

C0. Introduction

C0.1

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

Tracing its roots to 1877 in Cleveland, Ohio, Greif, Inc. is a world leader in industrial packaging products. Our offerings include steel, plastic, fiber, flexible, and corrugated containers, containerboard, corrugated sheets, rigid and flexible intermediate bulk containers, closure systems for industrial packaging products, transit protection products, water bottles and reconditioned containers. We provide filling and packaging services such as warehousing, reconditioning flexible intermediate bulk containers and container life cycle management for a wide range of industries. Our subsidiary, Soterra, sustainably manages more than 243,000 acres of timberland in the Southeastern United States and offers land management services including consulting, wildlife stewardship, recreation and wetlands mitigation bank development. With operating locations in more than 40 countries, we are positioned to serve global as well as regional customers. Our operations, wherever we are in the world, follow The Greif Way. These principles guide our decisions and actions throughout our operations. We use financial, natural, and human resources wisely without compromising the ability of future generations to meet their needs. In 2010, Greif established Container Life Cycle Management LLC, a joint venture focused on reconditioning rigid industrial packaging in North America. With the 2011 acquisition of pack2pack in Europe, we launched Earthminded® Life Cycle Services (LCS), one of the leading global reconditioning networks. Greif is committed to creating sustainable products, across all product groups, from supply chain through end of life, lowering greenhouse gas emissions and meeting our customers' needs.

All statements, other than statements of historical facts, included in this report or incorporated herein, including, without limitation, statements regarding our future financial position, business strategy, budgets, projected costs, goals and plan and objectives of management for future operations, are forward-looking statements within the meaning of Section 21E of the Securities Exchange Act of 1934, as amended. Forward-looking statements generally can be identified by the use of forward-looking terminology such as "may," "will," "expect," "intend," "estimate," "anticipate," "project," "believe," "continue," "on track" or "target" or the negative thereof or variations thereon or similar terminology. All forward-looking statements speak only as of the date the statements we made. Although we believe that the expectations reflected in forward-looking statements have a reasonable basis, we can give no assurance that these expectations will prove to be correct. Forward-looking statements are subject to risks and uncertainties that could cause our actual results to differ materially from those projected. All forward-looking statements made in this report are expressly qualified in their entirety by reference to such risks and uncertainties. We undertake no obligation to update or revise any forward-looking statements, whether as a result of new information, future events or otherwise.

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
Row 1	November 1 2017	October 31 2018	No	<Not Applicable>

C0.3

(C0.3) Select the countries/regions for which you will be supplying data.

- Algeria
- Argentina
- Australia
- Austria
- Belgium
- Brazil
- Canada
- Chile
- China
- Colombia
- Costa Rica
- Czechia
- Denmark
- Egypt
- France
- Germany
- Greece
- Guatemala
- Hungary
- Israel
- Italy
- Kenya
- Malaysia
- Mexico
- Morocco
- Netherlands
- Nigeria
- Philippines
- Poland
- Portugal
- Romania
- Russian Federation
- Saudi Arabia
- Singapore
- South Africa
- Spain
- Sweden
- Turkey
- Ukraine
- United Kingdom of Great Britain and Northern Ireland
- United States of America
- Venezuela (Bolivarian Republic of)
- Viet Nam

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 consolidation approach to your Scope 1 and Scope 2 greenhouse gas inventory.

Operational control

C-AC0.6/C-FB0.6/C-PF0.6

(C-AC0.6/C-FB0.6/C-PF0.6) Are emissions from agricultural/forestry, processing/manufacturing, distribution activities or emissions from the consumption of your products – whether in your direct operations or in other parts of your value chain – relevant to your current CDP climate change disclosure?

	Relevance
Agriculture/Forestry	Please select
Processing/Manufacturing	Please select
Distribution	Please select
Consumption	Please select

C-AC0.7/C-FB0.7/C-PF0.7

(C-AC0.7/C-FB0.7/C-PF0.7) Which agricultural commodity(ies) that your organization produces and/or sources are the most significant to your business by revenue? Select up to five.

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 Chair	Since 2016 Greif's entire board, and ultimately our Board Chair, has held responsibility for climate-related issues & sustainability. Ole Rosgaard, Sr. Vice President and Group President, Rigid Industrial Packaging & Services (RIPS) – Americas & Global Sustainability, reports to the board at each meeting. Annually, 1 board meeting is dedicated to sustainability, including climate change. In 2016, Ole assumed responsibility for leading sustainability. As the leader of RIPS Americas, Ole led 42% of our business (by 2018 operating profit), strategically positioning him to embed sustainability in our business. As of 2019, Ole has been promoted to Sr. Vice President of RIPS and Global Sustainability. Ole leads our Sustainability Steering Committee (SSC), consisting of members of the Executive Leadership Team and Aysu Katun, Director of Sustainability. The board holds the SSC accountable for reaching annual goals, impacting Ole and Aysu's remuneration and funding for sustainability programs.

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	Please explain
Scheduled – all meetings	<ul style="list-style-type: none"> Reviewing and guiding strategy Reviewing and guiding major plans of action Reviewing and guiding risk management policies Reviewing and guiding business plans Monitoring implementation and performance of objectives Overseeing major capital expenditures, acquisitions and divestitures Monitoring and overseeing progress against goals and targets for addressing climate-related issues 	Greif's Board of Directors receives updates on sustainability and our ESG scores from Ole Rosgaard at each quarterly board meeting. It is up to the board if they want to discuss sustainability further. Annually, one board meeting is dedicated to a discussion of sustainability issues, including climate change. The board receives an update on progress against formal goals, key initiatives, and establishment of new priorities. Additionally, we bring in outside resources to talk to the board during our quarterly board meetings. These outside resources educate board members on various ESG topics. Feedback and guidance received from the board is communicated to the Sustainability Steering Committee for implementation in the organization.

