



# 2023 TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES REPORT

# CHAIRMAN & CEO MESSAGE

On behalf of Caterpillar, I am pleased to share our second annual Task Force on Climate-related Financial Disclosures (TCFD) report, which describes how climate-related risks and opportunities may impact our business and how we are positioned to respond. This report also represents a further enhancement of our climate and sustainability disclosures to demonstrate shareholder responsiveness.

Caterpillar supports the transition to a lower-carbon future, and we are contributing by significantly reducing greenhouse gas (GHG) emissions in our operations and continuing to invest in a diverse portfolio of products, technologies and services that help customers achieve their sustainability goals.

At Caterpillar, we believe the energy transition and growing global energy demand expand opportunities for long-term profitable growth through increasing demand for a variety of Caterpillar products and services. We are working with our customers to identify their challenges, understand their requirements and deliver solutions to help them build a better, more sustainable world.



**Jim Umpleby**  
Chairman & CEO



## Navigating This Report

Caterpillar's Task Force on Climate-related Financial Disclosures (TCFD) report aligns with the 11 recommended disclosures of the TCFD and summarizes how we govern our strategy to address climate-related risks and opportunities and support customers in the energy transition. A TCFD index in the Appendix maps this report against TCFD's recommendations to further help readers identify the most relevant information.

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# INTRODUCTION

With 2023 sales and revenues of \$67.1 billion, Caterpillar Inc. is the world's leading manufacturer of construction and mining equipment, off-highway diesel and natural gas engines, industrial gas turbines and diesel-electric locomotives. In 2022, we performed a climate opportunity and risk assessment with scenario analysis to enhance our understanding of potential impacts of climate change on Caterpillar's business strategy. The results of our analysis continue to inform our decision-making and demonstrate that our enterprise sustainability strategy is resilient under a variety of assumptions for how the energy transition may unfold under possible future climate scenarios. Our 2023 TCFD Report builds on our inaugural 2022 report highlighting the opportunities for profitable growth presented by the energy transition.

The energy transition can expand opportunities for profitable growth in various ways. For example, we continue to believe the energy transition will support increased commodity demand over time, benefiting our mining customers. Global energy demand is also rising, with expected growth in both renewables and many traditional forms of energy. The energy transition will require significant global infrastructure investment, which is expected to expand opportunities for Caterpillar including our distributed power generation products to support electric grid stability. The combination of the energy transition and growing global energy demand is increasing Caterpillar's total addressable market. This results in opportunities to grow original equipment manufacturing and services in Resource Industries, Construction Industries, and Energy and Transportation, whether in construction equipment, mining machines, or fuel-flexible engines integrating new technologies and solutions.





# GOVERNANCE

At Caterpillar, robust governance creates long-term value for our shareholders, strengthens board and management accountability, and builds trust in the company and our brand. Strong governance contributes to enduring success, and Caterpillar has an experienced and highly engaged board of directors committed to sound enterprise governance policies and practices. Caterpillar's Code of Conduct, Our Values in Action, provides the framework to operate our business responsibly and with integrity to deliver long-term shareholder value. Our board is comprised of 10 directors, as of the date of this report, with a diverse range of experiences across a wide range of industries, including manufacturing, utilities, energy, transportation, automotive and agriculture, as well as notable experience and expertise in sustainability, climate and the energy transition.

## BOARD OVERSIGHT

The board is responsible for aligning our strategic priorities, including integrating sustainability objectives throughout the enterprise. The board also oversees the management of risks and opportunities associated with climate change including through four committees, each with its own responsibilities: the Sustainability and other Public Policy Committee, the Compensation and Human Resources Committee, the Audit Committee and the Nominating and Governance Committee. The board considers committee recommendations on climate-related strategies, priorities, goals and performance when making decisions about Caterpillar's business strategy, risk management, financial planning and performance.



## SUSTAINABILITY GOVERNANCE

Caterpillar Board of Directors

Sustainability & other Public Policy Committee

Chief Executive Officer

Executive Office including Chief Sustainability Officer

### The Sustainability and other Public Policy Committee (SPPC)

The SPPC has explicit oversight over climate change, environmental and sustainability issues, and social and public policy matters relevant to Caterpillar's operations and performance. The SPPC recommends sustainability policies, programs and strategies, reviews the development and implementation of Caterpillar's sustainability goals, including the framework and initiatives that underpin progress, and monitors the company's performance against these goals. The committee reviews shareholder proposals related to sustainability, climate risk, climate resilience and other public policy issues and recommends responses to the board. The chief sustainability officer (CSO) and enterprise sustainability team discuss these matters with the SPPC bimonthly at every regularly scheduled committee meeting.

