



**Task Force on Climate-Related
Financial Disclosures (TCFD) Report**

2023

Bayer supports the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD) with respect to reporting on this topic. In our report, we implement the 11 recommendations of the TCFD in the four categories of Governance, Strategy, Risk Management and Metrics & Targets.

1. Governance

Management's role

The Chairman of the Board of Management (CEO) holds direct responsibility for climate protection in his role as Chief Sustainability Officer. In keeping with their level of importance, climate-change-related topics and Bayer's climate strategy were discussed at a total of two meetings with the Board of Management, one meeting of the Supervisory Board and both meetings of the ESG Committee of the Supervisory Board in 2023. In 2023, the Chairman of the Board of Management (CEO) also participated in the UN Climate Change Conference COP28 in Dubai for the first time.

The attainment of our Group targets for reducing greenhouse gases by 2029 is factored into the long-term compensation of the Board of Management and Bayer's LTI-entitled managerial employees. The compensation-relevant target is based on Bayer's necessary contribution to an SBTi-validated 1.5 °C scenario. Climate protection is also an integral element of annual variable compensation.

The Chairman of the Board of Management (CEO) is supported in this by the Public Affairs, Science, Sustainability & HSE Enabling Function and the sustainability departments within the divisions. The divisions handle the operational implementation of the climate protection measures at their sites with the support of the enabling functions. We have formed Group-wide working groups for the strategic and operational implementation of climate-change-related measures and a special working group to analyze various climate scenarios and their impacts on our business.

In addition, the Sustainability Council that was established in 2020 advises the Board of Management in all matters relating to sustainability – including climate protection. In 2023, climate change and the related impacts on and opportunities for Bayer were discussed at four meetings of the Sustainability Council.

The Board of Management of Bayer AG holds overall responsibility for an effective risk management system. It examines the appropriateness and effectiveness of the risk management system at least once a year, as does the Supervisory Board's Audit Committee. In addition, a corresponding report is provided to the full Supervisory Board. The Bayer Assurance Committee is chaired by the Chief Financial Officer, with a second Board of Management member participating on a rotating basis. Besides ensuring that appropriate action is taken to control any substantial risks, the Bayer Assurance Committee regularly discusses and reviews the risk portfolio and the status of the risk control measures.

Board's oversight

Bayer AG is subject to German stock corporation law and therefore has a dual governance system consisting of the Board of Management and the Supervisory Board. The Board of Management manages the company based on a strategy that is geared toward its long-term success. The Supervisory Board oversees and monitors the Board of Management. Since 2022, the Supervisory Board has had its own ESG Committee, comprising the Chairman of the Supervisory Board and seven further members of the Supervisory Board. This focuses on Bayer's sustainable governance and business activities in the areas of environmental protection, social affairs and corporate governance (ESG) within the scope of responsibility of the Supervisory Board.

The Board of Management of Bayer AG holds overall responsibility for an effective risk management system. It examines the appropriateness and effectiveness of the risk management system at least once a year, as does the Supervisory Board's Audit Committee. In addition, a corresponding report is provided to the full Supervisory Board.

In our [Annual Report](#), we report in detail on the main elements of the Bayer Group's corporate governance structures and conformity with the recommendations of the German Corporate Governance Code, relevant corporate governance practices, the composition and procedures of the Board of Management, the Supervisory Board and their committees, and also on compensation in the Compensation Report along with the objectives to be defined and the underlying concepts.

For more information:

// [Bayer 2023 Sustainability Report](#) – Chapter 2.1 Corporate Governance Practices and Principles

// [Bayer 2023 Sustainability Report](#) – Chapter 7. Climate Protection

// [Bayer 2023 Sustainability Report](#) – Chapter 7.3 Climate Protection – Risk and Opportunity Analysis

// [Bayer 2023 Annual Report](#) – Chapter 3.2 Opportunity and Risk Report

2. Strategy

2.1 Identification and impacts

Climate change affects us all and is one of the greatest challenges that humankind will face in the future. Bayer considers climate protection and the related reduction of greenhouse gas emissions to be a top priority. We support the Paris Agreement and the objective of limiting global warming to 1.5 °C relative to the pre-industrial level. The [Science Based Targets initiative](#) (SBTi) has validated our target and confirms our contribution to fulfilling the Paris Agreement. We anticipate that our business areas of healthcare and agriculture will on the one hand be impacted by climate change, but on the other will also be part of the solution.

In 2023, we looked at the risks and opportunities stemming from the effects of climate change from various perspectives to evaluate them even better in relation to our company and integrate them into our strategy and measures. Climate-related risks are already accounted for in our Group-wide enterprise risk management (ERM) system.

2.2 Climate scenarios

We analyze the possible effects of climate change across two different scenarios. We use these scenarios to understand the impact of climate change on our business and to identify measures for mitigating risks and leveraging opportunities. With a cross-functional, cross-divisional team, we have identified relevant opportunities and risks for our business in both scenarios.

We have based our scenario descriptions on [Assessment Report 6](#) of the Intergovernmental Panel on Climate Change (IPCC) and supplementing this with further sources relevant to our business areas. The basis comprises the optimistic climate change scenario envisaging warming of below 2 °C – the “Green Road” SSP1-1.9, which equates to the fulfillment of the climate goals of the Paris Agreement (temperature increase of 1.4 °C by 2100 compared with the preindustrial age) – and a scenario that reflects current global behavior – the “Rocky Road” SSP3-7.0 (temperature increase of 3.6 °C).

The [Emissions Gap Report 2023](#) of the UN Environment Programme (UNEP) clearly shows that climate change is advancing. 2023 was the hottest year on record, featuring the first day on which average warming was above 2 °C. The current political reduction targets are far too low to reach the goal of the Paris Agreement. UNEP assumes that the current national reduction targets will result in an average global warming of

2.9 °C in 2100. Our optimistic scenario (Green Road) seems unrealistic in view of current global developments and crises. Both scenarios (Green Road and Rocky Road) are important for assessing Bayer's climate-related risks, and we will therefore continue to analyze both scenarios in detail. We once again adjusted our Green Road scenario in 2023 based on external requirements.



Green Road (SSP1-1.9)

- // The Green Road scenario assumes a rise in average global temperature compared with the pre-industrial age of 1.6 °C by between 2041 and 2060. Between 2081 and 2100, the temperature is likely to have risen by 1.4 °C compared with the preindustrial age.
- // This scenario is marked by the rapid implementation of ambitious and globally coordinated climate-related laws and rules that can also include transformational requirements and new regulations for companies in the short term. The rapid reduction in greenhouse gas emissions leads to less severe weather- and climate-related effects.
- // In 2023, we changed our Green Road scenario from SSP1-2.6 to SSP1-1.9, to be in line with requirements from the TCFD. This did not result in any relevant changes to our risks and opportunities analysis.



Rocky Road (SSP3-7.0)

- // The Rocky Road scenario assumes the rise in average global temperature compared with the preindustrial age to be around 2.1 °C by between 2041 and 2060, and probably 3.6 °C by between 2081 and 2100.
- // In this scenario, we expect less ambitious laws and provisions that vary widely from one region to another. That will lead to a slower pace of emissions reduction and thus more intensive weather- and climate-related changes in all regions of the world. The varying levels of ambition also lead to additional trade barriers that can be manifested in measures such as a Carbon Border Adjustment Mechanism (CBAM).

