GlobalFoundries Inc. - Climate Change 2022

C0. Introduction

C0.1

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

GlobalFoundries (GF) is one of the world's leading semiconductor foundries. We manufacture complex, feature-rich integrated circuits that enable billions of electronic devices that are pervasive throughout nearly every sector of the global economy. With our specialized manufacturing processes, vast library of intellectual property, and differentiated technologies, GF serves a broad range of customers that includes the global leaders in semiconductor design.

GF's differentiated services and technology and feature-rich solutions enable our customers to develop innovative products for an increasingly wide variety of applications across broad markets. We unlock value for our customers by helping drive technology in multiple dimensions, making their products more intelligent and intuitive, more connected and secure, and more powerful and energy efficient.

Semiconductor technology is central to our global economy and vital to the fabric of everyday life. GF's feature-rich chips are in the laptop computers, smartphones, smart devices, and automobiles we use every day. They are in the high-speed wireless networks, data centers, and multimedia tools that enable video conferencing in our homes, schools, and businesses and help humanity stay connected. As technology continues to accelerate and yield incredible new innovations and advancements, semiconductors will remain at the heart of this progress.

Since GF's founding in 2009, we have invested more than $23 billion in our company to build a global manufacturing footprint with multiple state-of-the-art facilities across three continents, offering customers the flexibility and security their supply chains require. We currently operate five manufacturing sites, called fabs, in: Dresden, Germany; Singapore; Malta and East Fishkill, New York; and Burlington, Vermont. These world-class manufacturing sites across three continents provide the scale, technology differentiation, and geographic diversification that we believe are critically important to our customers' success. Our scaled footprint also gives us the flexibility and agility to meet the dynamic needs of our customers around the globe, help them mitigate geopolitical risk, and provide greater supply chain certainty.

Semiconductor manufacturing is among the most complex and sophisticated manufacturing processes in the world. Requiring a strictly controlled environment called a cleanroom, the process includes a sequence of hundreds to thousands of processing steps in which electronic circuits are gradually built on a silicon surface. The resulting chips can be the size of a fingernail, or smaller, and feature billions of nanoscopic transistors.

We focus on manufacturing feature-rich semiconductors that enable our customers to create devices that connect, secure and process data, and efficiently power the digital world around us. To solve our customers' most complex challenges, we offer a broad range of sophisticated technology platforms that leverage our extensive patent portfolio and deep technical expertise in digital, analog, mixed-signal, RF and embedded memory. Our manufacturing expertise is complemented by a global network of R&D, design enablement, and customer support operations.
GF's mission is to innovate and partner with our clients to deliver technology solutions for humanity. As we manufacture semiconductors around the globe, we are deeply committed to ethical and responsible business practices. At GF, corporate responsibility is fundamental to our company and the value we provide to our customers.

C0.2

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

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

C0.3

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

Germany
Singapore
United States of America

C0.4

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

USD

C0.5

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

Operational control

C0.8

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

Indicate whether you are able to provide a unique identifier for your organization	Provide your unique identifier
Yes, a Ticker symbol	GFS

C1. Governance

C1.1

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

Yes

C1.1a

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

Position of individual(s)	Please explain
Board-level committee	The Board oversees the Company's ESG matters - including climate related matters - and programs through the ARCC (Audit, Risk & Compliance Committee): The ARCC is mandated by the Board to oversee the integrity of financial statements, financial filings and disclosures; compliance with legal and regulatory requirements (including oversight of the Ethics & Compliance program); the effectiveness of our accounting and internal systems and controls (including the company's internal audit function); the risk management function; approval of related party transactions; GF's ESG programs - including climate related programs-; cybersecurity, privacy, and information technology; and the independence, qualifications, appointment, remuneration and performance of the company's external auditors. The ARCC and the Board reviewed and approved GF's Journey to Zero Carbon Goal to reduce GF absolute Scope 1 and Scope 2 greenhouse gas emissions by 25% from 2020 to 2030 in August 2021.
Board Chair	A board level annual review of GF climate programs is in place that includes GHG emissions reduction goal setting and GHG emission reduction progress.

C1.1b

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

Frequency with which climate-related issues are a scheduled agenda item	Governance mechanisms into which climate-related issues are integrated	Scope of board-level oversight	Please explain
Scheduled – some meetings	Reviewing and guiding strategy Reviewing and guiding major plans of action Setting performance objectives Monitoring implementation and performance of objectives Monitoring and overseeing progress against goals and targets for addressing climate-related issues	<Not Applicable>	GF's board level annual review of GF climate programs includes GHG emissions reduction goal setting, and reviewing GHG emission reduction progress. The Board's review of GHG emission reduction goal setting specifically includes a review of the underlying project plan. The Board's Audit, Risk and Compliance Committee (ARCC) reviews strategy and performance towards goals on sustainability (including climate change), corporate responsibility, and business continuity / risk assessment.

C1.1d

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

	Board member(s) have competence on climate-related issues	Criteria used to assess competence of board member(s) on climate-related issues	Primary reason for no board-level competence on climate-related issues	Explain why your organization does not have at least one board member with competence on climate-related issues and any plans to address board-level competence in the future
Row 1	Yes	Criteria used to assess competence of at least one board member on climate-related issues are based on Board Members relevant experience or skills, such as industry experience, financial skills or leadership skills. For example, relevant experience or skills on climate-related issues includes leadership experience in companies with documented positions to drive positive change on climate issues, integrate climate change considerations	<Not Applicable>	<Not Applicable>

	Board member(s) have competence on climate-related issues	Criteria used to assess competence of board member(s) on climate-related issues	Primary reason for no board-level competence on climate-related issues	Explain why your organization does not have at least one board member with competence on climate-related issues and any plans to address board-level competence in the future
		into their decision making and support global climate action. Relevant experience or skills on climate-related issues also includes relevant industry experience and leadership in companies whose business model primarily is to drive clean technologies, sustainable development and, or renewable energy advancement.		

C1.2

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

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

C1.2a

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

GF CEO reviews GF climate programs at least annually. Our CEO sets strategic direction for longer term GHG emission reductions goal setting, and reviews GHG emission reduction progress.

The Board oversees the Company's ESG matters and programs through the ARCC. In addition to the oversight provided by the Board and the ARCC, GF maintains a Stewardship Committee which is responsible for setting strategic direction, conducting management reviews, and providing guidance and approval regarding ESG related topics. These include GF's EHS and CSR management systems, climate risk mitigation, Human Capital Development, Diversity & Inclusion, and Supplier Responsibility. The Stewardship Committee membership includes executives representing the Legal, Finance, Manufacturing, Human Resources, Communications, Technology, Supply Management, and Customer Design Enablement organizations. GF has also established an ESG Workgroup spanning multiple organizations which is chaired by our leader of Ethics and Sustainability. The Workgroup contributes to developing and implementing GF's long-term ESG strategy and ensures organizational readiness to address stakeholder expectations.

C1.3

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

	Provide incentives for the management of climate-related issues	Comment
Row 1	Yes	

C1.3a

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

Entitled to incentive	Type of incentive	Activity incentivized	Comment
All employees	Monetary reward	Emissions reduction project Energy reduction project Efficiency project	GF Global Recognition Program recognizes outstanding employee performance. Rewarded actions and initiatives include those that results in significant cost reduction, increase in operational efficiency, productivity and actions that exemplify application of company values. These specifically include energy efficiency, as well as energy and emissions reduction projects. There are several tiers to the recognition program including Appreciation Awards, Spotlight Awards, and Excellence

Entitled to incentive	Type of incentive	Activity incentivized	Comment
			Awards. GF also has an annual CEO Recognition Award Program, and individual GF site award programs.

C2. Risks and opportunities

C2.1

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

Yes

C2.1a

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

	From (years)	To (years)	Comment
Short-term	0	2	
Medium-term	2	5	
Long-term	5	10	

C2.1b

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

GF defines “substantive financial or strategic impact” as an impact that has a high probability to manifest a significant impact to the business.

GF uses risk severity and vulnerability to determine if a potential risk is significant considering impacts on:

- GF property, operations, and business continuity,
- GF personnel;
- upstream supply chain, utilities, and materials cost and continuity, and/or
- compliance, regulatory and quality related, and resulting reputational risks.

A risk that exceeds a defined threshold of risk severity and vulnerability combined is considered to be a substantive risk.

A qualitative TCFD assessment of climate-related risks and opportunities was conducted in early 2022, that analyzed climate related risks and opportunities along their probability to manifest and their perceived significant impact to the GF business.

C2.2

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

Value chain stage(s) covered

Direct operations

Risk management process

Integrated into multi-disciplinary company-wide risk management process

Frequency of assessment

Annually

Time horizon(s) covered

Short-term

Description of process

GF manages risk at the enterprise, business function and manufacturing site levels to meet our commitments to customers, shareholders, the community and employees.

Risks are identified through a variety of assessment methodologies conducted by both internal and external resources. The frequency of these assessments depends on risk type but is typically annual. Climate-related risks are generally included. Risks are aligned via a common risk scoring matrix and results roll up into a list of top enterprise-wide risks. During this process, risks are prioritized and mitigation strategies are identified, validated and measured.

Value chain stage(s) covered

Upstream

Risk management process

Integrated into multi-disciplinary company-wide risk management process

Frequency of assessment

Annually

Time horizon(s) covered

Short-term

Description of process

GF manages risk at the enterprise, business function and manufacturing site levels to meet our commitments to customers, shareholders, the community and employees.

Risks are identified through a variety of assessment methodologies conducted by both internal and external resources. The frequency of these assessments depends on risk type but is typically annual. Climate-related risks are generally included. Risks

are aligned via a common risk scoring matrix and results roll up into a list of top enterprise-wide risks. During this process, risks are prioritized and mitigation strategies are identified, validated and measured.

Value chain stage(s) covered
Direct operations
Upstream
Risk management process
A specific climate-related risk management process
Frequency of assessment
Not defined
Time horizon(s) covered
Short-term
Medium-term
Long-term
Description of process
In early 2022, GF conducted a focused TFCD-aligned climate risk assessment and a qualitative scenario analysis that utilized selected low and high emissions scenarios.
The climate risk assessment was done as a first step followed by the qualitative scenario-based analysis to better understand if GF potentially faces material impacts from selected climate related risks in the short-term to longer term.