### The Compensation and Human Resources Committee (CHRC)

The CHRC oversees the company's compensation and benefits plans, including compensation for executive officers, and recommends the chief executive officer's (CEO) compensation to the board. The CHRC is informed of climate-related issues through periodic reports from management and regular updates from the chair of the SPPC on sustainability issues, which inform the CHRC's design of incentive compensation for executives. Executive compensation is based on the company's strategic objectives, including climate-related issues. The board incorporates sustainability and climate considerations into the incentive plan for executive officers. More information on executive compensation is available in our proxy statement. The CHRC annually reviews incentive compensation arrangements to ensure that incentive pay does not encourage unnecessary risk taking. It also reviews and discusses the relationship between risk management policies and practices, enterprise strategy and executive compensation.

### The Audit Committee (AC)

The AC reviews Caterpillar's enterprise risk management (ERM) processes and outputs. Caterpillar's ERM program considers risks across many categories, including strategy, operational, financial and legal compliance risks. Sustainability-related risks, such as climate change, are embedded in each risk category. These risks are treated with the same priority and rigor as other risks across the enterprise. The AC assists the board in overseeing the ERM program including risk assessment and management policies and procedures covering risks related to the company's financial reporting requirements, system of internal controls, the internal audit program, the independent auditor, the compliance program and the information security program. Every year, the AC discusses with management the company's risk assessment and management framework and reviews the most significant enterprise-wide risks from ERM, including climate-related risks. Additionally, the AC oversees internal audits regarding the accuracy of the facts and data used in the company's ESG-related public reporting.

### The Nominating and Governance Committee (NGC)

The NGC oversees matters related to corporate governance to ensure and maintain appropriate board governance, structure and composition necessary to oversee risks managed by the company, including those related to sustainability. The NGC oversees the structure of the board and its committees by ensuring the appropriate division of responsibilities, adequate structures and that the board devotes a suitable amount of time to each issue. The NGC also oversees director qualifications and ensures that directors possess the correct skill sets to effectively advise the company on all relevant risks, including those related to climate and sustainability. This responsibility includes identifying and evaluating the skill sets of proposed director candidates and making recommendations regarding the selection of candidates to serve. The NGC leads the annual self-evaluation of the board and its committees whereby the board assesses its performance and whether the board, its committees and individual directors are functioning effectively. This robust evaluation process helps the board identify and implement necessary improvements to address any real or perceived shortcomings. The NGC also has oversight over all governance processes and ensures that the company has implemented effective governance processes, overseen by the board and its relevant committees, for all risks the company faces.

**More information about board oversight and governance, including board committees and corporate governance can be found on [our website](#) or [Caterpillar's annual proxy statement](#).**



## MANAGEMENT'S ROLE

In addition to the board's sustainability governance and oversight responsibility, Caterpillar management's sustainability governance includes our CEO and all executive officers, collectively the Executive Office, including the CSO. The CSO reports directly to the CEO representing an essential driver of our company's commitment to sustainability to strengthen management's role in assessing and managing climate-related risks and opportunities. The CSO leads Caterpillar's climate and sustainability initiatives and works with the Executive Office to further integrate climate and sustainability considerations into our core business strategies. As previously stated, the CSO also provides climate and sustainability updates at every regularly scheduled meeting of the SPPC.

Our enterprise sustainability team executes the ongoing cross-functional enterprise assessment and management of climate-related risks and opportunities. The enterprise sustainability team supports the execution of sustainability initiatives across Caterpillar's global footprint, coordinating efforts to achieve its sustainability targets, such as its 2030 sustainability goals. Business unit leaders responsible for local implementation of strategic objectives consider climate-related issues when setting goals, developing forecasts, identifying relevant risks and assessing market opportunities for respective business units. Sustainability execution is integrated through our matrixed structure across business units and enterprise functions, whether embedding sustainability in introducing new products or collaborating with customers to demonstrate lower-carbon solutions in the marketplace.

At Caterpillar, our board and management are committed to a robust governance framework that enables the execution of our enterprise strategy, including effective management of climate-related risks and opportunities. This framework guides our commitment to developing innovative products, technologies and services to help our customers achieve their climate-related objectives and build a better, more sustainable world.

## ADVOCACY

We support the goals of the Paris Agreement to limit global temperature rise, and we are committed and contributing to a reduced-carbon future. Our commitment extends to our public policy efforts as we advocate for a thoughtful approach to identifying and advancing policies that support our customers during the energy transition. Read more about how we address our advocacy to support our customers in the energy transition in the climate lobbying section of our [Lobbying Report](#).