In our analysis of the effects of climate change, we go beyond the customary enterprise risk management time horizons and instead apply the following time horizons:

- // Short-term (2023–2025)
- // Medium-term (2026–2035)
- // Long-term (2036–2050)

In 2023, we further developed our own agricultural climate model to analyze impacts on agricultural productivity in relation to the different scenarios. At the same time, we can use this climate model for various other analyses; for example, it is a useful extension of specific analyses on the impact and opportunities of climate change as regards our business activities in agriculture.

Analyzing the value chain

We analyze the impact of climate change on Bayer's various business areas including the upstream and downstream value chain. We expect the major effects, opportunities and risks to apply particularly to our agricultural customers and consumers. Among the questions that arise in this context is how to shape regenerative farming in the future in order to successfully master the various climate-related challenges and guarantee food security. We also expect climate change to impact patients, for example through the intensified emergence of certain diseases.

In addition, we have begun analyzing our upstream value chains and one production facility as part of the EU taxonomy assessment. By contrast with the changes in the downstream value chain, the impact of climate change on our production sites is regarded as immaterial. Nonetheless, we want to maintain continuous, safe production and to respond here as well to changing environmental conditions such as water scarcity, storms or heat.

2.3 Climate impact drivers

Based on the overarching description, we have identified 10 climate impact drivers of materiality for Bayer to enable us to analyze the effects regulatory and physical changes will have on our business in more detail. The goal of the analysis is to identify the relevance and change potential in relation to Bayer and our fields of business and to derive suitable measures.

Separately, we assess the opportunities and risks associated with the 10 climate impact drivers shown in the graphic – in each case based on the various time horizons and on the Green Road and Rocky Road scenarios.

Below, we provide insight into the assessments of the individual climate impact drivers.

Climate Impact Drivers	Short term (2021–2025)		Medium term (2026–2035)		Long term (2036–2050)		
	Risk	Opportunity	Risk	Opportunity	Risk	Opportunity	
Transition impact drivers							
Laws, regulations, policies							
Carbon taxation/pricing, carbon border adjustment and offsetting							
Agricultural innovation and practices							
Commodity prices							
End customer/customer/market							
Food security							
Acute physical impact drivers							
Extreme weather events							
Chronic physical impact drivers							
Permanent water cycle							
Diseases							
Temperature							

The Green Road (SSP1-1.9) = The Rocky Road (SSP3-7.0) = Relevance = low high

Transition impact drivers

Based on the Paris Agreement, the most important countries and regions in which Bayer operates have committed to limiting global warming by reducing their greenhouse gas emissions.

// One example is the European Union’s Green Deal, the goal of which is to accelerate the transition to an emissions-free future and achieve climate neutrality by 2050. Consequently, the EU is expected to further increase costs for the emission of greenhouse gases (e.g. through CO₂ regulations such as the EU emissions trading system [EU-ETS] or a carbon tax), adjust financing incentives (e.g. through the EU

taxonomy) and drive forward technological changes (e.g. through the promotion of renewable energies and hydrogen technologies).

// China has committed to attaining net-zero emissions by 2060 and is therefore expected to introduce further regulations in this connection.

Through our strategy for decarbonization, with a focus on reducing greenhouse gas emissions on the pathway to a 1.5 °C scenario, we are reducing the risk of additional costs being caused by the expected regulations.

We continuously analyze the further effects of regulatory changes on our business. National and international CO₂ reduction targets could lead to the abandonment of fossil fuels and impact the demand for fuels from biomass (biofuels), for example. Depending on the regulators' decision, this could lead to either increased or reduced demand for biofuels. This decision could impact our sales markets, as some of our customers grow corn for the production of biofuels.

As one of the world's biggest CO₂ emitters, the agriculture industry can also play a key part in protecting the climate and thus mitigating climate risks – for example through the capture of CO₂ in farmland. For more information on our target of reducing greenhouse gas emissions in agriculture by 30%, please see the Focus on: Agriculture chapter in our 2023 Sustainability Report.

Physical impact drivers

Taking account of weather and climate effects is particularly important in the Crop Science Division and is included in both strategic planning and the assessment of the seasonal business risk. These effects are intensifying as a result of climate change, and both short-term (extreme) weather events and long-term climate changes will increase further.

Bayer pursues a strategic concept of regenerative agriculture to help farmers adapt to climate change. By transforming agricultural practices, we want to help maintain long-term food security. For us, regenerative agriculture is a results-oriented production model that is geared toward improving soil health and strengthening plants' resilience. Complementary objectives include reducing greenhouse gas emissions from agricultural production and increasing carbon capture in the soil. Regenerative agriculture is also designed to protect and promote biodiversity, conserve water resources and increase agricultural yields so as to improve the economic and social well-being of farmers and their communities. In the coming years, we want to develop specific models for different regions and help farmers implement them by passing on knowledge and offering suitable products and services.

Acute physical impact drivers

All climate models anticipate an increase in extreme weather conditions (such as drought, heavy rains and storms) that present an elevated risk of crop losses and therefore also pose risks for the agricultural value chain as a whole. Despite all precautions, operations at our sites or those of our customers may be disrupted and crop failures may occur as a result of extreme weather events and natural disasters. In the IPCC forecasts, the intensity of such events varies widely from one region to the next. In the IPCC's regional fact sheets for the Central North America (CNA) region, for example, extreme precipitation is predicted to increase, while the South American Monsoon (SAM) region is expected to experience both a delay in the monsoon season and intensified droughts.

In addition to risks, however, climate change can also create opportunities for our business. Bayer's product range and innovative capability – particularly in the agricultural value chain – will create a foundation for leveraging new options and sales opportunities in the future against the background of climate change. As a seed producer, we already offer plants with increased resistance to extreme weather conditions. That includes short-stature corn that is less susceptible to storms (for more information, please see the Focus on: Agriculture chapter in our 2023 Sustainability Report).

We also enable farmers to react better and more quickly to extreme weather conditions with our FieldView™ digital farming platform. For more information, please see Chapter 3.6 Crop Science in our 2023 Sustainability Report.

Chronic physical impact drivers

The long-term natural and physical effects of climate change will have a particular impact on the permanent water cycle (for example through a transition to a wetter or drier climate or a delay in the monsoon season), the spread of diseases and insect pests, and further coupling effects of temperature changes. These effects will be particularly relevant for our agricultural business.

We develop strategies to help farmers increase their resilience against the effects of climate change. At the same time, we want to help farmers reduce their own greenhouse gas emissions and cultivate healthy crops. As there are no uniform solutions in agriculture, farmers need numerous options from which they can select the most suitable for their fields and the prevailing local conditions.

In addition, health risks such as cardiovascular disease can also intensify due to hotter summer months or more frequent heatwaves. This could create increased demand for products for cardiovascular disease or nutritional supplements.