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)	Responsibility	Frequency of reporting to the board on climate-related issues
Other C-Suite Officer, please specify (Senior Vice President & Group President)	Both assessing and managing climate-related risks and opportunities	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).

Greif's Board of Directors receives annual updates from Ole Rosgaard, Senior Vice President and Group President, Rigid Industrial Packaging & Services (RIPS), Americas and Global Sustainability, Ole assumed responsibility for leading sustainability across Greif in 2016 (As of FY2019, Ole has been promoted to Sr. Vice President of RIPS and Global Sustainability). As the leader of RIPS Americas, Ole leads 42 percent of our business (by operating profit), holds operational control of more than 70 production facilities and approximately 4,000 employees and is instrumental in leading RIPS's increased growth and profitability. Greif's aim is to further embed sustainability into our thinking and operations and believes that Ole is strategically positioned to do so. Ole leads Greif's 11-member Sustainability Steering Committee, which was formed in 2016 to establish a formal governance structure and provide broad organizational oversight of our sustainability program. In addition to Ole, the Sustainability Steering Committee includes Greif's President and Chief Executive Officer; Executive Vice President, Chief Financial Officer; Senior Vice President and Group President, Rigid Industrial Packaging & Services - Americas, and Global Sustainability; Senior Vice President, Chief Human Resources Officer; Executive Vice President, General Counsel and Secretary; Vice President and Chief Administrative Officer; Vice President, Investor Relations & Corporate Communications; Vice President and Division President, Flexible Products & Services; Vice President and Group President, Paper Packaging & Services and Soterra LLC; Senior Vice President and Group President, Rigid Industrial Packaging & Services - Europe, Middle East, Africa, and Asia Pacific, Tri-Sure, and Global Key Accounts; and Director of Sustainability. The Committee is tasked with further integrating sustainability into our strategy and operations, reviewing our sustainability progress and priorities biannually and ensuring accountability at all levels of our organization. The Committee, which is subject to Board oversight, was deliberately formed including Senior leadership to signal to the organization and our stakeholders the importance of sustainability, ensure an enterprise view of sustainability, accelerate our progress of initiatives and ensure the Committee has the authority to implement change in the organization. The Board of Directors holds the Sustainability Committee accountable for reaching annual goals, which directly impacts the remuneration of Ole and Aysu Katun, Director of Sustainability, and determines the level of funding for Greif's sustainability programs. The Steering Committee guides the activities of our six-member Sustainability Management Team, which works with topic teams, including the Global Energy Team, consisting of representatives from each region and business unit to drive operational projects and priorities. The Sustainability Management Team meets quarterly to review progress against goals through energy and emission performance dashboards and facility level roadmaps detailing energy and emission reduction initiatives that are active in Greif facilities and reports meeting outcomes to Ole Rosgaard and Greif's Director of Sustainability. Roadmaps are developed and implemented by Greif's Global Energy Team, consisting of leadership from each of Greif's operating regions and business units. The Global Energy Team works directly with each Greif facility to monitor progress on roadmap initiatives and identify new opportunities in support of Greif's sustainability goals. The Global Energy Team, in coordination with each Greif facility, is responsible for identifying specific operational risks and opportunities that can contribute to meeting Greif's energy and emission goals. Greif's sustainability governance structure was established to ensure climate-related issues are a focus at all levels of the organization and are tied to our business initiatives.

C1.3

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

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).

Who is entitled to benefit from these incentives?

Other C-Suite Officer

Types of incentives

Monetary reward

Activity incentivized

Energy reduction target

Comment

For Ole Rosgaard, the Senior Vice President and Group President, Rigid Industrial Packaging and Services - Americas, and Global Sustainability, 76 percent of his annual compensation is based on performance, which includes Greif's achievement of sustainability targets and initiatives, including energy- and emissions- reduction goals. As of FY2019, Ole has been promoted to Sr. Vice President of RIPS and Global Sustainability.

Who is entitled to benefit from these incentives?

All employees

Types of incentives

Monetary reward

Activity incentivized

Energy reduction target

Comment

Energy savings are integrated into Greif's incentive structure. Greif APAC incorporates energy reductions into operational excellence targets. All APAC employees are eligible for a RMB1000 bonus per quarter for meeting these targets. Our Flexible Products and Services (FPS) Hadimkoy facility in Turkey developed a sustainability program that focuses on employee engagement. They have identified various success criteria for the plant, including energy reduction, as a result of scrap reduction. All employees engaged in monthly meetings to generate improvement ideas. The plant evaluated the ideas, selected projects to implement, set success criteria, and tracked progress monthly. By decreasing the scrap ratio from 12.1% to 10.2%, they saved 328.9 kWh energy usage reduction, an 18.500 Euro savings. Blue collar employees' premiums (bonuses) are tied to the achievement of the success criteria identified and paid monthly, based on performance. For example, if semi-finished departments of Hadimköy had greater than 12% scrap, there are no bonuses paid. However, if they reduce the monthly scrap rate to 10.5% or less, then they are paid their full bonus.

Who is entitled to benefit from these incentives?

Business unit manager

Types of incentives

Other non-monetary reward

Activity incentivized

Energy reduction target

Comment

Greif's Global Energy and Emissions Team and business unit-level management create annual energy roadmaps; energy and emissions-reduction goals are integrated into management's performance reviews.

Who is entitled to benefit from these incentives?

