covered by the EU Emission Trading Scheme (EU ETS). In the framework of the European Green Deal, the EU started to revise key legislation. Among them the EU ETS. This poses a risk to Merck as the regulator aims for much higher certificate price in order to effectively realize steering of energy generation according to climate requirements. By this, the EU ETS could influence Merck directly through our own energy generation facilities participating in the EU ETS and indirectly, through our supply chain. Risks from emerging regulations are monitored at various levels in our company. For instance, our energy managers, sustainability managers and our legal teams constantly monitor climate-related legislative changes and developments and analyze their potential impact on Merck. Potential risks are reported based on our established risk management processes.
Emerging regulation	Relevant, always included	Based on the Paris Agreement and the need to tackle climate change we see an increasing regulatory pressure on a national, an EU and an international level. For instance, the UK became the first G20 country to enshrine in law mandatory TCFD-aligned requirements for Britain's largest companies and financial institutions to report on climate-related risks and opportunities. In the framework of the European Green Deal, the EU started to revise key legislation like the Renewable Energy Directive, the Energy Efficiency Directive or the Emissions Trading System. Merck is impacted by this and must closely monitor the development to mitigate any litigation risks. This applies for more than 60 countries where Merck is active. On the one hand side this bears legal risks from potential incompliance, on the other hand side this might have a negative impact on Merck's operational costs. Risks from emerging regulations are monitored at various levels in our company. For instance, our energy managers, sustainability managers and our legal teams constantly monitor climate-related legislative changes and developments and analyze their potential impact on Merck. Potential risks are reported based on our established risk management processes.

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	Relevance & inclusion	Please explain
Technology	Relevant, sometimes included	In terms of risks, technology could potentially have an impact on Merck's competitiveness via an increase of operational costs. To tackle climate change there is the need to transition to lower emissions technologies. For Merck this means primarily to safeguard a secure, low or zero carbon energy supply. Within the scope of Merck's climate protection goals to reduce greenhouse gas emissions, one of the measures is the installation of low or zero carbon technologies to generate energy (e.g., photovoltaic plants, heat pumps). Here we see the risks that investments might be unsuccessful because of changing framework conditions (e.g., unexpected increases in the costs of fuels) and that alternative technologies might be much more costly than standard technologies. For instance, at Merck's largest site, Darmstadt, we operate a large gas power plant to generate electricity, heat and steam. The plant underlies the EU ETS. Replacing this by a low or zero carbon technology will bear risks and uncertainties. At the Darmstadt site, the energy strategy is currently being further developed in order to align the energy supply even more closely with Merck's climate protection goals. Before such technologies are implemented possible risks are evaluated and mitigated within Merck's overall investment process. Later-on risk mitigation is done by the businesses. Furthermore, Merck's group-wide Business Continuity Management is an important component to assess this kind of risks and ensure the uninterrupted availability of all key business and mission-critical business activities. Moreover, in 2022, to comply with TCFD disclosure requirements, we will launch a qualitative analysis reviewing the transition risks associated with the adoption of relevant technology.
Legal	Relevant, always included	Based on the Paris Agreement and the need to tackle climate change we see an increasing regulatory pressure on a national, an EU and an international level. For instance, the UK became the first G20 country to enshrine in law mandatory TCFD-aligned requirements for Britain's largest companies and financial institutions to report on climate-related risks and opportunities. In the framework of the European Green Deal, the EU started to revise key legislation like the Renewable Energy Directive, the Energy Efficiency Directive or the Emissions Trading System. Merck is impacted by this and must closely monitor the development to mitigate any litigation risks. This applies for more than 60 countries where Merck is active. At this time, we do not see an increasing legal risk in future as legal monitoring is integrated in our risk and business processes. Legal, climate-related risks are monitored at various levels in our company. For instance, as part of their daily work and as an integral part of their ISO 14001 and ISO 50001 certification our site EHS and Facility Management closely monitor relevant regulations etc.

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	Relevance & inclusion	Please explain
Market	Relevant, always included	Merck monitors various market risks regarding our upstream supply chain, e.g., an interruption of supply due to extreme weather events, longer delivery times because of the shift from air to sea transportation, higher costs because of stricter climate-related regulations imposed on our supplier (e.g., emission trading schemes). Currently, there is no indication that risks due to climate change-related weather extremes increase relevantly at supplier sites. Due to our product portfolio, we do not see any risks in Merck's downstream supply chain from climate change for the upcoming years. There are no critical products where we expect decreasing sales quantities because of changing customer behaviour due to climate change. We rather see opportunities for some of our products (e.g., to fight Malaria or to improve energy efficiency in the display sector). Risks in Merck's upstream supply chain are part of Merck's overall risk management. Hereby, Merck's group-wide Business Continuity Management is an important component to assess this kind of risks and ensure the uninterrupted availability of all key business and mission-critical business activities. Based on our Business Continuity Management policy and guidelines, our businesses and their sites conduct business impact analyses, risk assessments and define mitigation, recovery and response measures. In this framework, climate-related issues are considered as well. Nevertheless, in 2022 we will conduct a detailed climate risk assessment including scenario analysis to further evaluate and understand any acute or chronic physical risks for our (key) suppliers.
Reputation	Relevant, always included	Merck considers potential risks arising from climate-related reputation which could potentially affect the demand for our products or our access to capital. Worldwide, investors, customers, NGOs and the public are increasingly focusing on how companies are dealing with sustainability issues such as climate change and how they are integrating these topics into their business strategies and communication. Currently, we do not see increasing climate-related reputation risks for Merck. Nevertheless, we react on increasing requirements, for instance, by taking into account the requirements of the TCFD in our Sustainability Report or by setting a science-based, 1.5°C-aligned target in 2022. By this, our reputation is further strengthened. Reputational risks are managed on various levels. For instance, our Group functions Corporate Sustainability and Investor Relations as well as the businesses are in close contact with customers, investors, rating agencies etc. To mitigate this risk, we regularly conduct materiality analyses in the framework of Merck's Sustainability Report that integrate feedback from multiple different stakeholders. By this, we safeguard that we cover the topics relevant to Merck (e.g., risks from climate change) within our sustainability strategy which is reviewed by Merck's Group-wide Sustainability Council under the overall responsibility of the Chairwoman of the Executive Board and CEO of Merck.
Acute physical	Relevant, always included	Merck considers potential acute physical risks in the form of climate change-related extreme weather events, such as cyclones, hurricanes or floods affecting our production facilities. An increase of such weather events affecting our facilities could result in increased operational and capital cost and disruption in our production. In 2017, two sites in the US had to be closed down out of precautionary measures because of hurricane Irma. Nevertheless, there was no physical damage and the financial damage was low. Acute physical risks are covered by the risk management on Group and asset level. On site level, this is done, for instance, by the 'Site Risk Inventory' tool. This inventory covers climate-related risks (short-, medium, long-term) as well. As the site EHS Management reports directly via dotted line to the Group function Corporate Sustainability, Quality & Trade Compliance (SQ) it is

	Relevance & inclusion	Please explain
		safeguarded that all relevant risks throughout the Merck Group are known, can be further assessed and passed on to the group-wide risk management. Nevertheless, in 2022, we will conduct a detailed climate risk assessment including scenario analysis to further evaluate any acute or chronic physical risks.
Chronic physical	Relevant, always included	Merck considers chronic physical risks due to climate change-related changes in precipitation extremes, such as droughts. A potential increase of droughts affecting our production facilities could result in increased operational and capital cost and disruption in our production. Approx. 15-20 Merck manufacturing sites are located in areas with a high water risk (water risk factor 3 and 4 according to Aqueduct Water Risk Atlas). Nevertheless, the overall water consumption of these sites is low and currently we do not see a substantial risk. As part of their daily work and as an integral part of their ISO 14001 certification our site EHS and Facility Management evaluate climate-related risks like droughts etc. Additionally, the assets play an important role in Business Continuity Management as they provide the basis of the overall process (e.g., business impact analyses, risk assessments/mitigation, recovery and response measures). The tool 'Site Risk Inventory' is used to evaluate risks on site level. This inventory covers climate-related risks (short-, medium, long-term) as well. As the site EHS Management reports directly via dotted line to the Group function Corporate Sustainability, Quality & Trade Compliance (SQ) it is safeguarded that all relevant risks throughout the Merck Group are known, can be further assessed and passed on to the group-wide risk management. Nevertheless, in 2022, we will conduct a detailed climate risk assessment including scenario analysis to further evaluate any acute or chronic physical risks.

C2.3

(C2.3) Have you identified any inherent climate-related risks with the potential to have a substantive financial or strategic impact on your business?

Yes

C2.3a

(C2.3a) Provide details of risks identified with the potential to have a substantive financial or strategic impact on your business.

Identifier

Risk 1

Where in the value chain does the risk driver occur?

Direct operations

Risk type & Primary climate-related risk driver

Emerging regulation	Carbon pricing mechanisms
---------------------	---------------------------

Primary potential financial impact

Increased direct costs

Climate risk type mapped to traditional financial services industry risk classification

<Not Applicable>

Company-specific description

The UN identified climate change as one of the major risks globally. Most countries worldwide committed to limit global warming by reducing greenhouse gas emissions with the Paris Agreement. Based on this many countries adapt or plan to adapt their legislation to safeguard emission reductions. The EU for instance has agreed on the European Green Deal to accelerate the transition of the EU economy to a sustainable economic model with the overarching objective to become the first climate neutral continent by 2050. Based on this decision, the EU started to revise key legislation like the Renewable Energy Directive, the Energy Efficiency Directive, the Emissions Trading System, the Energy Performance of Buildings Directive and the Energy Taxation Directive. This will further increase carbon prices, adjust financing incentives (e.g., EU Taxonomy) and drive changes of technology (e.g., fostering renewable energy). Many of these changes will impact Merck's European manufacturing sites. For instance, the EU Emissions Trading System (EU ETS) is a cornerstone of the EU's policy to combat climate change and a key tool in reducing greenhouse gas and to reach EU's 2030 reduction target. This poses a risk to the European industry as this will have an impact on the annual reduction in the 'cap' on emissions from EU ETS sectors and will increase the price of carbon allowances (EUA). With emissions of approx. 80,657 t of CO₂ in 2021 the heating and power plants at the Darmstadt and Gernsheim sites in Germany fall under the EU ETS and are directly affected by these cost risks. In addition, the "Brennstoffemissionshandelsgesetz (BEHG)" in Germany has introduced a national carbon pricing system for fuels in Germany from 2021 (carbon price 25 Euro/t CO₂ in 2021 - 60 Euro/t CO₂ in 2026) which will also affect Merck's German sites. Around the world countries set net-zero targets (e.g., China in 2060) and think about introducing cap and trade schemes, carbon taxes etc. as economic means to reduce greenhouse gas emissions. Besides already existing emission trading schemes, several countries (e.g., China, South Korea, Japan, Mexico, some US states) have scheduled or considered cap and trade schemes in the upcoming years. This will affect Merck that has subsidiaries in more than 66 countries and manufacturing sites in the countries mentioned above by increased operational costs. And of course, carbon pricing systems affect Merck indirectly as well via our supply chain.

Time horizon

Medium-term

Likelihood

Very likely

Magnitude of impact

Low

Are you able to provide a potential financial impact figure?

Yes, an estimated range

Potential financial impact figure (currency)

<Not Applicable>

Potential financial impact figure - minimum (currency)

7000000

Potential financial impact figure – maximum (currency)

20000000

Explanation of financial impact figure

To tackle climate change many countries will implement measures (e.g., emission trading schemes, carbon taxes) to set a price on carbon or to increase the price of carbon. To estimate the potential financial impact of this transition risk, we used data available for Germany to extrapolate global figures for Merck.

In Germany, two of our sites underly the EU ETS. According to today's assessment and depending on the allocation variant Merck's purchase of allowances for its plants under the EU ETS result in roughly estimated annual costs of 1.2 – 2.1 million Euros (average annual impact until 2030; carbon price of 20-60 Euro/ton). The German Renewable Energy Sources Act causes higher electricity costs per kWh. The contribution for renewable energies is up to a total of 6.5 Eurocent per kWh in 2021. Based on the electricity purchase for our German sites this sums up to approx. 5.2 million Euros in 2021. In addition, the national carbon pricing system for fuels in Germany (Brennstoffemissionshandelsgesetz - BEHG, started in 2021, increases the direct energy costs. The potential financial impact figure (7 million Euros) results from the sum of the average costs for the purchase of EU-ETS allowances (1.65 million Euros), the costs from the German Renewable Energy Sources Act (5.2 million Euros) and an estimate for the costs from the Brennstoffemissionshandelsgesetz.

The mentioned maximum figure of 20 million Euros is an expert estimate for the whole Merck Group based on the financial impact we see for Germany. The Merck sites in Germany account for approx. 27% of Merck's overall energy consumption. Under the assumption that carbon prices in Germany are relatively high, we end up with the given maximum figure.

Cost of response to risk

10000000

Description of response and explanation of cost calculation

Description of response: Prices on carbon increase Merck's operational costs.

Therefore, we react on this with measure to reduce our energy consumption and to increase energy efficiency. Our business sectors implemented processes to detect energy and GHG reduction possibilities and to implement respective projects. 14 of Merck's production sites are certified according to ISO 50001 Energy Management Systems.

Case study: Two of Merck's German sites, Darmstadt and Gernsheim, account for more than 20% of Merck's overall energy consumption. Both sites underly the EU-ETS and allowances must be purchased. Additionally, there are other regulations increasing carbon prices (e.g., German Renewable Energy Sources Act, Brennstoffemissionshandelsgesetz). All these impacts energy prices which are quite high in Germany anyhow. As this impacts our operational costs, energy consumption is in the focus at these sites. A sophisticated process to improve energy efficiency and to reduce energy consumption is in place. A team of experts advises the production plants etc. on energy efficiency. Based on this, multiple energy efficiency projects have been implemented in the past years. At the Darmstadt site, for instance, Merck spent around € 27 million on the construction of two state-of-the-

art energy stations which were commissioned in 2014 and 2015. The two stations are supplying the site with power, heating and cooling while decreasing the site's GHG emissions by around 2,500 metric tons per year. Besides this, both sites have been certified according to ISO 50001 Energy Management Systems since 2012 and benefit from their own energy supply, based on combined heat and power plants. All these measures resulted in a decrease of more than 20% of GHG emissions from 2009 to 2020 at the two sites (without purchasing electricity from renewable sources).

Explanation of cost calculation: Costs of response to risks are part of the standard operational costs of Merck's sites and cannot be extracted from there. Based on figures of the past years, we estimate that we spent at a minimum 10 million Euros per year for energy efficiency projects, improvements of our energy infrastructure (e.g., switch to low-carbon technologies) and GHG emission reduction projects. Most of these projects were financially attractive with payback times below three years.

Comment

Identifier

Risk 2

Where in the value chain does the risk driver occur?

Direct operations

Risk type & Primary climate-related risk driver

Acute physical	Other, please specify (Storms, tornadoes, hurricanes/typhoons, cyclones, heat waves, droughts, flood, heavy precipitation, wildfire etc.)
----------------	---

Primary potential financial impact

Increased direct costs

Climate risk type mapped to traditional financial services industry risk classification

<Not Applicable>

Company-specific description

All climate models anticipate an increase in extreme weather conditions like storms, floods, heat waves and droughts. The IPCC report describes the impact of climate change with increased temperatures and more intense as well as more frequent extreme weather conditions. Short-term extreme weather conditions and long-term climate change, whose intensity can vary according to the geographic region, will impact Merck's sites globally. For instance, Merck had to shut down two sites in the US during a hurricane in 2018. Events like this might increase in number and impact in future. Because those weather-related events occur mostly in a limited area, the magnitude of impact is seen as low at this time.

Time horizon

Long-term

Likelihood

More likely than not

Magnitude of impact

Low

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

25000000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

Weather-related events such as storms, floods, heat waves and droughts could interrupt the production at our sites directly or indirectly via interruptions in our supply chain. This could have an impact on our overall production capacity and sales and therewith have direct financial implications. Because those weather-related events occur mostly in a limited area, the magnitude of impact is seen as low. Nevertheless, possible risks of property damage and business interruption at Merck sites because of climate change related weather events are covered by insurance like comparable risks from other reasons. The mentioned financial impact is the insurance deductible to be covered by Merck in case of a damage.

Cost of response to risk

3000000

Description of response and explanation of cost calculation

Description of response:

We see an increased severity and frequency of extreme weather events that might impact our sites globally. Case study: we have multiple sites that are located in areas that might be impacted by hurricanes (e.g., Savannah, US) or by tornados (e.g., St. Louis, US). Other sites are located close to rivers where flooding might be an issue (e.g., Gernsheim, Germany). To mitigate and adapt to these risks we have to better understand the physical risks at our single sites. Therefore, it was decided to go for a detailed assessment in 2022/2023 including scenario analyses. Based on this, we can establish measures where needed.