Integration into the business strategy

We use the results of our climate change analysis to assess from this perspective the effects on our company and thus the Group's financial position or results of operations. Weather and climate effects are of particular significance for the Crop Science Division and are accounted for in both strategic planning and the seasonal business risk. These effects are intensifying as a result of climate change, and both short-term (extreme) weather events and long-term climate changes will increase further. We continue to develop innovative and sustainable methods to minimize risks and therefore currently do not see any fundamentally changed expectations with regard to the Group's financial position or results of operations.

For the present, we have identified and evaluated several climate risks in our company-wide enterprise risk management process. Within this framework, all risks are regularly reviewed and mitigation measures established. Various, in some cases local, effects of climate change are already evident but these must be observed over the long term. Their precise impact on Bayer can currently only be roughly estimated.

Impact of climate-related matters

Climate change can give rise to estimation uncertainties and risks with respect to accounting and the possible effects on Bayer's financial position and results of operations.

The climate models we have analyzed project that, over the long term, there will be an increase in extreme weather conditions (such as droughts, heavy rains and storms) in terms of frequency and intensity, as well as a shift in climate zones. Potential financial consequences resulting for our sites due to climate-related natural events are hedged through insurance coverage to the extent customary in the industry. One example of a climate-related natural event was Hurricane Ida in 2021, which caused production disruptions that year at our sites in Soda Springs and Luling, United States. We therefore received insurance compensation of €195 million in 2023 as a result of our property and business interruption insurance coverage.

In 2023, climate-related matters did not necessitate any changes to the expected useful lives of Group assets, such as due to changing regulatory requirements or climate-related natural events. Likewise, physical or transition-related climate risks did not lead to any significant write-downs. We are committed to continuously developing our portfolio of assets by investing in sustainable technologies in order to reduce greenhouse gas emissions.

The shift in climate zones also presents an elevated risk of crop losses and thus risks for the agricultural value chain as a whole. Weather and climate effects are of particular significance for the Crop Science Division and its downstream value chain in crop cultivation. We are working to advance climate change adaptation while also aiming to counteract changing environmental conditions through innovation and new approaches in order to help strengthen climate resilience. The objective is to offer solutions that put our customers, patients and consumers in a better position to overcome the challenges.

Transforming our product portfolio and leveraging new business models is therefore one of the three pillars of our greenhouse gas reduction program. Our efforts to support climate change adaptation can be seen in our innovative plant breeding activities, for example. Our Preceon™ Smart Corn System, for instance, comprises seed varieties that produce short stature corn hybrids that potentially do not bend or break as easily

as standard-height corn in the presence of strong winds or heavy rain – thus minimizing crop losses. Our Preceon™ Smart Corn System is set to be launched for the first time in 2024 and is included in our product innovation pipeline (see Chapter 1.3 Focus on Innovation in our 2023 Annual Report). Our business planning takes account of research and development expenses for product innovations that can help adapt our business model to the impact of climate change.

The other two pillars of our greenhouse gas reduction program concern the continual reduction of greenhouse gas emissions at our company and across our entire value chain to help limit global warming to 1.5° Celsius in accordance with the UN Sustainable Development Goals and the Paris Agreement. As part of our greenhouse gas reduction program, we aim to reach net zero emissions, including throughout our entire value chain, by 2050 or earlier. We define net zero greenhouse gas emissions as a 90% reduction in overall greenhouse gas emissions in our own operations (Scope 1 and 2) and across our value chain (Scope 3) compared with the 2019 baseline.

The Crop Science Division's medium-term planning contains climate-related investments in connection with the implementation of the greenhouse gas reduction program that are also taken into account in impairment testing. Since the risks and opportunities from the impact of climate change are balanced, there is currently no need to revise the long-term growth rate. Based on currently available information, there are no indications that additional impairment losses will be required over and above the impairment losses already recognized.

We continuously monitor the risks resulting from climate-related matters and develop innovative and sustainable methods to minimize them. Based on present information and assumptions, we do not currently see any fundamentally changed expectations with regard to the Group's financial position and results of operations

2.4 Next steps

As data models and insights into climate change are constantly evolving, we will continue to expand and refine our scenario description and analysis in 2024 and beyond. At the same time, we are enhancing our analytical capabilities and expanding our climate models e.g. in order to better understand how various climate zones are changing. By doing this, we aim to be in a position to describe future challenges and opportunities as accurately as possible to derive short-, medium- and long-term mitigation measures. Findings from these analyses will play a bigger role in our strategic, portfolio and operational processes.

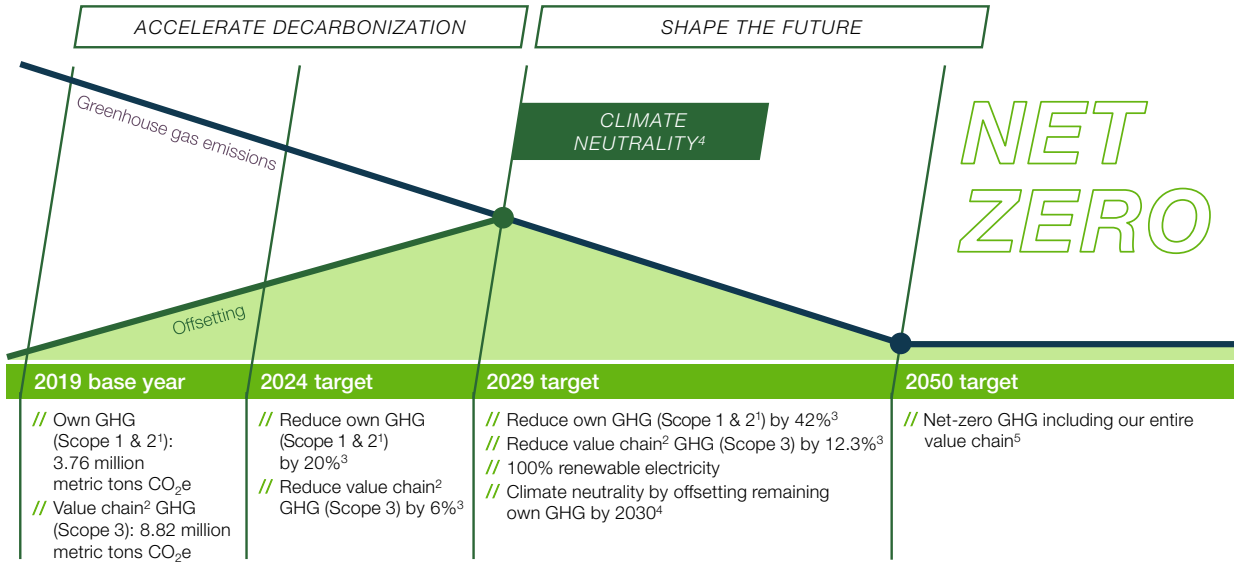
2.5 Targets – roadmap to net zero

We support the Paris Agreement and the objective of limiting global warming to 1.5 °C relative to the preindustrial level. The [Science Based Targets initiative](#) (SBTi) has validated our target and confirms our contribution to fulfilling the Paris Agreement

The attainment of our Group targets for reducing greenhouse gases by 2029 is factored into the long-term compensation of the Board of Management and Bayer's LTI-entitled managerial employees. The compensation-relevant target is based on Bayer's necessary contribution to an SBTi-validated 1.5 °C scenario. Climate protection is also an integral element of annual variable compensation.