Facilities manager

Types of incentives

Monetary reward

Activity incentivized

Energy reduction target

Comment

Plant managers track energy spend at their facility and actively work to achieve energy savings delineated in business unit energy roadmaps. A portion of plant managers' performance incentives are linked to energy reductions.

Who is entitled to benefit from these incentives?

All employees

Types of incentives

Recognition (non-monetary)

Activity incentivized

Energy reduction target

Comment

To reinforce our belief that good business is environmentally responsible, we introduced the Michael J. Gasser Global Sustainability Award Program in 2010. This program is available to all employees and recognizes superior effort and achievement in the improvement of the environment. The award recognizes teams that create innovative, sustainable products or processes that reduce or mitigate the direct and indirect impact of climate change. Awards are given for Energy Excellence, Ecosystem Improvement, and Sustainable Innovation. Award winners are recognized by Greif's Board and CEO. Greif funds a celebration event to further recognize the achievement of the winners. In 2018, we awarded the Michael J. Gasser Sustainability Award to a regional team consisting of HR and GSSC representatives from Greif's Rigid Industrial Packaging and Services (RIPS) business in our Europe, Middle East and Africa (EMEA) region for their successful efforts in reducing total fuel costs and overall CO2 emissions. The team modified the company car policy to standardize the types of cars available for use in the region to select more environmentally friendly cars. The updated policy applies to all colleagues in EMEA who renewed their company car. In total, the policy impacted 296 users during the project and reduced carbon emissions by 35 percent. In 2014, Greif introduced the Plant Olympics program in the drum manufacturing plants of the EMEA region to reinforce a pattern of excellence by ranking each plant as gold, silver, bronze, yellow or red, reward workers for outstanding accomplishments and identify areas of opportunity to promote year-over-year improvements. Due to the success of the program at driving incremental improvements, in 2017, it expanded globally to include all Greif regions and business units. Ratings are based on safety, people, productivity, customer satisfaction, 5S and sustainability, including climate change. Each facility achieving Gold, Silver or Bronze performance levels across all categories receives a medal recognizing the achievement. In addition, Gold, Silver and Bronze winners receive a non-financial award for the entire plant such as an award dinner.

Who is entitled to benefit from these incentives?

Environment/Sustainability manager

Types of incentives

Other non-monetary reward

Activity incentivized

Energy reduction target

Comment

Our Director of Sustainability's entire performance review consists of progress on sustainability goals and initiatives.

Who is entitled to benefit from these incentives?

Procurement manager

Types of incentives

Monetary reward

Activity incentivized

Environmental criteria included in purchases

Comment

Part of our Senior Director, North American Sourcing & Supply Chain's performance is based on their ability to lead Greif's Procurement Sustainability project to ensure / hold to account we are meeting our 2025 goals. Additionally, we evaluate our Regional Sourcing Manager, Paper & ODM's performance on utilizing Greenguard at our Van Wert facility instead of painting drums, reducing VOCs and waste disposal and their ability to reduce total load of the drum crusher at two of facilities in Houston, lowering emissions. Finally, we evaluate our Regional Sourcing Managers-Sourcing & Supply Chain's performance on a potential pallet project to use chip board instead of wood, a key sustainability project.

C2. Risks and opportunities

C2.1

(C2.1) Describe what your organization considers to be short-, medium- and long-term horizons.

	From (years)	To (years)	Comment
Short-term	0	2	
Medium-term	2	3	
Long-term	3	8	

C2.2

(C2.2) Select the option that best describes how your organization's processes for identifying, assessing, and managing climate-related issues are integrated into your overall risk management.

Integrated into multi-disciplinary company-wide risk identification, assessment, and management processes

C2.2a

(C2.2a) Select the options that best describe your organization's frequency and time horizon for identifying and assessing climate-related risks.

	Frequency of monitoring	How far into the future are risks considered?	Comment
Row 1	Six-monthly or more frequently	>6 years	-

C2.2b

(C2.2b) Provide further details on your organization's process(es) for identifying and assessing climate-related risks.

Climate-related risks identification is integrated into Greif's Enterprise Risk Management (ERM) Process, which considers all Greif Business Units and geographies. Risk information is identified and analyzed through Greif's Risk and Content Monitoring processes by assurance providers across the organization, including Executive Leadership, Internal Audit, Legal/Compliance, Greif Business System (GBS), feedback from regular customer and investor engagement, and the Sustainability Steering Committee (SSC). Information from these groups, including long-term emerging risks, is provided to Greif's Risk Leader Committee (RLC) led by Greif's Chief Audit Executive, and comprised of members of Greif's Executive, Business Unit, and Strategic Business Unit Leadership Teams, including Vice President (VP), Corporate Financial Controller and Treasurer; Chief Administrative Officer; Executive VP, General Counsel and Secretary; President Global Sourcing & Supply Chain; VP Global Tax; VP of Business Services; Senior Financial Controller, APAC; Strategic Business Unit Controller, EMEA; VP, Information Technology; VP, Global Shared Services; Director Controller, LATAM; Assistant General Counsel; Sr Manager - Finance, RIPS North America; VP & Controller, PPS Director Risk Management; and Director of Sustainability. The RLC identifies, ranks, reviews, and prioritizes risks in conjunction with Greif's Audit Committee to determine the most critical risks and identify areas of opportunity within them, which are reported to the Board annually for approval. Once approved, risks are evaluated by Greif's Executive Leadership Team (ELT) to develop plans for risk mitigation and opportunity capture. This team meets every three months. Risks identified through this process are evaluated and prioritized based on potential financial impact, production impact, importance to key stakeholders, and timeline to implementation. Greif prioritizes risks with the potential to have substantive financial impact to Greif-any strategic risk with the potential to have aggregated impact of approximately 5% of pre-tax income or greater, which is in alignment with guidance set forth by the U.S. Securities and Exchange Commission. Risks that fall below this threshold but are significant due to customer, operational or regulatory demands are also considered in this process and prioritized based on risk velocity, financial impact and likelihood of occurrence. The SSC, comprised of Greif's ELT and our Director of Sustainability, meets biannually to look at economic, environmental and social trends, risks and opportunities and ensure they are considered in our corporate strategy and ERM. The SSC monitors industry reports (i.e. WBCSD ESG Enterprise Risk Management Framework, WRI's Assessing the Post-2020 Clean Energy Landscape, and CSR's Fourth National Climate Assessment), ESG ratings and ranking (i.e. CDP, EcoVadis), energy pricing, evolving government regulations and programs, and holds formal relationships with ESG-specific associations and NGOs, including World Business Council for Sustainable Development (WBCSD) and the United Nations Global Compact, to identify emerging risks that may impact our business. Greif's Sustainability Management Team meets quarterly to discuss sustainability risks and opportunities and consists of regional leaders; Sr. Vice President of RIPS and Global Sustainability; and Director of Sustainability. This team develops Greif's sustainability goals and roadmaps and reports to Greif's SSC.