Besides this, we recognize, assess and manage risks early on and implement appropriate measures to minimize them through our systematic risk management activities. The aim of Merck's group-wide Business Continuity Management (BCM) for instance is to ensure the uninterrupted availability of all key business and mission-critical business activities, even in case of a disaster. Multiple sourcing and back-up manufacturing facilities safeguard the undisturbed supply of important raw materials and respectively production of our products. Among many other reasons, climate related issues can be one trigger for business interruptions. BCM consists of following main steps: prioritization, business impact analysis, risk assessment/mitigation, recovery and response measures. In this process site management has the responsibility of maintaining the ability of its organization to function without disruption. The business sectors compile and prioritize the individual business continuity plans into an overall concept and the respective global function monitors and steers the process (e.g., by providing policies, SOPs etc.). In case of climate-related emergency situations because of extreme weather events, Merck's Group-wide site emergency planning and response system will take effect to minimize potential impacts on Merck's employees, local residents, facilities, the local environment and business.

Explanation of cost calculation: The above-mentioned figure for the cost of response to the risk is the share of the insurance premia to cover damages from floodings and storms. Further costs of response to risks are part of the standard operational costs of Merck's sites and include among other personnel costs.

Comment

C2.4

(C2.4) Have you identified any climate-related opportunities with the potential to have a substantive financial or strategic impact on your business?

Yes

C2.4a

(C2.4a) Provide details of opportunities identified with the potential to have a substantive financial or strategic impact on your business.

Identifier

Opp1

Where in the value chain does the opportunity occur?

Downstream

Opportunity type

Products and services

Primary climate-related opportunity driver

Shift in consumer preferences

Primary potential financial impact

Increased revenues resulting from increased demand for products and services

Company-specific description

We see an increase in the demand for products tackling climate transition risks and for more sustainable product alternatives.

Merck's Life Science business sector works across its business units to drive product-related sustainability. This includes our Design for Sustainability (DfS) program for introducing more environmentally responsible sound Life Science products. Merck also created DOZN™, a web-based quantitative green chemistry web-based tool for assessing more sustainable alternatives, be that products or processes. Through our "DfS: Re-Engineering" initiative, our Life Science researchers are developing innovative solutions in line with the 12 Principles of Green Chemistry. These aim to make research as environmentally compatible as possible and to minimize negative impacts on human health. Our proprietary web-based tool DOZN™ enables us to assess sustainable alternatives for various chemicals and to provide transparency to our customers. DOZN™ provides a framework for rating our products in the three stewardship categories of "Improved resource use", "Increased energy efficiency" and "Reduced human and environmental hazards". In 2019, Merck made the DOZN™ tool publicly available free of charge to customers. This tool is currently being used by more than 1000 users around the world. There have been 50 references of the DOZN™ tool in third party published papers. The tool is also beginning to be implemented in higher education through chemistry departments to help increase the use of data/metric-based

quantification to help increase more sustainability driven product/process choices. As of December 2021, more than 1,400 greener alternatives, a 27% increase from year prior, had been made available across our platform of solutions.

Time horizon

Medium-term

Likelihood

Unlikely

Magnitude of impact

Medium-low

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

40000000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

The potential financial impact figure was extrapolated based on the incremental opportunities we have with one of our key account customers based on our sustainability programs and broad array of greener alternative products. More detailed explanations are not possible as these are business confidential data.

Cost to realize opportunity

1000000

Strategy to realize opportunity and explanation of cost calculation

Strategy to realize opportunity: Climate change and the related transitional risks trigger companies to seek for more sustainable product alternatives. Therefore, Merck's Life Science business sector works across its business units to drive product-related sustainability. This includes our Design for Sustainability (DfS) program for introducing more environmentally responsible sound Life Science products. Merck also created DOZN™, a web-based quantitative green chemistry web-based tool for assessing more sustainable alternatives, be that products or processes. Through our "DfS: Re-Engineering" initiative, our Life Science researchers are developing innovative solutions in line with the 12 Principles of Green Chemistry. These aim to make research as environmentally compatible as possible and to minimize negative impacts on human health. Our proprietary web-based tool DOZN™ enables us to assess sustainable alternatives for various chemicals and to provide transparency to our customers. DOZN™ provides a framework for rating our products in the three stewardship categories of "Improved resource use", "Increased energy efficiency" and "Reduced human and environmental hazards". Merck's commitment to innovative and sustainable solutions for complex problems resulted in an exciting win for Life Science. As of December 2021, more than 1,400 greener alternatives, a 27% increase from year prior, had been made available across our platform of solutions. In a grouping of Request for Proposals (RFPs) one of Merck's customers highlighted Life Science's Greener Products and Solutions (GP&S) approach to sustainability as a distinguishing factor, which helped solidify the RFP win versus other vendors. Based

on this, we see indeed an increase in customer demand for greener alternatives and increased revenue.

Explanation of cost calculation: This is part of our regular portfolio management and Research and Development approach that has several drivers. Because of this, the costs to realize this opportunity are based on expert estimates.

Comment

Identifier

Opp2

Where in the value chain does the opportunity occur?

Downstream

Opportunity type

Products and services

Primary climate-related opportunity driver

Development of climate adaptation, resilience and insurance risk solutions

Primary potential financial impact

Increased revenues resulting from increased demand for products and services

Company-specific description

According to World Health Organization (WHO) estimates, nearly half of the world's population is at risk of contracting malaria. More than 200 million cases of malaria and over 400,000 related deaths are recorded every year, with almost 70% occurring in children under the age of five. Over 90% of cases and deaths occur in Africa. Around the world, a child dies from the disease every two minutes. There is a need for new products to overcome the problem of increasing drug resistance and to achieve the goal of elimination. Through our "As One Against Malaria" program, we are helping to deliver integrated and sustainable health solutions involving treatments, diagnostics and preventive measures to fight malaria in endemic countries.

As part of this program, we are developing a new drug (M5717) for the prevention and treatment of malaria. In 2021, we completed a Phase Ib clinical trial to test the compound's ability to prevent the disease and published the data. The project is now progressing to Phase II (proof of concept) for both the treatment and prevention of malaria. In addition to our clinical program, our collaborative drug discovery activities are delivering promising candidates that are progressing into the preclinical stage.

Preventive methods such as the use of insect repellents form part of the strategic toolkit to combat malaria. We are testing our insect repellent IR3535® for malaria. It is already used for protection against insect and tick bites that can transmit diseases such as Lyme disease, Zika, dengue fever and chikungunya.

Through laboratory tests conducted in Ghana, we are evaluating the efficacy and acceptance of a new formulation of IR3535® that is expected to provide longer-lasting protection. Positive results would enable IR3535® to serve as a preventive measure for personal use and a large-scale vector control method to support population-based national malaria control programs.

In partnership with local institutions in Africa, we have established PAVON (Pan-African Vivax and Ovale Network), a network of centers of excellence for the epidemiological surveillance and scientific research on malaria.

Time horizon

Medium-term

Likelihood

More likely than not

Magnitude of impact

Low

Are you able to provide a potential financial impact figure?

No, we do not have this figure

Potential financial impact figure (currency)

<Not Applicable>

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

We see an increase in the demand for products from our businesses tackling climate related diseases. This results in an increase in annual sales. Nevertheless, financial implications of these opportunities are hard to estimate.

Cost to realize opportunity

Strategy to realize opportunity and explanation of cost calculation

This is part of our regular portfolio management and Research and Development approach that has several drivers. The costs cannot be allocated to activities caused by climate change only. As part of this program, we are developing a new drug (M5717) for the prevention and treatment of malaria. In 2021, we completed a Phase Ib clinical trial to test the compound's ability to prevent the disease and published the data. The project is now progressing to Phase II (proof of concept) for both the treatment and prevention of malaria. In addition to our clinical program, our collaborative drug discovery activities are delivering promising candidates that are progressing into the preclinical stage.

Preventive methods such as the use of insect repellents form part of the strategic toolkit to combat malaria. We are testing our insect repellent IR3535® for malaria. It is already used for protection against insect and tick bites that can transmit diseases such as Lyme disease, Zika, dengue fever and chikungunya.

Through laboratory tests conducted in Ghana, we are evaluating the efficacy and acceptance of a new formulation of IR3535® that is expected to provide longer-lasting protection. Positive results would enable IR3535® to serve as a preventive measure for personal use and a large-scale vector control method to support population-based national malaria control programs.

In partnership with local institutions in Africa, we have established PAVON (Pan-African Vivax and Ovale Network), a network of centers of excellence for the epidemiological surveillance and scientific research on malaria.

Comment

Identifier

Opp3

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Resource efficiency

Primary climate-related opportunity driver

Use of more efficient production and distribution processes

Primary potential financial impact

Reduced direct costs

Company-specific description

The UN identified climate change as one of the major risks globally. Most countries worldwide committed to limit global warming by reducing greenhouse gas emissions with the Paris Agreement. Based on this many countries adapt or plan to adapt their legislation to safeguard emission reductions. The EU for instance has agreed on the European Green Deal to accelerate the transition the EU economy to a sustainable economic model with the overarching objective to become the first climate neutral continent by 2050. Based on this decision, the EU started to revise key legislation like the Renewable Energy Directive, the Energy Efficiency Directive, the Emissions Trading System, the Energy Performance of Buildings Directive etc. This will further increase carbon prices (e.g., CO₂ taxes), adjust financing incentives (e.g., EU Taxonomy) and drive changes of technology (e.g., fostering renewable energy). Many of these changes will impact Merck's European manufacturing sites. For instance, the EU Emissions Trading System (EU ETS) is a cornerstone of the EU's policy to combat climate change and a key tool in reducing greenhouse gas and to reach EU's 2030 reduction target. With emissions of approx. 80,657 t of CO₂ in 2021 the heating and power plants at the Darmstadt and Gernsheim sites in Germany fall under the EU ETS and are directly affected by these cost risks. In addition, the "Brennstoffemissionshandelsgesetz (BEHG)" in Germany has introduced a national carbon pricing system for fuels in Germany from 2021 which will also affect Merck's German sites. Around the world countries set net-zero targets (e.g., China in 2060) and think about introducing cap and trade schemes, etc. as economic means to reduce greenhouse gas emissions. Besides already existing emission trading schemes, several countries (e.g., China, South Korea, Japan, Mexico, some US states) have scheduled or considered cap and trade schemes. This will affect Merck that has subsidiaries in more than 66 countries and manufacturing sites in the countries mentioned above by increased operational costs.

Out of these reasons, energy efficiency is an important cornerstone in our decarbonization process. Efficiency gains will reduce our operational costs or at least reduce the magnitude of increase. Additionally, regulations on energy efficiency and greenhouse gas emissions are often linked to incentive systems (subsidies from governments etc.). Using these incentives may offer additional cost reductions.

Time horizon

Medium-term

Likelihood

Very likely

Magnitude of impact

Low

Are you able to provide a potential financial impact figure?

No, we do not have this figure

Potential financial impact figure (currency)

<Not Applicable>

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

Financial implications of these opportunities are hard to estimate.

Cost to realize opportunity

Strategy to realize opportunity and explanation of cost calculation

The impact of energy and carbon costs on Merck's operational costs is increasing due to various climate-related regulations (e.g., emission trading schemes, carbon taxes). Energy saving and energy efficiency measures offer the opportunity to reduce costs or to keep costs under control. To detect and implement such measures, Merck follows different approaches:

- In 2021, Merck's business sectors implemented processes to drive energy efficiency at their sites. Our Life Science business sector reserved ten million Euros to implement energy efficiency measures at its sites. Experiences are shared in Best Practice meetings.
- Meanwhile, 14 manufacturing sites are certified according to ISO 50001 Energy Management. Among them are two of our major sites, the headquarters Darmstadt and Gernsheim which contribute to more than 20% of Merck's overall energy consumption. This implies that the sites set themselves energy saving targets.
- Two of our EHS standards, "Energy Management" and "Emissions of Refrigerants", enable energy and process-related emissions to be managed consistently across the Group.
- A working group was established to systematically search for possible incentive systems.

By this, Merck expects to reduce its operational costs or at least limit their increase.

Costs to realize this opportunity are hard to estimate.

Comment

Identifier

Opp4

Where in the value chain does the opportunity occur?

Downstream

Opportunity type

Products and services

Primary climate-related opportunity driver

Development of new products or services through R&D and innovation

Primary potential financial impact

Increased revenues resulting from increased demand for products and services

Company-specific description

In the Electronics industry various chemicals are used, e.g., Etch and Clean gases. Several of them like NF₃ show high greenhouse gas warming potentials (GWP) and

are emitted as process-related scope 1 emissions. Low-GWP gases solutions help to reduce our customer's scope 1 emissions as well as Merck's scope 3 emissions. So, they are a meaningful step forward in support of both side's sustainability goals. We see this as an opportunity to expand our market share, further establishing Merck as an innovation partner.

Time horizon

Medium-term

Likelihood

Very likely

Magnitude of impact

Medium-high

Are you able to provide a potential financial impact figure?

No, we do not have this figure

Potential financial impact figure (currency)

<Not Applicable>

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

We see an increase in the demand for more sustainable products from our businesses. This results in an increase in annual sales. Nevertheless, financial implications of these opportunities are hard to estimate

Cost to realize opportunity

Strategy to realize opportunity and explanation of cost calculation

Merck proactively reaches out to customers to join forces and support their sustainability goals. Within Merck sustainability strategy, our Electronics business sector has set a focus on the sustainability of its products. Reducing the environmental impact of products is an important part of the R&D process. Merck's Electronics R&D team has been actively engaging with one of our main customers to develop low-GWP gases solutions, starting with Etch and Clean gases. After a year of iterative collaboration, our customer is now testing an alternative low-GWP Etch gas from our lab to validate its process performance to replace a traditional, high global warming material. We are also collaborating on new, low emission gases for chamber cleaning applications.

Overall, Merck is continuously investing in research and development of climate related product solutions and engages in various research projects. Total Research and Development expenses of our Electronics business sector rose to 278 million Euros in 2021.

Comment

C3. Business Strategy

C3.1

(C3.1) Does your organization's strategy include a transition plan that aligns with a 1.5°C world?

Row 1

Transition plan

No, but our strategy has been influenced by climate-related risks and opportunities, and we are developing a transition plan within two years

Publicly available transition plan

<Not Applicable>

Mechanism by which feedback is collected from shareholders on your transition plan

<Not Applicable>

Description of feedback mechanism

<Not Applicable>

Frequency of feedback collection

<Not Applicable>

Attach any relevant documents which detail your transition plan (optional)

<Not Applicable>

Explain why your organization does not have a transition plan that aligns with a 1.5°C world and any plans to develop one in the future

A transition plan hasn't been an immediate priority within Merck's decarbonization journey. In the past two years we have developed a new sustainability strategy and integrated it in the business strategy of our three business sectors. Parallel, new climate targets (on scope 1, 2 and 3) have been developed and implemented. In May 2022, the SBTi has classified our scope 1 and 2 target ambition and has determined that it is in line with a 1.5°C trajectory. In 2022, we will conduct a detailed climate risk assessment and we expect to have qualitative scenario analysis by end of 2022 and quantitative analysis in 2023. Based on this, the decision will be taken whether we set up a transition plan.

Explain why climate-related risks and opportunities have not influenced your strategy

<Not Applicable>

C3.2

(C3.2) Does your organization use climate-related scenario analysis to inform its strategy?

	Use of climate-related scenario analysis to inform strategy	Primary reason why your organization does not use climate-related scenario analysis to inform its strategy	Explain why your organization does not use climate-related scenario analysis to inform its strategy and any plans to use it in the future
Row 1	No, but we anticipate using qualitative and/or quantitative	Important but not an immediate priority	Climate-related scenario analysis haven't been an immediate priority for Merck so far. In the past two years we have developed a new sustainability strategy and integrated it in the business strategy of our three

	Use of climate-related scenario analysis to inform strategy	Primary reason why your organization does not use climate-related scenario analysis to inform its strategy	Explain why your organization does not use climate-related scenario analysis to inform its strategy and any plans to use it in the future
	analysis in the next two years		business sectors. Parallel, new climate targets (on scope 1, 2 and 3) have been developed and implemented. In May 2022, the SBTi has classified our scope 1 and 2 target ambition and has determined that it is in line with a 1.5°C trajectory. Nevertheless, in 2022, we will conduct a project on climate risk assessments, and we expect to have qualitative scenario analysis by end of 2022 and quantitative analysis in 2023.