Through our strategy for decarbonization, with a focus on reducing greenhouse gas emissions on the pathway to a 1.5 °C scenario, we are reducing the risk of additional costs being caused by the expected regulations.

Roadmap to Net Zero



GHG = greenhouse gas

¹ Comprises direct emissions (Scope 1) and indirect emissions (Scope 2, market-based) from Bayer sites whose annual energy consumption exceeds 1.5 terajoules

² In accordance with the criteria set out by the Science-Based Targets initiative (SBTi), the following Scope 3 categories of the Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Accounting & Reporting Standard are relevant for Bayer: (3.1) purchased goods and services, (3.2) capital goods, (3.3) fuel- and energy-related activities, (3.4) (upstream) transportation and distribution, (3.6) business travel.

³ Absolute, compared to the 2019 base year

⁴ Bayer aims to achieve climate neutrality at all its own sites (Scope 1 & 2) by 2030. By 2030, the remaining greenhouse gas emissions of our own operations will be fully offset by purchasing certificates from verified climate protection projects, especially in the areas of forest conservation and agriculture.

⁵ Defined as a 90% reduction in our entire Scope 1, 2 & 3 emissions compared with the base year 2019. Scope 3 includes all categories defined in the GHG Protocol.

Net-zero target

We have undertaken to reach net-zero greenhouse gas emissions including our entire value chain by 2050 or earlier (entire Scope 1, 2 and 3 emissions; Scope 3 includes all categories defined in the GHG Protocol). This target was formulated in accordance with the criteria of the SBTi and is thus aligned with the goals of the Paris Agreement of 2015. The target has been submitted to the SBTi and is currently being evaluated. As an external expression of commitment to net-zero greenhouse gas emissions, the company also signed the Business Ambition for 1.5 °C, a campaign of the SBTi in partnership with the UN Global Compact and the We Mean Business Coalition.

We define net-zero greenhouse gas emissions as a 90% reduction in our overall greenhouse gas emissions (Scope 1 and 2) and those in our value chain (Scope 3) compared with the base year 2019. The achievement of a net-zero target is a very ambitious endeavor, yet essential for all companies – including Bayer in particular. We plan to report in detail in the coming years on our planned actions to achieve a net-zero target.

Scientific studies indicate that the world community is currently not on a path to achieve the goals of the Paris Agreement. As part of society, we want to lead by example. Currently, we still see numerous hurdles on the path to net-zero emissions at Bayer, particularly from a political and technological perspective.

Medium-term climate targets by 2029

We intend to reduce our own greenhouse gas emissions by an absolute 42% compared to the base year 2019 by the end of 2029 (comprises direct emissions [Scope 1] and indirect emissions [Scope 2, market-based] from Bayer sites whose annual energy consumption exceeds 1.5 terajoules). This target on the pathway to a 1.5°C scenario was reviewed and acknowledged by the SBTi.

We aim to reduce greenhouse gas emissions from relevant Scope 3 categories in our supply chain by an absolute 12.3% (compared to the 2019 base year) by 2029. In accordance with the criteria set out by the Science Based Targets initiative (SBTi), the following Scope 3 categories of the GHG Protocol Corporate Value Chain (Scope 3) Accounting & Reporting Standard are relevant for Bayer: (3.1) purchased goods and services, (3.2) capital goods, (3.3) fuel- and energy-related activities, (3.4) (upstream) transportation and distribution and (3.6) business travel. This target was also reviewed and acknowledged by the SBTi. An increased reduction target is currently being reviewed by the SBTi.

This planned increase will mean that we will need to intensify our collaboration with our partners along the entire value chain to find common solutions. We are certain in our own mind of the importance of pursuing this goal and of convincing other partners of this.

Interim targets by 2024

By 2024, we aim to reduce our own greenhouse gas emissions by an absolute 20% compared to the base year 2019 (comprises direct emissions [Scope 1] and indirect emissions [Scope 2, market-based] from Bayer sites whose annual energy consumption exceeds 1.5 terajoules) and greenhouse gas emissions from relevant Scope 3 categories in our supply chain by an absolute 6% (compared to the 2019 base year). In accordance with the criteria set out by the Science-Based Targets initiative (SBTi), the following Scope 3 categories of the GHG Protocol Corporate Value Chain (Scope 3) Accounting & Reporting Standard are relevant for Bayer: (3.1) purchased goods and services, (3.2) capital goods, (3.3) fuel- and energy-related activities, (3.4) (upstream) transportation and distribution and (3.6) business travel – in line with the reduction pathway of our Science Based Target (SBT). Depending on the validation of our renewed targets by the SBTi, we plan to update our interim targets.

2.6 Climate policy engagement and management

Externally, we advocate for a climate position in line with our ambitious targets and demand that our partners also undertake action to reduce greenhouse gas emissions in accordance with the Paris Agreement. We have therefore published a detailed list of our [climate policy lobbying](#) activities

In line with our goals, we critically scrutinize our memberships in relevant industry associations and their positions as regards climate policy measures on a regular basis. The analysis forms the basis for Bayer's further efforts to advocate for scientifically founded policies to combat climate change through its member associations. In developing this approach, we have worked together with [Climate Action 100+](#), an investor initiative that cooperates with the world's biggest industrial companies on the issue of climate change.

To ensure maximum transparency in this process, Bayer has published the results in the [Industry Association Climate Review](#) since 2021. This report compares the climate policy positions of our industry associations with our own climate goals. As our industry associations represent us in the public debate, we disclose where we agree with these positions and where they diverge from ours. It is of paramount importance to us that we maintain a dialogue with our associations to achieve a mutually acceptable solution. Where differences exist, dialogue enables us to take measures to close these gaps. We disclosed both our achievements and the challenges that still lie ahead of us in our [Industry Association Climate Review](#) published in 2023.

For more information:

- // [Bayer 2023 Annual Report](#) – Chapter 1.3 Focus on Innovation
- // [Bayer 2023 Sustainability Report](#) – Chapter 7. Climate Protection
- // [Bayer 2023 Sustainability Report](#) – Chapter 7.2 Climate Protection – Decarbonization
- // [Bayer 2023 Sustainability Report](#) – Chapter 7.3 Climate Protection – Risk and Opportunity Analysis
- // [Bayer 2023 Sustainability Report](#) – Chapter Focus on: Agriculture – Enabling a Climate-Smart Agriculture
- // [Bayer 2023 Sustainability Report](#) – Chapter 3.6 Crop Science
- // Bayer 2023 CDP Climate Report – www.bayer.com/cdp-climate
- // [Bayer Industry Association Climate Review 2021](#)
- // [Bayer Industry Association Climate Review Update 2022](#)
- // [Bayer Industry Association Climate Review Update 2023](#)

3. Risk Management

As an international life science enterprise, we are exposed to a wide range of internal and external developments and events that could significantly impact the achievement of our financial and nonfinancial targets. Opportunity and risk management is therefore an integral part of corporate management at Bayer. We regard opportunities as positive deviations from projected or target values for potential future developments, while we see risks as negative deviations from these. We augment our risk definition process by also taking into account any potential adverse effects that our business operations could have on people and/or the environment.