In 2017, Greif completed our first robust materiality assessment to better inform our sustainability strategy and improve our sustainability reporting. During the process we engaged Greif's ELT and board of directors, customers, investors, community members, community partners, suppliers and sustainability experts to determine Greif's most significant environmental, social, economic, and governance impacts, risks, and opportunities and validated our findings with leadership to determine the most material topics to our business. Through this process we gained a greater understanding of stakeholder expectations to inform our on-going identification and assessment of climate-related risks.

In 2018, the results of our on-going risk identification reaffirmed the importance of reducing energy and emissions, our 2020 goal of 10% and establishing a 2025 goal. In conjunction with our annual operational energy and emission project roadmaps, these goals help us tie short-term tactics to our short-, medium- and long-term mitigation of climate-related risk. Our 2018 Sustainability Report discusses our sustainability strategies, including our eight priorities that specifically address climate-related risks.

In 2018, we were selected by WBCSD to participate in a pilot program to further integrate climate and sustainability risks into our ERM process. Our work with WBCSD will officially commence in 2019.

C2.2c

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

	Relevance & inclusion	Please explain
Current regulation	Relevant, always included	As an organization with operations across the globe, current regulations are considered as part of Greif's ongoing climate-related risk assessments. Each Regional VP is responsible for monitoring the regulatory environment and ensuring their operations are compliant with all applicable regulations. The Sustainability Steering Committee is responsible for maintaining awareness of climate-related regulations globally and helping to identify risk and opportunity within these regulations, based on input from Regional VPs. Current regulatory risks are discussed at each biannual Sustainability Steering Committee meeting. Climate-related regulatory risk is incorporated into Greif's Enterprise Risk Management process, which is reviewed quarterly by Greif's Audit Committee and ELT, and annually by Greif's Board of Directors. Greif's most recent risk reviews have identified current compliance and regulatory risk as a moderate risk factor with potential impact evident within six to 12 months. For example, our Chinese RIPS operations are subject to strict air quality regulations set by the Ministry of Ecology and Environment. If air quality falls below yellow alert levels, the government will request that manufacturers shut down operations until air quality returns to a safe level. Greif's Tianjin facility was shut down twice in 2017 as a result of these regulations, resulting in seven days of lost production time. Similar mandated shut-downs could recur at any time, representing risk of lost revenues as a result of climate-related regulations. As such, this, and similar climate-related regulations, are relevant and always included in our Enterprise Risk Management process, as described in C2.2b. Further, per our 2018 10K, we are subject to transportation safety regulations set by the U.S. Department of Transportation and similar agencies in other jurisdictions. These regulations and standards set forth requirements related to the transportation of both hazardous and nonhazardous materials in some of our packaging products and subject Greif to random inspections and testing to ensure compliance. As transportation, and reducing emissions related to the transportation of our products, is a critical component of our climate strategy, the implications of these regulations are relevant to, and thus always included in, our climate-related risk assessments.
Emerging regulation	Relevant, always included	Emerging regulations are considered as part of Greif's ongoing climate-related risk assessments. Each Regional VP is responsible for monitoring the regulatory environment in their region and notifying executive leadership of emerging changes. The Sustainability Steering Committee (SSC) is notified when regulatory changes with potential climate-related impacts are identified by regional VPs and the Director of Sustainability. Emerging regulatory risks are discussed at each biannual SSC meeting. Climate-related regulatory risk is incorporated into Greif's Enterprise Risk Management process, which is reviewed quarterly by Greif's Audit Committee and ELT, and annually by Greif's Board of Directors. The risk of changing climate, climate change regulations and greenhouse gases affecting our operations and financial performance is disclosed as a risk on our 2018 10K. We believe it is likely that the scientific and political attention to issues concerning the extent and causes of climate change will continue, with the potential for further legislation and regulations that could affect our results of operations and financial condition. Recently, Canada implemented a number of rules and regulations around paint, impacting our operations in the country. To address the new regulations, Greif is in the process of implementing Dakota Software to track the relevant regulations across our RIPS North American operations. By creating unique profiles for each of our sites, we can better understand the relevant laws and regulations that each facility is subject to. The system sends out monthly updates, informing each facility of any changes to relevant regulations. In 2016, the Brazilian Federal Government, through the Ministry of Mines and Energy, initiated MERCADO LIVRE DE ENERGIA ELETRICA ou AMBIENTE DE CONTRATAÇÃO LIVRE - ACL" (FREE ELECTRICITY MARKET or FREE HIRING ENVIRONMENT - ACL), an energy rationing program intended to make the energy market more competitive for consumers and energy traders. The emerging regulation was identified as a potential risk through our ERM process. After implementing the program, Greif reduced energy costs 30 percent, savings more than \$1.4 million USD, and reduced CO2 emission 70 percent. We are evaluating similar programs in Chile and Argentina that are pending approval.
Technology	Relevant, always included	Greif surfaces technology opportunities/risks through customer conversations and RFPs, our Life Cycle Analysis showing where our most significant emissions occur, facility energy audits, and product cost analyses. We address these opportunities/risks through product quality and innovation and operational energy and emission roadmaps. In 2018, we combined our Global and Sustainable Innovation teams into a single Global Innovation Committee and established a formal innovation function in our RIPS North America business. The committee is comprised of representatives from each of Greif's business units and is responsible for driving collaboration and idea sharing across business units, including technological innovations that may benefit multiple business units. In RIPS NA's innovation function, innovation priorities are evaluated and prioritized based on potential financial return, sustainability impacts and overall value to Greif and our customers. Since efforts identified by this team have potential for significant capital investment, and indicate changing customer behavior, the activities are a Risk Process and Content Monitoring input considered in our ERM process by the Risk Leader Committee, as described in C2.2b. Our technology-related innovation efforts focus on transforming our product portfolio by developing sustainable packaging solutions based on a set of eight environmental, social, and financial sustainability criteria. Through internally-initiated solutions and collaboration with customers, our innovation efforts focus on dematerialization, and green material substitution, while continuing to meet performance requirements. In 2017 Greif introduced our EcoBalance™ product line in North America, which is produced using approximately 75 percent recycled plastic and reduces CO2 emissions 30 to 53 percent compared to comparable conventional products. Each year, Greif's Sustainability Steering Committee (SSC) oversees the development of operational energy and emissions roadmaps to identify projects, including technology replacements that will contribute to climate-related goals. This information is incorporated into Greif's ERM process, as described in C2.2b. Progress against the roadmaps is discussed at each biannual SSC Meeting. In 2018, we completed 47 projects, reducing energy consumption by greater than 8.9 million kWh, annually.