C3.3

(C3.3) Describe where and how climate-related risks and opportunities have influenced your strategy.

	Have climate-related risks and opportunities influenced your strategy in this area?	Description of influence
Products and services	Yes	Sustainable products play an essential role to mitigate transition risks (e.g., reputation) and to drive opportunities from climate-change (e.g., increased revenue from increased demand for products). Merck defines sustainable innovation as new or improved products, services, technologies, or processes that generate economic benefits and have positive environmental and social impacts. Our Life Science business sector follows a comprehensive approach to increasing the sustainability of its products through our Design for Sustainability (DfS) framework. The "DfS: Development" pillar provides our product developers with a range of tools that enable them to analyze product impacts in terms of materials used, energy and emissions, water, packaging, usability, innovation, circular economy as well as supplier- and manufacturing-related issues. In 2021, we piloted a new version of our "DfS: Development" pillar. The framework comprises additional criteria and a scorecard system that helps our development teams address and minimize any negative product- and supply chain-related factors and enables us to improve our communication of product sustainability credentials to our customers. As of December 2021, more than 1,400 greener alternatives, a 27% increase from year prior, had been made available across our platform of solutions. Our proprietary, web-based tool, DOZN™, enables us to evaluate various products and/or processes to identify opportunities for sustainability improvements and provide transparency to our customers. DOZN™ industrializes the 12 Principles of Green Chemistry. DOZN™ 2.0 is the tool's external interface, allowing our customers and other scientists to make more ecologically sustainable choices in their development processes. In 2021, we established partnerships with universities in Canada,

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	Have climate-related risks and opportunities influenced your strategy in this area?	Description of influence
		France, India, Switzerland, and the United States to apply the DOZN™ tool in both virtual and in-lab chemistry curricula. Using DOZN™ in an academic setting yields many benefits. Firstly, it increases the overall accessibility and tangibility of Green Chemistry and its principles. Secondly, it provides a practical opportunity to calculate scores for chemical products and processes and further reinforce learning while highlighting the importance of sustainability in the minds of future scientists.
Supply chain and/or value chain	Yes	To address potential transitional risks (raw material cost increases due to emission trading systems etc.) and physical risks (business interruption due to heavy weather events) in our supply chain, Merck established a Supplier Decarbonization Program. This program is a key element contributing to reduce our emissions in line with our decision to join the Science Based Targets initiative. Through the program, we aim to reduce greenhouse gas emissions associated with purchased goods and services as well as capital goods. We set up this cross-functional Supplier Decarbonization Program team within Group Procurement to define our strategy and drive the execution of a ten-year program plan. We also started to provide training sessions and materials for procurement managers and sourcing teams. We intend to approach our suppliers in waves and contacted the first target group with a letter from our Chief Procurement Officer, information about our aspirations and a questionnaire to assess their current decarbonization status in 2021. Our sourcing managers collect relevant supplier data in a global monitoring database. Besides this, it was decided to develop an automated carbon accounting tool to manage the large quantities of data on the CO2 emissions of our suppliers. Purchase of electricity, as part of our supply chain activities, constitutes a significant strategic lever for reducing our emissions exposure in view of climate-related transition risks (e.g., higher costs through carbon regulation). In 2021, it was decided to start the

Merck KGaA CDP Climate Change Questionnaire 2022

	Have climate-related risks and opportunities influenced your strategy in this area?	Description of influence
		process to go for a Virtual Power Purchasing Agreement on renewable electricity in Europe and to go for a second Virtual Power Purchasing Agreement in the US. Contracts will be signed most likely in 2022.
Investment in R&D	Yes	Research and development (R&D) constitute a significant strategic lever for reducing our emissions exposure in view of climate-related transition risks and plays an essential role when looking at potential opportunities from climate-change (e.g., increased revenue from increased demand for products). In 2021, we partnered with the well-established patent information platform LexisNexis® PatentSight® to assess the sustainability impact of our intellectual property. Building on this, we will start disclosing the share of newly published sustainability-related patent families as of the reporting year 2022. Our Life Science business sector follows a comprehensive approach to increasing the sustainability of its products through our Design for Sustainability (DfS) framework. The “DfS: Development” pillar provides our product developers with a range of tools that enable them to analyze product impacts in terms of materials used, energy and emissions, water, packaging, usability, innovation, circular economy as well as supplier- and manufacturing-related issues. We have developed sustainability criteria that can be used to rank a product’s performance in each of these areas. When developing a new product, our aim is to improve on as many of these criteria scores as possible. In 2021, we piloted a new version of our “DfS: Development” pillar across various projects and prepared for its official implementation into our product development process, which will begin in 2022. The framework comprises additional criteria and a scorecard system that helps our development teams address and minimize any negative product- and supply chain-related factors and enables us to improve our communication of product sustainability credentials to our customers. As of December 2021, more than 1,400 greener alternatives, a 27% increase from year prior, had been made available across our platform of solutions. In our Healthcare business sector, we aim to reduce any adverse impacts our medicines may have on the environment during their development, manufacture, transportation, use, and disposal. We are developing an overarching strategy to make our medicines, our medical devices and their packaging more ecologically sustainable and user-friendly. In 2021, our Electronics business sector launched a project to integrate the assessment of ESG criteria into our R&D portfolio management.

	Have climate-related risks and opportunities influenced your strategy in this area?	Description of influence
Operations	Yes	The number of carbon pricing mechanisms are increasing globally affecting Merck that operates in 66 countries. Emission trading schemes, carbon taxes etc. are already affecting our operational costs and we are assuming an even increased impact. Therefore, Merck invests continually into energy efficiency/ saving and greenhouse gas reduction measures at our sites and further develops its own energy supply. To reduce this kind of transition risks and to reduce our operational costs our Life Science business sector decided in 2021 to provide a dedicated budget for energy efficiency measures totalling approx. 5 million Euros. In our Life Science business sector as well, we are recording process-related emissions primarily from the release of perfluorinated hydrocarbons (PFCs). In response, in 2021 we have again replaced some emission-intensive production lines with equipment that does not emit PFCs. With the integration of Versum Materials, acquired in 2019, into the Electronics business sector, our process-related emissions increased sharply – mainly in the production of special chemicals for the electronics industry. In 2021, we continued the investigations into reduction measures by installing and commissioning a pilot for the thermal treatment of waste gas streams.

C3.4

(C3.4) Describe where and how climate-related risks and opportunities have influenced your financial planning.

	Financial planning elements that have been influenced	Description of influence
Row 1	Capital expenditures Capital allocation	To mitigate transitional risks (e.g., from increased carbon prices) Merck introduced a sustainability evaluation ("Green business case" with CO₂e emission measures and cost savings) using a shadow price of 100 Euro/t CO₂e. This is mandatory as of January 1st, 2022, for all investment projects larger than 10 million Euros. The shadow price has to be considered for the whole Merck Group. Clear implication is to set a focus and sensitivity to the carbon emissions in large capital expenditure projects. Our Life Science business sector reserved several million Euros to implement energy efficiency measures at its sites.

C4. Targets and performance

C4.1

(C4.1) Did you have an emissions target that was active in the reporting year?

Absolute target

Intensity target

C4.1a

(C4.1a) Provide details of your absolute emissions target(s) and progress made against those targets.

Target reference number

Abs 1

Year target was set

2020

Target coverage

Company-wide

Scope(s)

Scope 1

Scope 2

Scope 2 accounting method

Market-based

Scope 3 category(ies)

<Not Applicable>

Base year

2020

Base year Scope 1 emissions covered by target (metric tons CO2e)

1706410

Base year Scope 2 emissions covered by target (metric tons CO2e)

322020

Base year Scope 3 emissions covered by target (metric tons CO2e)

<Not Applicable>

Total base year emissions covered by target in all selected Scopes (metric tons CO2e)

2028430

Base year Scope 1 emissions covered by target as % of total base year emissions in Scope 1

100

Base year Scope 2 emissions covered by target as % of total base year emissions in Scope 2

100

Base year Scope 3 emissions covered by target as % of total base year emissions in Scope 3 (in all Scope 3 categories)

<Not Applicable>

Base year emissions covered by target in all selected Scopes as % of total base year emissions in all selected Scopes

100

Target year

2030

Targeted reduction from base year (%)

50

Total emissions in target year covered by target in all selected Scopes (metric tons CO2e) [auto-calculated]

1014215

Scope 1 emissions in reporting year covered by target (metric tons CO2e)
1522213

Scope 2 emissions in reporting year covered by target (metric tons CO2e)
321042

Scope 3 emissions in reporting year covered by target (metric tons CO2e)
<Not Applicable>

Total emissions in reporting year covered by target in all selected scopes (metric tons CO2e)
1843255

% of target achieved relative to base year [auto-calculated]
18.2579630551707

Target status in reporting year
Underway

Is this a science-based target?

Yes, and this target has been approved by the Science Based Targets initiative

Target ambition
1.5°C aligned

Please explain target coverage and identify any exclusions

This target covers the whole Merck Group (operational control as specified in this questionnaire). In 2020/2021, Merck set itself a new set of climate goals. By 2030, we intend to lower our direct (Scope 1) and indirect (Scope 2) emissions by 50% (2020 baseline). Merck also commits to reduce scope 3 GHG emissions 52% per euro value added within the same timeframe. Both targets have been approved by the SBTi in May 2022.

By 2040, we intend to achieve climate neutral operations along our entire value chain. This target covers our Scope 1, 2 and 3 greenhouse gas emissions.

Plan for achieving target, and progress made to the end of the reporting year

At this time, we see three main levers to reduce our scope 1 and 2 emissions:

- Reduction of our process-related emissions
- Purchase of renewable electricity
- Energy efficiency

In 2021 we saw a decline of approx. 10% in our scope 1 and 2 emissions compared to 2020. This was mainly caused by lower process-related emissions.

List the emissions reduction initiatives which contributed most to achieving this target

<Not Applicable>

Target reference number

Abs 2

Year target was set

2020

Target coverage

Company-wide

Scope(s)

Scope 1

Scope 2

Scope 3

Scope 2 accounting method

Market-based

Scope 3 category(ies)

Category 1: Purchased goods and services

Category 2: Capital goods

Category 3: Fuel-and-energy-related activities (not included in Scopes 1 or 2)

Category 4: Upstream transportation and distribution

Category 5: Waste generated in operations

Category 6: Business travel

Category 7: Employee commuting

Category 9: Downstream transportation and distribution

Category 11: Use of sold products

Category 12: End-of-life treatment of sold products

Category 13: Downstream leased assets

Category 15: Investments

Base year

2020

Base year Scope 1 emissions covered by target (metric tons CO₂e)

1706410

Base year Scope 2 emissions covered by target (metric tons CO₂e)

322020

Base year Scope 3 emissions covered by target (metric tons CO₂e)

5031168

Total base year emissions covered by target in all selected Scopes (metric tons CO₂e)

7059598

Base year Scope 1 emissions covered by target as % of total base year emissions in Scope 1

100

Base year Scope 2 emissions covered by target as % of total base year emissions in Scope 2

100

Base year Scope 3 emissions covered by target as % of total base year emissions in Scope 3 (in all Scope 3 categories)

100

Base year emissions covered by target in all selected Scopes as % of total base year emissions in all selected Scopes

100

Target year

2040

Targeted reduction from base year (%)

100

Total emissions in target year covered by target in all selected Scopes (metric tons CO₂e) [auto-calculated]

0

Scope 1 emissions in reporting year covered by target (metric tons CO2e)

1522213

Scope 2 emissions in reporting year covered by target (metric tons CO2e)

321042

Scope 3 emissions in reporting year covered by target (metric tons CO2e)

5717290

Total emissions in reporting year covered by target in all selected scopes (metric tons CO2e)

7560545

% of target achieved relative to base year [auto-calculated]

-7.09597062042343

Target status in reporting year

Underway

Is this a science-based target?

No, but we are reporting another target that is science-based

Target ambition

<Not Applicable>

Please explain target coverage and identify any exclusions

This target covers the whole Merck Group (operational control as specified in this questionnaire). In 2020/2021, Merck set itself a new set of climate goals. By 2030, we intend to lower our direct (Scope 1) and indirect (Scope 2) emissions by 50% (2020 baseline). Merck also commits to reduce scope 3 GHG emissions 52% per euro value added within the same timeframe. Both targets have been approved by the SBTi in May 2022.

By 2040, we intend to achieve climate neutral operations along our entire value chain. This target covers our Scope 1, 2 and 3 greenhouse gas emissions.

Plan for achieving target, and progress made to the end of the reporting year

At this time, we see three main levers to reduce our scope 1 and 2 emissions:

- Reduction of our process-related emissions
- Purchase of renewable electricity
- Energy efficiency

With regard to our scope 3 emissions we see for instance these levers:

- Encourage decarbonization of value chain (e.g. Drive top tier 1 suppliers to switch from grid electricity to renewable electricity in production of raw materials)
- Reduction of emissions in transport sector (e.g. air to ocean freight)
- New innovative products with renewable raw materials or circularity
- Optimize product design to reduce emissions from packaging and raw material
- Encourage our customers to reduce their scope 1 emissions related to our products
- Reduce share of landfilled and incinerated waste in own operations

Merck's overall emissions increased by approx. 7% in 2021 compared to 2020. Due to lower process-related emissions Merck's scope 1 and 2 emissions decreased by approx. 10%.

The increase in scope 3 emissions of approx. 12% was mainly caused by methodical reasons. Increasing prices of raw materials etc. caused a strong increase of our category 1 and 2 emissions as we use a spent-based calculation approach.

List the emissions reduction initiatives which contributed most to achieving this target

<Not Applicable>

C4.1b

(C4.1b) Provide details of your emissions intensity target(s) and progress made against those target(s).

Target reference number

Int 1

Year target was set

2022

Target coverage

Company-wide

Scope(s)

Scope 3

Scope 2 accounting method

<Not Applicable>

Scope 3 category(ies)

Category 1: Purchased goods and services

Category 2: Capital goods

Category 3: Fuel-and-energy-related activities (not included in Scopes 1 or 2)

Category 4: Upstream transportation and distribution

Category 5: Waste generated in operations

Category 6: Business travel

Category 7: Employee commuting

Category 9: Downstream transportation and distribution

Category 11: Use of sold products

Category 12: End-of-life treatment of sold products

Category 13: Downstream leased assets

Category 15: Investments

Intensity metric

Metric tons CO₂e per USD(\$) value-added

Base year

2020

Intensity figure in base year for Scope 1 (metric tons CO₂e per unit of activity)

<Not Applicable>

Intensity figure in base year for Scope 2 (metric tons CO₂e per unit of activity)

<Not Applicable>

Intensity figure in base year for Scope 3 (metric tons CO₂e per unit of activity)

0.00054

Intensity figure in base year for all selected Scopes (metric tons CO₂e per unit of activity)

0.00054

% of total base year emissions in Scope 1 covered by this Scope 1 intensity figure

<Not Applicable>

% of total base year emissions in Scope 2 covered by this Scope 2 intensity figure

<Not Applicable>

% of total base year emissions in Scope 3 (in all Scope 3 categories) covered by this Scope 3 intensity figure

100

% of total base year emissions in all selected Scopes covered by this intensity figure

100

Target year

2030

Targeted reduction from base year (%)

52

Intensity figure in target year for all selected Scopes (metric tons CO₂e per unit of activity) [auto-calculated]

0.0002592

% change anticipated in absolute Scope 1+2 emissions

0

% change anticipated in absolute Scope 3 emissions

-52

Intensity figure in reporting year for Scope 1 (metric tons CO₂e per unit of activity)

<Not Applicable>

Intensity figure in reporting year for Scope 2 (metric tons CO₂e per unit of activity)

<Not Applicable>

Intensity figure in reporting year for Scope 3 (metric tons CO₂e per unit of activity)

0.00055

Intensity figure in reporting year for all selected Scopes (metric tons CO₂e per unit of activity)

0.00055

% of target achieved relative to base year [auto-calculated]

-3.56125356125357

Target status in reporting year

New

Is this a science-based target?

Yes, and this target has been approved by the Science Based Targets initiative

Target ambition

Other, please specify (The target is approved by SBTi but as an intensity target it is not aligned with 1.5°C or 2°C.)

Please explain target coverage and identify any exclusions

This target covers the whole Merck Group (operational control as specified in this questionnaire). In 2020/2021, Merck set itself a new set of climate goals. By 2030, we intend to lower our direct (Scope 1) and indirect (Scope 2) emissions by 50% (2020 baseline). Merck also commits to reduce scope 3 GHG emissions 52% per euro value added within the same timeframe. Both targets have been approved by the

SBTi in May 2022.

