

TCFD Disclosure

Howmet Aerospace Inc.

At Howmet Aerospace, we continually reassess and revamp our environmental, social and governance (ESG) programs, including those related to climate change.

In 2020, we prepared an initial disclosure following the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) and the Sustainability Accounting Board Standard (SASB) for aerospace and defense. We have approached the implementation of these reporting frameworks as a long-term journey, and the steps we carried out in our recent reporting laid the foundation for future work.

This report addresses the 11 TCFD disclosures on governance, strategy, risk management, and metrics and targets.

GOVERNANCE: The organization's governance around climate-related risks and opportunities

Governance: Disclosure a) Describe the boards oversight of climate-related risks and opportunities.

As per our [Corporate Governance Guidelines](#), the full Howmet Aerospace Board of Directors (Board) "oversees and provides guidance to management on Company issues related to corporate social responsibility and sustainability, and environmental, health and safety matters. The Board considers, as appropriate, (a) current and emerging political, social and environmental trends and major global legislative and regulatory developments or other public policy issues that may affect the business operations, performance or public image of the Company or are otherwise pertinent to the Company and its stakeholders, and (b) how the Company's policies and practices can address such trends or issues."

Annually, the full Board reviews the outputs of our enterprise risk management (ERM) process, overseeing our management, monitoring and mitigation of enterprise risks. Climate change is built into our ERM process.

Governance: Disclosure b) Describe management's role in assessing and managing climate-related risks and opportunities.

Our [Executive Leadership Team](#) (ELT) has responsibility for climate-related issues. These responsibilities include guiding our sustainability and climate change assessments, setting objectives, and defining and monitoring resilience strategies and mitigation plans. The ELT also sets ESG disclosure strategies, which incorporate leading standards from SASB, TCFD and the Global Reporting Initiative (GRI).

Our Executive Vice President of Human Resources, and our Director of Environment, Health and Safety (EHS) & Sustainability prepare information on climate-related topics for the ELT meetings.

Our technology and commercial leadership at the segment level primarily identify and assess climate-related market and technology opportunities. Our Chief Commercial Officer reports on these opportunities to the ELT.

Our Sustainability Working Committee carries out our day-to-day activities on sustainability and climate change. This committee reports to the Director of EHS & Sustainability, who reports to the Executive Vice President of Human Resources. The committee comprises our Director of EHS & Sustainability, Manager of Chemical Compliance, Director of Corporate Environmental & Remediation and the Senior Environmental Specialist.

The Sustainability Working Committee acts as a knowledge hub, supports data gathering, conducts assessments, such as climate change scenario analysis and impact studies, and drives the deployment of the sustainability agenda. The committee further facilitates sustainability initiatives and coordinates internal stakeholder engagement.

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

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

Our climate-related risks are summarized in Table 1, while our climate-related opportunities are found in Table 2.

Assessment periods related to climate risk are considered short term when less than one-year, medium term when one to five years, and long term when more than five years and up to 15 years. Where data was available, we expanded the assessment beyond long term.

Table 1: Climate-Related Risks Identified by Howmet Aerospace Inc.

Risk	Category	Financial Impact	Significant Before Mitigation Measures?	Term	Strategic Response	Practical Management Measures	Metrics Used by Howmet to Track Progress
1. Introduction of carbon price	Transition al – policy changes	Cost increase for CO ₂ emissions from our manufacturing plants and potential price increases in energy and raw materials (metals)	Yes	Medium to long term	Focus on energy efficiency to reduce direct emissions linked to natural gas use and to reduce consumption of electricity, thus reducing cost exposure	As of April 2021, we are currently undertaking an energy-efficiency review to determine viable energy-efficiency objectives and a road map to accomplish them. We survey key suppliers yearly regarding their climate change activities to encourage our supply base to adapt to a carbon-constrained world and mitigate potential impacts of climate change in their activities.	CO ₂ Scope 1, 2 and 3 emissions Energy consumption Energy intensity per revenue + energy intensity per purchased metal Percentage of suppliers with a “leading or active” score in our yearly supplier sustainability surveys
2. Floods and wind damage linked to increased frequency and severity of weather events (storms, hurricanes)	Physical risks – acute	Increased capital expenditures to repair/prevent damage; loss of income due to temporary operation stops; and insurance costs	While we anticipate our risk level as low, there are a limited number of locations in the U.S. Gulf Coast, Japan and China that potentially could be impacted by a hurricane, cyclone or typhoon. Severe weather impacts have been low.	Short term	Identify potential locations at risk and mitigate impacts by capital or management actions (loss prevention investments, emergency planning) and adequate insurance coverage	We have an ongoing program in which third-party risk engineers audit our sites for loss control, including flood and wind damage. The audits identify preventive and mitigation actions for individual sites, and our segment leadership tracks the implementation of these actions. Our insurance program mitigates risks caused by flood and wind damage.	Risk score provided by our insurance company for each site