We have implemented an integrated risk management system designed to ensure the continued existence and future target attainment of the Group through the early identification, assessment and treatment of risks. Our risk management system is aligned to internationally recognized standards and principles such as the ISO 31000 standard of the International Organization for Standardization and is defined and implemented with the help of binding Group regulations.

Responsibility for the identification, assessment, treatment and reporting of risks lies with the operational business units in the divisions and enabling functions, where risks are identified by the respective risk owner.

In 2023, we looked at the risks and opportunities stemming from the effects of climate change from various perspectives to evaluate them even better in relation to our company and integrate them into our strategy and measures. Climate-related risks are already accounted for in our Group-wide enterprise risk management (ERM) system.

For more information:

// [Bayer 2023 Annual Report](#) – Chapter 3.2 Opportunity and Risk Report

// [Bayer 2023 Sustainability Report](#) – Chapter 2.10 Risk Management

// [Bayer 2023 Sustainability Report](#) – Chapter 7.3 Climate Protection – Risk and Opportunity Analysis

4. Metrics and Targets

4.1 Climate reporting

We have committed to transparently communicating our climate targets and progress, as well as the impact that climate change has on Bayer.

Through our longstanding and continuous participation in [CDP](#), we disclose our climate-related activities and progress with a high degree of detail.

Bayer supports the recommendations of the [Task Force on Climate-Related Financial Disclosures](#) (TCFD) with respect to reporting on this topic. In our report, we implement the 11 recommendations of the TCFD in the four categories of Governance, Strategy, Risk Management and Metrics & Targets.

4.2 Measures to achieve our climate targets

We have developed a net-zero roadmap to achieve our ambitious climate targets. This roadmap comprises various measures in the areas of energy and efficiency, governance and certificates (credits/offsets). To implement our long-term climate strategy, we focus on reducing the greenhouse gas emissions associated with our operations and on strengthening the resilience of our business areas.

Energies & efficiencies

Electricity from renewable energies:

- // By 2029, we intend 100% of the electricity we purchase to be derived from renewable sources.
- // We have defined specific criteria for the procurement of renewable electricity and this information is published on our [website](#). These criteria include the geographical proximity between power generation locations and Bayer's sites, the use of new production sources and a focus on wind and solar energy. The criteria are based on the [next-generation green power guidelines](#) of the WWF (World Wide Fund for Nature).
- // In 2023, we pressed ahead with the conversion of our Group-wide electricity procurement, and renewable energies now account for 35.4% of our total purchased electricity volume (2022: 32.6%).
- // For example, in 2023, we invested in photovoltaic systems or concluded long-term supply agreements with producers of electricity generated from renewable energies for sites in Australia, China, India, Mexico, Thailand and the United States.

Governance

- // Capital expenditures and an internal CO₂ price: We are aligning our capital expenditures to our goal of achieving net-zero greenhouse gas emissions by 2050. This is in line with the international goal of limiting global warming to 1.5°C. To drive this transition, we have launched a pilot project and established an internal CO₂ price of €100 per metric ton of CO₂ for the calculation of our capital expenditure projects.
- // We are also currently developing an internal CO₂ price to manage our Scope 3 emissions.
- // Capital expenditure decisions: We perform a voluntary ecological assessment for capital expenditure projects exceeding €10 million. Emissions reduction and efficiency measures are integral to these evaluations. For more information, please see Chapter 8. Environmental Protection in our 2023 Sustainability Report.
- // Certifications according to the international ISO 14001 (environmental management) and ISO 50001 (energy management) standards help to identify energy savings potential both in existing production processes and in the development of new production processes and the conversion of existing processes. These standards support us in managing and reducing energy consumption at our production sites. For more information, please see Chapter 8. Environmental Protection in our 2023 Sustainability Report.

// Through transparency, we want to motivate our employees in a variety of different areas to consume energy and electricity efficiently. For example, in one office building in Germany, electricity consumption is displayed visually for employees to see. In various areas, best practices are shared – for example, as “sustainability moments,” through the company suggestion system or through networking between Bayer’s country units on the topic of sustainability.

Investment in energy efficiency and renewable energies

- // To achieve an absolute reduction in our remaining emissions, we intend to invest €500 million in renewable energies and in increasing the energy efficiency of our facilities and buildings by 2030.
- // We are investing in process innovations, more efficient facilities and building technology, and in the implementation and optimization of energy management systems, particularly at our production sites.
- // Capital expenditure projects are underway at various sites to advance the use of climate-neutral technologies such as geothermal energy or emissions-free steam production.
- // At our site in Beijing, China, the first part (3,000 m²) of a 1MW photovoltaic system was built and connected to the grid. In 2024, we plan to build an additional 9,000 m².
- // In Berkeley, United States, energy supply using heat pumps for our cell culture technology center were put into operation.
- // At our site in Luling, United States, using enhanced analysis and synchronization of usages, we optimized steam production in a needs-based manner and reduced temporary overproduction.
- // At our sites in Knapsack and Dormagen, both Germany, as well as in MuttENZ, Switzerland, we reduced energy consumption significantly by changing the operation of distillation columns and optimizing chemical and physical process steps.
- // At our site in Oxnard, United States, a new, energy efficient dryer for our vegetable seeds was put into operation.
- // At one site in Guatemala, we improved our ventilation and air conditioning to avoid unnecessary humidification in the dry season (overcooling and reheating). The site was able to reduce energy consumption permanently.
- // At our site in Kunming, China, we modified ventilation and air conditioning to only run in full operation mode during production times. This resulted in relevant reductions of energy usage.

Climate neutrality

- // We will offset those of our emissions (Scope 1 and 2) that still remain following reduction through technological measures and cannot be avoided (such as greenhouse gas emissions generated by chemical processes or through business travel) by purchasing certificates from climate protection projects that meet recognized quality standards. By doing so, Bayer aims to achieve climate neutrality at all its own sites (comprises direct emissions [Scope 1] and indirect emissions [Scope 2, market-based] from Bayer sites whose annual energy consumption exceeds 1.5 terajoules) by 2030. By 2030, the remaining greenhouse gas emissions of our own operations will be fully offset by purchasing carbon certificates from verified climate protection projects, especially in the areas of forest conservation and agriculture. However, our focus is on further reducing our emissions.
- // The climate protection projects with which we aim to generate additional value toward global climate targets need to have a connection to our business. In this respect, too, we have established specific criteria for procuring carbon certificates from climate protection projects. In this process, we focus on nature-based climate solutions, preferably concerning forestry and agriculture projects. We will also invest in innovative projects to promote the development of voluntary emissions trading. On our [website](#), we report on our strategy and the projects we support.
- // Our engagement in voluntary carbon markets is supplementary to our reduction targets and projects for our own greenhouse gas emissions. We recognize that climate protection projects are being criticized in the media. But there is no doubt that forest conservation and reforestation are necessary to limit global warming. Applying clear criteria and transparency on these projects, we want to support voluntary carbon markets.
- // In 2023, we additionally supported projects that enabled more than 600,000 metric tons of greenhouse gas emissions in CO₂ equivalents to be avoided or reduced. For example, we financed reforestation and forest conservation projects in Brazil, Cambodia, Indonesia, Laos, Nicaragua, and Uruguay.
- // In 2023, we supported the topic of biochar, which is produced using pyrolysis and has the potential to capture CO₂ for more than 1,000 years. Biochar is therefore seen as a future technology. It also has the potential to be used in agriculture as a soil conditioner and to reduce the amount of fertilizers used.