By 2040, we intend to achieve climate neutral operations along our entire value chain. This target covers our Scope 1, 2 and 3 greenhouse gas emissions.

Plan for achieving target, and progress made to the end of the reporting year

At this time, we see for instance these levers to reduce our scope 3 emissions:

- Encourage decarbonization of value chain (e.g. Drive top tier 1 suppliers to switch from grid electricity to renewable electricity in production of raw materials)
- Reduction of emissions in transport sector (e.g. air to ocean freight)
- New innovative products with renewable raw materials or circularity
- Optimize product design to reduce emissions from packaging and raw material
- Encourage our customers to reduce their scope 1 emissions related to our products
- Reduce share of landfilled and incinerated waste in own operations

This goal was set up newly in the process of setting science-based targets in 2021/2022. For the first reporting year 2021, we see an increase in GHG intensity (in USD). When using EURO as basis for the intensity calculation we see a slight decrease.

List the emissions reduction initiatives which contributed most to achieving this target

<Not Applicable>

C4.2

(C4.2) Did you have any other climate-related targets that were active in the reporting year?

Target(s) to increase low-carbon energy consumption or production

Other climate-related target(s)

C4.2a

(C4.2a) Provide details of your target(s) to increase low-carbon energy consumption or production.

Target reference number

Low 1

Year target was set

2020

Target coverage

Company-wide

Target type: energy carrier

Electricity

Target type: activity

Consumption

Target type: energy source

Renewable energy source(s) only

Base year

2020

Consumption or production of selected energy carrier in base year (MWh)

945065

% share of low-carbon or renewable energy in base year

27

Target year

2030

% share of low-carbon or renewable energy in target year

80

% share of low-carbon or renewable energy in reporting year

30

% of target achieved relative to base year [auto-calculated]

5.66037735849057

Target status in reporting year

Underway

Is this target part of an emissions target?

This target is part of a set of emission targets. By 2030, we intend to lower our direct (Scope 1) and indirect (Scope 2) emissions by 50% (2020 baseline). This target was approved as a Science-Based Target by the SBTi in May 2022. [Abs1] By 2040, we intend to achieve climate neutral operations along our entire value chain. This target covers our Scope 1, 2 and 3 greenhouse gas emissions. [Abs2]

Is this target part of an overarching initiative?

No, it's not part of an overarching initiative

Please explain target coverage and identify any exclusions

This target covers the whole Merck Group (operational control as specified in this questionnaire).

Plan for achieving target, and progress made to the end of the reporting year

Merck's renewable electricity strategy is to go continent-wise. In the US a first VPPA (68 MW wind project) went live in May 2022. A second one VPPA (40 MW solar project) is signed in the contracting phase. For Europe a VPPA is under negotiation as well. Besides, this we are actively investigating in possible solutions for the APAC market.

List the actions which contributed most to achieving this target

<Not Applicable>

C4.2b

(C4.2b) Provide details of any other climate-related targets, including methane reduction targets.

Target reference number

Oth 1

Year target was set

2016

Target coverage

Company-wide

Target type: absolute or intensity

Absolute

Target type: category & Metric (target numerator if reporting an intensity target)

Waste management	Other, please specify (Rate)
------------------	------------------------------

Target denominator (intensity targets only)

<Not Applicable>

Base year

2016

Figure or percentage in base year

443

Target year

2025

Figure or percentage in target year

421

Figure or percentage in reporting year

418

% of target achieved relative to base year [auto-calculated]

113.636363636364

Target status in reporting year

Underway

Is this target part of an emissions target?

No, but it supports our activities with regard to GHG emission reduction. We use the Merck Waste Score to systematically track the environmental footprint of our waste disposal activities. We are aiming to reduce this score by 5% by 2025 compared with 2016. By reducing the overall waste quantities and by disposing of existing waste in more environmentally friendly ways (more recycling, less landfilling etc.), this waste target helps to reduce our Scope 3, category 5 GHG emissions.

Is this target part of an overarching initiative?

No, it's not part of an overarching initiative

Please explain target coverage and identify any exclusions

This target covers the whole Merck Group (operational control as specified in this questionnaire).

Plan for achieving target, and progress made to the end of the reporting year

To achieve this goal, we continually examine our production processes and disposal methods to identify potential areas for improvement, an endeavour supported by the EHS units of the business sectors at each respective site. They regularly discuss best practices, share lessons learned across our sites, and drive the transition to greener disposal methods.

List the actions which contributed most to achieving this target

<Not Applicable>

C4.3

(C4.3) Did you have emissions reduction initiatives that were active within the reporting year? Note that this can include those in the planning and/or implementation phases.

Yes

C4.3a

(C4.3a) Identify the total number of initiatives at each stage of development, and for those in the implementation stages, the estimated CO₂e savings.

	Number of initiatives	Total estimated annual CO ₂ e savings in metric tonnes CO ₂ e (only for rows marked *)
Under investigation	47	
To be implemented*	13	470
Implementation commenced*	36	4400
Implemented*	3	41
Not to be implemented	0	0

C4.3b

(C4.3b) Provide details on the initiatives implemented in the reporting year in the table below.

Initiative category & Initiative type

Energy efficiency in buildings	Motors and drives
--------------------------------	-------------------

Estimated annual CO₂e savings (metric tonnes CO₂e)

7

Scope(s) or Scope 3 category(ies) where emissions savings occur

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

2400

Investment required (unit currency – as specified in C0.4)

5900

Payback period

1-3 years

Estimated lifetime of the initiative

6-10 years

Comment

In total Merck completed more than 120 projects in 2021 summing up to approx. 44 kilotons of GHG savings. The most impactful project is a multi-year project of our Life Science business sector to eliminate process related GHG emissions. In 2021 these emissions decreased by almost 40 kilotons. As we do not track the financial

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data for each and every project we can share this information only for a few projects. Often the effort to track this information increases the efforts to implement the project.

Initiative category & Initiative type

Energy efficiency in buildings	Heating, Ventilation and Air Conditioning (HVAC)
--------------------------------	--

Estimated annual CO2e savings (metric tonnes CO2e)

34

Scope(s) or Scope 3 category(ies) where emissions savings occur

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

9500

Investment required (unit currency – as specified in C0.4)

1500

Payback period

<1 year

Estimated lifetime of the initiative

6-10 years

Comment

In total Merck completed more than 120 projects in 2021 summing up to approx. 44 kilotons of GHG savings. The most impactful project is a multi-year project of our Life Science business sector to eliminate process related GHG emissions. In 2021 these emissions decreased by almost 40 kilotons. As we do not track the financial data for each and every project we can share this information only for a few projects. Often the effort to track this information increases the efforts to implement the project.

C4.3c

(C4.3c) What methods do you use to drive investment in emissions reduction activities?

Method	Comment
Compliance with regulatory requirements/standards	Merck regularly checks on company and asset level regulatory requirements/standards on energy/energy efficiency or greenhouse gas emissions to be compliant.
Employee engagement	Our commitment to climate change mitigation is not restricted to the workplace - we encourage our employees to exhibit this through more sustainable living habits as well. We encourage our people to do their part to preserve the climate. Aside from regularly reporting on our Groupwide climate actions in our EHS newsletters, we also provide all employees with helpful information and tips on our Intranet. Our workforce in Darmstadt also has access to a "Jobticket", an annual public transit pass whose cost is partially covered by our company. Additionally, we also make available an online tool that helps our people arrange carpools. The mobility plans of our Healthcare sites Aubonne and Vevey include financial incentives for employees who commute by public transport, do car-sharing and use other environment-friendly options.

Method	Comment
Internal incentives/recognition programs	We encourage our people to do their part to preserve the climate. Aside from regularly reporting on our Groupwide climate actions in our EHS newsletters, we also provide all employees with helpful information and tips on our Intranet. Moreover, we support members of our workforce who are seeking greener modes of transportation. - At our German subsidiaries, we offer a subsidy of € 150 towards monthly lease payments to employees who opt for a greener car model. - Our employees can recharge their company, department or personal cars at 66 charging stations across six sites in Germany. We intend to double the number of charging stations by 2022. We also provide our employees in other countries with access to more than 130 charging stations, including stations in France, Switzerland, the United Kingdom, India, and the United States. For those on the road, we offer the "Laden@road" program, which allows our employees to charge their company cars or personal vehicles at roughly 160,000 stations across Europe. Through "Laden@home", an initiative launched in Germany in April 2021, we provide € 1,700 to help cover the use of home wall charging stations and also pay for the resulting electricity costs. - At our German sites, we also encourage workers to use climate-friendly forms of transportation through "bike4me", a program enabling them to lease a bike at discounted rates with payments coming out of their pre-tax income.
Dedicated budget for energy efficiency	Our Life Science business sector reserved several million Euros to implement energy efficiency measures at its sites.

C4.5

(C4.5) Do you classify any of your existing goods and/or services as low-carbon products?

No

C5. Emissions methodology

C5.1

(C5.1) Is this your first year of reporting emissions data to CDP?

No

C5.1a

(C5.1a) Has your organization undergone any structural changes in the reporting year, or are any previous structural changes being accounted for in this disclosure of emissions data?

Row 1

Has there been a structural change?

No

Name of organization(s) acquired, divested from, or merged with

<Not Applicable>

Details of structural change(s), including completion dates

<Not Applicable>

C5.1b

(C5.1b) Has your emissions accounting methodology, boundary, and/or reporting year definition changed in the reporting year?

	Change(s) in methodology, boundary, and/or reporting year definition?	Details of methodology, boundary, and/or reporting year definition change(s)
Row 1	Yes, a change in methodology	Emission factors to calculate scope 2 emissions have been updated to the latest state. For instance, newly published emission factors from the International Energy Agency have been applied to previous years data. Furthermore, we set up a complete scope 3 emissions reporting in the past two years. Before, we reported just a few categories. The new methodology has been applied to the 2020 reporting (our target base year) as well.

C5.1c

(C5.1c) Have your organization's base year emissions been recalculated as result of the changes or errors reported in C5.1a and C5.1b?

	Base year recalculation	Base year emissions recalculation policy, including significance threshold
Row 1	Yes	Merck does not yet have a recalculation policy, including significance thresholds. We are working at this at the moment and plan to establish it in 2022.

C5.2

(C5.2) Provide your base year and base year emissions.

Scope 1

Base year start

January 1 2020

Base year end

December 31 2020

Base year emissions (metric tons CO₂e)

1706410

Comment

Scope 2 (location-based)

Base year start

January 1 2020

Base year end

December 31 2020

Base year emissions (metric tons CO₂e)

379173

Comment

Scope 2 (market-based)

Base year start

January 1 2020

Base year end

December 31 2020

Base year emissions (metric tons CO2e)

322020

Comment

Scope 3 category 1: Purchased goods and services

Base year start

January 1 2020

Base year end

December 31 2020

Base year emissions (metric tons CO2e)

3040372

Comment

Scope 3 category 2: Capital goods

Base year start

January 1 2020

Base year end

December 31 2020

Base year emissions (metric tons CO2e)

293145

Comment

Scope 3 category 3: Fuel-and-energy-related activities (not included in Scope 1 or 2)

Base year start

January 1 2020

Base year end

December 31 2020

Base year emissions (metric tons CO2e)

102079

Comment

Scope 3 category 4: Upstream transportation and distribution

Base year start

January 1 2020

Base year end

December 31 2020

Base year emissions (metric tons CO2e)

264397

Comment

Scope 3 category 5: Waste generated in operations

Base year start

January 1 2020

Base year end

December 31 2020

Base year emissions (metric tons CO2e)

84748

Comment

Scope 3 category 6: Business travel

Base year start

January 1 2020

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Base year end

December 31 2020

Base year emissions (metric tons CO2e)

32157

Comment

Scope 3 category 7: Employee commuting

Base year start

January 1 2020

Base year end

December 31 2020

Base year emissions (metric tons CO2e)

89571

Comment

Scope 3 category 8: Upstream leased assets

Base year start

January 1 2020

Base year end

December 31 2020

Base year emissions (metric tons CO2e)

0

Comment

Scope 3 category 9: Downstream transportation and distribution

Base year start

January 1 2020

Base year end

December 31 2020

Base year emissions (metric tons CO2e)

8435

Comment

Scope 3 category 10: Processing of sold products

Base year start

January 1 2020

Base year end

December 31 2020

Base year emissions (metric tons CO2e)

0

Comment

Scope 3 category 11: Use of sold products

Base year start

January 1 2020

Base year end

December 31 2020

Base year emissions (metric tons CO2e)

1090814

Comment

Scope 3 category 12: End of life treatment of sold products

Base year start

January 1 2020

Base year end

December 31 2020

Base year emissions (metric tons CO2e)

23351

Comment

Scope 3 category 13: Downstream leased assets

Base year start

January 1 2020

Base year end

December 31 2020

Base year emissions (metric tons CO2e)

1678

Comment

Scope 3 category 14: Franchises

Base year start

January 1 2020

Base year end

December 31 2020

Base year emissions (metric tons CO2e)

0

Comment

Scope 3 category 15: Investments

Base year start

January 1 2020

Base year end

December 31 2020

Base year emissions (metric tons CO2e)

421

Comment

Scope 3: Other (upstream)

Base year start

Base year end

Base year emissions (metric tons CO2e)

Comment

Scope 3: Other (downstream)

Base year start

Base year end

Base year emissions (metric tons CO2e)

Comment

C5.3

(C5.3) Select the name of the standard, protocol, or methodology you have used to collect activity data and calculate emissions.

The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)

C6. Emissions data

C6.1

(C6.1) What were your organization's gross global Scope 1 emissions in metric tons CO₂e?

Reporting year

Gross global Scope 1 emissions (metric tons CO₂e)

1522213

Start date

<Not Applicable>

End date

<Not Applicable>

Comment

C6.2

(C6.2) Describe your organization's approach to reporting Scope 2 emissions.

Row 1

Scope 2, location-based

We are reporting a Scope 2, location-based figure

Scope 2, market-based

We are reporting a Scope 2, market-based figure

Comment

C6.3

(C6.3) What were your organization's gross global Scope 2 emissions in metric tons CO₂e?

Reporting year

Scope 2, location-based

385283

Scope 2, market-based (if applicable)

321042

Start date

<Not Applicable>

End date

<Not Applicable>

Comment

C6.4

(C6.4) Are there any sources (e.g. facilities, specific GHGs, activities, geographies, etc.) of Scope 1 and Scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure?

Yes

C6.4a

(C6.4a) Provide details of the sources of Scope 1 and Scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure.

Source

Company owned vehicles

Relevance of Scope 1 emissions from this source

Emissions are not relevant

Relevance of location-based Scope 2 emissions from this source

No emissions from this source

Relevance of market-based Scope 2 emissions from this source (if applicable)

No emissions from this source

Explain why this source is excluded

Combustion of fossil fuels in company owned vehicles is only partly considered. Merck accounts dispenses of gasoline and diesel at filling stations owned/controlled by Merck to have comparable and meaningful data. Collecting information on the energy consumption of all vehicles owned/controlled by Merck is not included due to lacking data availability.

Estimated percentage of total Scope 1+2 emissions this excluded source represents

1

Explain how you estimated the percentage of emissions this excluded source represents

Due to lacking availability emissions from company owned vehicles are excluded from reporting. We estimate their share to be below 1%. This estimate was done by using the number of company owned vehicles, an average annual driving distance and an average emission factor.

Source

Small sites

Relevance of Scope 1 emissions from this source

Emissions are not relevant

Relevance of location-based Scope 2 emissions from this source

Emissions are not relevant

Relevance of market-based Scope 2 emissions from this source (if applicable)

Emissions are not relevant

Explain why this source is excluded

Merck's GHG accounting covers all production sites, (large) R&D sites, (large) sites with warehouses and (large) commercial affiliates (in total around 250 sites). A number of small commercial affiliates, labs, etc. have not been incorporated into Merck's EHS data management system because we assessed their GHG emissions as being minor in relation to the sites already included in our accounting. For one, integrating these sites requires a huge effort for GHG emissions that are minor in relation to the sites already included in our accounting. Secondly, very often these small sites are not able to provide the necessary data because they use rented offices and do not receive energy-related information from their landlord. In 2020,

around 90% of Merck's emissions come from just 25 production sites. Therefore, these sites are in the main focus for the reduction of GHG emissions.

Estimated percentage of total Scope 1+2 emissions this excluded source represents

1

Explain how you estimated the percentage of emissions this excluded source represents

Not all small Merck sites are excluded from our GHG inventory. Data from these sites was used to extrapolate the gap.