3. Sea level rise	Physical risks – chronic	No potential impact identified given the location of our manufacturing sites. While there might be potential supply chain impacts, our initial focus is on the impacts in our own operations	No	Long term	Identify site-specific potential impacts to determine action need	As part of scenario analysis, our Sustainability Working Committee has carried out a preliminary site-by-site analysis of flood risks linked to sea level rise using available information, such as the NOAA sea level rise risk tool. No significant issues have been identified.	Score assigned in internal evaluation
4. Increased temperatures and a linked decrease in water availability	Physical risks – chronic	Increased costs linked to increased cooling activity; increased water cost or lost income due to temporary operation stop	Increased temperature is not considered material for our operations. Water availability could limit production in very extreme cases.	Medium to long term	Reduce water consumption	We are currently undertaking a water-consumption review to determine viable reduction objectives and a road map to accomplish them.	Water efficiency/use per site and company wide

Table 2: Climate Related Opportunities Identified by Howmet Aerospace Inc.

Opportunities	Category	Financial Impact	Term	Strategic Response	Metrics Used by Howmet to Track Progress
Commitment of the aviation industry to reduce emissions, which is driving the need for more fuel-efficient engines and lighter aircraft	Products	Increased revenue from increased product content on the next-generation aerospace engines and lighter aircraft	Short, medium and long term	Development of innovative lightweight and fuel-efficient aviation components	Revenue by product stream
Incentives in commercial road transportation to	Products	Increased revenue from increased aluminum wheel	Short and medium term	Increased manufacturing and commercialization efforts: Aluminum wheels	Increased aluminum wheel content on truck

increase fuel efficiency per ton of payload		content on truck tractors, trailers, buses and other commercial transportation		<p>represent less than 20 percent of the global heavy truck market</p> <p>Product innovation focus that will increase freight efficiency by reducing the weight of aluminum wheels. Our lightest wheel is 47 percent lighter than steel wheels, allowing increased fuel efficiency per ton of payload</p>	tractors, trailers, buses and other commercial transportation
Manufacture of fasteners used in renewable energy, including windmills and solar panels	Products	Increased revenue through increased market penetration of these product lines	Short and medium term	Product innovations that support lower operations and maintenance (O&M) and therefore reduced costs for renewables	Revenue by product stream

Strategy: Disclosure b) Describe the impact of climate- related risks and opportunities in the organization’s business strategy and financial planning.

Our climate strategy is based on three levers – product sustainability, energy management and supply chain management.

Product Sustainability

Through our products, we support our customers’ efforts to reduce their greenhouse gas (GHG) footprint and position themselves for market success in an increasingly carbon-constrained environment.

Products that our customers manufacture from our advanced materials and technologies use less energy and emit fewer GHGs than those produced from heavier materials or legacy technologies. As a result, GHG emissions avoided by using our products are substantial relative to the emissions generated in the manufacturing of these materials. This represents a key commercial opportunity.

Energy Management

The second strategic lever is to improve the resilience of our operations to a carbon-constrained environment by reducing our direct and indirect emissions through improvements in energy efficiency – thus addressing the risk of increased carbon costs linked to carbon pricing. Currently, we are reassessing our energy-efficiency action plan.

We completed an analysis considering various market growth scenarios and mitigation strategies to understand the financial impact. One of the key mitigation strategies is centered around energy-efficiency objectives in the near term that include operational improvements, equipment upgrades and process design changes. In the midterm, we plan to research opportunities that enable renewable fuel changes, particularly for product heating, which might become affordable and available at scale, as well as plant footprint optimizations.

In recent times, we were limited by the pandemic and its subsequent impact on production volumes. That complicated our target-setting process due to the challenges in predicting energy consumption and efficiency gains.

Supply Chain Management

The third strategic lever is related to suppliers. We request that our suppliers drive GHG reductions into their processes and practices, helping us build a more resilient supply base and leverage supplier experience to achieve our climate-related goals.

Since our most significant emissions are related to the purchases of primary metals, it is important that we use suppliers that are focused on energy efficiency, renewable energy and advanced technologies to minimize their GHG impact and, in turn, our Scope 3 emissions. Indirectly, this approach also addresses the potential cost increases linked to regulatory actions (carbon pricing) in the raw materials supply chain.

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

To further understand the impact that climate change could have on our business, we performed a high-level climate change scenario analysis in 2020 for both physical risks and risks related to policies linked to the transition to a low-carbon economy.

For physical risks, we considered a worst-case scenario with no policy mitigation actions and a middle-of-the-road scenario to screen worst-case impacts. For risks related to the transition to a low-carbon economy, such as changing policies, we used the International Energy Agency Sustainable Development (SDS) Scenario.

The scenario is constructed to limit global temperature increase by 1.8° C with a 66 percent probability without reliance on global net negative CO₂ emissions. This is equivalent to limiting the temperature rise to 1.65° C with a 50 percent probability.

Carbon Pricing and Transitional Risk

In the Sustainable Development Scenario, society acts rapidly to limit GHG emissions. Policies, such as a carbon price of US\$100 per ton of emissions by 2030, are implemented to discourage GHG emissions. We have assumed that there will be no significant physical impacts to our business by 2030 in this scenario. Thus, only the impacts of regulatory changes are assessed, focusing on carbon pricing.