C2.2a

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

	Relevance & inclusion	Please explain
Current regulation	Relevant, always included	Impacts of current climate-related regulation are monitored and assessed by GF's Global EHS team with inclusion of other GF teams (such as Legal, Facilities, Global Supply Management, Finance, Operations) as necessary. Examples of current regulatory risk types include regulations on carbon taxes (Singapore carbon tax) or related costs (e.g. for emissions allowances under the EU ETS), and regulations on fluorinated GHGs.
Emerging regulation	Relevant, always included	Impact of emerging climate-related regulation are monitored and assessed by GF's' Global EHS team with inclusion of other GF teams (such as Legal, Facilities, Global Supply Management, Finance, Operations) as necessary. Examples of emerging regulatory risk types include regulations on "carbon neutral" policy developments in regions where GF operates, such as emerging policies under the EU Green Deal.

	Relevance & inclusion	Please explain
Technology	Relevant, always included	Impact of technological climate-related risks was considered as part of a TCFD-based climate risk assessment in early 2022 that evaluated key areas of potential risk using qualitative scenario analysis. The qualitative scenario analysis analyzed the risk associated with availability of low emission technology to support GF Journey to Zero Carbon emission reductions (25% reduction of combined Scope 1 and Scope 2 GHG emissions from 2020 to 2030). It is also part of technology portfolio management. Semiconductors generally enable innovation in energy efficiency across multiple sectors. The contribution of GF products in electrification and the push for increasingly energy efficient products means that GF may contribute to the development and adoption of low emissions technology in other sectors.
Legal	Relevant, always included	Legal risks: compliance risks, potential litigation claim risks (including climate-related litigation claims) are considered a key risk and are always included in GF's risk assessment process.
Market	Relevant, always included	The impact of market climate-related risks is considered as part of GF technology portfolio management. Technologies from GF are helping to address some of the world's most pressing climate, resource sustainability and societal challenges. The low power consumption, outstanding high-frequency performance, and power handling capabilities of GF technologies, among other attributes, make it possible for our customers to create innovative solutions that address these important challenges in areas such as transportation, wireless connectivity, computing and many others. A key driver for the growing semiconductor market is energy efficiency: GF addresses this market by developing and providing feature-rich energy efficient semiconductor solutions. For example, GF solutions enable energy efficiency in the following markets: Electric Vehicles (EVs), energy-efficient wireless devices and networks, the internet of things (IoT), solutions for computing and control, high-performance computing and artificial intelligence (AI), as well as smart sensors.
Reputation	Relevant, always included	Reputational risks including climate-related reputational risks are subject to consideration in GF's risk assessment process. This specifically includes our customers' climate program expectations.
Acute physical	Relevant, always included	Acute physical risks are included in the annual risk assessment process. GLOBALFOUNDRIES manufacturing sites are located outside regions that are generally understood to be vulnerable to climate-related increase of extreme and severe weather events, such as cyclones, hurricanes, or floods. Acute physical risk was considered as part of a TCFD-based climate risk assessment that evaluated key areas of potential risk using qualitative scenario analysis in early 2022.
Chronic physical	Relevant, sometimes included	Chronic physical risk was considered as part of a TCFD-based climate risk assessment that evaluated key areas of potential risk using qualitative scenario analysis in early 2022. GF's manufacturing sites are located outside regions that are generally understood to be vulnerable to chronic physical climate-related risks (such as rising annual average temperatures, droughts, water shortages), so that the chronic physical risk is assessed as not relevant in the short-term to mid-term for GF's own operations.

C2.3

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

No

C2.3b

(C2.3b) Why do you not consider your organization to be exposed to climate-related risks with the potential to have a substantive financial or strategic impact on your business?

	Primary reason	Please explain
Row 1	Risks exist, but none with potential to have a substantive financial or strategic impact on business	As per response to C2.1b, GF defines "substantive financial or strategic impact" as an impact that has a high probability to manifest a significant impact to the business. GF uses risk severity and vulnerability to determine if a potential risk is significant considering impacts on: - GF property, operations, and business continuity, - GF personnel; - upstream supply chain, utilities, and materials cost and continuity, and/or - compliance, regulatory and quality related, and resulting reputational risks. Risks are identified through a variety of assessment methodologies conducted by both internal and external resources. The frequency of these assessments depends on risk type but is typically annual. Climate-related risks are generally included. These have not been prioritized at the level of significant (substantive) risks to date. In early 2022, GF conducted a TFCD-aligned climate risk assessment and a qualitative scenario analysis that utilized selected low and high emissions scenarios. While climate modeling is complex and different outcomes are possible, based on this qualitative scenario analysis, we do not expect any of the evaluated risks to present substantive impacts in the short-term (within the next 2 years) to mid-term (2-5 years). Our manufacturing sites are located in generally low-risk geographies for natural hazards, and the scenario analysis did not indicate a significant risk to our operations from extreme weather events well into the middle of the century.

C2.4

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

Yes

C2.4a

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

Identifier
Opp1
Where in the value chain does the opportunity occur?
Downstream
Opportunity type
Products and services
Primary climate-related opportunity driver
Development and/or expansion of low emission goods and services
Primary potential financial impact
Increased revenues resulting from increased demand for products and services
Company-specific description
Automotive-qualified differentiated technologies for vehicle electrification and battery-charging infrastructure:
GF offers a wide range of feature-rich solutions that can address the needs of mission-critical applications in Smart Mobile Devices, Home and Industrial IoT, Communications Infrastructure & Datacenter, Automotive and Personal Computing. To solve our customers' most complex challenges, we have developed a broad range of sophisticated technology platforms that leverage our extensive patent portfolio and deep technical expertise in digital, analog, mixed-signal, RF and embedded memory. The transition from vehicles with internal combustion engines to electric vehicles (EVs) presents growing opportunities in the automotive semiconductor market. Many automakers and industry suppliers rely on multiple automotive-qualified GF differentiated technologies, which are solving some of the most difficult power management challenges presented by vehicle electrification and EVs.
Time horizon
Medium-term
Likelihood
Likely
Magnitude of impact
Medium-low
Are you able to provide a potential financial impact figure?
Yes, an estimated range
Potential financial impact figure (currency)
<Not Applicable>
Potential financial impact figure – minimum (currency)
50000000
Potential financial impact figure – maximum (currency)

100000000

Explanation of financial impact figure

GF 2021 Automotive sector revenue was $287M. According to Gartner, the automotive semiconductor devices, ADAS applications, and EV/HEV applications markets are expected to grow at 14.2% CAGR, 20% CAGR and 28% CAGR respectively, from 2020 to 2025, excluding memory. If GF were to grow its total automotive business by 25% as a result of opportunities related to EVs, HEVs and vehicle charging infrastructure, that would represent increased revenues of ~$75M annually, on average, over the next four years.

Cost to realize opportunity

20000000

Strategy to realize opportunity and explanation of cost calculation

Strategy to realize opportunity:
Develop and manufacture semiconductor solutions for energy efficiency in Automotive end markets related to electric vehicles.
Many automakers and industry suppliers rely on multiple automotive-qualified GF differentiated technologies, which are solving some of the most difficult power challenges presented by vehicle electrification. For example, one key goal is to enable an EV to travel farther on a single battery charge. To do this, battery efficiency must be increased for greater output, and the substantial weight of EV batteries and related components must be reduced. Chips designed and manufactured with GF differentiated technologies make possible new battery-management systems (BMS) that address these needs in the harsh, real-world environments in which vehicles operate.
For example, Edinburgh, Scotland-based Dukosi Ltd has developed an advanced BMS based on GF technologies. Dukosi's BMS chipset transmits data on the health of an EV battery's individual cells wirelessly, eliminating more than 95 percent of the cables currently required to monitor the temperature, health and state-of-charge in EV battery packs. This allows designers to re-architect EV battery systems for higher and more reliable output through greater cell density while also reducing weight.
Fast battery charging is another key requirement for vehicle electrification. EV charging stations convert AC power from the grid into the specific DC voltage and current needed by EVs, using components called AC-to-DC converters. These require chips with specialized power-management features.
Timescale of implementation is medium term , i.e. 2-5 years.
Explanation of cost: GF will invest $15-20M annually on average in development of semiconductor process and design improvements to improve power efficiency in electric vehicle end markets applications.

Comment

N/A

C3. Business Strategy

C3.1

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

Row 1

Transition plan

No, our strategy has been influenced by climate-related risks and opportunities, but we do not plan to develop a transition plan within two years

Publicly available transition plan

<Not Applicable>

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

<Not Applicable>

Description of feedback mechanism

<Not Applicable>

Frequency of feedback collection

<Not Applicable>

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

<Not Applicable>

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

In August 2021, GF has announced its goal to reduce greenhouse gas emissions by 25% from 2020 to 2030, even as the company expands its global manufacturing capacity. This new Journey to Zero Carbon initiative reinforces the company's commitment to sustainable and environmentally efficient manufacturing operations.
GF's current transition plans align with a "well below 2 degrees" path.

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

<Not Applicable>

C3.2

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

	Use of climate-related scenario analysis to inform strategy	Primary reason why your organization does not use climate-related scenario analysis to inform its strategy	Explain why your organization does not use climate-related scenario analysis to inform its strategy and any plans to use it in the future
Row 1	Yes, qualitative, but we plan to add quantitative in the next two years	<Not Applicable>	<Not Applicable>

C3.2a

(C3.2a) Provide details of your organization's use of climate-related scenario analysis.