Source

Thermal waste air purification

Relevance of Scope 1 emissions from this source

Emissions are not relevant

Relevance of location-based Scope 2 emissions from this source

No emissions from this source

Relevance of market-based Scope 2 emissions from this source (if applicable)

No emissions from this source

Explain why this source is excluded

Emissions of thermal waste air purification (e.g., from regenerative thermal oxidizers for the destruction of VOC's) are only partly included in the GHG inventory. GHG emissions from thermal waste air purification devices are caused by the fuels used to operate the device (mainly natural gas) and by the VOC's etc. that shall be destroyed in the device. The overwhelming share of GHG emissions comes from fuel usage and is included in the Scope 1 data. The negligible share from the destroyed VOC's is excluded as these data are not available.

Estimated percentage of total Scope 1+2 emissions this excluded source represents

1

Explain how you estimated the percentage of emissions this excluded source represents

The gap was estimated based on an assessment that has been conducted for one of our thermal waste air purification systems. Based on this we did an extrapolation. We estimate the share to be below 1%.

C6.5

(C6.5) Account for your organization's gross global Scope 3 emissions, disclosing and explaining any exclusions.

Purchased goods and services

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO₂e)

3571854

Emissions calculation methodology

Spend-based method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Category 1 includes all upstream (i.e., cradle-to-gate) emissions from the extraction, production, and transportation of products purchased or acquired by the reporting company in the reporting year.

Emissions are calculated with a spend-based approach based on a procurement data management system (which integrates various ERP systems) and environmentally extended input-output (EEIO) data (source: US Environmentally-Extended Input-Output (USEEIO) Technical Content, United States Environmental Protection Agency, 2017). USEEIO provides emission factors on spend basis for different industrial sectors; regional variations are not considered.

The procurement system contains 95-97% of Merck's total spend; i.e. there is a minor under-reporting. The gap comes from smaller Merck companies that either do not have a system in place or that have a very specific system setup (e.g., a small local ERP system). Due to technical reasons within our newly implemented calculation tool, 2020 data are slightly over-reported (approx. 3.4%) as the currency conversion factor (USD -> EUR) from 2021 was used which was higher than the one for 2020.

In a next step, Merck is working on a weight-based approach to further increase accuracy. Final target is to use supplier-specific data to calculate these emissions.

Capital goods

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO₂e)

290940

Emissions calculation methodology

Spend-based method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Category 2 includes all upstream (i.e., cradle-to-gate) emissions from the extraction, production, and transportation of capital goods purchased or acquired by the reporting company in the reporting year.

As for category 1, emissions are calculated with a spend-based approach based on a procurement data management system (which integrates various ERP systems) and environmentally extended input-output (EEIO) data (source: US Environmentally-Extended Input-Output (USEEIO) Technical Content, United States Environmental Protection Agency, 2017). USEEIO provides emission factors on spend basis for different industrial sectors; regional variations are not considered.

The procurement system contains 95-97% of Merck's total spend; i.e. there is a minor under-reporting. The gap comes from smaller Merck companies that either do not have a system in place or that have a very specific system setup (e.g., a small local ERP system). Due to technical reasons within our newly implemented calculation tool, 2020 data are slightly over-reported (approx. 3.4%) as the currency

conversion factor (USD -> EUR) from 2021 was used which was higher than the one for 2020.

In a next step, Merck is working on a weight-based approach to further increase accuracy. Final target is to use supplier-specific data to calculate these emissions.

Fuel-and-energy-related activities (not included in Scope 1 or 2)

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO₂e)

142544

Emissions calculation methodology

Site-specific method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Category 3 includes emissions related to the production of fuel and energy purchased and consumed by the reporting company in the reporting year that are not included in scope 1 or scope 2. Data on purchased and consumed fuels (mainly natural gas) and electricity, steam/heat and cold which are basis to calculate category 3 emissions are collected via the central EHS data management system of Merck.

To determine upstream emissions of purchased fuels, the fuel quantities are multiplied with well-to-tank emission factors (source: DEFRA, 2021, WTT – fuels). Upstream emissions as well as transportation and distribution (T&D) losses of purchased heat/steam and cold are calculated by multiplying consumption figures with respective emission factors (source: DEFRA, 2021; WTT - heat and steam (WTT - heat and steam - District heat and steam) and respectively DEFRA, 2021, WTT - heat and steam (WTT - district heat & steam distribution, 5% loss) for losses. To calculate emissions from the generation and T&D of minor quantities of purchased cold the same emission factors are used as for heat/steam as no specific factors are available.

Upstream emissions from electricity purchased are determined by multiplying consumption figures with respective emission factors (source: DEFRA, 2021; WTT - overseas electricity (generation)). Hereby, electricity purchased from renewable sources is deducted (direct supply of renewable electricity as well as electricity covered by energy attribute certificates)

Electricity T&D losses are determined based on the quantities of electricity purchased and country-specific loss factors. Basis for country-specific electric power transmission and distribution losses: IEA 2021. Hereby, electricity purchased from renewable sources (direct supply of renewable electricity) is deducted.

Emissions from the generation of purchased electricity sold to end users is not relevant for Merck because Merck does not sell purchased electricity.

Upstream transportation and distribution

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO₂e)

264397

Emissions calculation methodology

Distance-based method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Category 4 covers the transportation and distribution of products purchased by the reporting company in the reporting year between a company's tier 1 suppliers and its own operations (in vehicles and facilities not owned or controlled by the reporting company) as well as the transportation and distribution of services purchased by the reporting company in the reporting year, including inbound logistics, outbound logistics (e.g., of sold products), and transportation and distribution between a company's own facilities (in vehicles and facilities not owned or controlled by the reporting company).

Emissions are calculated with a distance-based approach using the freight weight, the distance transported and emission factors for freighting goods (source; DEFRA, 2021).

Input data for the calculations is provided by multiple different logistics systems. Based on the cities of transportation origin and destination, geographical coordinates are derived which are used to calculate transportation distances. In case no origin or destination city is available, the geographical coordinates of the center of the respective country are used. If no geographic coordinates could be derived or if no valid mode of transportation is available, the data records are not considered in the calculations. For sea freight a scaling factor of 1.2 is considered to integrate an estimate on the transportation to and from the harbor. For our Life Science business sector, no data on road transportations for the LATAM and Asia regions are available. Therefore, a spend-based approach is used to estimate these emissions. Not included are shipments from suppliers where transportation is not paid by Merck.

Compared to other Scope 3 categories, the screening of category 4 and 9 GHG emissions contains more uncertainties, e.g., raw data is incomplete with partly missing accuracy and the described distance calculation leads to partly incorrect results. Their overall impact cannot be estimated at this time. Merck is already working on improving the accuracy of these data.

Waste generated in operations

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO₂e)

79321

Emissions calculation methodology

Waste-type-specific method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Category 5 includes emissions from third-party disposal and treatment of waste generated in facilities owned or controlled by Merck (including disposal of both solid waste and wastewater).

The calculation of emissions from waste generated in operations and disposed of by third parties is based on primary data from the manufacturing sites of Merck collected on an annual basis via the central EHS data management system of Merck. This data is split up into various waste types (e.g., solvent waste, soil waste) and waste disposal methods (e.g. waste-to-energy, landfill, recycling). Emission factors based on the carbon content of the waste were taken from the "Guidance for Accounting & Reporting Corporate GHG Emissions in the Chemical Sector Value Chain". The emission factor for external waste recycling/recovery and for external waste incineration with energy recovery is 0 kg CO₂e/metric ton carbon (it is assumed that recycling and energy recovery are attributed to the organization that uses the recycled material, or that uses the waste to generate energy); the emission factor for external waste incineration without energy recovery is 1 kg CO₂e/metric ton carbon; the emission factor for external landfill waste is 13 kg CO₂e/metric ton carbon. Carbon content factors are mainly taken from the "2006 IPCC Guidelines for National Greenhouse Gas Inventories" (e.g., solvent waste: 80%; construction and demolition waste: 24%; plastic waste: 75%). These data are then multiplied with each other. Emissions resulting from the transportation of waste materials are not taken into account.

To calculate greenhouse gas emissions from wastewater treatment in third party municipal or industrial wastewater treatment plants, we use primary data from the manufacturing sites of Merck, which is collected on an annual basis via the central EHS data management system of Merck. Wastewater quantities are multiplied by the DEFRA emission factor for water treatment.

The waste and wastewater accounting of Merck only covers manufacturing sites. Pure warehouse sites, labs or commercial affiliates are not included in our waste reporting. Nevertheless, it is expected that the accounting covers more than 95% of the overall waste quantity of Merck. Additionally, it can be assumed that the majority of waste not taken into account is recycled (paper, cardboard, plastic, etc.).

Business travel

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO₂e)

26375

Emissions calculation methodology

Average data method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Category 6 includes emissions from the transportation of employees for business related activities in vehicles owned or operated by third parties, such as aircraft, trains, buses, and passenger cars.

Air travel: Based on its flight booking and billing processes, the payment solution

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service provider of Merck supplies detailed data of all flights booked. Greenhouse gas emissions are calculated by atmosfair (www.atmosfair.de), a recognized non-governmental organization dealing with climate protection with a focus on travel. The figure shows emissions including high altitudes effects (Radiation Forcing Index RFI of 2.7).

Rail travel: Rail travel is considered relevant in some European countries (e.g., Germany, France, Spain). In non-European countries, it is seen as rather negligible. At this time, data for rail travel is only available for Germany and is provided by Deutsche Bahn AG. Hereby, only short distance service are considered as Deutsche Bahn AG switched to renewable energy for long distance trains some years ago. Rental cars: Emissions data is provided by the global rental car providers of Merck on an annual basis. Data on other means of transportation (e.g., trams, taxis and buses) are not available. Their impact on the overall emissions of Merck is expected to be negligible.

Hotel accomodation: Emissions from hotel stays are calculated based on the number of hotel stays per country (source: internal ERP system) and the DEFRA emission factors for hotel stays.

Employee commuting

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO₂e)

94312

Emissions calculation methodology

Average data method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Category 7 includes emissions from the transportation of employees between their homes and work.

Within Merck, there is no detailed data available on how employees commute to work (means of transport), the distance they travel each day, and how often they commute to work per year. Therefore, the assessment of the GHG emissions is based on estimates and assumptions. For this, we use the "Guidance for Accounting & Reporting Corporate GHG Emissions in the Chemical Sector Value Chain" along with statistical data (source: "GLOBAL CONSUMER SURVEY", Statista).

The Statista survey "Modes of transportation for commuting" provides percentages for different modes of transportation used for commuting for various countries. The average number of trips per year and employee (440) as well as the average travel distance (30 km by car/taxi, 20 km by public transportation or motorbike) are taken from the "Guidance for Accounting & Reporting Corporate GHG Emissions in the Chemical Sector Value Chain". Emission factors for modes of transport are taken from DEFRA, 2021, Business travel-land.

Upstream leased assets

Evaluation status

Not relevant, explanation provided

Emissions in reporting year (metric tons CO₂e)

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Please explain

Category 8 includes emissions from the operation of assets that are leased by Merck and that are not already included in the reporting company's scope 1 or scope 2 inventories.

Emissions from this category are not relevant for the scope 3 reporting of Merck because leased assets (e.g. rented offices, labs or warehouses) are integrated in the annual EHS data collection processes and are part of the scope 1 and 2 GHG inventory of Merck.

A number of small commercial affiliates, labs, etc. have not been incorporated into the EHS data management system of Merck. For one, integrating these sites requires a huge effort for GHG emissions that are minor in relation to the sites already included in our accounting. Secondly, very often these small sites are not able to provide the necessary data because they use rented offices and do not receive energy-related information from their landlord.

Downstream transportation and distribution

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO₂e)

8435

Emissions calculation methodology

Distance-based method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Category 9 covers transportation and distribution of products sold by the reporting company in the reporting year between the reporting company's operations and the end consumer (if not paid for by the reporting company), including retail and storage (in vehicles and facilities not owned or controlled by the reporting company)

Emissions are calculated with a distance-based approach using the freight weight, the distance transported and emission factors for freighting goods (source; DEFRA, 2021).

Input data for the calculations is provided by multiple different logistics systems. Based on the cities of transport origin and destination, geographical coordinates are derived which are used to calculate transportation distances. In case no origin or destination city is available, the geographical coordinates of the center of the respective country are used. If no geographic coordinates could be derived or if no valid mode of transportation is available, the data records are not considered in the calculations. For sea freight a scaling factor of 1.2 is considered to integrate an

estimate on the transportation to and from the harbor.

Compared to other Scope 3 categories, the screening of category 4 and 9 GHG emissions contains more uncertainties e.g., raw data is incomplete with partly missing accuracy and the described distance calculation leads to partly incorrect results. Their overall impact cannot be estimated at this time. Merck is already working on improving the accuracy of these data.

Processing of sold products

Evaluation status

Not relevant, explanation provided

Emissions in reporting year (metric tons CO₂e)

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Please explain

Category 10 includes emissions from the processing of sold intermediate products by third parties (e.g., manufacturers) subsequent to sale by the reporting company. Merck produces a huge variety of intermediate products for various purposes. Due to the range of potential applications and our customer structure, the related GHG emissions cannot be tracked in a practical fashion. Reliable figures are difficult to obtain. Here, Merck adheres to the recommendation of the "Guidance for Accounting and Reporting Corporate GHG Emissions in the Chemical Sector Value Chain of the WBCSD", which states that "Chemical companies are not required to report Scope 3, category 10 emissions, since reliable figures are difficult to obtain, due to the diverse application and customer structure".

Use of sold products

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO₂e)

1213112

Emissions calculation methodology

Average data method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Category 11 includes emissions from the use of goods and services sold by the reporting company in the reporting year.

Internal expert assessments of Merck's huge and very diverse product portfolio show that for Merck 'Greenhouse gases and products that contain or form greenhouse gases that are emitted during use' are the main driver of greenhouse gas emissions in this category. 'Products that directly consume energy (fuels or electricity) during use' contribute to a much lesser extent to the overall emissions. 'Fuels and feedstocks' as well as indirect use-phase emissions are not relevant for Merck. 'Indirect use-phase emissions' are optional and are not reported by Merck.

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Electronics business sector: Among the broad Electronics product portfolio there are some specialty gases with high Global Warming Potential (GWP) that are emitted during use phase. Emissions are calculated based on technical expertise of internal experts on the percentage of gas quantities that escape the processes at Merck's customers and abatement efficiency, sales volumes and global warming potentials (source: IPCC, 5th Assessment Report). Besides this, some product control devices consume electricity. Emissions of these devices are calculated based on runtime, average lifetime, and an estimated global emission factor. Other product lines are negligible or do not contribute at all to the overall emissions within this category.

Merck's Life Science business sector offers two product lines that consume electricity during use-phase. Emission calculation is based on product energy consumption (internal expert estimations), sales volumes, and respective emissions factors per country (source: IEA 2021). Sales data covers approx. 90-95% of sales (internal expert knowledge).

Merck's Healthcare business sector offers some battery-based injection devices that fall under category 11. Emissions are calculated based on energy consumption (expert estimate), sales volumes, and respective emission factors per country (source: IEA 2021).

Compared to other Scope 3 categories, the screening of the emissions in this category contains more uncertainties and is meant to provide a first indication of the impact of those Scope 3 emissions. Their impact cannot be estimated more precisely at this time. Merck is already working on improving the accuracy of these data.

End of life treatment of sold products

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO₂e)

23351

Emissions calculation methodology

Average data method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Category 12 includes emissions from the waste disposal and treatment of products sold by the reporting company (in the reporting year) at the end of their life.

Emissions from the disposal of sold products and respective packaging materials are calculated based on sales data, weight data of products and packaging material, statistical data on regional disposal methods and waste disposal emission factor data (source: DEFRA 2021).

For the Healthcare sector, the approach is slightly different than for the other business sectors. Here, only packaging material is considered as it is assumed that all healthcare products will be consumed by the customer/patient (e.g., drugs, medicine, etc.).

Compared to other Scope 3 categories, the screening of the emissions in this category contains more uncertainties and is meant to provide a first indication of

the impact of those Scope 3 emissions. Their impact cannot be estimated more precisely at this time. Merck is already working on improving the accuracy of these data.

Downstream leased assets

Evaluation status

Not relevant, calculated

Emissions in reporting year (metric tons CO₂e)

1673

Emissions calculation methodology

Asset-specific method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Category 13 includes emissions from the operation of assets that are owned by the reporting company (acting as lessor) and leased to other entities.

At Darmstadt, Germany, Merck is lessor of a few residential and commercial buildings

Emissions are calculated based on building master data (e.g. energy demand from energy certificates) and respective emission factors.