# STRATEGY

Since our founding in 1925, sustainable innovation has powered our business, inspiring us to develop innovative products, technologies and services to support our customers on their sustainability journey. Our longstanding commitment to sustainability has inspired us to set and achieve meaningful sustainability goals. Sustainability is one of Caterpillar's Values in Action, guiding our daily activities to balance environmental stewardship, social responsibility and economic growth. Our enterprise strategy includes sustainability as a key focus area together with operational excellence, expanded offerings and services, reflecting how we help customers build a better, more sustainable world.

## CLIMATE SCENARIO ANALYSIS

In 2022, Caterpillar performed a climate opportunity and risk assessment including scenario analysis to enhance our understanding of the potential impacts of climate change on Caterpillar's business and further prepare for the energy transition. This assessment was performed with support from a third-party consultant, leveraging TCFD guidance, industry insights, climate-related expertise, and Caterpillar leaders and subject matter experts. The analysis aimed to identify, assess and prioritize climate-related risks and opportunities for Caterpillar's industry and operating model. We performed scenario analysis to identify potential implications to Caterpillar's business over the short, medium and long term, and across three climate scenarios. The selected scenarios leverage data and qualitative narratives from the Intergovernmental Panel on Climate Change (IPCC) for physical risks and the International Energy Agency's World Energy Outlook (IEA WEO) for transition risks and opportunities. Further descriptions of these scenarios can be found later in this section. Through our analysis, we identified the climate-related risks and opportunities that follow.



## CLIMATE-RELATED PHYSICAL ISSUES<sup>1</sup>

Caterpillar recognizes that under future climate scenarios identified by the IPCC, the leading scientific authority on the topic, climate change may generate physical impacts on physical infrastructure and natural habitats. Relying on IPCC findings, our climate scenario analysis evaluated potential impacts of possible acute and chronic physical risks at the facilities where Caterpillar operates through the assessment of underlying climate hazards such as extreme heat, wildfires and floods. The physical climate scenario analysis leveraged scientific consensus on future climate scenarios from the IPCC, projecting potential physical climate impacts on our operations. We estimated the percentage of key Caterpillar manufacturing sites and facilities exposed to relevant physical climate hazards under different future scenarios. Applying this methodology, these facilities may experience physical damage, operational disruptions, higher insurance premiums and/or impacts on our workforce's health and safety.

The table below structures our analysis results, highlighting specific details from TCFD guidance such as risk type, time horizon and potential impacts. The analysis identified geographies that may be most impacted by physical climate risk principally in Asia and

North America. Although for impacted facilities, the magnitude of these risks is medium-high, Caterpillar's global manufacturing footprint with sites across each continent is an inherent source of resilience to physical climate risks, and facilities also maintain robust contingency plans to cope with natural disasters, including how to migrate the facility's operations to another site if required. Furthermore, our primary insurance provider assists in physical risk identification and management by highlighting facilities that have the potential for an extreme weather event.

The energy transition represents an opportunity for Caterpillar to help solve complex engineering and technical challenges for the benefit of our customers. This includes supporting society in addressing physical climate impacts such as extreme weather. Caterpillar will continue offering solutions and services to support customers impacted by acute and chronic physical risks. Our products can support rebuilding efforts after natural disasters such as hurricanes and wildfires. Our strategy positions us to respond to potential physical climate risks and underlying climate hazards while supporting our customers as they respond to the changing climate.

### PHYSICAL RISKS

#### RISK: Acute Physical Risk

##### RISK TYPE(S): Acute

**DESCRIPTION:** Relying on IPCC projections, potential increases in the frequency and intensity of acute physical risks, such as extreme heat, flood, extreme precipitation and wildfire, may cause operational and financial impacts. Such impacts may include physical damage, loss or degradation of facilities or equipment, operational disruptions, decreased manufacturing productivity, supply chain disruptions, increased workforce health and safety concerns, and higher insurance premiums or retentions. Under IPCC projections, Caterpillar operations in some locations are potentially exposed to a wide range of acute physical risks and their associated impacts.

##### IMPACT:

**Time horizon:** Medium- to long- term

**Primary potential financial impact:** Increased operating expenses and decreased revenue

**Potential impact:** Medium-High<sup>2</sup>

#### RISK: Chronic Physical Risk

##### RISK TYPE(S): Chronic

**DESCRIPTION:** Relying on IPCC projections, potential longer-term, incremental changes to climate patterns, such as projected increases in annual average temperature or changes in total annual precipitation, may impact aspects of Caterpillar's business through disruptions to ongoing operations and productivity, and increased operating expenses.

##### IMPACT:

**Time horizon:** Long-term

**Primary potential financial impact:** Increased operating expenses and decreased revenue

**Potential impact:** Medium-High

<sup>1</sup>Climate-related issues refers collectively to both climate-related risks and opportunities as defined in TCFD's 2021 Implementation Guidance.