Climate-related scenario	Scenario analysis coverage	Temperature alignment of scenario	Parameters, assumptions, analytical choices
Transition scenarios: IEA STEPS (previously IEA NPS)	Company-wide	<Not Applicable>	The IEA STEPS high emissions scenario generally assumes an avoidance of the worst impacts of climate change, it still results in a trajectory exceeding a 2°C increase, resulting in more severe climate changes relative to the low emissions scenario. STEPS reflects current policy settings based on a sector-by-sector assessment of the specific policies that are in place, as well as those that have been announced by governments around the world. Although the scenario shows that current commitments by governments around the world will make a difference compared to the current carbon trajectory, there will still be a large gap in warming between STEPS and the SDS. IEA STEPS includes all existing or announced carbon pricing schemes, at the national and regional level. GF scenario analysis was a qualitative scenario analysis with a time frame from current state to 2050.
Transition scenarios: IEA SDS	Company-wide	<Not Applicable>	The IEA SDS low emissions scenario requires global emissions to peak as soon as possible and rapidly fall by 70% by 2050, until they hit net zero by 2070. The scenario defines how the global energy sector needs to change by 2040 to both limit temperature increases to 2°C and also achieve the UN related policy goals around energy access and air pollution. Under this scenario, the world has a near even chance of staying within the 2°C temperature increase, thereby mitigating extreme impacts of climate change and the associated physical risk. SDS is based on a surge in clean energy policies and investments that aim to reach a plausible transition in line with the Paris Agreement. Under the scenario, current net zero pledges are achieved and efforts are made to realize near-term emissions reductions. In the SDS, carbon pricing is expanding to all advanced economies and most emerging market and developing economies. For countries with existing prices, costs follow stated policy and then converge on IEA's projected rates in 2040. The IEA SDS identifies 35% of the cumulative emissions reductions by 2070 as coming from technologies that are currently at the prototype or demonstration phase. A further 40% of the cumulative emissions reductions rely on technologies that have not yet been commercially deployed in mass-market

Climate-related scenario	Scenario analysis coverage	Temperature alignment of scenario	Parameters, assumptions, analytical choices
			applications. GF scenario analysis was a qualitative scenario analysis with a time frame from current state to 2050.
Physical climate scenarios RCP 8.5	Company-wide	<Not Applicable>	SSP5-8.5 high emission scenario: The push for economic and social development is coupled with the exploitation of abundant fossil fuel resources and the adoption of resource and energy intensive lifestyles around the world. All these factors lead to rapid growth of the global economy, with strong investments in health, education, and institutions to enhance human and social capital. RCP 8.5 is characterized by very high emissions throughout the 21st century. Though considered relatively unlikely, this scenario would result in approximately 4.3°C of warming as minimal additional effort is made to constrain GHG emissions. This is generally considered a 'worst-case' climate change scenario. GF scenario analysis was a qualitative scenario analysis with a time frame from current state to 2050.
Physical climate scenarios RCP 2.6	Company-wide	<Not Applicable>	SSP1-2.6 low emissions scenario: The world shifts gradually, but pervasively, toward a more sustainable path, emphasizing more inclusive development that respects perceived environmental boundaries. Management of the global commons slowly improves, educational and health investments accelerate the demographic transition, and the emphasis on economic growth shifts toward a broader emphasis on human well-being. Consumption is oriented toward low material growth and lower resource and energy intensity. This scenario is characterized by substantial net negative greenhouse gas emissions by the year 2100. It assumes carbon transition policies are put in place, resulting in generally less than 2°C warming, largely aligned with the well below 2°C warming scenario described in the Paris Agreement. GF scenario analysis was a qualitative scenario analysis with a time frame from current state to 2050.

C3.2b

(C3.2b) Provide details of the focal questions your organization seeks to address by using climate-related scenario analysis, and summarize the results with respect to these questions.

Row 1

Focal questions

Does GF potentially face material impacts from climate related risks in the time frame from current state to 2050?

Results of the climate-related scenario analysis with respect to the focal questions

Our TFCD-aligned climate risk assessment and qualitative scenario analysis utilized selected low and high emissions scenarios. The transitional risks included pricing of GHG emissions through carbon taxes and fees, and costs for lower emissions technology in manufacturing operations. The physical risks included increased severity of extreme weather with the potential

to impact GF manufacturing operations in Germany, Singapore and the Northeast region of the U.S., or our suppliers, and rising mean temperatures.

Transitional risks: Carbon price; low emissions technology costs
While potential costs related to carbon pricing and adopting low emissions technology to reduce emissions do have the potential to impact GF under both analyzed transition scenarios (IEA STEPS, and IEA SDS), the majority of impacts are not expected in the near (within the next 2 years) to mid-term (2-5 years).
The impact of carbon pricing can be further mitigated as absolute Scope 1 and Scope 2 greenhouse gas emissions are reduced by 25% by 2030 (compared to 2020 as planned according to GF's Journey to Zero Carbon Initiative.

Physical risks:
Acute Physical Risk for GF operations:
The location of the GF fabs (in Germany, Singapore, and the Northeastern US) outside of regions that are typically exposed to destructive natural hazards continues to offer protection to operations from the acute physical risks of climate change.
Chronic Physical Risk for GF operations:
Under a high emissions scenario, annual average temperature could rise by over 2°C by 2050 in the Northeastern US. The resulting increased cooling requirements could have significant impact on the cooling costs as well as potentially reduce the reliability of local electricity supply during periods of peak demand.
Acute Physical Risk in GF Supply Chain:
Increased frequency and severity of extreme weather events can directly or indirectly affect multiple entities within supply chain networks such as physical infrastructure and assets, natural resources, and GF and supplier workforce. In both (low and high emissions) scenarios. The resulting modeled impact was considered medium for both scenarios.

C3.3

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

	Have climate-related risks and opportunities influenced your strategy in this area?	Description of influence
Products and services	Yes	GF is focused on creating innovations in the largest and most pervasive segments of the semiconductor industry. As power efficiency has become a critical success factor for our industry, we strive to develop solutions that can lower the power consumption of digital technology.
Supply chain and/or value chain	Yes	GF engages with a defined set of our suppliers ("major suppliers") to gain a better understanding of and drive environmental sustainability throughout our supply chain. This specifically includes, but is not limited to, climate related strategies and goals.
Investment in R&D	Yes	Technology for Humanity: We are focused on creating innovations in the largest and most pervasive segments of the semiconductor industry. As power efficiency has become a critical success factor for our industry, we strive to develop solutions that can lower the power consumption of digital technology. We offer a wide range of feature-rich solutions that can address the needs of mission-critical applications in Smart Mobile Devices, Home and Industrial IoT, Communications Infrastructure & Datacenter, Automotive and Personal Computing. In response to energy efficiency market drivers, many GF technology platforms and features are designed to specifically enable energy-efficiency in modern electronic components and systems. We devote the majority of our R&D efforts to our six primary differentiated technology platforms, that leverage our extensive patent portfolio and deep technical expertise in digital, analog, mixed-signal, RF and embedded memory: RF SOI, FinFET, Feature-Rich CMOS, FDX, SiGe (Silicon-Germanium). and SiPh (Silicon Photonics). GF is also investing in gallium nitride (GaN) technology research and development. GaN devices can operate at higher voltages more efficiently and reliably than silicon, and one major area of growth for GaN technology is in systems called inverters. Inverters are used to convert DC power from solar farms to AC power for use in homes and businesses, to control electric motors in electric vehicles, and to make many other applications more efficiently.
Operations	Yes	As an important step to align with climate science and minimize longer term exposure to climate change, in August 2021 we announced our Journey to Zero Carbon Goal, building on GHG emission reduction strategies to conserve energy, implement additional emission controls and develop renewable and lower-carbon energy sources. We set a goal to reduce absolute Scope 1 and Scope 2 GHG emissions by 25% from 2020 to 2030 - even as we significantly expand our global manufacturing capacity.

C3.4

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

	Financial planning elements that have been influenced	Description of influence
Row 1	Revenues Direct costs Capital expenditures	GF's Journey to Zero Carbon Goal implementation plans have an impact on planned capital expenditures and on direct cost. To meet our goal of reducing absolute greenhouse emissions by 25%, GF will apply a variety of approaches and investments tailored to our global manufacturing footprint. These approaches include enhancing manufacturing emission controls (with associated capital expenditures), further improving energy efficiency (with an impact on direct costs), and sourcing renewable and lower-carbon energy (with an impact on capital expenditure and direct costs). Future GF revenue could be affected as per response to C2.4a as a result of seized climate-related opportunities.

C4. Targets and performance

C4.1

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

Absolute target

Intensity target

C4.1a

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

Target reference number

Abs 1

Year target was set

2021

Target coverage

Company-wide

Scope(s)

Scope 1

Scope 2

Scope 2 accounting method

Market-based

Scope 3 category(ies)

<Not Applicable>

Base year
2020
Base year Scope 1 emissions covered by target (metric tons CO2e)
1552767
Base year Scope 2 emissions covered by target (metric tons CO2e)
780771
Base year Scope 3 emissions covered by target (metric tons CO2e)
<Not Applicable>
Total base year emissions covered by target in all selected Scopes (metric tons CO2e)
2333538
Base year Scope 1 emissions covered by target as % of total base year emissions in Scope 1
100
Base year Scope 2 emissions covered by target as % of total base year emissions in Scope 2
100
Base year Scope 3 emissions covered by target as % of total base year emissions in Scope 3 (in all Scope 3 categories)
<Not Applicable>
Base year emissions covered by target in all selected Scopes as % of total base year emissions in all selected Scopes
100
Target year
2030
Targeted reduction from base year (%)
25
Total emissions in target year covered by target in all selected Scopes (metric tons CO2e) [auto-calculated]
1750153.5
Scope 1 emissions in reporting year covered by target (metric tons CO2e)
1715613
Scope 2 emissions in reporting year covered by target (metric tons CO2e)
791302
Scope 3 emissions in reporting year covered by target (metric tons CO2e)
<Not Applicable>
Total emissions in reporting year covered by target in all selected scopes (metric tons CO2e)
2506915
% of target achieved relative to base year [auto-calculated]

-29.7191646332736

Target status in reporting year

New

Is this a science-based target?

No, and we do not anticipate setting one in the next 2 years

Target ambition

<Not Applicable>

Please explain target coverage and identify any exclusions

The Journey to Zero Carbon target encompasses all of GF's fabs' Scope 1 and Scope 2 GHG emissions and will also include those of our newest fab currently under construction in Singapore. GF Journey to Zero Carbon ambition level was set at "well-below 2°C aligned".

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

In August 2021, GF announced its goal to reduce greenhouse gas emissions by 25% from 2020 to 2030, as the company expands its global manufacturing capacity. GF's Journey to Zero Carbon initiative reinforces the company's commitment to sustainable and environmentally efficient manufacturing operations. GF Journey to Zero Carbon ambition level was set at "well-below 2°C aligned".

To meet the goal of reducing absolute greenhouse emissions by 25%, GF will apply a variety of approaches and investments tailored to its global manufacturing footprint. These approaches include enhancing manufacturing emission controls, further improving energy efficiency, and sourcing renewable and lower-carbon energy. The 25% reduction goal encompasses all of GF's fabs and will include its newest fab currently under construction in Singapore.

In 2021, GF developed project plans to realize the planned emissions reductions and accelerated GHG reduction projects as we began to implement our Journey to Zero Carbon initiative. Key 2021 projects to reduce GHG emissions are noted in response to question C4.3.