Legal	Relevant, always included	Greif considers climate-related legal risk in conjunction with emerging regulatory risk. Greif's legal risks are evaluated collaboratively by Greif's Environmental Health and Safety, Legal and Compliance teams. As direct assurance providers to Greif's Risk Process and Content Monitoring inputs, risks identified by these teams are directly factored into Greif's ERM process, and evaluated by the Risk Leader Committee, as described in C2.2b. When legal risk with potential climate-related implications is identified, the Sustainability Steering Committee is notified. If the matter is urgent, the Committee will convene to discuss and address the risk, with subsequent updates occurring at each biannual meeting. In 2017, the Wisconsin reconditioning facilities of Container Life Cycle Management LLC (CLCM), a joint venture partially owned by Greif, became subject to environmental and safety regulatory violation allegations, many of which CLCM disputes, and to odor complaints. CLCM immediately began working with the regulators to identify and address these issues and is continuing to make tangible changes to those operations. For example, CLCM raised the height of a smoke stack to immediately address odor concerns. In 2018, CLCM installed a regenerative thermal oxidizer (RTO) at the St. Francis facility intended to reduce odors emanating from the site's operations. Thermal oxidation is recognized as the most effective way to destroy odor-causing compounds and is commonly used throughout the United States for a wide variety of processes. CLCM initiated the use of the RTO in February 2019. More information on this situation is available at clcmwi.com. Greif's risk management process enabled us to quickly identify, respond to, and continue to manage any potential legal ramifications of this event.
Market	Relevant, always included	Industrial packaging customers are increasingly looking to manufacturers like Greif to help them optimize their costs and reduce waste and emissions in their supply chain. Greif's sales and marketing teams engage with our customers on a daily basis to ensure we remain abreast of their concerns and are able to respond to them. We track Customer Satisfaction Index and Net Promoter Scores quarterly to ensure we are properly addressing customer needs and use their feedback to monitor emerging concerns. Greif formally collaborates with our customers on product development and innovation efforts to help them meet their sustainability goals. These efforts have led to the launch of a variety of products, including NexDrum and EcoBalance products lines, both of which increase the use of recycled materials, reduce weight and emissions compared to conventional products. All customers have access to our Green Tool, which allows them to estimate the emission impact of various Greif solutions. Our supply chain management efforts proactively reduce material use and seek to identify materials that are more environmentally friendly, including low-VOC and energy-efficient alternatives. In response to these risks, and to ensure market related risks associated with them are being actively managed, Greif set two 2025 goals: 1) Using a fiscal year 2017 baseline, reduce raw materials/logistical costs used to produce current product offering by 1%; 2) Move from non-green to green material sourcing if it is economically feasible and doing so provides high quality products to our customers. The Sustainability Steering Committee (SSC) receives updates on these risks and associated programs at biannual meetings. Through the activities and teams described above, Greif identifies market-related risks related to raw materials, procurement activities, supplier relations, and competition. These risks are identified by Greif's Global Sales and Marketing, Global Sourcing and Procurement teams and Global Innovation Committee, with oversight by the SSC. Recommendations from these teams are Risk Process and Content Monitoring inputs and considered in our ERM process by the Risk Leader Committee, as described in C2.2b. As stated in our 2018 10K, the risk of raw material and energy price fluctuations and shortages in part due to climate related events, is a material financial risk to the business.
Reputation	Relevant, always included	Acknowledgment and management of climate risk is increasingly becoming an expectation for our current and potential customers that poses a risk of reduced demand for our products. Our Sustainability Director, who reports to the Senior Vice President and Group President, Rigid Industrial Packaging and Services, Americas and Global Sustainability and sits on both the Sustainability Steering Committee and Sustainability Management Team, is responsible for assessing and managing climate-related reputational risk through regular engagement with our stakeholders and developing communications and reporting on sustainability topics. In 2017, the SSC conducted a third-party ESG materiality assessment, identifying climate strategy, energy, and emissions among the important topics to our stakeholders. Based on the results of the assessment, Greif assigned owners to high priority ESG topics and set goals and KPIs related to high priority topics. Potential reputational risks that we identified as part of this assessment, as well as the SSC's ongoing stakeholder engagement and responsibilities, are Risk Process and Content Monitoring inputs and considered in our ERM process by the Risk Leader Committee, as described in C2.2b. Greif has published sustainability reports since 2009. Since 2017, we have published sustainability reports in accordance with GRI Standards Core reporting requirements. Greif has been a member of the World Business Council for Sustainable Development (WBCSD) since 2009. We engage with WBCSD quarterly, have partnered to host conferences, signed on to the organization's Manifesto for Energy Efficiency in Buildings, and partnered to publish From Cradle to Grave: Greif's Life Cycle Analysis, a case study on how we implement Life Cycle Analysis in our business. In 2018, we were selected by WBCSD to participate in a pilot program to further integrate climate and sustainability risks into our ERM process. Our work with WBCSD will officially commence in 2019. Customer collaboration has led to the launch of a variety of products, including NexDrum and EcoBalance products lines – both of which increase the use of recycled materials, reduce weight and emissions compared to conventional products. All customers have access to the Greif Green Tool, which allows them to estimate the emission impact of various Greif solutions.
Acute physical	Relevant, always included	Risk Management and Business Continuity is a material risk for Greif that is evaluated on an ongoing basis via our ERM process, as described in C2.2b. To ensure this risk is regularly and proactively managed, in 2017 Greif established the We Got Chu program, administered by representatives from sales, marketing, customer service, operations and logistics in conjunction with business unit leadership. The program manages risk and business continuity through inventory and production redundancy capabilities, facility risk assessments and proactive labor relations. We Got Chu outlines a Natural Disaster Recovery Protocol for each Greif production facility in NA to follow. The protocol requires each facility to maintain alternate supplier lists for the top 35 materials used in the facility, identify back-up Greif production facilities, provide production documentation for all products made in the facility, maintain a Recovery Checklist, and complete sales order transition templates. Through the program, each facility conducts monthly random mock disasters to ensure protocols are in place, understood, and able to be implemented quickly. Every two years Greif's highest risk facilities are third-party audited to assess natural disaster and safety risks. Based on audit findings, Greif makes capital investments to address those risks, such as upgrades to the fire protection system in our Alsip, Illinois facility, completed in 2017. In 2017, Greif's North American operations were hit by hurricanes Harvey and Irma, resulting in \$5.3 million of impact to our business. Despite the impact, our risk management and business continuity practices allowed us to meet our customer commitments during recovery without declaring force majeure. In 2018, no Greif facilities were directly impacted by acute physical events, however we did complete facility upgrades to continue to improve our resilience should we be impacted in the future. For example, in 2018 we initiated an upgrade to the roof for one of our Houston, Texas facilities to better protect against hurricane-related wind and water damage.