<sup>2</sup>Medium-High is the rating result of the impact assessment performed by our third-party consultant using their methodology to assess the percentage of key Caterpillar manufacturing sites and facilities exposed to relevant physical climate hazards under future climate scenarios.



## CLIMATE-RELATED TRANSITION ISSUES

Caterpillar expects customers to adopt energy transition solutions at substantially different rates by segment, application and geography. Factors such as customer needs, economic considerations and the regulatory environment will likely impact adoption rates, and these factors and the rate of change will shape any potential impact on our business. Our transition climate scenario analysis involved estimates and analysis from our third-party consultant to inform a qualitative assessment of potential impacts from our internal subject matter experts and leaders familiar with our business, recognizing the relative early-stage maturity of transition scenario analysis.

### Energy Transition Changes in Market Demand for Products and Services

The energy transition may impact market demand for our products and services. This includes the opportunity of increased demand for lower-carbon products and services such as fuel-flexible and electrified machinery, equipment and engines, and related services such as battery replacement, as well as traditionally powered products and services due to growing global energy demand. Rising demand for lower-carbon products and services may increase Caterpillar's incremental revenues from expanded offerings to meet the evolving needs of new or existing customers. This could include construction equipment for physical and energy infrastructure, mining equipment for critical metals and products powered by alternative fuels.

Conversely, there also exists the possibility of decreased market demand for products and services due to challenges in meeting emerging climate-related customer and industry expectations. Caterpillar may see reduced demand for products that consume fossil fuels such as diesel engines if applicable industries increasingly adopt alternative

technologies or are impacted by more stringent climate-related regulations. Caterpillar's competitors and new market entrants may enhance their competitive position relative to Caterpillar depending on how they respond to evolving market expectations.

These potential impacts relate to several TCFD categories of climate-related risks and opportunities including products and services, technology and markets, which could occur over a long-term time horizon. The potential impact is assessed as high and may include increased revenues through access to new and emerging markets or increased demand for new and traditional products and services, or conversely, decreased revenues due to reduced market demand for traditional products and services or missed opportunities in new and emerging markets.

Caterpillar recognizes uncertainty in the pace of customer adoption and regulatory changes for lower-carbon solutions that may lead to changes in market demand for our products and services. However, our company will continue offering diverse solutions to serve our customers for their sustainability and business objectives. Our enterprise strategy and legacy of innovation position us to capture climate-related growth opportunities while managing the potential risks of changing customer demands. The energy transition and growing global energy demand are expected to expand Caterpillar's total addressable market. Regardless of the speed of the energy transition, Caterpillar is well positioned to contribute to a reduced-carbon future while profitably growing our company and helping our customers achieve their climate-related objectives.



# SUPPORTING OUR CUSTOMERS IN THE ENERGY TRANSITION

## Supporting the Mine Sites of the Future

Our mining equipment supports the increased demand for critical materials required for evolving energy technologies. These include copper, lithium, nickel and aluminum for electric vehicles, battery storage, wind and solar power, and grid modernization and stability.

## Building Infrastructure

Our construction equipment helps build the infrastructure needed for the energy transition. Improving fuel efficiency and productivity of machines helps customers reduce greenhouse gas emissions.



## Optimizing Natural Gas

Our reciprocating engines and gas turbines are widely used across the globe in upstream natural gas production and transmission. Natural gas is playing an important role in the energy transition.

## Increasing Alternative Fuel Capabilities

We offer machines and engines that are capable of operating on alternative fuels, such as biodiesel, biogas, hydrogen, hydrotreated vegetable oil and methanol while continuing to develop technologies for the future.

## Enhancing Energy Reliability

Customers utilize our reciprocating engine and gas turbine generator sets to support grid stability as renewable energy is increasingly added to the grid.



**The Cat® R2900 XE, Caterpillar's first diesel electric underground load-haul-dump (LHD) loader, delivers larger payloads, faster loading and reduced emissions.**



## POSITIONING OUR PRODUCT PORTFOLIO TO SUPPORT THE ENERGY TRANSITION

Our sustainability journey inspires us to help our customers build a better, more sustainable world through products and services that help sustainably fulfill society's need for infrastructure — shelter, clean water, transportation and reliable energy. Sustainability is a focus area of our strategy for long-term profitable growth. Now more than ever, our customers rely on us to provide diverse products, services and technology that help lower greenhouse gas (GHG) emissions, improve efficiency and productivity, and deliver energy flexibility.

### Product Efficiency

Caterpillar offers the latest technologies aimed at improving fuel efficiency, reducing emissions, and ultimately leading to cost savings for our customers. Examples are included from each of our segments below.

The Cat® 980 XE Wheel Loader features a Caterpillar-designed and manufactured continuous variable transmission, improves fuel efficiency by as much as 35% and reduces GHG emissions by as much as 17% compared to the previous model.