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

<Not Applicable>

C4.1b

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

Target reference number

Int 1

Year target was set

2019

Target coverage
Company-wide
Scope(s)
Scope 1
Scope 2
Scope 2 accounting method
Market-based
Scope 3 category(ies)
<Not Applicable>
Intensity metric
Other, please specify (Grams CE (Carbon Equivalents) per Manufacturing Index (MI). MI = Number of semiconductor wafers manufactured * wafer area * number of masking steps in our fabrication processes (reflecting process complexity))
Base year
2018
Intensity figure in base year for Scope 1 (metric tons CO2e per unit of activity)
0.0000278311
Intensity figure in base year for Scope 2 (metric tons CO2e per unit of activity)
0.0000156169
Intensity figure in base year for Scope 3 (metric tons CO2e per unit of activity)
<Not Applicable>
Intensity figure in base year for all selected Scopes (metric tons CO2e per unit of activity)
0.000043448
% of total base year emissions in Scope 1 covered by this Scope 1 intensity figure
100
% of total base year emissions in Scope 2 covered by this Scope 2 intensity figure
100
% of total base year emissions in Scope 3 (in all Scope 3 categories) covered by this Scope 3 intensity figure
<Not Applicable>
% of total base year emissions in all selected Scopes covered by this intensity figure
100
Target year
2021
Targeted reduction from base year (%)

18

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

0.00003562736

% change anticipated in absolute Scope 1+2 emissions

1.9

% change anticipated in absolute Scope 3 emissions

0

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

0.0000242102

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

0.0000111666

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

<Not Applicable>

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

0.0000353768

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

103.203829865586

Target status in reporting year

Achieved

Is this a science-based target?

No, and we do not anticipate setting one in the next 2 years

Target ambition

<Not Applicable>

Please explain target coverage and identify any exclusions

Target covered all GF Scope 1 and Scope 2 GHG emissions and ran from 2018 to 2021.

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

<Not Applicable>

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

To enable the nearly 20 percent increase in GHG efficiency from 2018 to 2021, GF had executed projects between 2019 to 2021 that annually save more than 206,430 MTCO2e:

Emission reduction initiatives that contributed most to achieving this target:

Reducing manufacturing Scope 1 emissions, e.g. by optimizing manufacturing processes, so that less process gas is used and emitted (such as optimizing the use of C2F6 and NF3 gas in manufacturing tools) or by substituting processes and process

gases with other lower GHG emitting process solutions (transferring a manufacturing process from a CVD tool set that uses C2F6, for chamber cleaning to another CVD tool set that uses an NF3 remote clean based process with significantly lower emissions)
Reducing fugitive emissions, e.g. reducing the emissions of fluorinated heat transfer fluids through robust, proactive point-of-use chiller leak detection and repair programs.
Increasing energy efficiency, e.g. in chilled water plants through optimizing pumps, in the clean room by reducing the pressure in the cleanroom by lowering duct static pressure, by replacing lighting with energy efficient light-remitting diodes (LEDs) and many other projects.

C4.2

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

C4.2b

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

Target reference number
Oth 1

Year target was set
2019

Target coverage
Company-wide

Target type: absolute or intensity
Intensity

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

Energy consumption or efficiency	kWh

Target denominator (intensity targets only)
Other, please specify (Manufacturing Index (MI). MI = Number of semiconductor wafers manufactured * wafer area * number of masking steps in our fabrication processes (reflecting process complexity))

Base year
2018

Figure or percentage in base year

0.0563

Target year

2021

Figure or percentage in target year

0.0478

Figure or percentage in reporting year

0.0432

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

154.117647058824

Target status in reporting year

Achieved

Is this target part of an emissions target?

GF's energy efficiency goal supports our GHG reduction goals as listed above: Abs1, Int1.

Is this target part of an overarching initiative?

No, it’s not part of an overarching initiative

Please explain target coverage and identify any exclusions

GF's energy efficiency goal supports our GHG reduction goals and has the same company -wide coverage (100%).

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

<Not Applicable>

List the actions which contributed most to achieving this target

Semiconductor manufacturing requires electricity to create and maintain the critical cleanroom conditions in our fabs, as well as for powering process tools, pumps and other equipment needed for our complex manufacturing processes. GF continually improve and optimize these processes, identifying and implementing further efficiencies and energy-saving measures into our operations.

From 2019 to 2021 years, GF has executed projects that annually save more than 86 GWh.

Key projects included to increase energy efficiency, in chilled water plants through optimizing pumps and settings, increasing make up air energy efficiency, e.g. by reducing the pressure in the cleanroom by lowering duct static pressure, or by converting make up air unit fans to more energy efficient fans. Other projects included replacing lighting with energy efficient light-remitting diodes (LEDs), as well as many other projects.

C4.3

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

Yes

C4.3a

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

	Number of initiatives	Total estimated annual CO2e savings in metric tonnes CO2e (only for rows marked *)
Under investigation	5	459434
To be implemented*	2	153266
Implementation commenced*	1	42533
Implemented*	9	65804
Not to be implemented		

C4.3b

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

Initiative category & Initiative type

Non-energy industrial process emissions reductions	Process material substitution

Estimated annual CO2e savings (metric tonnes CO2e)

10366

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

Scope 1

Voluntary/Mandatory

Voluntary

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

58891

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

0

Payback period

No payback

Estimated lifetime of the initiative
6-10 years
Comment
At GF Singapore, a specific manufacturing process was transferred from a CVD tool set that uses C2F6, a PFC gas, for chamber cleaning to another CVD tool set that uses an NF3 remote clean based with significantly lower emissions. This project achieved annual GHG emissions savings of more than 10,267 MTCO2e.

Initiative category & Initiative type

Energy efficiency in production processes	Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)
16995
Scope(s) or Scope 3 category(ies) where emissions savings occur
Scope 1
Voluntary/Mandatory
Voluntary
Annual monetary savings (unit currency – as specified in C0.4)
48539
Investment required (unit currency – as specified in C0.4)
0
Payback period
No payback
Estimated lifetime of the initiative
6-10 years
Comment
GF Singapore engineers successfully eliminated one of two CVD chamber cleaning steps for a specific deposition process that uses C2F6. Along with optimizing the remaining use of C2F6, these improvements reduced annual GHG emissions by 16,995 MTCO2e.

Initiative category & Initiative type

Fugitive emissions reductions	Other, please specify (Heat transfer fluid fugitive GHG emission reduction at Fab 10 site)

Estimated annual CO2e savings (metric tonnes CO2e)
28725

Scope(s) or Scope 3 category(ies) where emissions savings occur
Scope 2 (location-based)
Voluntary/Mandatory
Voluntary
Annual monetary savings (unit currency – as specified in C0.4)
94405
Investment required (unit currency – as specified in C0.4)
0
Payback period
No payback
Estimated lifetime of the initiative
1-2 years
Comment
Fab 10 performed a project that avoided emissions of fluorinated heat transfer fluids through a robust, proactive point-of-use chiller leak detection and repair program. In 2021, the execution of the leak detection and repair program avoided over 28,725 MTCO2e GHG emissions.

Initiative category & Initiative type

Non-energy industrial process emissions reductions	Process material efficiency

Estimated annual CO2e savings (metric tonnes CO2e)
1503
Scope(s) or Scope 3 category(ies) where emissions savings occur
Scope 1
Voluntary/Mandatory
Voluntary
Annual monetary savings (unit currency – as specified in C0.4)
25000
Investment required (unit currency – as specified in C0.4)
0
Payback period
No payback
Estimated lifetime of the initiative
3-5 years

Comment
GF Fab 9 optimized C2F6 use in CVD cleaning in a set of manufacturing tools by reducing the standard clean time and with that the use of C2F6 as cleaning gas.

Initiative category & Initiative type

Energy efficiency in production processes	Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)
5708
Scope(s) or Scope 3 category(ies) where emissions savings occur
Scope 2 (market-based)
Voluntary/Mandatory
Voluntary
Annual monetary savings (unit currency – as specified in C0.4)
391740
Investment required (unit currency – as specified in C0.4)
0
Payback period
No payback
Estimated lifetime of the initiative
6-10 years
Comment
At our GF Singapore site, a major chilled water plant optimization project that began in 2020 was completed in mid-2021. These measures introduced variable speed drives that optimize pump flow rates for more efficiency. The completed project is estimated to save more than 13,900 MWh annually, which also saves a corresponding annual amount of 5709 MTCO2e in Scope 2 GHG emissions. The project was without investment costs for GF because the project vendor covered the investment and the recurring monetary savings are shared between GF and the vendor.

Initiative category & Initiative type

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

Estimated annual CO2e savings (metric tonnes CO2e)
703
Scope(s) or Scope 3 category(ies) where emissions savings occur

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

331448

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

0

Payback period

No payback

Estimated lifetime of the initiative

3-5 years

Comment

GF Fab 8 saved 6,600 MWh of electricity by reducing the pressure in the cleanroom by lowering duct static pressure. This also achieves annual savings of 703 MTCO2e in Scope 2 GHG emissions

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Initiative category & Initiative type

Energy efficiency in buildings	Lighting

Estimated annual CO2e savings (metric tonnes CO2e)

339

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

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

139000

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

106383

Payback period

<1 year

Estimated lifetime of the initiative

6-10 years

Comment

GF Fab 1 completed several projects to replace office and plenum lighting with energy efficient light-remitting diodes (LEDs)s, resulting in combined annual savings of 1,156 MWh (equivalent to nearly 367 MTCO2e of Scope 2 GHG emissions).

Initiative category & Initiative type

Non-energy industrial process emissions reductions	Process material efficiency

Estimated annual CO2e savings (metric tonnes CO2e)
268
Scope(s) or Scope 3 category(ies) where emissions savings occur
Scope 1
Voluntary/Mandatory
Voluntary
Annual monetary savings (unit currency – as specified in C0.4)
11000
Investment required (unit currency – as specified in C0.4)
0
Payback period
No payback
Estimated lifetime of the initiative
3-5 years
Comment
Fab 9 optimized NF3 use in CVD manufacturing tools by extending the set time before automatic cleaning using NF3 is triggered during tool idle time.

Initiative category & Initiative type

Non-energy industrial process emissions reductions	Other, please specify (Installation of process gas abatement)

Estimated annual CO2e savings (metric tonnes CO2e)
1197
Scope(s) or Scope 3 category(ies) where emissions savings occur
Scope 1
Voluntary/Mandatory
Voluntary
Annual monetary savings (unit currency – as specified in C0.4)

0

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

1585000

Payback period

No payback

Estimated lifetime of the initiative

11-15 years

Comment

Installation at Fab 9 of additional point of use abatement units that abate fluorinated greenhouse gas process gas emissions.