The main impacts identified in this transition scenario are associated with projected carbon pricing schemes in key countries, driving increases in both manufacturing costs due to natural gas-related CO₂ emissions and the cost of energy and raw materials.

Our analysis considered various market growth scenarios and mitigation strategies to understand the financial impact associated with our direct carbon emissions. One of the key mitigation strategies is centered around energy-efficiency objectives in the near term that include operational improvements, equipment upgrades and process design changes. Energy efficiencies are a critical lever to reduce GHG emissions for our operating locations.

Recently, we were limited by the pandemic and its subsequent impact on production volumes. This complicated our analysis around future GHG emissions due to challenges in projecting energy consumption and efficiency gains. This delayed our target-setting process.

In the mid-term, we plan to research opportunities that enable renewable fuel changes, particularly for product heating, which might become affordable and available at scale, as well as plant footprint optimization. Our analysis was limited by the current status of technological developments. Further work will be needed on this topic.

Physical Risk

In the physical impact scenarios, CO₂ emissions continue to rise, increasing CO₂ concentration and thus the global temperature to around 4° C in 2100. In this assessment, we did not include impacts from regulatory restrictions but focused on physical impacts.

We used the following scenarios from the Intergovernmental Panel on Climate Change (IPCC):

- Representative concentration pathway (RCP) 8.5, which is a worst-case scenario with a worldwide average global temperature increase of 4° C in 2100; and
- RCP 4.5, which is a scenario with an average global temperature increase of 2° C.

The initial approach was to focus on the direct impact of physical risks in our operations. Potential supply chain impacts will be considered in the future for additional assessment.

The main physical impacts identified in the 4° C worst-case scenario analysis are:

- Acute physical risks: Increased frequency and severity of extreme weather events, such as storms and floods; and
- Chronic physical risks: Potential for sea-level rise to affect facilities, but no significant exposure was indicated.

A general conclusion from the physical scenario analysis was that no dramatic change in physical risks at our locations is expected between 2020 to 2050. Beyond 2050, risk increases locally in the 4° C average temperature increase scenario. We plan to review the assessment when more standardized tools to evaluate physical impacts become available.

While the focus of both the physical and transition scenario analyses was limited to in-house operations, outcomes validate our strategic direction.

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

Risk Management: Disclosure a) Describe the organization's processes for identifying and assessing climate-related risks.

Climate-related transition risks are identified by our Sustainability Working Committee. Current climate-related physical risks are identified as part of our external risk audits, which is a process carried out by our insurance company. The Sustainability Working Committee reviewed climate risks linked to potential chronic effects of climate change in the future.

We integrate the identification, assessment and management of climate-related risks into our company-wide ERM process. Each identified risk is assigned a subject matter expert (SME) that revisits and evaluates the risk three times per year as per a set of criteria. Considering potential impact and likelihood, we consider risks as base risk, watch tier risk or key enterprise risk. Potential new risks are identified via bi-annual leadership discussions.

Risk Management: Disclosure b) Describe the organization's process for managing climate-related risks.

We address all identified risks. We address base risks at the segment/business unit level, while watch tier and key company risks have management plans that are periodically reviewed by the company-wide

Risk Management Team. This team comprises members from legal, financial, EHS, sustainability, human resources, operations and commercial.

The Risk Management Team contacts the SMEs annually to revisit current risk status, discuss potential rating changes and explore additional risks that might have been identified. Risk owners develop and own risk management plans and are responsible for their implementation. The Risk Management Team reviews the status of the management plans and progress against them. The Executive Team is briefed on the risks periodically, and the Board is briefed on the risks at least annually.

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

The previous two risk management related disclosures – a) and b) – address in detail how climate-related risks are identified, assessed, and managed as part of our ERM process.

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

Metrics & Targets: Disclosure a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.

We use the following metrics:

- Total GHG emissions;
- GHG intensity by revenue;
- Total energy use;
- Total fuel consumed – percentage from natural gas, oil, LPG, diesel, gasoline and renewable sources;
- Energy intensity per revenue;
- Energy intensity per metal bought;
- Water withdrawal, consumption, use and discharge;
- Percent of water withdrawn from water-stressed areas;
- Air emissions, including nitrogen oxides; and
- Percent of suppliers qualified as leading or active for sustainability programs.

Details on the metrics and their evolution during the past five years is included in the [Howmet ESG Report](#).

Metrics & Targets: Disclosure b) Disclose scope 1, scope 2 and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.

Our Scope 1, 2 and 3 emissions are disclosed yearly in the [Howmet ESG Report](#).

Metrics & Targets: Disclosure c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.

Company targets and progress are covered in the [Howmet ESG Report](#).

Following our status as a new standalone company since April 2020, we are reviewing our targets. In recent times, we were limited by the pandemic and its subsequent impact on production volumes. This complicated our target-setting process around GHG emissions due to challenges in predicting energy consumption and efficiency gains.