To split up the energy demand into heating and electricity for residential and commercial buildings International Energy Agency (IEA) data is used. Emissions from heating energy are calculated by using the fuel type and DEFRA emission factors. Emissions from electricity demand is calculated by using the German grid emission factor provided by Bundesverband der Energie- und Wasserwirtschaft e.V (BDEW).

Franchises

Evaluation status

Not relevant, explanation provided

Emissions in reporting year (metric tons CO₂e)

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Please explain

Category 14 includes emissions from the operation of franchises.

This category is not relevant for Merck as Merck does not operate franchises, i.e. businesses operating under a license to sell or distribute another company's goods or services within a certain location. Out-licensing in the pharmaceutical sector is not regarded as franchising.

Investments

Evaluation status

Not relevant, calculated

Emissions in reporting year (metric tons CO₂e)

976

Emissions calculation methodology

Investment-specific method

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Category 15 includes emissions from the operation of investments (including equity and debt investments and project finance) in the reporting year, not included in Scope 1 or Scope 2.

Emissions are calculated based on direct share of capital, respective annual revenue and environmentally extended input-output (EEIO) data (source: US

Environmentally-Extended Input-Output (USEEIO) Technical Content, United States Environmental Protection Agency, 2017). USEEIO provides emission factors on spend basis for different industrial sectors; regional variations are not considered.

Other (upstream)

Evaluation status

Emissions in reporting year (metric tons CO₂e)

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Please explain

Other (downstream)

Evaluation status

Emissions in reporting year (metric tons CO₂e)

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Please explain

C6.7

(C6.7) Are carbon dioxide emissions from biogenic carbon relevant to your organization?

Yes

C6.7a

(C6.7a) Provide the emissions from biogenic carbon relevant to your organization in metric tons CO₂.

	CO ₂ emissions from biogenic carbon (metric tons CO ₂)	Comment
Row 1	14599	

C6.10

(C6.10) Describe your gross global combined Scope 1 and 2 emissions for the reporting year in metric tons CO₂e per unit currency total revenue and provide any additional intensity metrics that are appropriate to your business operations.

Intensity figure

0.000094

Metric numerator (Gross global combined Scope 1 and 2 emissions, metric tons CO₂e)

1843255

Metric denominator

unit total revenue

Metric denominator: Unit total

19687000000

Scope 2 figure used

Market-based

% change from previous year

19

Direction of change

Decreased

Reason for change

In 2021, we see a decrease in revenue-based emissions intensity which is caused by decreased emissions on the one hand side and an increased revenue on the other hand side. Compared to 2020 Merck's GHG emissions decreased by approx. 9% while revenue increased by approx. 12%. The decrease in emissions results from GHG emission reduction initiatives, an increased amount of renewable electricity purchased and less emissions due to reduced output. In total Merck completed more than 120 projects in 2021 summing up to approx. 44 kilotons of GHG savings. The most impactful project is a multi-year project of our Life Science business sector to eliminate process related GHG emissions. In 2021 these emissions decreased by almost 40 kilotons.

Intensity figure

0.751

Metric numerator (Gross global combined Scope 1 and 2 emissions, metric tons CO₂e)

1843255

Metric denominator

Other, please specify (megawatt hour energy used (MWh))

Metric denominator: Unit total

2454363

Scope 2 figure used

Market-based

% change from previous year

12

Direction of change

Decreased

Reason for change

In 2021, we saw a decrease in energy-based emissions intensity which is caused by decreased emissions while there was a slight increase in energy consumption.

C7. Emissions breakdowns

C7.1

(C7.1) Does your organization break down its Scope 1 emissions by greenhouse gas type?

Yes

C7.1a

(C7.1a) Break down your total gross global Scope 1 emissions by greenhouse gas type and provide the source of each used greenhouse warming potential (GWP).

Greenhouse gas	Scope 1 emissions (metric tons of CO ₂ e)	GWP Reference
CO ₂	261143	IPCC Fifth Assessment Report (AR5 – 100 year) <i>Greenhouse gas emissions from energy use incl. CH₄ and N₂O</i>
HFCs	25734	IPCC Fifth Assessment Report (AR5 – 100 year) <i>Emissions from HVACs, chillers etc.</i>
PFCs	54689	IPCC Fifth Assessment Report (AR5 – 100 year) <i>Process-related emissions</i>
NF ₃	1000717	IPCC Fifth Assessment Report (AR5 – 100 year) <i>Process-related emissions</i>
Other, please specify (CF ₄)	70467	IPCC Fifth Assessment Report (AR5 – 100 year) <i>Process-related emissions</i>
N ₂ O	109463	IPCC Fifth Assessment Report (AR5 – 100 year) <i>Process-related emissions</i>

C7.2

(C7.2) Break down your total gross global Scope 1 emissions by country/region.

Country/Region	Scope 1 emissions (metric tons CO ₂ e)
China	1223
France	11280
Germany	118048
Ireland	12098
Israel	1646

Country/Region	Scope 1 emissions (metric tons CO ₂ e)
Italy	13424
Japan	10525
Republic of Korea	472020
Taiwan, China	124659
United States of America	729803
Other, please specify (Rest of world)	27487

C7.3

(C7.3) Indicate which gross global Scope 1 emissions breakdowns you are able to provide.

By activity

C7.3c

(C7.3c) Break down your total gross global Scope 1 emissions by business activity.

Activity	Scope 1 emissions (metric tons CO ₂ e)
Emissions from manufacturing sites	1481930
Emissions from non-manufacturing sites	40283

C7.5

(C7.5) Break down your total gross global Scope 2 emissions by country/region.

Country/Region	Scope 2, location-based (metric tons CO ₂ e)	Scope 2, market-based (metric tons CO ₂ e)
China	43064	44525
France	10056	11471
Germany	26670	48504
Ireland	9794	0
Israel	7469	11636
Italy	3667	22
Japan	13384	13914
Republic of Korea	44653	44652
Taiwan, China	10233	9488
United States of America	181265	117100
Other, please specify (Rest of World)	35028	19730

C7.6

(C7.6) Indicate which gross global Scope 2 emissions breakdowns you are able to provide.

By activity

C7.6c

(C7.6c) Break down your total gross global Scope 2 emissions by business activity.

Activity	Scope 2, location-based (metric tons CO ₂ e)	Scope 2, market-based (metric tons CO ₂ e)
Emissions from manufacturing sites	306186	283871
Emissions from non-manufacturing sites	79097	37172

C7.9

(C7.9) How do your gross global emissions (Scope 1 and 2 combined) for the reporting year compare to those of the previous reporting year?

Decreased

C7.9a

(C7.9a) Identify the reasons for any change in your gross global emissions (Scope 1 and 2 combined), and for each of them specify how your emissions compare to the previous year.

	Change in emissions (metric tons CO ₂ e)	Direction of change	Emissions value (percentage)	Please explain calculation
Change in renewable energy consumption	3552	Decreased	0.18	Increase in renewable electricity usage. Calculation: 'Additional CO ₂ e savings from the purchase of renewable electricity in 2021'/'Scope 1+2 Emissions 2020'*100: $3,552/2,028,430*100=0.18$
Other emissions reduction activities	44411	Decreased	2.19	Energy efficiency projects/Projects on the reduction of process-related emissions. Calculation: CO ₂ e savings from reduction projects implemented in 2021/'Scope 1+2 Emissions 2020'*100: $44,411/2,028,430*100=2.19$
Divestment		<Not Applicable>		
Acquisitions		<Not Applicable>		
Mergers		<Not Applicable>		

	Change in emissions (metric tons CO2e)	Direction of change	Emissions value (percentage)	Please explain calculation
Change in output	155212	Decreased	7.65	Calculation 1 - increase because of change in output: 'Scope 1+2 Emissions 2020'-'Scope 1+2 Emissions 2021'-'CO2e savings from reduction projects implemented in 2021'-'Additional CO2e savings from the purchase of renewable electricity in 2021'+'Changes due to methodology changes in 2021': 2,028,430-1,843,255-44,411-3,552+18,000=155,212 Calculation 2 - percent change because of change in output: 'Result from Calculation 1 (see above)'/ 'Scope 1+2 Emissions 2020'*100: 155,212/2,028,430*100=7.65
Change in methodology	18000	Increased	0.89	Update of emission factors for past years (e.g., from IEA). Calculation: 'Changes due to methodology changes in 2021'/'Scope 1+2 Emissions 2020'*100: 18,000/2,028,430*100=0.89
Change in boundary		<Not Applicable>		
Change in physical operating conditions		<Not Applicable>		
Unidentified		<Not Applicable>		
Other		<Not Applicable>		

C7.9b

(C7.9b) Are your emissions performance calculations in C7.9 and C7.9a based on a location-based Scope 2 emissions figure or a market-based Scope 2 emissions figure?

Market-based

C8. Energy

C8.1

(C8.1) What percentage of your total operational spend in the reporting year was on energy?

More than 0% but less than or equal to 5%

C8.2

(C8.2) Select which energy-related activities your organization has undertaken.

	Indicate whether your organization undertook this energy-related activity in the reporting year
Consumption of fuel (excluding feedstocks)	Yes
Consumption of purchased or acquired electricity	Yes
Consumption of purchased or acquired heat	Yes
Consumption of purchased or acquired steam	No
Consumption of purchased or acquired cooling	Yes
Generation of electricity, heat, steam, or cooling	Yes

C8.2a

(C8.2a) Report your organization's energy consumption totals (excluding feedstocks) in MWh.

	Heating value	MWh from renewable sources	MWh from non-renewable sources	Total (renewable and non-renewable) MWh
Consumption of fuel (excluding feedstock)	LHV (lower heating value)	35602	1280231	1315833
Consumption of purchased or acquired electricity	<Not Applicable>	285609	672235	957844
Consumption of purchased or acquired heat	<Not Applicable>	0	176562	176562
Consumption of purchased or acquired steam	<Not Applicable>	<Not Applicable>	<Not Applicable>	<Not Applicable>
Consumption of purchased or acquired cooling	<Not Applicable>	0	1803	1803
Consumption of self-generated non-fuel renewable energy	<Not Applicable>	2452	<Not Applicable>	2452
Total energy consumption	<Not Applicable>	323663	2130831	2454494

C8.2b

(C8.2b) Select the applications of your organization's consumption of fuel.

	Indicate whether your organization undertakes this fuel application
Consumption of fuel for the generation of electricity	Yes
Consumption of fuel for the generation of heat	Yes
Consumption of fuel for the generation of steam	Yes
Consumption of fuel for the generation of cooling	Yes
Consumption of fuel for co-generation or tri-generation	Yes

C8.2c

(C8.2c) State how much fuel in MWh your organization has consumed (excluding feedstocks) by fuel type.

Sustainable biomass

Heating value

LHV

Total fuel MWh consumed by the organization

35602

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

0

MWh fuel consumed for self- cogeneration or self-trigeneration

0

Comment

Locally sourced certified forestry residues.

Data on the share of the fuels used for the different purposes is not available. Due to the very high level of detail these data are not collected on Merck Group level although available on site level.

Other biomass

Heating value

Unable to confirm heating value

Total fuel MWh consumed by the organization

0

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

0

MWh fuel consumed for self- cogeneration or self-trigeneration

0

Comment

n/a

Other renewable fuels (e.g. renewable hydrogen)

Heating value

Unable to confirm heating value

Total fuel MWh consumed by the organization

0

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

0

MWh fuel consumed for self- cogeneration or self-trigeneration

0

Comment

n/a

Coal

Heating value

Unable to confirm heating value

Total fuel MWh consumed by the organization

0

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

0

MWh fuel consumed for self- cogeneration or self-trigeneration

0

Comment

n/a

Oil

Heating value

LHV

Total fuel MWh consumed by the organization

27924

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

0

MWh fuel consumed for self- cogeneration or self-trigeneration

0

Comment

Data on the share of the fuels used for the different purposes is not available. Due to the very high level of detail these data are not collected on Merck Group level although available on site level.

Gas

Heating value

LHV

Total fuel MWh consumed by the organization

1232314

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

0

MWh fuel consumed for self- cogeneration or self-trigeneration

0

Comment

Natural gas is used to generate electricity, heat, steam and cooling. At several sites this is done via self-cogeneration or self-trigeneration. Data on the share of the fuels used for the different purposes is not available. Due to the very high level of detail these data are not collected on Merck Group level although available on site level.

Other non-renewable fuels (e.g. non-renewable hydrogen)

Heating value

LHV

Total fuel MWh consumed by the organization

19993

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

0

MWh fuel consumed for self- cogeneration or self-trigeneration

0

Comment

Data on the share of the fuels used for the different purposes is not available. Due to the very high level of detail these data are not collected on Merck Group level although available on site level.

Total fuel

Heating value

LHV

Total fuel MWh consumed by the organization

1315833

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

0

MWh fuel consumed for self- cogeneration or self-trigeneration

0

Comment

Data on the share of the fuels used for the different purposes is not available. Due to the very high level of detail these data are not collected on Merck Group level although available on site level.

C8.2d

(C8.2d) Provide details on the electricity, heat, steam, and cooling your organization has generated and consumed in the reporting year.

	Total Gross generation (MWh)	Generation that is consumed by the organization (MWh)	Gross generation from renewable sources (MWh)	Generation from renewable sources that is consumed by the organization (MWh)
Electricity	108545	103867	2591	2452
Heat	289013	185346	0	0
Steam	0	0	0	0
Cooling	47535	46527	0	0

C8.2e

(C8.2e) Provide details on the electricity, heat, steam, and/or cooling amounts that were accounted for at a zero or near-zero emission factor in the market-based Scope 2 figure reported in C6.3.

Sourcing method

Green electricity products from an energy supplier (e.g. green tariffs)

Energy carrier

Electricity

Low-carbon technology type

Hydropower (capacity unknown)

Country/area of low-carbon energy consumption

Switzerland

Tracking instrument used

GO

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)

58789

Country/area of origin (generation) of the low-carbon energy or energy attribute

Switzerland

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

Comment

The Merck Group procures the "Wasser Schweiz" electricity product for its sites in Switzerland. This energy comes exclusively from ewz's own hydropower plants. ewz operates 22 hydropower plants in Switzerland. They were in operation between 1877 and 2021 and are being renovated or renewed on an ongoing basis.

Sourcing method

Green electricity products from an energy supplier (e.g. green tariffs)

Energy carrier

Electricity

Low-carbon technology type

Sustainable biomass

Country/area of low-carbon energy consumption

Italy

Tracking instrument used

GO

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)

12768

Country/area of origin (generation) of the low-carbon energy or energy attribute

Italy

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

Comment

Sourcing method

Green electricity products from an energy supplier (e.g. green tariffs)

Energy carrier

Electricity

Low-carbon technology type

Solar

Country/area of low-carbon energy consumption

Spain

Tracking instrument used

GO

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)

21124

Country/area of origin (generation) of the low-carbon energy or energy attribute

Spain

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

2017

Comment

Sourcing method

Green electricity products from an energy supplier (e.g. green tariffs)

Energy carrier

Electricity

Low-carbon technology type

Wind

Country/area of low-carbon energy consumption

Ireland

Tracking instrument used

No instrument used

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)

33156

Country/area of origin (generation) of the low-carbon energy or energy attribute

Ireland

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

Comment

Sourcing method

Green electricity products from an energy supplier (e.g. green tariffs)

Energy carrier

Electricity

Low-carbon technology type

Wind

Country/area of low-carbon energy consumption

Netherlands

Tracking instrument used

No instrument used

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)

2751

Country/area of origin (generation) of the low-carbon energy or energy attribute

Netherlands

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

Comment

Sourcing method

Green electricity products from an energy supplier (e.g. green tariffs)

Energy carrier

Electricity

Low-carbon technology type

Wind

Country/area of low-carbon energy consumption

United Kingdom of Great Britain and Northern Ireland

Tracking instrument used

No instrument used

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)

16458

Country/area of origin (generation) of the low-carbon energy or energy attribute

United Kingdom of Great Britain and Northern Ireland

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

Comment

Sourcing method

Purchase from an on-site installation owned by a third party

Energy carrier

Electricity

Low-carbon technology type

Solar

Country/area of low-carbon energy consumption

Switzerland

Tracking instrument used

No instrument used

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)

29

Country/area of origin (generation) of the low-carbon energy or energy attribute

Switzerland

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

2018

Comment

Sourcing method

Unbundled energy attribute certificates (EACs) purchase

Energy carrier

Electricity

Low-carbon technology type

Large hydropower (>25 MW)

Country/area of low-carbon energy consumption

Brazil

Tracking instrument used

I-REC

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)

17958

Country/area of origin (generation) of the low-carbon energy or energy attribute

Brazil

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

2007

Comment

Sourcing method

Unbundled energy attribute certificates (EACs) purchase

Energy carrier

Electricity

Low-carbon technology type

Small hydropower (<25 MW)

Country/area of low-carbon energy consumption

Colombia

Tracking instrument used

I-REC

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)

78

Country/area of origin (generation) of the low-carbon energy or energy attribute

Colombia

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

2016

Comment

Sourcing method

Unbundled energy attribute certificates (EACs) purchase

Energy carrier

Electricity

Low-carbon technology type

Wind

Country/area of low-carbon energy consumption

Argentina

Tracking instrument used

I-REC

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)

613

Country/area of origin (generation) of the low-carbon energy or energy attribute

Argentina

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

2019

Comment

Sourcing method

Unbundled energy attribute certificates (EACs) purchase

Energy carrier

Electricity

Low-carbon technology type

Small hydropower (<25 MW)

Country/area of low-carbon energy consumption

Ecuador

Tracking instrument used

I-REC

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)

71

Country/area of origin (generation) of the low-carbon energy or energy attribute

Colombia

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

2016

Comment

Sourcing method

Unbundled energy attribute certificates (EACs) purchase

Energy carrier

Electricity

Low-carbon technology type

Wind

Country/area of low-carbon energy consumption

United States of America

Tracking instrument used

US-REC

Low-carbon energy consumed via selected sourcing method in the reporting year (MWh)

121814

Country/area of origin (generation) of the low-carbon energy or energy attribute

United States of America

Commissioning year of the energy generation facility (e.g. date of first commercial operation or repowering)

2018

Comment

C8.2g

(C8.2g) Provide a breakdown of your non-fuel energy consumption by country.