- // In 2022, we joined the [Brazilian Initiative for the Voluntary Carbon Market](#). This initiative brings together companies and institutions from several industries in Brazil with the goal of structuring key measures to develop voluntary carbon emissions trading in that country and to contribute to global carbon emissions trading with accredited certificates.
- // In 2023, we used certificates from the Bayer Carbon Program (as part of ForGround by Bayer) for the first time. These support farmers financially who apply sustainable agricultural practices. The volume of CO₂ sequestered in the soil is certified. The resulting emissions certificates can then be sold on the market. Bayer has acquired the equivalent of 100,000 metric tons of CO₂ from this program.
- // LEAF Coalition: The destruction of forests is a pressing global challenge, especially considering that forest conservation is one of the most important measures for protecting biodiversity and the climate. Within the framework of its activities to protect forests, Bayer is a participant in the LEAF Coalition (LEAF = Lowering Emissions by Accelerating Forest finance). LEAF has mobilized more than US\$1.5 billion since 2021 to initiate the biggest public-private effort to protect the rainforests. We clearly advocate enforcement of the corresponding laws to protect the Amazon rainforest. That also includes driving forward the sustainable intensification of agriculture in Brazil to prevent further deforestation. During the UN Climate Conference COP 28 in Dubai, the first contracts on carbon certificates were signed with Costa Rica and Ghana. Certificates from activities undertaken in connection with LEAF are expected to be part of our certificate portfolio beginning in 2024.

Value chain (Scope 3)

We aim to reduce greenhouse gas emissions from relevant Scope 3 categories in our supply chain by an absolute 12.3% (compared to the 2019 base year) by 2029 (in accordance with the criteria set out by the Science Based Targets initiative [SBTi], the following Scope 3 categories of the GHG Protocol Corporate Value Chain [Scope 3] Accounting & Reporting Standard are relevant for Bayer: [3.1] purchased goods and services, [3.2] capital goods, [3.3] fuel- and energy-related activities, [3.4] [upstream] transportation and distribution, [3.6] business travel through cooperation with suppliers and customers). This target was first published in 2019 and validated and acknowledged at the time by the [Science Based Targets initiative](#) (SBTi). In line with the now updated requirements of the SBTi, we submitted an update of this target to the SBTi for validation in January 2024.

Our target to reduce greenhouse gas emissions in the value chain is factored into the compensation of the Board of Management and Bayer's LTI-entitled managerial employees.

Reducing these emissions is a particular challenge because we cannot ourselves directly impact the reduction in greenhouse gas emissions that actually needs to occur, and the framework conditions are equally challenging. Decarbonization at the companies in our value chain is still at an early stage: most still use electricity from renewable energies to an insufficient degree, due in part to inadequate infrastructure and thus availability, and binding political plans and requirements are not in place. In 2023, therefore, we launched a new, internal program to reduce our Scope 3 emissions (Scope 3 Decarbonization Accelerator) through which we coordinate and constantly evolve our various activities. Our Scope 3 Decarbonization Accelerator focuses on the following activities:

- // We further strengthened the demands and expectations we place on our suppliers as regards greenhouse gas emissions. In this connection, we defined specific development paths to cooperate more closely with suppliers that account for a major share of our Scope 3 emissions – either because they supply products with a particularly high greenhouse gas footprint or because we procure large volumes of products from them.
- // By 2030, we expect the identified suppliers to manufacture the products we procure from them using electricity from renewable energy sources exclusively.
- // The objective is for the identified suppliers to establish ambitious climate targets by 2025 that include a net-zero target for no later than 2050. Currently 17 of the 100 suppliers accounting for the biggest share of Bayer's Scope 3 emissions have specified climate targets in accordance with the Paris Agreement as defined by the SBTi. The implementation of climate targets by suppliers remains an industry-wide challenge. Without further action, the resulting reductions for us are therefore insufficient to achieve our targets in the future.
- // At the same time, we are further developing our internal systems and collect climate-related data from our suppliers, particularly the product carbon footprints (PCFs) of the products we procure. Through the Supply Chain Initiative of [CDP](#) (formerly the Carbon Disclosure Project), we ask our strategically important suppliers and those who account for a significantly high proportion of our emissions in the value chain to provide us with more exact greenhouse gas emissions data. The goal is to be able to better integrate the data into the

calculation of our Scope 3 emissions. Based on this data, we also want to identify emissions reduction potential, for example by basing purchasing decisions on emissions or being able to initialize and evaluate joint reduction projects. For more information, please see Chapter 4.3 Sustainability in the Supply Chain in our 2023 Sustainability Report.

As the ability of one company on its own to reduce greenhouse gas emissions along the value chain is only limited, Bayer has joined together with other companies within various initiatives. Together, we aim to ascertain the level of greenhouse gas emissions and climate risks and develop reduction targets and strategies within the scope of programs such as the Together for Sustainability (TfS) initiative of the chemical industry.

The goal is to standardize the calculation of a product carbon footprint (PCF) for the chemical industry. At the same time, an allocation approach is being developed for the product carbon footprint within the value chain. The plan is to share results from the TfS working group with the Partnership for Carbon Transparency (PACT) of the World Business Council for Sustainable Development (WBCSD). PACT develops climate approaches across industries. As a member of the WBCSD, we are working on suitable measures there as well.

Furthermore, we take advantage of the Pharmaceutical Supply Chain Initiative (PSCI) working group to engage in dialogue as part of the pharmaceutical industry about measures to reduce Scope 3 emissions.

For more information on our target of reducing greenhouse gas emissions in agriculture by 30%, please see also the Focus on: Agriculture chapter in our 2023 Sustainability Report.

For more information:

- // [Bayer 2023 Annual Report](#) – Chapter 1.2 Strategy and Management – Sustainability
- // [Bayer 2023 Sustainability Report](#) – Sustainability Strategy chapter
- // [Bayer 2023 Sustainability Report](#) – Chapter 3.6 Product Stewardship – Crop Science
- // [Bayer 2023 Sustainability Report](#) – Chapter 7.2 Decarbonization
- // [Bayer 2023 Sustainability Report](#) – Chapter 7.3 Climate Protection – Risk and Opportunity Analysis
- // [Bayer 2023 Sustainability Report](#) – Chapter 8.1 Environmental Protection – Management Approach
- // <https://www.bayer.com/en/agriculture/article/carbon-zero-future-for-agriculture>

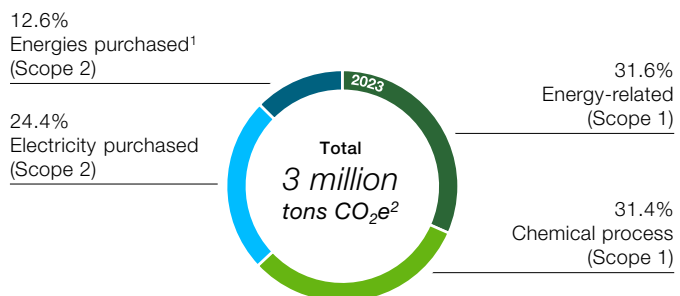
4.3 Metrics

At Bayer, direct greenhouse gas emissions (Scope 1) are primarily caused by the combustion of primary energy sources such as gas and oil. These are used to generate electricity, steam and auxiliary energy (such as for heating and cooling) for the manufacture of our products. Further emissions derive from chemical processes in which coal and other energy sources are required to produce chemical reactions.