C4.3c

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

Method	Comment
Financial optimization calculations	This method is used to identify the hierarchy of GHG reduction projects.
Dedicated budget for other emissions reduction activities	GHG emissions reduction projects (process emissions and abatement installations) are budgeted within the overall company budget planning process.

C4.5

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

No

C5. Emissions methodology

C5.1

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

No

C5.1a

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

Row 1

Has there been a structural change?

No

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

<Not Applicable>

Details of structural change(s), including completion dates

<Not Applicable>

C5.1b

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

	Change(s) in methodology, boundary, and/or reporting year definition?	Details of methodology, boundary, and/or reporting year definition change(s)
Row 1	No	<Not Applicable>

C5.2

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

Scope 1

Base year start

January 1 2020

Base year end

December 31 2020

Base year emissions (metric tons CO2e)

1552766

Comment

To quantify semiconductor process related PFC emissions GF uses Tier 2 methods of IPCC Guideline for GHG Inventories V3_Chapt6 Electronics Industries. -

Scope 2 (location-based)

Base year start

January 1 2020

Base year end

December 31 2020
Base year emissions (metric tons CO2e)
897687
Comment
Scope 2 (market-based)
Base year start
January 1 2020
Base year end
December 31 2020
Base year emissions (metric tons CO2e)
780771
Comment
Scope 3 category 1: Purchased goods and services
Base year start
January 1 2021
Base year end
December 31 2021
Base year emissions (metric tons CO2e)
434151
Comment
For the year 2021, GF has begun to quantify an extended GHG inventory beyond Scope 1 and Scope 2 GHG emissions.
Scope 3 category 2: Capital goods
Base year start
January 1 2021
Base year end
December 31 2021
Base year emissions (metric tons CO2e)
25966
Comment
For the year 2021, GF has begun to quantify an extended GHG inventory beyond Scope 1 and Scope 2 GHG emissions.
Scope 3 category 3: Fuel-and-energy-related activities (not included in Scope 1 or 2)
Base year start
January 1 2021

Base year end
December 31 2021
Base year emissions (metric tons CO2e)
349719
Comment
For the year 2021, GF has begun to quantify an extended GHG inventory beyond Scope 1 and Scope 2 GHG emissions.
Scope 3 category 4: Upstream transportation and distribution
Base year start
Base year end
Base year emissions (metric tons CO2e)
Comment
Scope 3 category 5: Waste generated in operations
Base year start
Base year end
Base year emissions (metric tons CO2e)
Comment
Scope 3 category 6: Business travel
Base year start
Base year end
Base year emissions (metric tons CO2e)
Comment
Scope 3 category 7: Employee commuting
Base year start
Base year end
Base year emissions (metric tons CO2e)
Comment
Scope 3 category 8: Upstream leased assets
Base year start
Base year end
Base year emissions (metric tons CO2e)
Comment
Scope 3 category 9: Downstream transportation and distribution
Base year start

Base year end
Base year emissions (metric tons CO2e)
Comment
Scope 3 category 10: Processing of sold products
Base year start
Base year end
Base year emissions (metric tons CO2e)
Comment
Scope 3 category 11: Use of sold products
Base year start
Base year end
Base year emissions (metric tons CO2e)
Comment
Scope 3 category 12: End of life treatment of sold products
Base year start
Base year end
Base year emissions (metric tons CO2e)
Comment
Scope 3 category 13: Downstream leased assets
Base year start
Base year end
Base year emissions (metric tons CO2e)
Comment
Scope 3 category 14: Franchises
Base year start
Base year end
Base year emissions (metric tons CO2e)
Comment
Scope 3 category 15: Investments
Base year start
Base year end
Base year emissions (metric tons CO2e)
Comment

Scope 3: Other (upstream)
Base year start
Base year end
Base year emissions (metric tons CO2e)
Comment
Scope 3: Other (downstream)
Base year start
Base year end
Base year emissions (metric tons CO2e)
Comment

C5.3

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

IPCC Guidelines for National Greenhouse Gas Inventories, 2006
The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)
US EPA Mandatory Greenhouse Gas Reporting Rule

C6. Emissions data

C6.1

(C6.1) What were your organization's gross global Scope 1 emissions in metric tons CO2e?
Reporting year
Gross global Scope 1 emissions (metric tons CO2e)
1715613
Start date
<Not Applicable>
End date
<Not Applicable>
Comment

C6.2

(C6.2) Describe your organization's approach to reporting Scope 2 emissions.
Row 1
Scope 2, location-based
We are reporting a Scope 2, location-based figure
Scope 2, market-based
We are reporting a Scope 2, market-based figure
Comment

C6.3

(C6.3) What were your organization's gross global Scope 2 emissions in metric tons CO2e?
Reporting year
Scope 2, location-based
908902
Scope 2, market-based (if applicable)
791302
Start date
<Not Applicable>
End date
<Not Applicable>
Comment

C6.4

(C6.4) Are there any sources (e.g. facilities, specific GHGs, activities, geographies, etc.) of Scope 1 and Scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure?
No

C6.5

(C6.5) Account for your organization's gross global Scope 3 emissions, disclosing and explaining any exclusions.
Purchased goods and services
Evaluation status
Relevant, calculated
Emissions in reporting year (metric tons CO2e)

434151

Emissions calculation methodology

Supplier-specific method

Hybrid method

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

80

Please explain

Scope 3 GHG emissions of purchased goods (chemicals, wafers, masks, outsourced assembly and test services) and services were estimated using GF major suppliers' information obtained in annual major supplier request for environmental information. GF major supplier Scope 1 and Scope 2 emissions were allocated to GF as Scope 3 emissions using supplier GHG emissions per revenue and GF specific supplier spend. The derived estimate represented more than 80 percent of spend and was extrapolated to 100 percent.

Capital goods

Evaluation status

Not relevant, calculated

Emissions in reporting year (metric tons CO2e)

25966

Emissions calculation methodology

Supplier-specific method

Hybrid method

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

70

Please explain

Scope 3 GHG emissions of capital goods (manufacturing tools) were estimated using GF major suppliers' information obtained in annual major supplier request for environmental information. GF major supplier Scope 1 and Scope 2 emissions were allocated to GF as Scope 3 emissions using supplier GHG emissions per revenue and GF specific supplier spend. The derived estimate represented more than 70 percent of spend and was extrapolated to 100 percent.

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

Evaluation status

Relevant, calculated

Emissions in reporting year (metric tons CO2e)

349719

Emissions calculation methodology

Average data method

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

0

Please explain

GF Scope 3 fuel and energy related activities (not already included in Scope 1 or 2) were quantified using GF's own data on energy use and third party average factors (Defra 2021, and EPA egrid 2021).

Upstream transportation and distribution

Evaluation status

Not relevant, calculated

Emissions in reporting year (metric tons CO2e)

25905

Emissions calculation methodology

Other, please specify (Upstream Logistics Scope 3 emissions. The number represents an engineering estimate, based on prior detail Scope 3 assessments where upstream transportation Scope 3 emissions represented ~ 6% of Purchased Goods and Services Scope 3 GHG emissions.)

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

0

Please explain

Upstream Logistics Scope 3 emissions. The number represents an engineering estimate, based on prior detail Scope 3 assessments where upstream transportation Scope 3 emissions represented ~ 6% of Purchased Goods and Services Scope 3 GHG emissions.

Waste generated in operations

Evaluation status

Not relevant, calculated

Emissions in reporting year (metric tons CO2e)

11506

Emissions calculation methodology

Average data method

Average product method

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

0

Please explain

Engineering estimate, based on actual GF total waste tonnage, assumptions on distance to waste treatment facilities, and third party average factors (Defra 2021, and EPA 2021) for waste transportation, as well as waste disposal proxy data for economic allocation for Scope 3 GHG emissions in the waste disposal step.

Business travel

Evaluation status

Not relevant, calculated

Emissions in reporting year (metric tons CO2e)

940.58

Emissions calculation methodology

Supplier-specific method

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

100

Please explain

Business travel: Data provided by GF's global travel provider.

Employee commuting

Evaluation status

Not relevant, calculated

Emissions in reporting year (metric tons CO2e)

14458

Emissions calculation methodology

Average data method

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

0

Please explain

Engineering estimate, based on employee number by location, employee commute assumptions and third party average factors (Defra 2021, and EPA 2021).

Upstream leased assets

Evaluation status

Not relevant, calculated

Emissions in reporting year (metric tons CO2e)

420

Emissions calculation methodology

Lessor-specific method

Percentage of emissions calculated using data obtained from suppliers or value chain partners
100
Please explain
For GF leased offices, only electricity use is relevant for their GHG emissions. GHG emissions calculation are based on leased offices electricity usage data and location based Scope 2 GHG emissions factors, respectively market based Scope 2 GHG emissions factors where available.
Downstream transportation and distribution
Evaluation status
Not relevant, explanation provided
Emissions in reporting year (metric tons CO2e)
<Not Applicable>
Emissions calculation methodology
<Not Applicable>
Percentage of emissions calculated using data obtained from suppliers or value chain partners
<Not Applicable>
Please explain
As a manufacturer of "sold intermediate products", GF does not have control and has not had sufficient insight into this category and therefore does not quantify this category.
Processing of sold products
Evaluation status
Not relevant, explanation provided
Emissions in reporting year (metric tons CO2e)
<Not Applicable>
Emissions calculation methodology
<Not Applicable>
Percentage of emissions calculated using data obtained from suppliers or value chain partners
<Not Applicable>
Please explain
As a manufacturer of "sold intermediate products", GF is not quantifying this category. GF has not had sufficient insight into this life cycle phase.
Use of sold products
Evaluation status
Not relevant, explanation provided