	Relevance & inclusion	Please explain
Chronic physical	Relevant, always included	Chronic physical risks are evaluated as part of our long-term risk management and business continuity efforts, which is led by our Risk Leader Committee according to our ERM process, described in C2.2b. Each of our business units works with the Global Strategy Team to set short- and long-term strategy around locations of operation, facility placement, and markets we serve. Climate risk is integrated into business decisions, including siting of facilities and areas of operation. Every two years Greif's highest risk facilities are third-party audited to assess natural disaster and safety risks. Based on audit findings, Greif makes capital investments to address those risks, such as the completed upgrades to the fire protection system in our Alsip, Illinois facility in 2017. In 2018 we initiated an upgrade to the roof for one of our Houston, Texas facilities to better protect against hurricane-related wind and water damage.
Upstream	Relevant, always included	In 2017 Greif performed a Life Cycle Analysis to determine the emissions impact of our products at each stage of the value chain. The analysis concluded that approximately 60% of emissions associated with our products result from raw materials production and transportation (new packaging only, does not include credits due to recycling or reconditioning activities). These upstream climate-related risks are evaluated by Greif's Global Sourcing and Supply Chain Team, which monitors raw material supply risks in for Greif's key direct material inputs: steel, resins and paint. Risks are communicated to Greif's Sustainability Steering Committee at each biannual meeting and included as Risk Process and Content Monitoring inputs considered in our ERM process by the Risk Leader Committee, (see C2.2b). Each month, these teams track improvements in material costs, deal terms, working capital and inventory in the Greif Business System (GBS). In 2018, we integrated sustainability into the GBS, allowing us to identify projects with positive sustainability impacts. This capability allowed us to identify 10 projects with \$1.3 million in sustainability impact completed in 2018. In 2017, we formed the Sustainability Procurement Team, comprised of representatives from each region. The team set, and is responsible for achieving, two 2025 goals related to upstream risk: 1) Reduce raw materials / logistical costs used to produce current product offering by one percent, and 2) Move from non-green to green material sourcing if it is economically feasible and doing so provides high quality products to our customers. These efforts contribute to reducing emissions associated with the manufacturing and transportation of Greif's products. Our Natural Disaster Recovery Protocol, We Got Chu, requires each facility to maintain alternate supplier list for the top 35 materials used in the facility. These lists are maintained to ensure continuity of supply and Greif production can be maintained in the event a supplier is impacted by a natural disaster. Expectations of our suppliers are outlined in our Supplier Code of Conduct. In 2018, 100% of our new suppliers were given access to our Supplier Code of Conduct via Greif.com and expected to adhere to the principles within, including the expectation to "make continuous efforts to reduce the environmental impacts of their operations."
Downstream	Relevant, always included	Downstream climate-related risks are considered in conjunction with Greif's reputational and market risks. In 2017, Greif expanded our Scope 3 GHG inventory to include purchased goods and services, capital goods, fuel and energy related activities not included in Scope 1 and 2, including waste generated in operations, business travel, employee commuting, and end-of-life treatment of sold products through Greif's EarthMinded LCS/CLCM network (including steel and plastic drums and IBC products manufactured by Greif and Greif's competitors), allowing us to better understand and manage downstream climate risk, particularly as we launch additional products reducing our customers', and our own carbon footprint, including the NexDrum and EcoBalance products lines – both of which increase the use of recycled materials, reduce weight and emissions compared to conventional products. Greif's Global Energy team tracks emissions on a monthly basis via our Energy Goals Status Report. Results are formally communicated and reviewed biannually by the Sustainability Steering Committee and included as Risk Process and Content Monitoring inputs considered in our ERM process by the Risk Leader Committee, as described in C2.2b.