Country/area

China

Consumption of electricity (MWh)

59714

Consumption of heat, steam, and cooling (MWh)

33829

Total non-fuel energy consumption (MWh) [Auto-calculated]

93543

Is this consumption excluded from your RE100 commitment?

<Not Applicable>

Country/area

France

Consumption of electricity (MWh)

56070

Consumption of heat, steam, and cooling (MWh)

41233

Total non-fuel energy consumption (MWh) [Auto-calculated]

97303

Is this consumption excluded from your RE100 commitment?

<Not Applicable>

Country/area

Germany

Consumption of electricity (MWh)

80143

Consumption of heat, steam, and cooling (MWh)

10694

Total non-fuel energy consumption (MWh) [Auto-calculated]

90837

Is this consumption excluded from your RE100 commitment?

<Not Applicable>

Country/area

Ireland

Consumption of electricity (MWh)

33156

Consumption of heat, steam, and cooling (MWh)

0

Total non-fuel energy consumption (MWh) [Auto-calculated]

33156

Is this consumption excluded from your RE100 commitment?

<Not Applicable>

Country/area

Israel

Consumption of electricity (MWh)

15563

Consumption of heat, steam, and cooling (MWh)

0

Total non-fuel energy consumption (MWh) [Auto-calculated]

15563

Is this consumption excluded from your RE100 commitment?

<Not Applicable>

Country/area

Italy

Consumption of electricity (MWh)

12816

Consumption of heat, steam, and cooling (MWh)

0

Total non-fuel energy consumption (MWh) [Auto-calculated]

12816

Is this consumption excluded from your RE100 commitment?

<Not Applicable>

Country/area

Japan

Consumption of electricity (MWh)

27381

Consumption of heat, steam, and cooling (MWh)

0

Total non-fuel energy consumption (MWh) [Auto-calculated]

27381

Is this consumption excluded from your RE100 commitment?

<Not Applicable>

Country/area

Republic of Korea

Consumption of electricity (MWh)

96929

Consumption of heat, steam, and cooling (MWh)

727

Total non-fuel energy consumption (MWh) [Auto-calculated]

97656

Is this consumption excluded from your RE100 commitment?

<Not Applicable>

Country/area

Taiwan, China

Consumption of electricity (MWh)

18405

Consumption of heat, steam, and cooling (MWh)

0

Total non-fuel energy consumption (MWh) [Auto-calculated]

18405

Is this consumption excluded from your RE100 commitment?

<Not Applicable>

Country/area

United States of America

Consumption of electricity (MWh)

400238

Consumption of heat, steam, and cooling (MWh)

79169

Total non-fuel energy consumption (MWh) [Auto-calculated]

479407

Is this consumption excluded from your RE100 commitment?

<Not Applicable>

Country/area

Other, please specify (Rest of world)

Consumption of electricity (MWh)

157429

Consumption of heat, steam, and cooling (MWh)

12713

Total non-fuel energy consumption (MWh) [Auto-calculated]

170142

Is this consumption excluded from your RE100 commitment?

<Not Applicable>

C9. Additional metrics

C9.1

(C9.1) Provide any additional climate-related metrics relevant to your business.

C10. Verification

C10.1

(C10.1) Indicate the verification/assurance status that applies to your reported emissions.

	Verification/assurance status
Scope 1	Third-party verification or assurance process in place
Scope 2 (location-based or market-based)	Third-party verification or assurance process in place
Scope 3	Third-party verification or assurance process in place

C10.1a

(C10.1a) Provide further details of the verification/assurance undertaken for your Scope 1 emissions, and attach the relevant statements.

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

[Merck CDP Verification Letter 2021 KPMG.pdf](#)

[Merck Sustainability Report 2021.pdf](#)

Page/ section reference

Merck CDP Verification letter 2021, see page 2 Merck Sustainability Report 2021, see pages 190, 242-244

Relevant standard

ISAE3000

Proportion of reported emissions verified (%)

100

C10.1b

(C10.1b) Provide further details of the verification/assurance undertaken for your Scope 2 emissions and attach the relevant statements.

Scope 2 approach

Scope 2 market-based

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

[Merck CDP Verification Letter 2021 KPMG.pdf](#)

[Merck Sustainability Report 2021.pdf](#)

Page/ section reference

Merck CDP Verification letter 2021, see page 2 Merck Sustainability Report 2021, see pages 190, 242-244

Relevant standard

ISAE3000

Proportion of reported emissions verified (%)

100

C10.1c

(C10.1c) Provide further details of the verification/assurance undertaken for your Scope 3 emissions and attach the relevant statements.

Scope 3 category

Scope 3: Purchased goods and services

Scope 3: Capital goods

Scope 3: Fuel and energy-related activities (not included in Scopes 1 or 2)

Scope 3: Upstream transportation and distribution

Scope 3: Waste generated in operations

Scope 3: Business travel

Scope 3: Employee commuting

Scope 3: Upstream leased assets

Scope 3: Investments

Scope 3: Downstream transportation and distribution

Scope 3: Processing of sold products

Scope 3: Use of sold products

Scope 3: End-of-life treatment of sold products

Scope 3: Downstream leased assets

Scope 3: Franchises

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

[Merck CDP Verification Letter 2021 KPMG.pdf](#)

[Merck Sustainability Report 2021.pdf](#)

Page/section reference

Merck CDP Verification letter 2021, see page 2 Merck Sustainability Report 2021, see pages 191, 242-244

Relevant standard

ISAE3000

Proportion of reported emissions verified (%)

100

C10.2

(C10.2) Do you verify any climate-related information reported in your CDP disclosure other than the emissions figures reported in C6.1, C6.3, and C6.5?

Yes

C10.2a

(C10.2a) Which data points within your CDP disclosure have been verified, and which verification standards were used?

Disclosure module verification relates to	Data verified	Verification standard	Please explain
C4. Targets and performance	Progress against emissions reduction target	ISAE3000	The progress against our GHG reduction target was published in Merck's Sustainability Report (p. 144) which was externally verified. See pages 242-244 of Merck's Sustainability Report for the Independent Assurance Report of the external verifier or the attached CDP Verification Letter. Merck CDP Verification Letter 2021 KPMG.pdf Merck Sustainability Report 2021.pdf
C6. Emissions data	Year on year change in emissions (Scope 1 and 2)	ISAE3000	Year on year change was published in Merck's Sustainability Report (p. 144, 1901) which was externally verified. See pages 242-244 of Merck's Sustainability Report for the Independent Assurance Report of the external verifier or the attached CDP Verification Letter. Merck CDP Verification Letter 2021 KPMG.pdf Merck Sustainability Report 2021.pdf
C6. Emissions data	Year on year change in emissions (Scope 3)	ISAE3000	Year on year change was published in Merck's Sustainability Report (p. 191) which was externally verified. See pages 242-244 of Merck's Sustainability Report for the Independent Assurance Report of the external verifier or the attached CDP Verification Letter. Merck CDP Verification Letter 2021 KPMG.pdf Merck Sustainability Report 2021.pdf

Disclosure module verification relates to	Data verified	Verification standard	Please explain
C8. Energy	Energy consumption	ISAE3000	Energy consumption was published in Merck's Sustainability Report (p. 193) which was externally verified. See pages 242-244 of Merck's Sustainability Report for the Independent Assurance Report of the external verifier or the attached CDP Verification Letter. Merck CDP Verification Letter 2021 KPMG.pdf Merck Sustainability Report 2021.pdf

C11. Carbon pricing

C11.1

(C11.1) Are any of your operations or activities regulated by a carbon pricing system (i.e. ETS, Cap & Trade or Carbon Tax)?

Yes

C11.1a

(C11.1a) Select the carbon pricing regulation(s) which impacts your operations.

EU ETS

C11.1b

(C11.1b) Complete the following table for each of the emissions trading schemes you are regulated by.

EU ETS

% of Scope 1 emissions covered by the ETS

5.3

% of Scope 2 emissions covered by the ETS

0

Period start date

January 1 2021

Period end date

December 31 2021

Allowances allocated

24935

Allowances purchased

46934

Verified Scope 1 emissions in metric tons CO₂e

80657

Verified Scope 2 emissions in metric tons CO₂e

0

Details of ownership

Facilities we own and operate

Comment

C11.1d

(C11.1d) What is your strategy for complying with the systems you are regulated by or anticipate being regulated by?

With power plants at the Darmstadt and Gernsheim sites in Germany, Merck is covered by the EU Emission Trading Scheme (EU ETS) launched Europe-wide in 2005. When issuing emissions certificates, the German Emissions Trading Authority (DEHSt) acknowledged our previous measures (the substitution of brown and black coal with gas) as “early actions”. In the trading periods I and II Merck benefited from free allowances. In the third trading period (2013-2020) new allocation rules were implemented. Merck’s benefited from free allocation which was based on heat benchmarks and industrial exceptions. But Merck had to purchase first additional allowances. In the meantime, the allocation rules for the fourth period have been established. A first application for free allocation (until 2025) has been submitted. A purchase will remain necessary in the next years.

There is still the risk of changes of the EU ETS in the coming years and still there are planning and investment uncertainties caused by such discussions and by possible regulatory changes within the next years.

In the context of the EU Green Deal the complete climate and energy legislation is being reviewed. There is currently a discussion on extending the scope of the EU-ETS, further restricting the free allocation up to let them expire from 2030 (in connection with the CBAM initiative).

Merck reacts on changes of the EU ETS in different ways. Scenario planning is used to estimate the possible financial impact by the changes in EU ETS. Merck observes tightly the discussions and decisions of the EU regarding the period until 2030 and beyond to adapt strategy if needed.

Besides this, we reduce the need for emissions certificates by implementing energy saving and greenhouse gas reduction projects. At Darmstadt and Gernsheim, the two sites underlying the EU ETS, a sophisticated process to improve energy efficiency and to reduce energy consumption is in place. Production plants are systematically examined on potentials to save energy. Multiple energy efficiency projects were implemented in the past years. At the Darmstadt site, for instance, Merck spent around € 27 million on the construction of two state-of-the-art energy stations which were commissioned in 2014 and 2015. The two stations are supplying the site with power, heating and cooling while decreasing the site's GHG emissions by around 2,500 metric tons per year. At the Gernsheim site a combined heat and power plant was installed reducing GHG emissions by 6,000 metric tons per year. To have a solid basis to improve energy efficiency and to save energy, the two sites have been certified according to ISO 50001 Energy Management Systems already in 2012.

Merck KGaA CDP Climate Change Questionnaire 2022

At the Darmstadt and Gernsheim sites, the energy strategy is currently being further developed in order to align the energy supply even more closely with Merck's climate protection goals.

A special focus is also on energy-efficient new buildings: e.g. avoidance of oversizing, selection of highly efficient technologies, intensification of life cycle considerations, increase usage of renewable energies (photovoltaic, geothermal, solar thermal, ...) and the expansion of e-mobility.

In addition, the Delta project (Sustainability Research Project) for example, intends to make greater use of waste heat to replace steam in combination with a low temperature heating grid.

C11.2

(C11.2) Has your organization originated or purchased any project-based carbon credits within the reporting period?

No

C11.3

(C11.3) Does your organization use an internal price on carbon?

Yes

C11.3a

(C11.3a) Provide details of how your organization uses an internal price on carbon.

Objective for implementing an internal carbon price

Stakeholder expectations

Change internal behavior

Drive energy efficiency

Drive low-carbon investment

Stress test investments

Identify and seize low-carbon opportunities

GHG Scope

Scope 1

Scope 2

Application

Merck introduced a sustainability evaluation ("Green business case" with CO₂e emission measures and cost savings) using a shadow price of 100 Euro/t CO₂e. This will be mandatory as of January 1st, 2022, for all investment projects larger than 10 million Euros. This shadow price has to be considered for the whole Merck Group. Clear implication is to set a focus and sensitivity to the carbon emissions in large capital expenditure projects.

Actual price(s) used (Currency /metric ton)

100

Variance of price(s) used

No variances being used.

Type of internal carbon price

Shadow price

Impact & implication

Merck introduced a sustainability evaluation ("Green business case" with CO₂e emission measures and cost savings) using a shadow price of 100 Euro/t CO₂e. This will be mandatory as of January 1st, 2022, for all investment projects larger than 10 million Euros. This shadow price has to be considered for the whole Merck Group. Clear implication is to set a focus and sensitivity to the carbon emissions in large capital expenditure projects.

C12. Engagement

C12.1

(C12.1) Do you engage with your value chain on climate-related issues?

Yes, our suppliers

Yes, our customers/clients

C12.1a

(C12.1a) Provide details of your climate-related supplier engagement strategy.

Type of engagement

Engagement & incentivization (changing supplier behavior)

Details of engagement

Run an engagement campaign to educate suppliers about climate change

% of suppliers by number

1.1

% total procurement spend (direct and indirect)

50

% of supplier-related Scope 3 emissions as reported in C6.5

50

Rationale for the coverage of your engagement

Our Supplier Decarbonization Program is a key element contributing to reduce our emissions in line with our decision to join the Science Based Targets initiative. Through the program, we aim to reduce greenhouse gas emissions associated with purchased goods and services as well as capital goods which sum up to 68% of our overall scope 3 emissions. We set up a cross-functional Supplier Decarbonization Program team within Group Procurement to define our strategy and drive the execution of a ten-year program plan. We also started to provide training sessions and materials for procurement managers and sourcing teams. We intend to approach our suppliers in waves and contacted the first target group with a letter from our Chief Procurement Officer, information about our aspirations and a questionnaire to assess their current decarbonization status (e.g., share of renewables in energy consumption, availability of Product Carbon Footprints, monitoring of emissions, availability of reduction plans, setting of Science Based targets). Target of the first wave was to cover approx. 50% of Merck's scope 3, category 1 and 2 emissions. The selection of the first wave suppliers was therefore based on their GHG emissions. The resulting list was further refined by other

supplier-specific data.

Besides this, our sourcing managers collect relevant data from these suppliers in a global monitoring database.

Merck is as well active in the industry initiative Together for Sustainability (TfS). Through the TfS initiative, suppliers are assessed either based on information obtained during audits or based on self-reported and publicly accessible information provided by EcoVadis, an independent rating agency. EcoVadis assesses suppliers from more than 160 countries and 200 sectors across the four categories of Environment, Labor and Human Rights, Ethics, and Sustainable Procurement. The results are shared among TfS member companies in compliance with all restrictions stipulated by antitrust law. Through the TfS initiative, we have access to more than 1,460 valid scorecards on the assessment of our suppliers, 882 of which completed a new assessment or re-assessment in 2021. In some cases, these were initiated by us and in other cases by other TfS members.

Impact of engagement, including measures of success

The results from the first contact with the selected first wave suppliers fulfilled our expectations. We measure the success based on the response rate of our customers, with a threshold of 75%. Based on a response rate of 75%, we evaluated the feedback with regard to our key questions (e.g., setting of Science Based targets). Main result of this evaluation is that we are working together with many suppliers that are already on their own decarbonization journey. This applies mainly for larger companies. However, we clearly see room for improvement in various areas. Nevertheless, there is high interest and willingness among the suppliers to proceed. In the next step, target is to safeguard that more suppliers answer our key questions with yes, meaning that they progress with their decarbonization.