Emissions in reporting year (metric tons CO2e)
<Not Applicable>
Emissions calculation methodology
<Not Applicable>
Percentage of emissions calculated using data obtained from suppliers or value chain partners
<Not Applicable>
Please explain
As a manufacturer of "sold intermediate products", GF is not quantifying this category. GF has not had sufficient insight into this life cycle phase.
End of life treatment of sold products
Evaluation status
Not relevant, explanation provided
Emissions in reporting year (metric tons CO2e)
<Not Applicable>
Emissions calculation methodology
<Not Applicable>
Percentage of emissions calculated using data obtained from suppliers or value chain partners
<Not Applicable>
Please explain
As a manufacturer of "sold intermediate products", GF is not quantifying this category. GF has not had sufficient insight into this life cycle phase.
Downstream leased assets
Evaluation status
Not relevant, explanation provided
Emissions in reporting year (metric tons CO2e)
<Not Applicable>
Emissions calculation methodology
<Not Applicable>
Percentage of emissions calculated using data obtained from suppliers or value chain partners
<Not Applicable>
Please explain
This category is not relevant to GF business.
Franchises

Evaluation status
Not relevant, explanation provided
Emissions in reporting year (metric tons CO2e)
<Not Applicable>
Emissions calculation methodology
<Not Applicable>
Percentage of emissions calculated using data obtained from suppliers or value chain partners
<Not Applicable>
Please explain
This category is not relevant to GF business.
Investments
Evaluation status
Not relevant, explanation provided
Emissions in reporting year (metric tons CO2e)
<Not Applicable>
Emissions calculation methodology
<Not Applicable>
Percentage of emissions calculated using data obtained from suppliers or value chain partners
<Not Applicable>
Please explain
GF joint ventures and subsidiaries are disclosed in 2021 GF Annual Report GF Form 20-F.
In cases where GF exercises operational control over these, specifically Silicon Manufacturing Partners Pte Ltd. (“SMP”), these are accounted as part of GF's Scope 1 and Scope 2 GHG emissions.
In cases where these are part of GF's supply chain, a portion of investee emissions are already accounted for as part of Scope 3 category "purchased goods and services".
Other (upstream)
Evaluation status
Not relevant, explanation provided
Emissions in reporting year (metric tons CO2e)
<Not Applicable>
Emissions calculation methodology
<Not Applicable>
Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Please explain

This category is not relevant to GF business.

Other (downstream)

Evaluation status

Not relevant, explanation provided

Emissions in reporting year (metric tons CO2e)

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

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

<Not Applicable>

Please explain

This category is not relevant to GF business.

C6.7

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

No

C6.10

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

Intensity figure

0.000380701

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

2506915

Metric denominator

unit total revenue

Metric denominator: Unit total

6585000000

Scope 2 figure used

Market-based

% change from previous year

21

Direction of change

Decreased

Reason for change

GF revenue increased from 2020 to 2021 by 36%. GF GHG emission increased as well from 2020 to 2021, but at a lower growth rate than GF revenue.
Also 2021 projects that reduced GHG emissions in this reporting year (see as reported in response to question C4.3b) helped to increase our GHG efficiency.

Intensity figure

0.0000354

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

2506915

Metric denominator

Other, please specify (Manufacturing Index (MI): the MI is derived from the number of wafers manufactured, the number of masking steps in our fabrication processes (reflecting process complexity), and the total area of wafers produced)

Metric denominator: Unit total

70863215873

Scope 2 figure used

Market-based

% change from previous year

13

Direction of change

Decreased

Reason for change

GF manufacturing activity increased significantly from 2020 to 2021. GF GHG emissions increased as well from 2020 to 2021, but not linearly to GF manufacturing output (expressed as MI). Also, projects that reduced GHG emissions in 2021 (see as reported in response to question C4.3b) helped to increase our GHG efficiency.

C7. Emissions breakdowns

C7.1

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

Yes

C7.1a

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

Greenhouse gas	Scope 1 emissions (metric tons of CO2e)	GWP Reference
CO2	124851	IPCC Fourth Assessment Report (AR4 - 100 year)
N2O	92389	IPCC Fourth Assessment Report (AR4 - 100 year)
HFCs	55221	IPCC Fourth Assessment Report (AR4 - 100 year)
PFCs	894699	IPCC Fourth Assessment Report (AR4 - 100 year)
NF3	292903	IPCC Fourth Assessment Report (AR4 - 100 year)
SF6	61705	IPCC Fourth Assessment Report (AR4 - 100 year)
Other, please specify (Fluorinated Heat Transfer Fluids)	193847	Other, please specify (AR4 and U.S. EPA GWPs per Table A-1 to Subpart A of Part 98 GHG Mandatory Reporting Rule (MRR))

C7.2

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

Country/Region	Scope 1 emissions (metric tons CO2e)
Germany	55217
Singapore	1017957
United States of America	642439

C7.3

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

By facility

C7.3b

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

Facility	Scope 1 emissions (metric tons CO2e)	Latitude	Longitude
Fab 1, Dresden, Germany	55217	51.050407	13.737262
Woodlands, Singapore	1017957	1.3521	103.8198
Fab 8, Malta, NY, USA	199987	42.9854	-73.7868
Fab 9, Burlington, VT, USA	298265	44.4759	-73.2121
Fab 10 East Fishkill, USA	144186	41.5356	-73.899

C7.5

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

Country/Region	Scope 2, location-based (metric tons CO2e)	Scope 2, market-based (metric tons CO2e)
Germany	279679	254455
Singapore	415547	415547
United States of America	213675.33	121300

C7.6

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

By facility

C7.6b

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

Facility	Scope 2, location-based (metric tons CO2e)	Scope 2, market-based (metric tons CO2e)
Fab 1, Dresden, Germany	279679	254455
Woodlands, Singapore	415547	415547

Facility	Scope 2, location-based (metric tons CO2e)	Scope 2, market-based (metric tons CO2e)
Fab 8, Malta, NY, USA	80284	80284
Fab 9, Burlington, VT, USA	92375	0
Fab 10, East Fishkill, NY, USA	41016	41016

C7.9

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

Increased

C7.9a

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

	Change in emissions (metric tons CO2e)	Direction of change	Emissions value (percentage)	Please explain calculation
Change in renewable energy consumption	0	No change	0	There has been no change in (onsite) renewable energy generation and consumption from 2020 to 2021.
Other emissions reduction activities	65804	Decreased	2.8	GHG emission reduction (Scope 1 and Scope 2) through greenhouse gas reduction projects that were implemented in 2021. Please see the project descriptions in response to question C4.3b. The total combined savings amount to 65,804 MTCO2, which are 2.8% of GF's 2020 Scope 1 and Scope 2 GHG emissions (2,506,915 MTCO2e) (all based on market-based Scope 2).
Divestment		<Not Applicable>		
Acquisitions		<Not Applicable>		
Mergers		<Not Applicable>		

	Change in emissions (metric tons CO2e)	Direction of change	Emissions value (percentage)	Please explain calculation
Change in output	239181	Increased	10.2	GF experienced a significant increase in production output in 2021 compared to 2020. The number provided here (239,181 MTCO2e) is the amount of Scope 1 and Scope 2 emissions that are attributed to GF growth only. This is equal to 2021 Scope 1 and Scope 2 GHG emissions (2,506,915 MTCO2e) + 2021 GHG emissions reductions (65,804 MTCO2e) - 2020 GHG emissions of 2,333,538 MTCO2e. If no Scope 1 and Scope 2 GHG reduction projects had been implemented (see above) increased production would have generated an additional 2.8% of Scope 1 and Scope 2 GHG emissions. (all based on market-based Scope 2).
Change in methodology		<Not Applicable>		
Change in boundary		<Not Applicable>		
Change in physical operating conditions		<Not Applicable>		
Unidentified		<Not Applicable>		
Other		<Not Applicable>		

C7.9b

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

Market-based

C8. Energy

C8.1

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

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

C8.2

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

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

C8.2a

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

	Heating value	MWh from renewable sources	MWh from non-renewable sources	Total (renewable and non-renewable) MWh
Consumption of fuel (excluding feedstock)	LHV (lower heating value)	0	682815	682815
Consumption of purchased or acquired electricity	<Not Applicable>	0	3057752	3057752
Consumption of purchased or acquired heat	<Not Applicable>	0	181427	181427
Consumption of purchased or acquired steam	<Not Applicable>	<Not Applicable>	<Not Applicable>	<Not Applicable>
Consumption of purchased or acquired cooling	<Not Applicable>	0	324202	324202
Consumption of self-generated non-fuel renewable energy	<Not Applicable>	4256	<Not Applicable>	4256
Total energy consumption	<Not Applicable>	4256	4246196	4250452

C8.2b

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

	Indicate whether your organization undertakes this fuel application
Consumption of fuel for the generation of electricity	No
Consumption of fuel for the generation of heat	Yes
Consumption of fuel for the generation of steam	No
Consumption of fuel for the generation of cooling	No
Consumption of fuel for co-generation or tri-generation	No

C8.2c

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

Sustainable biomass

Heating value

LHV

Total fuel MWh consumed by the organization

0

MWh fuel consumed for self-generation of electricity

<Not Applicable>

MWh fuel consumed for self-generation of heat

<Not Applicable>

MWh fuel consumed for self-generation of steam

<Not Applicable>

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self- cogeneration or self-trigeneration

<Not Applicable>

Comment

GF is not using sustainable biomass to date as a fuel.

Other biomass

Heating value

LHV

Total fuel MWh consumed by the organization

0

MWh fuel consumed for self-generation of electricity

<Not Applicable>

MWh fuel consumed for self-generation of heat

<Not Applicable>

MWh fuel consumed for self-generation of steam

<Not Applicable>

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self- cogeneration or self-trigeneration

<Not Applicable>

Comment

GF is not using biomass to date as a fuel.

Other renewable fuels (e.g. renewable hydrogen)

Heating value

LHV

Total fuel MWh consumed by the organization

0

MWh fuel consumed for self-generation of electricity

<Not Applicable>

MWh fuel consumed for self-generation of heat

<Not Applicable>

MWh fuel consumed for self-generation of steam

<Not Applicable>

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self- cogeneration or self-trigeneration

<Not Applicable>

Comment

GF is not using other renewable fuel to date.