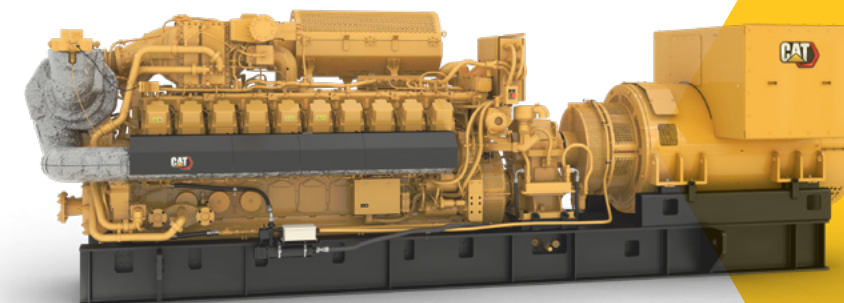
The Cat R2900 XE, Caterpillar's first diesel electric underground LHD loader, delivers larger payloads, faster loading and reduced emissions. The new loader features a proven switch reluctance electric drive system. Its continuous variable speed control delivers improved power and cycle times; the high-efficiency system helps reduce fuel consumption, GHG emissions and total cost of ownership. Equipped with the Cat C15 engine including a variety of emissions reduction and aftertreatment options, the new R2900 XE LHD delivers the power needed with greater than 31% increased fuel efficiency compared to the R2900G.

We are also improving the efficiency of our natural gas engines. The Cat G3600 Gen 2 introduced this year in gas compression applications reduces methane emissions by 33% compared to the previous model while boosting power by 10%.

### Fuel Flexibility

Caterpillar has been a technology leader for nearly a century. We have significant experience developing innovative technologies through consistent R&D investments. To support our customers' climate objectives, we continue to invest in power sources that offer lower emissions without sacrificing performance. Our products can use an increasingly wide range of fuels, including renewable fuels, biodiesels, biogas, hydrogen and hydrogen blends, which helps our customers achieve their climate-related objectives.

Caterpillar has made substantial progress in expanding our portfolio of generator sets capable of operating on natural gas blended with up to 25% hydrogen by volume. The lineup now includes the Cat CG132B and Cat CG170B generator sets, and the G3500H series platform. Additionally, Caterpillar offers aftermarket retrofit kits for updating select G3500H series platform products to provide the same hydrogen blending capabilities. These new generator sets add to Caterpillar's current portfolio of hydrogen-capable power solutions.



## Electrification

Caterpillar is committed to delivering robust electrified products and solutions for our customers. We are gaining valuable experience from our initial introductions of battery-powered equipment, and additional battery-powered machines and chargers under development will help our customers achieve their sustainability objectives. Caterpillar-designed batteries can power a variety of industrial applications. The lithium-ion battery range, built on our proven technology, features a modular design that offers flexible configurations. The batteries are engineered to be scalable to industry and customer performance needs and maximize sustainability throughout their life cycle, including recycling and reuse at the end of life.

At the CONEXPO-CON/AGG construction trade show in 2023, we displayed components of Caterpillar's total construction site solution for the energy transition, including four battery electric machine prototypes — Cat 301.9 Mini Excavator, 320 Medium Excavator, 950 GC Medium Wheel Loader and 906 Compact Wheel Loader — in addition to AC and DC charging solutions. Caterpillar's battery prototypes powering these battery electric machines use lithium-ion technology.

We continue to work closely with our customers to determine the optimal pathway to market adoption for our battery electric technologies.



## CATERPILLAR'S EARLY LEARNER PROGRAM

Caterpillar demonstrated the first battery electric 793 Large Mining Truck Prototype in 2022 with support from key mining customers participating in Caterpillar's Early Learner program. Commercial production of the first of seven Early Learner trucks is underway today.

The Early Learner program focuses on accelerating the development and validation of Caterpillar's battery electric trucks at participating customers' sites. This approach supports the individual commitments each Early Learner participant has made to reduce and eliminate greenhouse gas emissions from their operations. A primary objective of the program is for Caterpillar to collaborate more closely with customers as the industry undergoes transformational change through the energy transition.

In an extension of the program into quarry and aggregates, CRH and Caterpillar signed an electrification strategic agreement focused on accelerating the deployment of Caterpillar's 70 to 100-ton-class battery electric off-highway trucks and charging solutions at a CRH site in North America. CRH will test and validate battery electric off-highway trucks in real-world applications, and provide customer feedback to address safety, performance, operational and compliance requirements.

At the end of 2023, participants in the Early Learner program with definitive electrification agreements included BHP, CRH, Freeport-McMoRan, Newmont Corporation, NMG, Rio Tinto and Teck Resources Limited.