C2.2d

(C2.2d) Describe your process(es) for managing climate-related risks and opportunities.

Climate-related risks and opportunities are integrated into Greif's Enterprise Risk Management (ERM) Process. Risk information is identified and analyzed through Greif's Risk and Content Monitoring processes by assurance providers across the organization, including Internal Audit, Legal/Compliance, Greif Business System, and the Sustainability Steering Committee (SSC). Information from these groups is provided to Greif's Risk Leader Committee (RLC) led by Greif's Chief Audit Executive, and comprised of members of Greif's Executive, Business Unit, and Strategic Business Unit Leadership Teams, including Vice President, Corporate Financial Controller and Treasurer; Chief Administrative Officer; Executive VP, General Counsel and Secretary; President Global Sourcing & Supply Chain; VP Global Tax; VP of Business Services; Sr Financial Controller, APAC; Strategic Business Unit Controller, EMEA; VP, Information Technology; VP, Global Shared Services; Director Controller, LATAM; and Assistant General Counsel; Sr Manager - Finance, RIPS North America; VP & Controller, PPS; Director Risk Management; and Director of Sustainability. The RLC identifies, ranks, reviews, and prioritizes risks in conjunction with Greif's Audit Committee to determine the most critical risks and identify areas of opportunity within them, which are then discussed with the Board of Directors. Once aligned to, risks are evaluated by Greif's Strategy Team (ST) to develop plans for risk mitigation and opportunity capture, which are approved by Greif's Executive Leadership Team prior to implementation.

Through this process Greif identified extreme weather events as an acute physical risk with potential to cause substantive financial impact to Greif, particularly where Greif's operations and suppliers are exposed to hurricane risk (e.g RIPS facilities and suppliers in Texas, Florida, and Louisiana). Based on planning by Greif's ST, insurance coverage, redundancies in supply chain and manufacturing capabilities were established, and the We Got Chu Natural Disaster Recovery Protocol was launched. Administered by representatives from sales, marketing, customer service, operations and logistics in conjunction with business unit leadership, We Got Chu manages risk and business continuity through inventory and production redundancy capabilities, facility risk assessments and proactive labor relations. The protocol requires each facility to maintain alternate supplier lists for the top 35 materials used in the facility, identify back-up Greif production facilities, provide production documentation for all products made in the facility, maintain a Recovery Checklist, and complete sales order transition templates. Through the program, each facility conducts monthly random mock disasters to ensure protocols are in place, understood, and able to be implemented quickly. Our risk planning was implemented when our facilities were impacted by hurricane's Harvey and Irma in 2017. Despite operational stoppages in these facilities, our supply and manufacturing redundancies and disaster response plans allowed us to fulfill all customer obligations without declaring force majeure. We also identified extreme weather events as an opportunity, which led to the development of Greif's FIBC bag product line, which can be used to store water in the event of drought and in water scarce regions.

Our ERM process and SSC has also identified that Greif is exposed to transitional market risk in the form of raw material price and supply volatility, particularly in our core raw materials of steel, resin, and paint, as a result of climate related impacts. This risk was also identified as a material topic during our 2017 formal materiality assessment, and reported in our 2018 Sustainability report. Our global procurement team mitigates this risk by securing long-term price-locked contracts, opportunistically increasing stock if prices fall, and establishing multiple supply relationships for like materials. This is also an opportunity for product innovation in reducing the raw materials required to manufacture our products. Our procurement, product development, and innovation teams collaborate with suppliers and customers to lightweight and reduce the gauge of materials used in our products, including NexDRUM® which is produced using 15% less material and 12% less CO2 emissions than standard drums, thus creating opportunity from our raw material price and supply volatility risk. In 2018, efforts to lightweight and down gauge our product lines resulted in \$1 million in savings, an example of how our ERM process is used to identify and manage climate related opportunities.

In 2018, we conducted an onsite review of our Riverville plant (our largest source of Scope 1 and Scope 2 emissions) in partnership with a 3rd party to identify energy/emissions reduction opportunities. In 2019, the results of this assessment will be used to determine which projects can be feasibly implemented.