Approximately 14% of our Scope 1 emissions are generated in countries with a regulated emissions trading system in which we participate. The purchase of electrical energy largely falls under Scope 2 emissions. Transitioning the electricity consumed by Bayer to 100% renewable energy is therefore a central element of our decarbonization strategy (see Chapter 7.2 Decarbonization in our 2023 Sustainability Report).

In reporting greenhouse gas emissions, we take account of the recommendations of the Greenhouse Gas Protocol (GHG Protocol). Direct emissions from our own power plants, vehicles, waste incineration plants and production facilities (Scope 1) and indirect emissions from the procurement of electricity, steam and cooling energy (Scope 2) are determined at all environmentally relevant sites whose annual energy consumption exceeds 1.5 terajoules. In this connection, we have drafted Group regulations for the Group-wide recording

Sources of Greenhouse Gas Emissions at Bayer



¹ Steam, cooling, other than electricity
² Million metric tons of CO₂ equivalents

of greenhouse gas emissions. In line with the GHG Protocol, we report indirect emissions (Scope 2) according to both the location-based and the market-based methods.

Bayer's greenhouse gas emissions fell further in 2023 compared to 2022. We succeeded in reducing our own Scope 1 and Scope 2 emissions by 0.9%, or around 28,000 metric tons of CO₂ equivalents, particularly by increasing the share of our electricity derived from renewable energies (Scope 2). Overall, we have already reduced our own emissions (Scope 1 and Scope 2) by 20.2% compared with the base year 2019.

Scope 1, Scope 2 and Scope 3 Emissions

Greenhouse Gas Emissions (Scope 1 and 2)

Million metric tons of CO ₂ equivalents	2019	2020	2021	2022	2023
Scope 1: Direct emissions ¹	2.08	2.01	1.93	1.91	1.89
of which carbon dioxide (CO ₂)	1.97	1.96	1.90	1.85	1.84
of which ozone-depleting substances	0.019	0.011	0.011	0.011	0.003
of which partially fluorinated hydrocarbons (HFCs)	0.022	0.022	0.014	0.039	0.040
of which nitrous oxide (N ₂ O)	0.006	0.008	0.007	0.007	0.008
of which methane (CH ₄)	0.002	0.003	0.003	0.003	0.003
Scope 2: Indirect emissions ² according to the location-based method	1.77	1.75	1.56	1.56	1.65
Scope 2: Indirect emissions ² according to the market-based method ³	1.68	1.57	1.24	1.12	1.11
Total greenhouse gas emissions (Scope 1 and 2) according to the market-based method³	3.76	3.58	3.17	3.03	3.00
Offset greenhouse gas emissions ⁴			0.3	0.45	0.60
Specific greenhouse gas emissions (kg CO ₂ e/€ thousand external sales) according to the market-based method ^{3, 5}	86.38	86.55	71.95	59.72	63.03

¹ In line with the GHG Protocol, we also report the direct emissions resulting from the generation of energy for other companies that is sold as a site service. In 2023, these emissions corresponded to 0.11 million metric tons of CO₂ equivalents.

² Typically, CO₂ accounts for 97.2% of all energy-related greenhouse gas emissions. When determining indirect emissions, our calculations are therefore limited to these greenhouse gases and we indicate all emissions in CO₂ equivalents.

³ For Bayer, the market-based method of the GHG Protocol most reliably reflects the values for Scope 2 emissions and the success of emissions reduction measures, so we apply emissions volumes calculated using this method when calculating the total and specific greenhouse gas emissions.

⁴ Corresponds to a share of 20.0% of Scope 1 and 2 emissions in 2023

⁵ Specific Bayer Group emissions are calculated by adding together direct emissions and indirect emissions calculated using the market-based method of the GHG Protocol (Scope 2), then dividing the total volume by the external sales volume.

In 2023, Bayer participated in European emissions trading with a total of five plants. These facilities account for more than 265,000 metric tons of CO₂ emissions.

Due to the varying depth of value creation, direct and indirect greenhouse gas emissions (Scope 1 and Scope 2) are unequally distributed among our divisions. Our raw material extraction activities, including treatment and downstream processing, for the manufacture of the crop protection intermediates of Crop Science are especially energy-intensive – this division therefore accounts for the greatest share of our greenhouse gas emissions.

Greenhouse Gas Emissions by Division (Scope 1 and 2)

Million metric tons of CO ₂ equivalents	2019	2020	2021	2022	2023
Scope 1: Direct emissions ¹	2.08	2.01	1.93	1.91	1.89
of which Crop Science	1.70	1.65	1.61	1.58	1.55
of which Pharmaceuticals	0.20	0.19	0.18	0.18	0.17
of which Consumer Health	0.02	0.02	0.02	0.02	0.02
of which other ²	0.15	0.16	0.13	0.14	0.16
Scope 2: Indirect emissions ³ according to the market-based method ⁴	1.68	1.57	1.24	1.12	1.11
of which Crop Science	1.40	1.38	1.06	0.93	0.94
of which Pharmaceuticals	0.19	0.13	0.12	0.11	0.10
of which Consumer Health	0.09	0.06	0.05	0.05	0.05
of which other ²	0.002	0.004	0.003	0.03	0.02

¹ In line with the GHG Protocol, we also report the direct emissions resulting from the generation of energy for other companies that is sold as a site service.

² These include greenhouse gas emissions from the vehicle fleet and emissions caused by the enabling functions.

³ Typically, CO₂ accounts for 97.2% of all energy-related greenhouse gas emissions. When determining indirect emissions, our calculations are therefore limited to these greenhouse gases and we indicate all emissions in CO₂ equivalents.

⁴ For Bayer, the market-based method of the GHG Protocol most reliably reflects the values for Scope 2 emissions and the success of emissions reduction measures, so we apply emissions volumes calculated using this method when calculating the total and specific greenhouse gas emissions.

Value chain (Scope 3)

The GHG Protocol Corporate Value Chain (Scope 3) Accounting & Reporting Standard bindingly regulates the reporting of all indirect greenhouse gas emissions from the value chain and separates these emissions into 15 categories. Emissions from eight Scope 3 categories are of material importance to Bayer and together account for our total Scope 3 emissions.