An additional example of industry collaboration includes Caterpillar's first battery electric prototype underground mining truck, which has grown our battery electric and semi-autonomous technology portfolio for underground mining applications. This battery electric truck will complete Caterpillar's first fully electric underground load and haul solution when paired with the commercially available R1700 XE Battery Electric Loader. Caterpillar developed its first battery electric prototype underground mining truck with input and support from Newmont Corporation. The collaboration is aimed at achieving Newmont's vision of a fully connected, automated, zero-exhaust emitting, end-to-end mining system.



## Remanufacturing

Caterpillar products are built to be rebuilt. Caterpillar actively promotes extending the life of our machines through rebuilding and remanufacturing, which offers the opportunity to return equipment to like-new condition. Cat Reman facilitates an exchange business where customers trade a used product or part for a remanufactured one, which lowers total cost of ownership. Caterpillar then takes the traded-in (core) product, strips it down to the lowest-level component and puts it through our remanufacturing process.

Because we are returning end-of-life components to like-new condition, we reduce waste and minimize the need for raw material and energy to produce new parts. We recycle millions of pounds of end-of-life iron annually. In 2023, 147 million pounds of material was taken back through Cat Reman. Remanufacturing helps keep high-value raw materials, such as iron, in productive use and extends the value created through consuming important resources like energy and metals in a component's original manufacturing process.

## System Integration

Caterpillar is uniquely positioned to meet the diverse needs of the energy transition, given the breadth of our products and the industries we serve. For example, we provide differentiation to our customers with the ability to integrate the engines we develop, including lower-carbon technologies, into the construction and mining machines we offer. We also have broad capabilities in integrating lower-carbon intensity fuels, batteries, electric and hybrid powertrains, and advanced controls into our equipment and worksite solutions to support customer sustainability goals. Our holistic approach maximizes the effectiveness of machines, electrical systems, supporting technologies and services to provide a total job site solution.

As the energy landscape evolves, power systems are becoming increasingly complex, utilizing multiple energy sources and grid interfaces. Cat Energy Storage Systems (ESS) is a suite of commercially available battery technologies that help enhance power reliability and quality, improve flexibility in power system design, support the integration of renewable energy sources, and potentially reduce overall energy costs. Cat ESS offerings include Cat Power Grid Stabilization, Cat Energy Time Shift and Cat Compact ESS modules. The systems feature flexible, scalable and modular designs for a wide range of electric power distributed energy system applications, offering capabilities including generator set transient assist, grid integration and support, shifting of energy from time of generation to time of use, power stabilization, power factor correction and renewable energy integration.

Caterpillar has the experience pairing established power sources with new technologies to meet customer needs. By combining our technology, digital solutions and deep system integration capabilities, we can seamlessly integrate the established power sources of today with emerging technologies. These include electric drives, hybrid powertrains for mobile equipment, and microgrids for stationary power that can integrate many kinds of energy, including wind, solar and batteries into sophisticated, smart and efficient power systems.

At the same time, we work with our customers to provide supporting technology, including autonomous systems that boost safety and productivity while enabling more consistent and efficient operations. Caterpillar has long invested in autonomous development and the team reached a milestone of 10 years of autonomous operations in 2023. Through the end of 2023, this fleet comprised more than 630 large mining trucks, which has moved a cumulative 7.5 billion metric tons of materials. Additionally, none of our customers reported lost time injuries due to Caterpillar's autonomous system in 2023.

## THE CAT COMPACT ESS MODULE

The Cat Compact ESS module is a mobile battery energy storage system that supplements traditional mobile power solutions to reduce noise and enable the deployment of renewable energy sources. Customers can minimize fuel usage, reduce fuel costs and lower GHG emissions when compared to continuous generator set usage. The module is designed for rapid plug-and-play installation and integration, and can be used with any combination of diesel, natural gas or renewable energy sources such as solar. It stores surplus power from these energy sources and discharges from its reserve, as needed, and is equipped with an energy control module, an onboard management system that continuously monitors load levels and automatically switches between generator set power and stored energy when required.



## ENERGY TRANSITION CHANGES IN PRODUCTION COSTS

The transition to electrification and alternative power sources may require changes in manufacturing, the development of new production methods, maintenance and storage, and new supply chains for raw materials, which could impact manufacturing costs. Our focus on operational excellence includes a strategic focus on maintaining a competitive and flexible cost structure. We are committed to continuing our lean manufacturing approach by synchronizing across our value chains, reducing lead times, optimizing working capital and increasing availability. We also continually optimize our operations by reducing waste, lowering emissions, reducing energy consumption and minimizing costs. Our strategy positions us well to respond to the potential climate-related risk of increased production costs, while leveraging opportunities to increase efficiencies and reduce costs.