Comment

C12.1b

(C12.1b) Give details of your climate-related engagement strategy with your customers.

Type of engagement & Details of engagement

Collaboration & innovation	Run a campaign to encourage innovation to reduce climate change impacts
----------------------------	---

% of customers by number

1

% of customer - related Scope 3 emissions as reported in C6.5

5

Please explain the rationale for selecting this group of customers and scope of engagement

Merck is in direct contact with many of its customers to further develop our products according to the needs of the clients. Hereby, sustainability and climate protection is an important aspect. Main focus is of course on our key account customers. Nevertheless, the number is relatively low as we have several million customers.

Impact of engagement, including measures of success

The Life Science business sector works across its business units to drive product-related sustainability. This includes our Design for Sustainability (DfS) program for introducing more environmentally responsible sound Life Science products. Merck also created as well as DOZN™, a web-based quantitative green chemistry web-based tool for assessing more sustainable alternatives, be that products or processes. Through our “DfS: Re-Engineering” initiative, our Life Science researchers are developing innovative solutions in line with the 12 Principles of Green Chemistry. These aim to make research as environmentally compatible as possible and to minimize negative impacts on human health. Our proprietary web-based tool DOZN™ enables us to assess sustainable alternatives for various chemicals and to provide transparency to our customers. DOZN™ provides a framework for rating our products in the three stewardship categories of “Improved resource use”, “Increased energy efficiency” and “Reduced human and environmental hazards”. In 2019, Merck made the DOZN™ tool publicly available free of charge to customers. This tool is currently being used by more than 1000 users around the world. There have been 50 references of the DOZN™ tool in third party published papers. The tool is also beginning to be implemented in higher education through chemistry departments to help increase the use of data/metric-based quantification to help increase more sustainability driven product/process choices. As of December 2021, more than 1,400 greener alternatives, a 27% increase from year prior, had been made available across our platform of solutions.

Type of engagement & Details of engagement

Collaboration & innovation	Run a campaign to encourage innovation to reduce climate change impacts
----------------------------	---

% of customers by number

50

% of customer - related Scope 3 emissions as reported in C6.5

50

Please explain the rationale for selecting this group of customers and scope of engagement

In the Electronics industry various chemicals are used, e.g., Etch and Clean gases. Several of them like NF₃ show high greenhouse gas warming potentials (GWP) and are emitted as process-related scope 1 emissions at our customers. Low-GWP gases solutions help to reduce our customer’s scope 1 emissions as well as Merck’s scope 3 emissions. So, they are a meaningful step forward in support of both side’s sustainability goals. We see this as an opportunity to expand our market share, further establishing Merck as an innovation partner.

Impact of engagement, including measures of success

Merck proactively reaches out to customers to join forces and support their sustainability goals. Within Merck sustainability strategy, our Electronics business sector has set a focus on the sustainability of its products. Reducing the environmental impact of products is an important part of the R&D process. Merck’s Electronics R&D team has been actively engaging with one of our main customers to develop low-GWP gases solutions, starting with Etch and Clean gases. After a year of iterative collaboration, our customer is now testing an alternative low-GWP Etch gas from our lab to validate its process performance to replace a traditional, high global

warming material. We are also collaborating on new, low emission gases for chamber cleaning applications.

Type of engagement & Details of engagement

Collaboration & innovation	Run a campaign to encourage innovation to reduce climate change impacts
----------------------------	---

% of customers by number

1

% of customer - related Scope 3 emissions as reported in C6.5

Please explain the rationale for selecting this group of customers and scope of engagement

Merck's Electronics business sector is in direct contact with many of its customers to further develop our products according to the needs of the clients. Hereby, sustainability and climate protection are important aspects. Nevertheless, we do not have any detailed data on the number of customers or similar.

Impact of engagement, including measures of success

Merck products significantly help our customers conserve energy and thus reduce their GHG emissions, help them to produce more energy-efficient products or to develop new technologies for renewable energy resources.

Our Electronics portfolio contains numerous examples of such products. Among others, we are developing innovative solutions for energy-efficient displays and lighting (based on Light Emitting Diodes (LED) and Organic Light Emitting Diodes (OLED) technologies).

Our liquid crystal window (LCW) technology helps to reduce the energy consumption of buildings.

We view sustainability as a competitive advantage, and we proactively engage in partnerships with our customers to collectively drive more sustainable value creation. We have complemented our product development process with the principle that it should avoid highly hazardous materials wherever possible. Therefore, we have also prioritized new green and innovative materials that deliver sustainable value to our customers.

C12.2

(C12.2) Do your suppliers have to meet climate-related requirements as part of your organization's purchasing process?

Yes, climate-related requirements are included in our supplier contracts

C12.2a

(C12.2a) Provide details of the climate-related requirements that suppliers have to meet as part of your organization's purchasing process and the compliance mechanisms in place.

Climate-related requirement

Implementation of emissions reduction initiatives

Description of this climate related requirement

As per Supplier Code of Conduct, Merck expects its suppliers to support the reduction of GHG emissions by ensuring that over time in accordance with the timelines communicated by Merck:

- An energy management system is established, for example in accordance with ISO 50001,
- CO2 emissions are reduced during transport (e.g., green logistics) and in warehousing,
- They engage with their own suppliers to reduce CO2 emissions,
- Circular economy practices are established, e.g., reuse products and material, (e.g. packaging), and/or develop and introduce of recyclable products (e.g. cradle to cradle approach).

% suppliers by procurement spend that have to comply with this climate-related requirement

12

% suppliers by procurement spend in compliance with this climate-related requirement

4

Mechanisms for monitoring compliance with this climate-related requirement

Supplier self-assessment

Response to supplier non-compliance with this climate-related requirement

Retain and engage

Climate-related requirement

Climate-related disclosure through a public platform

Description of this climate related requirement

As per Supplier Code of Conduct, Merck expects its suppliers to support the reduction of GHG emissions by ensuring that over time in accordance with the timelines communicated by Merck:

- A GHG inventory is established in accordance with the GHG Protocol Corporate Accounting and Reporting Standard, covering own operations (Scope 1 and Scope 2) and the value chain (Scope 3).

% suppliers by procurement spend that have to comply with this climate-related requirement

12

% suppliers by procurement spend in compliance with this climate-related requirement

5

Mechanisms for monitoring compliance with this climate-related requirement

Supplier self-assessment

Response to supplier non-compliance with this climate-related requirement

Retain and engage

Climate-related requirement

Purchasing renewable energy

Description of this climate related requirement

As per Supplier Code of Conduct, Merck expects its suppliers to support the reduction of GHG emissions by ensuring that over time in accordance with the timelines communicated by Merck:

- An energy management system is established, for example in accordance with ISO 50001,

- Renewable energy is sourced, whereby a target of at least 80% of the total amount of purchased energy should be met.

% suppliers by procurement spend that have to comply with this climate-related requirement

21

% suppliers by procurement spend in compliance with this climate-related requirement

1

Mechanisms for monitoring compliance with this climate-related requirement

Supplier self-assessment

Response to supplier non-compliance with this climate-related requirement

Retain and engage

C12.3

(C12.3) Does your organization engage in activities that could either directly or indirectly influence policy, law, or regulation that may impact the climate?

Row 1

Direct or indirect engagement that could influence policy, law, or regulation that may impact the climate

Yes, we engage directly with policy makers

Yes, we engage indirectly through trade associations

Does your organization have a public commitment or position statement to conduct your engagement activities in line with the goals of the Paris Agreement?

Yes

Attach commitment or position statement(s)

"We want to do our part to preserve the climate and achieve the Paris Agreement on Climate Change. In 2020, we drew up new objectives: By 2030, we intend to lower our direct (Scope 1) and indirect (Scope 2) greenhouse gas emissions by 50% compared with 2020." (Merck Annual Report 2021, p. 115).

These targets have been approved by the SBTi in May 2022. The SBTi's Target Validation Team has classified our scope 1 and 2 target ambition and has determined that it is in line with a 1.5°C trajectory.

[Merck Annual Report 2021.pdf](#)

Describe the process(es) your organization has in place to ensure that your engagement activities are consistent with your overall climate change strategy

Merck's engagement activities are mainly driven by our Group function Corporate Affairs. This group is well aware of Merck's overall position on climate change (sustainability strategy, targets etc.). Information about Merck's climate strategy etc. is shared among all employees via different means (e.g., intranet, webinars, townhall meetings of the Board). Employees involved in advocacy activities are often deeply involved in our climate action program as well. By this, consistency between Merck's strategy and our advocacy activities is ensured.

Primary reason for not engaging in activities that could directly or indirectly influence policy, law, or regulation that may impact the climate

<Not Applicable>

Explain why your organization does not engage in activities that could directly or indirectly influence policy, law, or regulation that may impact the climate

<Not Applicable>

C12.3a

(C12.3a) On what policy, law, or regulation that may impact the climate has your organization been engaging directly with policy makers in the reporting year?

Focus of policy, law, or regulation that may impact the climate

Carbon tax

Climate-related targets

Emissions trading schemes

Specify the policy, law, or regulation on which your organization is engaging with policy makers

Carbon Border Adjustment Mechanism (CBAM), EU Emission Trading Scheme (EU ETS), EU Green Deal

Policy, law, or regulation geographic coverage

Global

Country/region the policy, law, or regulation applies to

<Not Applicable>

Your organization's position on the policy, law, or regulation

Support with minor exceptions

Description of engagement with policy makers

Sustainability (and hence climate) is a key priority of Merck. When addressing policy-makers in personal meetings this topic is nearly always briefly outlined. We see our activities as a competitive advantage and explain it.

Details of exceptions (if applicable) and your organization's proposed alternative approach to the policy, law or regulation

Exclude chemical industry from CBAM as mechanism and consequences are unclear and very difficult to find the "right" way to allocate emissions along the whole value chain. Further, compatibility with WTO remains unclear.

The allocation of ETS certificates should reflect the real situation and a reasonable (though ambitious) reduction of certificates in a level-playing field should be ensured.

Have you evaluated whether your organization's engagement is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

C12.3b

(C12.3b) Provide details of the trade associations your organization engages with which are likely to take a position on any policy, law or regulation that may impact the climate.

Trade association

European Chemical Industry Council (CEFIC)

Is your organization's position on climate change consistent with theirs?

Consistent

Has your organization influenced, or is your organization attempting to influence their position?

We publicly promote their current position

State the trade association's position on climate change, explain where your organization's position differs, and how you are attempting to influence their position (if applicable)

The European chemical industry has the ambition to become climate neutral by 2050. Therefore, Cefic supports the Paris Agreement. The Paris Agreement, the international treaty on climate change linked to the UN-SDGs, sets a target that requires tremendous efforts of all sectors combating climate change, but the transition also creates opportunities. The European chemical industry wants to seize the opportunities arising from the transition to a climate neutral and circular economy.

Cefic supports as well Europe's ambition to become the first climate-neutral continent by 2050. By reducing GHG emissions, the industry is working towards the EU's ambitions for climate neutrality, clean energy and zero pollution.

Cefic welcomes the European Commission's 'Fit for 55' package. This package consists of a set of interconnected proposals, which drive the EU towards reducing net emissions by at least 55% by 2030 compared to 1990 and being the first climate-neutral continent by 2050. Overall, the package strengthens eight existing pieces of legislation and presents five new initiatives across a range of policy areas and economic sectors: climate, energy and fuels, transport, buildings, land use and forestry.

See <https://cefic.org/>

Funding figure your organization provided to this trade association in the reporting year, if applicable (currency as selected in C0.4) (optional)

Describe the aim of your organization's funding

<Not Applicable>

Have you evaluated whether your organization's engagement with this trade association is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

Trade association

German Chemical Industry Association (VCI)

Is your organization's position on climate change consistent with theirs?

Consistent

Has your organization influenced, or is your organization attempting to influence their position?

We publicly promote their current position

State the trade association's position on climate change, explain where your organization's position differs, and how you are attempting to influence their position (if applicable)

The chemical and pharmaceutical industry in Germany has set itself the goal of becoming greenhouse gas neutral.

To find ways and solutions, the Association of German Engineers (VDI) and the German Chemical Industry Association (VCI) launched the Chemistry4Climate platform in May 2021.

In total, more than 80 stakeholders from industry, politics and civil society are represented at C4C. The participating companies come from the chemical, energy, waste management, plant construction buildings and transport sectors, as well as other energy-intensive industries. The German Federal Ministry of Economics and Climate Protection (BMWK) supports the work of the platform.

With the VCI Roadmap 2050 from fall 2019, the German chemical industry had already analyzed whether, and if so how, the path to a greenhouse gas-neutral chemical industry is possible. Technically, it is possible, but it is linked to numerous prerequisites. First and foremost, large amounts of renewable electricity at competitive prices are needed, as well as sufficient availability of green hydrogen. Furthermore, new sources of carbon for material use must be mobilized when fossil carriers are largely eliminated. Only then will the investments in the new technologies materialize.

See: <https://www.vci.de/themen/energie-klima/klimaschutz/ueber-chemistry4climate-klimaschutzplattform.jsp>

Funding figure your organization provided to this trade association in the reporting year, if applicable (currency as selected in C0.4) (optional)

Describe the aim of your organization's funding

<Not Applicable>

Have you evaluated whether your organization's engagement with this trade association is aligned with the goals of the Paris Agreement?

Yes, we have evaluated, and it is aligned

C12.4

(C12.4) Have you published information about your organization's response to climate change and GHG emissions performance for this reporting year in places other than in your CDP response? If so, please attach the publication(s). Publication

In mainstream reports

Status

Complete

Attach the document

[Merck Annual Report 2021.pdf](#)

Page/Section reference

Annual Report Merck 2021; see pages 115-118

Content elements

Governance

Strategy

Emissions figures

Emission targets

Other metrics

Comment

Publication

In voluntary sustainability report

Status

Complete

Attach the document

[Merck Sustainability Report 2021.pdf](#)

Page/Section reference

Merck Sustainability Report 2021, see pages 14, 143-147, 190-191, 193

Content elements

Governance

Strategy

Emissions figures

Emission targets

Other metrics

Comment

C15. Biodiversity

C15.1

(C15.1) Is there board-level oversight and/or executive management-level responsibility for biodiversity-related issues within your organization?

	Board-level oversight and/or executive management-level responsibility for biodiversity-related issues	Description of oversight and objectives relating to biodiversity	Scope of board-level oversight
Row 1	No, but we plan to have both within the next two years	<Not Applicable>	<Not Applicable>

C15.2

(C15.2) Has your organization made a public commitment and/or endorsed any initiatives related to biodiversity?

	Indicate whether your organization made a public commitment or endorsed any initiatives related to biodiversity	Biodiversity-related public commitments	Initiatives endorsed
Row 1	Yes, we have made public commitments only	Other, please specify (Nagoya Protocol, commitment to follow Convention on Biological Diversity (CBD) – Global Biodiversity Framework)	<Not Applicable>

C15.3

(C15.3) Does your organization assess the impact of its value chain on biodiversity?

	Does your organization assess the impact of its value chain on biodiversity?	Portfolio
Row 1	No, but we plan to assess biodiversity-related impacts within the next two years	<Not Applicable>

96C15.4

(C15.4) What actions has your organization taken in the reporting year to progress your biodiversity-related commitments?

	Have you taken any actions in the reporting period to progress your biodiversity-related commitments?	Type of action taken to progress biodiversity-related commitments
Row 1	No, we are not taking any actions to progress our biodiversity-related commitments, but we plan to within the next two years	<Not Applicable>

C15.5

(C15.5) Does your organization use biodiversity indicators to monitor performance across its activities?

	Does your organization use indicators to monitor biodiversity performance?	Indicators used to monitor biodiversity performance
Row 1	No	Please select

C15.6

(C15.6) Have you published information about your organization's response to biodiversity-related issues for this reporting year in places other than in your CDP response? If so, please attach the publication(s).

Report type	Content elements	Attach the document and indicate where in the document the relevant biodiversity information is located
In voluntary sustainability report or other voluntary communications	Content of biodiversity-related policies or commitments Governance Other, please specify (examples)	p. 79, 140, 142, 212

C16. Signoff

C-FI

(C-FI) Use this field to provide any additional information or context that you feel is relevant to your organization's response. Please note that this field is optional and is not scored.

C16.1

(C16.1) Provide details for the person that has signed off (approved) your CDP climate change response.

	Job title	Corresponding job category
Row 1	Member of the Executive Board, CEO	Director on board