Coal

Heating value

LHV

Total fuel MWh consumed by the organization
0
MWh fuel consumed for self-generation of electricity
<Not Applicable>
MWh fuel consumed for self-generation of heat
<Not Applicable>
MWh fuel consumed for self-generation of steam
<Not Applicable>
MWh fuel consumed for self-generation of cooling
<Not Applicable>
MWh fuel consumed for self- cogeneration or self-trigeneration
<Not Applicable>
Comment
GF is not using coal as a fuel.
Oil
Heating value
LHV
Total fuel MWh consumed by the organization
0
MWh fuel consumed for self-generation of electricity
<Not Applicable>
MWh fuel consumed for self-generation of heat
<Not Applicable>
MWh fuel consumed for self-generation of steam
<Not Applicable>
MWh fuel consumed for self-generation of cooling
<Not Applicable>
MWh fuel consumed for self- cogeneration or self-trigeneration
<Not Applicable>
Comment
GF is not using oil as a fuel.
Gas
Heating value

LHV

Total fuel MWh consumed by the organization

655552

MWh fuel consumed for self-generation of electricity

<Not Applicable>

MWh fuel consumed for self-generation of heat

<Not Applicable>

MWh fuel consumed for self-generation of steam

<Not Applicable>

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self- cogeneration or self-trigeneration

<Not Applicable>

Comment

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

Heating value

LHV

Total fuel MWh consumed by the organization

27263

MWh fuel consumed for self-generation of electricity

<Not Applicable>

MWh fuel consumed for self-generation of heat

<Not Applicable>

MWh fuel consumed for self-generation of steam

<Not Applicable>

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self- cogeneration or self-trigeneration

<Not Applicable>

Comment

Other non renewable fuels include Diesel and LPG, and Hydrogen.

Total fuel

Heating value

LHV

Total fuel MWh consumed by the organization

682815

MWh fuel consumed for self-generation of electricity

<Not Applicable>

MWh fuel consumed for self-generation of heat

<Not Applicable>

MWh fuel consumed for self-generation of steam

<Not Applicable>

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self- cogeneration or self-trigeneration

<Not Applicable>

Comment

The total of the fuels in MWh as provided above by fuel.

C8.2d

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

	Total Gross generation (MWh)	Generation that is consumed by the organization (MWh)	Gross generation from renewable sources (MWh)	Generation from renewable sources that is consumed by the organization (MWh)
Electricity	4256	4256	4256	4256
Heat	0	0	0	0
Steam	0	0	0	0
Cooling	0	0	0	0

C8.2e

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

Sourcing method

Default delivered electricity from the grid (e.g. standard product offering by an energy supplier), supported by energy attribute certificates

Energy carrier

Electricity

Low-carbon technology type

Low-carbon energy mix, please specify (This refers to the standard grid electricity as provided by the local utility provider Green Mountain Power (GMP) to GF Fab 9 in Burlington, Vermont. The Scope 2 emission factor is provided by GMP ("carbon free").)

Country/area of low-carbon energy consumption

United States of America

Tracking instrument used

No instrument used

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

381744

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

United States of America

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

Comment

This refers to the standard grid electricity as provided by the local utility provider Green Mountain Power (GMP) to GF Fab 9 in Burlington, Vermont. The Scope 2 emission factor of 100% carbon free is provided by GMP. With that it is significantly lower than the US EPA eGRID VT location based emission factor.

C8.2g

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

Country/area

Germany

Consumption of electricity (MWh)

519864

Consumption of heat, steam, and cooling (MWh)

505629

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

1025493

Is this consumption excluded from your RE100 commitment?
<Not Applicable>

Country/area
Singapore
Consumption of electricity (MWh)
1021016
Consumption of heat, steam, and cooling (MWh)
0
Total non-fuel energy consumption (MWh) [Auto-calculated]
1021016
Is this consumption excluded from your RE100 commitment?
<Not Applicable>

Country/area
United States of America
Consumption of electricity (MWh)
1521128
Consumption of heat, steam, and cooling (MWh)
0
Total non-fuel energy consumption (MWh) [Auto-calculated]
1521128
Is this consumption excluded from your RE100 commitment?
<Not Applicable>

C9. Additional metrics

C9.1

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

Metric value
Metric numerator
Electricity used in kWh
Metric denominator (intensity metric only)
Manufacturing output as MI (Manufacturing Index)
% change from previous year
Direction of change
<Not Applicable>
Please explain

C10. Verification

C10.1

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

	Verification/assurance status
Scope 1	No third-party verification or assurance
Scope 2 (location-based or market-based)	No third-party verification or assurance
Scope 3	No third-party verification or assurance

C10.2

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

No, but we are actively considering verifying within the next two years

C11. Carbon pricing

C11.1

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

Yes

C11.1a

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

Singapore carbon tax

C11.1c

(C11.1c) Complete the following table for each of the tax systems you are regulated by.

Singapore carbon tax

Period start date

January 1 2021

Period end date

December 31 2021

% of total Scope 1 emissions covered by tax

45

Total cost of tax paid

2340000

Comment

This is the amount of payment that was made in year 2021 as pertaining to the SGP carbon tax.

C11.1d

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

GF Singapore is subject to the Singapore Carbon Pricing Act (CPA), which came into operation on 1 Jan 2019.
GF has a project plan in place to reduce the affected GHG emissions in scope (direct Scope 1 GHG emissions). Projects relate to PFC (perfluorocompound) process GHG emissions reduction.
Since 2019 GF SGP has completed a number of projects that reduce annual Scope 1 PFC emissions by more than 109,000 MTCO2e. The list of projects included projects that implemented process gas use optimization, and projects that substitute certain PFC process gases with NF3 in an optimized process that generates significantly lower GHG emissions. Further projects are planned for the next years (2022 to 2024) that are specifically targeting more process gas substitution to further reduce GF SGP Scope 1 GHG emissions.

C11.2

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

No

C11.3

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

Yes

C11.3a

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

Objective for implementing an internal carbon price

Identify and seize low-carbon opportunities

GHG Scope

Scope 1
Scope 2

Application

GF is using an internal carbon price to prioritize GHG emissions reduction projects in project planning for our Journey to Zero Carbon initiative.

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

50

Variance of price(s) used

We are currently using USD 50, but are also considering applying potential higher future carbon prices to GHG emissions reduction projects in project planning.

Type of internal carbon price

Shadow price

Impact & implication

Our internal carbon pricing supports our planning and priorization of projects that contribute to our Journey to Zero Carbon initiative across operations (fabs) and company fab locations.

C12. Engagement

C12.1

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

Yes, our suppliers
Yes, our customers/clients
Yes, other partners in the value chain

C12.1a

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

Type of engagement

Information collection (understanding supplier behavior)

Details of engagement

Collect climate change and carbon information at least annually from suppliers

% of suppliers by number

2

% total procurement spend (direct and indirect)

80

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

83

Rationale for the coverage of your engagement

GF annually engages with its "major" suppliers via Responsible Business Alliance (RBA) tools and platforms.
The composition of the annual GF major supplier list is based on documented criteria that are related to supplier category, supplier spend, supplier facility location, and nature of supplier business.
The 2021 GF major supplier list covered suppliers with a cumulative spend of more than 80 percent in the primary commodities, which include silicon wafer, electronic grade and specialty
chemical suppliers, manufacturing tool suppliers, mask suppliers, and outsourced manufacturing — mostly outsourced test and assembly (OSAT) suppliers.
The suppliers of capital goods (manufacturing tools) and the suppliers of the chemicals / materials / gases that we use in semiconductor manufacturing, as well as OSAT suppliers, are the suppliers that are understood to account for the majority of GF supply chain climate impact.

The aim of the annual RBA major supplier engagement is:
a) to assess the risks at GF's major suppliers for nonconformance to the RBA Code, including its environmental and climate related requirements (using RBA SAQs (Self Assessment Questionnaires) and RBA Audit tools), and

b) to better understand / quantify and drive environmental sustainability throughout our supply chain: The annual RBA Environmental Survey covers GHG reporting (Scope 1, 2 and 3), emissions verification, and goal setting, as well as energy use and types of energy used (e.g. renewables). GF is using major supplier information reported in the RBA Environmental Survey to quantify estimated GF supply chain Scope 3 GHG emissions.

GF identified major suppliers are incentivized to report the requested RBA information, including the environmental and climate-related information, because the annual results of the RBA Code conformity assessment and verification process are included in our Global Supplier Ratings process, which scores supplier performance with regard to Quality, Cost, Operations, Service, Technology and Business Continuity / Compliance. Failure to be in non-conformance to the RBA Code, and failure to provide requested RBA information results in a lower supplier score.

Impact of engagement, including measures of success

Impact of engagement:
The annual major supplier engagement allows GF to assess whether GF's major suppliers are at risk of non-conformance to the RBA Code, including its environmental and climate related requirements. This risk is assessed using RBA SAQs (Self Assessment Questionnaires) and RBA Audit Information.
The annual RBA Environmental Survey that GF major suppliers are required to complete includes questions on GHG emissions (Scope 1 and 2 as well as Scope 3) and GHG emission reduction targets and the level of ambition of these targets. GF staff analyze major supplier GHG emissions and reduction strategies/ targets to assess supplier best practices and to estimate GF supply chain Scope 3 GHG emissions.

Incentive:
The annual results of the RBA Code conformity assessment and verification process are included in our Global Supplier Ratings process, which scores supplier performance with regard to Quality, Cost, Operations, Service, Technology and Business Continuity / Compliance. Failure to be in non-conformance to the RBA Code, and failure to provide requested RBA information results in a lower supplier score.

Success is measured by:
a) the number of major supplier sites (in percent) with a high risk to be in non-conformance to the RBA Code: The target is 0% of major suppliers with a (confirmed) high risk to be in non-conformance to the RBA Code, including its environmental and climate related requirements. In 2021, GF obtained RBA SAQs for 198 major supplier sites, with zero SAQs scored high risk. Of the 21 RBA audits performed at GF major supplier sites in 2020-2021, there were zero priority findings (the most severe category) on environmental (including climate) provisions of the RBA Code.

b) the number of major suppliers with completed reporting on their GHG emissions and reduction targets (in percent). The target is to drive a maximum of major suppliers to complete reporting on their GHG emissions and reduction targets.

Comment

The percentage related to number of suppliers relates to the number of suppliers in the primary commodities: Silicon wafer, electronic grade and specialty chemical suppliers, manufacturing tool suppliers, mask suppliers, and outsourced manufacturing — mostly outsourced test and assembly (OSAT) services.

The percentage of spend is not exactly 80%, but in the 80% range. It is more than 80% in the primary commodities: Silicon wafer, electronic grade and specialty chemical suppliers, manufacturing tool suppliers (suppliers in this category covered more than 70 percent of spend), mask suppliers, and outsourced manufacturing — mostly outsourced test and assembly (OSAT).

C12.1b

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

Type of engagement & Details of engagement

Education/information sharing	Share information about your products and relevant certification schemes (i.e. Energy STAR)

% of customers by number

100

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

0

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

GF shares product specific manufacturing carbon footprint information with customers on request, as well as information regarding GF GHG emissions, GF strategy on GHG reduction as well as performance to GHG reduction targets - to enable our customers' climate programs.