The energy transition may involve changes to production costs including the opportunity for improved efficiency in manufacturing or remanufacturing due to technological advances in the methods of production driven by the energy transition. Conversely, advancements in electrification and alternative power sources may increase production costs due to new technology requirements to meet evolving climate-related customer and regulatory expectations. Production delays may also drive cost increases due to the availability of raw materials and essential manufacturing components. These potential impacts relate to several TCFD categories of climate-related risks and opportunities including resource efficiency, energy source and resilience, which could occur over the medium- or long- term time horizon. The potential impact is assessed as medium and may include reduced direct costs, indirect operating expenses or capital expenditures, or conversely, increased direct costs, indirect operating expenses or capital expenditures.

## RESILIENCE OF OUR STRATEGY

The results of our climate scenario analysis provided insights into the resiliency of our enterprise sustainability strategy. Three climate scenarios were leveraged to assess resiliency to climate change risks and opportunities:

- The **current** climate action scenario leverages IPCC SSP5-8.5 and the IEA Stated Policies Scenario (STEPS). In this scenario, GHG emissions are curbed based on existing policies, commitments and Nationally Determined Contributions (NDCs), but fall short of meeting the Paris Agreement targets. This scenario projects the continued use of fossil fuels and energy-intensive activities. Climate-related physical risks are present and require significant investments in adaptation measures to protect assets, infrastructure and communities.
- The **moderate** climate action scenario leverages IPCC SSP2-4.5 and IEA Announced Pledges Scenario (APS). In this scenario, governments meet announced climate targets, including NDCs, and achieve GHG emissions reductions. Moderate decarbonization is achieved economy-wide, with moderate climate-related transition and physical risks present. This scenario also assumes universal access to sustainable, affordable and modern energy by 2030.
- The **aggressive** climate action scenario leverages IPCC SSP1-2.6 and the IEA Net Zero Emissions by 2050 (NZE2050) scenario. In this scenario, there are aggressive emission reductions to meet the Paris Agreement marked by global collaboration among governments, society and industry to lead steep decarbonization towards net zero emissions by 2050. Transition risks and opportunities are highly present in this scenario, with an accelerated transition to renewables and electrification. This scenario also features aggressive regulations limiting the extraction and use of fossil fuels in many sectors and economies.

Caterpillar's enterprise sustainability strategy shows resilience under different climate scenarios and is well-positioned to capture opportunities and mitigate risks from the energy transition.

Over the past 20 years, we've invested over \$30 billion in R&D to deliver best-in-class innovation. We've continued to invest in autonomy, alternative fuels, connectivity and digital, and electrification (AACE) over the past several years. In the future, we'll continue our focus in these areas as we work with our customers to help them achieve their sustainability objectives. In 2023, Caterpillar continued to collaborate with Lithos Energy Inc. to advance battery pack development and manufacturing. We also entered into a collaborative agreement with Albemarle to explore potential R&D opportunities in battery technologies including recycling techniques. We anticipate a wide range of solutions will be needed throughout the energy transition, and we are confident the investments and partnerships we continue to make in technology will help meet the evolving needs of diverse customers.

Our strategy is also supported by data and insight using Caterpillar's Operating and Execution Model (O&E Model). Our O&E Model promotes a disciplined investment framework that supports our strategy to enhance future profitable growth. By using this model, all our investments, capital, R&D, mergers and acquisitions, or other cash investments are measured through a consistent lens. This enables us to prioritize and allocate resources to the highest opportunities for profitable growth.

The energy transition and growing global energy demand are expanding Caterpillar's total addressable market, and we are well positioned to contribute to a reduced-carbon future while profitably growing our company and helping our customers achieve their climate-related objectives. We continue to evaluate the potential impacts of relevant climate-related risks and opportunities on our business strategy, including how best to integrate these considerations into strategic planning and decision-making.



# RISK MANAGEMENT

**Our enterprise risk management (ERM) framework integrates climate-related risks, which are managed with the same priority and rigor as other enterprise risks. Caterpillar's enterprise risk management, compliance and internal audit functions collaborate across the business to identify, prioritize and manage risks. For example, our emissions regulatory compliance team stays apprised of existing and upcoming environmental regulations and policies impacting our products. Climate-related risks are identified and assessed through these programs and are integrated into our risk taxonomy.**

To better inform decision-making, Caterpillar identifies and assesses risks at all company levels, including business units and the total enterprise, which are regularly discussed with the Audit Committee of the Board. ERM at Caterpillar is founded on three core fundamental principles:

1. ERM is an enterprise-level function that manages risk from a process perspective, but risk management is disaggregated to business leaders and units worldwide. Caterpillar leaders are responsible for and are expected to raise, understand, and mitigate risk in every strategic, financial, operational, compliance and safety decision they make.
2. Risk management is not separate from our work, but rather the way we work. Recognizing, understanding, and mitigating risk is part of how we work, think, act, and communicate.
3. ERM complements business unit risk management. Business unit risk and compliance work led by full-time leaders occurs constantly.