We use the spend-based/average spend-based method to calculate the relevant greenhouse gas emissions in the categories “Scope 3.1 purchased goods and services” and “Scope 3.2 capital goods,” which we implement with the “estell” calculation model of the Systain consulting firm. This model is based on a detailed, multi-regional environmentally extended input output (EEIO) database in line with the GHG Protocol. We use data from our purchasing system for the calculation, broken down according to cost types and the country in which we make the purchase. The emission factors used by “estell” are based on the input/output tables of the OECD, supplemented with additional data from the [Bureau of Economic Analysis \(BEA\)](#) and indicators of the [World Bank](#) and the [EXIOBASE](#).

Primary data on emissions from the products and services purchased by us, capital goods, energy sources and the associated logistics can currently only be provided by a small number of players. Once this data is more readily available, we intend to include it to a greater degree in the calculation of our Scope 3 emissions. Another objective is to be able to measure our suppliers’ efforts in achieving decarbonization in the supply chain (e.g. by transitioning to electricity from renewable energy sources). In this context, we want to intensify the dialogue with our suppliers and help them to achieve the global goal of net-zero greenhouse gas emissions. A detailed description of the procedures and data applied by Bayer in the individual categories is contained in the [Report to CDP](#).

Greenhouse Gas Emissions in the Value Chain (Scope 3)

Million metric tons of CO ₂ equivalents	2019	2020	2021	2022	2023
Scope 3: Indirect emissions from our upstream and downstream value chain (by materiality) ¹	9.99	8.91	8.91	9.72	9.18
of which indirect emissions from our upstream and downstream value chain to attain the SBT ^{2, 3}	8.82	7.93	7.97	8.98	8.44
of which (3.1) purchased goods and services	6.62	6.15	6.14	6.94	6.52
of which (3.2) capital goods	0.51	0.40	0.46	0.51	0.49
of which (3.3) fuel- and energy-related activities	0.73	0.63	0.63	0.55	0.54
of which (3.4) (upstream) transportation and distribution	0.66	0.70	0.71	0.82	0.70
of which (3.6) business travel	0.30	0.06	0.03	0.15	0.19
Progress in the reduction of Scope 3 emissions compared to the base year 2019 ^{3, 4, 5}		-10.8%	-9.6%	+1.8%	-4.2%

Previous years’ figures restated

¹ Emissions from eight Scope 3 categories are of material importance to Bayer and together represent our total Scope 3 emissions: (3.1) purchased goods and services, (3.2) capital goods, (3.3) fuel- and energy-related activities, (3.4) (upstream) transportation and distribution, (3.5) waste generated in operations, (3.6) business travel, (3.7) employee commuting and (3.12) end-of-life treatment of sold products.

² Science Based Target

³ For the calculation of our reduction target for Scope 3 emissions in line with SBTi, 88% of total materially important Scope 3 emissions in the base year 2019 are considered (target inventory). The following Scope 3 categories are covered: (3.1) purchased goods and services, (3.2) capital goods, (3.3) fuel- and energy-related activities, (3.4) (upstream) transportation and distribution and (3.6) business travel.

⁴ 2029 target: 12.3% reduction

⁵ All greenhouse gas emissions from air travel in 2021, 2022 and 2023 were offset.

In accordance with the guidelines of the Science Based Targets initiative (SBTi), the calculation of our reduction target for Scope 3 emissions utilizes only the five major categories that made up the biggest portion of our Scope 3 emissions (88%) in the base year 2019. These are shown in the table on the left. For more information on initiatives to reduce Scope 3 emissions, please see Chapter 7.2 Decarbonization in our 2023 Sustainability Report.

In the Scope 3 Science Based Target (SBT) categories that are relevant for us, our emissions fell by 0.53 million metric tons of CO₂ equivalents, representing a decrease of 6.0% compared with 2022. The reduction in Scope 3 emissions in the SBT-relevant Scope 3 categories can essentially be attributed to reduced purchase volumes (Scope 3.1) and associated logistics operations (Scope 3.4). In the non-SBT-relevant categories (Scope 3.5, 3.7 and 3.12), emissions fell slightly by 4,500 metric tons (0.6%) compared with 2022.

Category 3.1 (purchased goods and services) accounts for the most significant share of our Scope 3 emissions, at 77%.

Total greenhouse gas emissions

In 2023, we reduced our total greenhouse gas emissions (Scope 1, 2 and 3) compared to the base year 2019 by around 1.1 million metric tons, while our business has grown over the same period. Regarding the reduction in our own emissions (Scope 1 and 2) we have already exceeded our targets, achieving a decline of 20.2% since 2019. Reducing emissions in our value chain (Scope 3) is an increasing challenge in the face of a growing business. To achieve significant reductions in the supply chain in the coming years, we are intensifying our collaboration with suppliers, in particular in terms of a shift to renewable energies. We have also specified this in our updated Supplier Code of Conduct. In 2023, we began developing an internal CO₂ price to manage our Scope 3 emissions. This should create an incentive internally to purchase products with a lower carbon footprint.

Total Greenhouse Gas Emissions (Scope 1, 2 and 3)			
Million metric tons of CO ₂ equivalents	2019	2022	2023
Total emissions according to the location-based method ¹	12.67	12.46	11.98
Total emissions according to the market-based method ²	12.58	12.01	11.45
Specific total emissions (kg CO ₂ e/€ thousand external sales) according to the location-based method ³	290.93	245.52	251.58
Specific total emissions (kg CO ₂ e/€ thousand external sales) according to the market-based method ⁴	288.87	236.68	240.28

Previous years' figures restated

¹ Total emissions according to the location-based method are calculated by adding together direct emissions (Scope 1) and indirect emissions calculated using the location-based method of the GHG Protocol (Scope 2), plus indirect emissions from our value chain. For the Scope 3 categories, we use the five categories of material importance to Bayer that represent our target inventory for Scope 3 emissions: (3.1) purchased goods and services, (3.2) capital goods, (3.3) fuel- and energy-related activities, (3.4) (upstream) transportation and distribution and (3.6) business travel.

² Total emissions according to the market-based method are calculated by adding together direct emissions (Scope 1) and indirect emissions calculated using the market-based method of the GHG Protocol (Scope 2), plus indirect emissions from our value chain. For the Scope 3 categories, we use the five categories of material importance to Bayer that represent our target inventory for Scope 3 emissions (see above).

³ Specific total emissions according to the location-based method are calculated by adding together direct emissions (Scope 1) and indirect emissions calculated using the location-based method of the GHG Protocol (Scope 2), plus indirect emissions from our value chain, then dividing this total by the external sales volume. For the Scope 3 categories, we use the five categories of material importance to Bayer that represent our target inventory for Scope 3 emissions (see above).

⁴ Specific total emissions according to the market-based method are calculated by adding together direct emissions (Scope 1) and indirect emissions calculated using the market-based method of the GHG Protocol (Scope 2), plus indirect emissions from our value chain, then dividing this total by the external sales volume. For the Scope 3 categories, we use the five categories of material importance to Bayer that represent our target inventory for Scope 3 emissions (see above).

For more information:

// [Bayer 2023 Sustainability Report](#) – Chapter 7.4 Climate Protection – Greenhouse Gas Emissions

// We address our climate protection activities in our latest report to CDP (formerly the Carbon Disclosure Project): www.bayer.com/cdp-climate

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