For example, we share our PFC emissions data according to EPEAT ecolabel criteria with customers to enable them to meet EPEAT ecolabel criteria and prioritize their products as environmentally preferred under U.S. public procurement criteria.

Impact of engagement, including measures of success

Impact of engagement:

We enable our customers to better understand their supply chain (Scope 3) emissions associated with GF manufacture of their wafers and define their climate and GHG reduction strategies accordingly. We also enable GF customers to meet EPEAT criteria for prioritization of their products as environmentally preferred under US public procurement criteria.

Measure of success:
Customer satisfaction: GF Customer Experience program is geared to continually improve our customers' experience when partnering with GF by listening to and feeding our customers' voice back into our business processes. This includes our customers' voice on our shared commitment to social and environmental responsibility. Additionally, we share our PFC emissions data according to EPEAT ecolabel criteria with 100% of our customers by providing this information on our website

C12.1d

(C12.1d) Give details of your climate-related engagement strategy with other partners in the value chain.

Other partners in GF's value chain include industry peers and universities with whom GF works to drive innovation through R&D

Industry peers: Industry association working groups
Through our participation and leadership in semiconductor industry associations, we gain valuable insight into the economic, social and environmental trends that affect our business. These associations include the Semiconductor Industry Association (SIA), European Semiconductor Industry Association (ESIA), the World Semiconductor Council (WSC). These associations all have active EHS committees, including working groups on reducing perfluorocompound (PFC) emissions from semiconductor manufacturing.
ESIA for example announced in May 2021 that the European semiconductor industry has achieved a 42% absolute emission reduction of PFC gases from 2010 to 2020. Over the same period, the industry has also reduced its overall emissions – normalised per unit of production index – by 54%.

R&D networks
GF is actively partnering with universities as well as other semiconductor companies in research projects on various aspects of environmental, health, and safety of semiconductor manufacturing processes.
In 2021, GF sponsored 13 such university research projects. For example, with other industry partners GF sponsored research at the University of California, Los Angeles (UCLA) and the Arizona State University that is focused on global warming gas emissions reduction: One of the projects is working to develop alternative plasma etch processes, with lower net greenhouse gas emissions than the current processes that use PFCs and HFCs. The second project is investigating the development of a catalytic processes to reduce N2O emissions from semiconductor manufacturing facilities exhausts.

C12.2

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

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

C12.2a

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

Climate-related requirement

Climate-related disclosure through a non-public platform

Description of this climate related requirement

GF requires suppliers to be in conformity to the Responsible Business Alliance (RBA) Code that includes environmental and climate related requirements. Our requirement that suppliers conform with the RBA Code is included in our standard contract templates, Purchase Order Terms and Conditions, Global Supplier and Subcontractor Management Policy and Material Qualification .Procedure

We have implemented a risk-based process that assesses our major suppliers' conformity the RBA Code, in which GF annually works with its "major" suppliers via RBA tools and platforms:

a) to assess via self assessment information and verify as applicable through on site audit report information the risks at GF's major suppliers for nonconformance to the RBA Code, including its environmental and climate related requirements, and

b) to better understand / quantify and drive environmental sustainability throughout our supply chain: The annual RBA Environmental Survey covers GHG reporting (Scope 1, 2 and 3), emissions verification, and goal setting, as well as energy use and types of energy used (e.g. renewables). GF is using major supplier information reported in the RBA Environmental Survey to estimate GF supply chain Scope 3 GHG emissions.

The 2021 GF major supplier list covered suppliers with a cumulative spend of more than 80 percent in the primary commodities: silicon wafer, electronic grade and specialty chemical suppliers, tool suppliers, mask suppliers, and outsourced manufacturing suppliers.

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

100

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

80

Mechanisms for monitoring compliance with this climate-related requirement

Supplier self-assessment
On-site third-party verification

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

Retain and engage

C12.3

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

Row 1

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

Yes, we engage directly with policy makers
Yes, we engage indirectly through trade associations

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

No, and we do not plan to have one in the next two years

Attach commitment or position statement(s)

<Not Applicable>

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

As according to the mechanisms within our governance structure: The Global EHS & CSR Director and/or the Chief Ethics and Sustainability Officer are included in all such efforts to ensure a consistent position. Strategic decisions and position taking are presented for review and approval to GLOBALFOUNDRIES Stewardship Committee. The Stewardship Committee is responsible for setting strategic direction, conducting management reviews, and providing guidance and approval regarding ESG related topics, including climate-related topics.

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

<Not Applicable>

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

<Not Applicable>

C12.3a

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

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

Climate-related targets

Mandatory climate-related reporting

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

NY State CLCPA (Climate Leadership and Community Protection Act) and associated regulations.

Policy, law, or regulation geographic coverage

Sub-national

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

United States of America

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

Neutral

Description of engagement with policy makers

Public participation in various working groups. We are generally supportive of the law, and are looking to work with the regulatory authorities on the best implementation methods.

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

<Not Applicable>

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

Yes, we have evaluated, and it is aligned

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

Climate-related targets

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

Global Warming Solutions Act (GWSA): This recently passed legislation requires the State of Vermont to cut carbon emissions by 80% and achieve net zero by 2050. The first reduction milestone of the GWSA requires a 26% reduction in GHG emissions from a 2005 baseline by 2025.

Policy, law, or regulation geographic coverage

Sub-national

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

United States of America

Your organization's position on the policy, law, or regulation
Neutral
Description of engagement with policy makers
GF met with VTDEC (State of Vermont Department of Environmental Conservation) to review GHG reduction opportunities and the GF Vermont (Fab 9) site's commitment to assist the State with achieving their climate-related targets. There is general alignment in that the Vermont regulation, the GF goals, and the Paris Agreement are all looking for significant GHG reductions by 2030 (or sooner).
Details of exceptions (if applicable) and your organization's proposed alternative approach to the policy, law or regulation
<Not Applicable>
Have you evaluated whether your organization's engagement is aligned with the goals of the Paris Agreement?
Yes, we have evaluated, and it is aligned

C12.3b

(C12.3b) Provide details of the trade associations your organization engages with which are likely to take a position on any policy, law or regulation that may impact the climate.
Trade association
Other, please specify (Semiconductor Industry Association (SIA))
Is your organization's position on climate change consistent with theirs?
Consistent
Has your organization influenced, or is your organization attempting to influence their position?
We publicly promote their current position
State the trade association's position on climate change, explain where your organization's position differs, and how you are attempting to influence their position (if applicable)
The semiconductor industry is an acknowledged global leader in promoting environmental sustainability in the design, manufacture, and use of its products, as well as the health and safety of its operations and impacts on workers in semiconductor facilities (fabs). SIA's position is that the semiconductor industry will play a constructive role in protecting the global environment, including engaging with the international community on effective means of addressing climate change. Although the industry contributes only a very small amount of GHG emissions, SIA and its members have been engaged in ongoing efforts to reduce these emissions.
For example, SIA contributed to the World Semiconductor Council's Best Practice Guidance for Semiconductor PFC Emission Reduction.

https://www.semiconductors.org/policies/environment-health-safety/
http://www.semiconductorcouncil.org/wp-content/uploads/2017/07/Best-Practice-Guidance-of-PFC-Emission-Reduction.pdf

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

0

Describe the aim of your organization's funding

<Not Applicable>

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

Yes, we have evaluated, and it is aligned

Trade association

Other, please specify (European Semiconductor Industry Association)

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

Consistent

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

We publicly promote their current position

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

The European Union has pledged to become the first climate-neutral continent by 2050, with a revised 2030 emission reduction goal of 'at least 55%'. The European Green Deal, aims at using technological innovations that are enabled by semiconductors as the main tool for decarbonising economies. The European Semiconductor industry supports the Green Deal and its semiconductor products will continue to be a key enabler of low carbon and energy efficient innovative solutions.
https://www.eusemiconductors.eu/esia/public-policy/sustainability-esh
ESIA contributed as well to the World Semiconductor Council's Best Practice Guidance for Semiconductor PFC Emission Reduction.
http://www.semiconductorcouncil.org/wp-content/uploads/2017/07/Best-Practice-Guidance-of-PFC-Emission-Reduction.pdf

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

0

Describe the aim of your organization's funding

<Not Applicable>

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

Yes, we have evaluated, and it is aligned

C12.4

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

Publication

In voluntary sustainability report

Status

Complete

Attach the document

GF-CRR-22.pdf

Page/Section reference

Sections: Governance (page 14), Sustainable manufacturing (page 48), SASB index (page 94), TCFD table (page 98)
See page detail page numbers and references as per GRI Index that is on page 82.

Content elements

Governance
Strategy
Risks & opportunities
Emissions figures
Emission targets
Other metrics

Comment

Sections: Governance (page 14), Sustainable manufacturing (page 48), SASB index (page 94), TCFD table (page 98)
Please find all detail page numbers and references as per GRI Index that is on page 82.

Publication

In mainstream reports

Status

Complete

Attach the document
0001709048-22-000008.pdf
Page/Section reference
Annual Report on Form 20-FSections:
Key Information, Risk Factors (beginning on page 3, specifically, page 16, 21-22;)
Information on the Company, Business Overview, Environmental, Social and Governance (ESG) Initiatives (page 36)
Content elements
Governance
Strategy
Risks & opportunities
Emission targets
Comment
GF 20-F Filing: https://investors.gf.com/sec-filings/sec-filing/20-f/0001709048-22-000008

C15. Biodiversity

C15.1

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

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

C15.2

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

	Indicate whether your organization made a public commitment or endorsed any initiatives related to biodiversity	Biodiversity-related public commitments	Initiatives endorsed
Row 1	No, but we plan to do so within the next 2 years	<Not Applicable>	<Not Applicable>

C15.3

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

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

C15.4

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

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

C15.5

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

	Does your organization use indicators to monitor biodiversity performance?	Indicators used to monitor biodiversity performance
Row 1	No, we do not use indicators, but plan to within the next two years	Please select

C15.6

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

Report type	Content elements	Attach the document and indicate where in the document the relevant biodiversity information is located
No publications	<Not Applicable>	<Not Applicable>

C16. Signoff

C-FI

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

We have no other comment.

C16.1

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

	Job title	Corresponding job category
Row 1	Chief Ethics & Sustainability Officer	Chief Sustainability Officer (CSO)