The ERM program focuses on internal and external factors such as current and emerging regulations, global economic developments and market trends that could impact Caterpillar's strategic position. The ERM team has developed a comprehensive universe of risk categories covering strategic, climate and sustainability,

macro, operational, and financial and compliance risks. In 2023, the team further institutionalized climate and sustainability into our risk taxonomy by establishing it as a new risk category. Within this category, examples of specific risks include:

- Climate and sustainability strategy
- Stakeholder expectations
- Acute physical risks (extreme weather and natural disasters)
- Long-term impact of climate change and pollution
- Natural resource availability
- GHG policy and regulation

Our risk universe is updated annually by engaging with business unit leaders to understand the risks most relevant to their businesses.

ERM also performs external analysis to ensure the risk universe captures key emerging risks. An annual ERM survey, which in recent years has fully integrated sustainability-related topics, gathers risk perspectives from the senior leaders of the enterprise. These perspectives are integrated with external data and discussed with senior business leaders. These discussions with senior business leaders and the executive leadership of the company are intended to understand the nature of a risk, whether and how it is changing over time and relevant mitigation actions.



The Audit Committee of the Board reviews ERM processes and outputs annually, including an annual list of enterprise-wide risks, including climate and sustainability. As discussed previously in the Strategy section of this report, scenario analysis identified potential climate-related risks and opportunities across three climate scenarios and time horizons. The analysis also assessed each risk and opportunity for potential size, scope, likelihood and impact. We have integrated these results within our existing risk management processes for mitigation across our business.



# METRICS & TARGETS

Caterpillar supports the goals of the Paris Agreement to limit global temperature rise, and we are committed and contributing to a reduced-carbon future. In 2021, we set seven sustainability goals to be achieved by 2030. To assess and monitor environmental and climate-related performance, we measure and disclose metrics across GHG emissions, energy, waste, water, sustainable products and remanufacturing. These metrics, along with our publicly stated sustainability goals and associated information (e.g., historical data, base year and progress indicators), are included in our [annual Sustainability Report](#).

Among our seven goals, Caterpillar established a target to reduce absolute Scope 1 and 2 GHG emissions from operations by 30% between 2018 and 2030. Through 2023, we have reduced our emissions by 35% from our 2018 baseline. The table below contains our GHG emissions.



[Read more  
in our annual  
Sustainability  
Report.](#)

## GHG Emissions<sup>3</sup>

METRIC	2019	2020	2021	2022	2023
<b>Scope 1 GHG Emissions</b> Million metric tons CO <sub>2</sub> e	0.91	0.70	0.74	0.74	0.69
<b>Scope 2 GHG Emissions (market-based)</b> Million metric tons CO <sub>2</sub> e	0.87	0.76	0.77	0.74	0.75
<b>Scope 2 GHG Emissions (location-based)</b> Million metric tons CO <sub>2</sub> e	0.93	0.83	0.85	0.80	0.81
<b>Absolute Scope 1 and 2 GHG Emissions<sup>4</sup></b> Million metric tons CO <sub>2</sub> e	1.78	1.46	1.51	1.49	1.44
<b>Scope 1 and 2 GHG Intensity<sup>4</sup></b> Metric tons CO <sub>2</sub> e / million dollars of sales and revenues	33.09	34.97	29.82	25.07	21.47

<sup>3</sup>Data represents information as of December 31, 2023.

<sup>4</sup>Includes market-based Scope 2 GHG emissions in the aggregated Scope 1 and Scope 2 GHG emissions total. Caterpillar's GHG emissions inventory is calculated in alignment with the GHG Protocol and received limited assurance from ERM Certification and Verification Services, Inc.





# APPENDIX

## TCFD RECOMMENDED DISCLOSURES INDEX

## PAGE REFERENCE

### Governance

Disclose the organization's governance around climate-related risks and opportunities.

a) Describe the board's oversight of climate-related risks and opportunities. **4**

b) Describe management's role in assessing and managing climate-related risks and opportunities. **6**

### Strategy

Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.

a) Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term. **8**

b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning. **9**

c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario. **14**

### Risk Management

Disclose how the organization identifies, assesses, and manages climate-related risks.

a) Describe the organization's processes for identifying and assessing climate-related risks. **15**

b) Describe the organization's processes for managing climate-related risks. **15**

c) Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management. **15**

### Metrics and Targets

Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.

a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process. **16**

b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks. **16**

c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets. **16**



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