C2.3

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

Yes

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

Risk 1

Where in the value chain does the risk driver occur?

Direct operations

Risk type

Physical risk

Primary climate-related risk driver

Chronic: Rising sea levels

Type of financial impact

Reduced revenue from decreased production capacity (e.g., transport difficulties, supply chain interruptions)

Company- specific description

Climate change, to the extent it produces rising temperatures inducing sea level rise, may adversely impact our ability to manufacture and transport our products. Our operations include facilities in low-lying coastal areas such as Europort, Vreeland, and Asterweg, in the Netherlands, Malaysia, and Singapore, which may be significantly impacted by sea level rise. Our facilities are strategically located in close proximity to our customers and sea ports to minimize logistics and transportation costs, which can be significant due to the weight of raw materials that are transported in Greif packaging. Adaptations due to sea level rise may lead to increased logistics costs, production interruptions, or potentially facility relocation, each of which could disrupt Greif's strategic locations.

Time horizon

Long-term

Likelihood

Likely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

1070000000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

18 Greif facilities are situated in low-lying coastal areas, accounting for 13% of Greif's revenue from the manufacture of rigid industrial packaging products and closures. According to the Fifth Assessment of the Intergovernmental Panel on Climate Change (IPCC), such areas are at risk of the consequences of sea-level rise. A study from the European Commission's FP7 notes that "expected annual damage from flooding [in Europe] is projected to grow to around €5 bil. by the 2020s [and] €11 bil. by the 2050s." A 2008 study by the Dutch Deltacommissie estimated costs of adaptation to sea level rise increasing up to €1.6 bil./year by 2020, and €1.5 bil. through 2100. With operations and customers in these lands, Greif may bear some of these adaptation costs. Potential financial impact assumes that all Greif facilities at risk of sea level rise will need to be relocated at the full value of the facility and revenues generated from those facilities will be lost for a period of one year.

Management method

Each of our business units works with the Strategy Team to set short- and long-term strategy around markets we serve. Climate risk is integrated into business decisions, including location of facilities. Greif purchases property insurance to protect assets from losses associated with fire, flood, wind storm, and earthquake. Such coverage would cover the total loss of a facility and equipment replacement costs. In addition to asset protection, Greif purchases business interruption coverage, which protects the company from loss of profits due to a loss from covered natural disasters. Business interruption coverage includes contingent coverage, protecting Greif from loss of supply of raw materials and loss of customer business provided that such losses are due to the supplier or customer sustaining a loss due to a covered natural disaster. In 2017, Greif's North American operations in Texas and Florida were hit by hurricanes Harvey and Irma, resulting in \$5.3 mil. of impact to our business. Despite the impact, our risk management practices allowed us to meet our customer commitments during recovery without declaring force majeure. In 2018, no Greif facilities were directly impacted by acute physical events, however we did complete facility upgrades to continue to improve our resilience should we be impacted in the future. In 2018 we initiated an upgrade to the roof for one of our Houston, Texas facilities to better protect against hurricane-related wind and water damage.

Cost of management

3400000

Comment

Sources include: OECD Environment Working Paper: Ranking Port Cities with High Exposure and Vulnerability to Climate Extremes; Environmental Technology: Which Countries are Most at Risk of Rising Sea Levels?; Quaternary Science Reviews: Expert assessment of sea-level rise by AD 2100 and AD 2300; Surging Seas Risk Zone Map (<https://ss2.climatecentral.org>)

Identifier

Risk 2

Where in the value chain does the risk driver occur?

Direct operations

Risk type

Physical risk

Primary climate-related risk driver

Acute: Increased severity of extreme weather events such as cyclones and floods

Type of financial impact

Reduced revenue from decreased production capacity (e.g., transport difficulties, supply chain interruptions)

Company- specific description

Climate change, to the extent it impacts the frequency and severity of precipitation extremes and related natural disasters—including wildfires and flooding—may impact our ability to manufacture and transport our products. Such climate-related extremes may impact our footprint in any geography at any time. Greif's Mexico and United States operations in Florida, Texas, and Louisiana are at specific risk of hurricanes and California locations are at specific risk of drought and wildfires. In 2017, Greif's North American operations were hit by hurricanes Harvey and Irma, resulting in \$5.3 million of impact to our business. Despite the impact, our risk management and business continuity practices allowed us to meet our customer commitments during recovery without declaring force majeure. In 2018, no Greif facilities were directly impacted by acute physical events, however we did complete facility upgrades to continue to improve our resilience should we be impacted in the future. For example, in 2018 we initiated an upgrade to the roof for one of our Houston, Texas facilities to better protect against hurricane-related wind and water damage.

Time horizon

Current

Likelihood

Virtually certain

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

3000000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

Several of Greif's operations are subject to temporary disruptions or increased costs due to extreme weather events, including flooding and drought. A significant number of our manufacturing facilities are situated nearby our customers to minimize the impact of freight and enhance customer service. This strategy also facilitates our business contingency plans, which focus on moving production to other facilities during any business interruptions. Supplying our customer base from an alternate location may increase freight costs and/or production costs, however we are confident in our abilities to efficiently and effectively support the supply chain during any period of the interruption. A recent review of several loss events enables an estimated exposure range of \$1 million to \$3 million due to production downtime and lost revenues associated with facility closure events with a duration of less than a year. The provided financial impact is the impact of one such event at one facility.

Management method

Each of our businesses works with the Global Strategy Team to set short- and long-term strategy around locations of operation, facility placement, and markets we serve. We also assess business continuity risk and implement redundancy plans to mitigate risks related to changing physical conditions. Our operations are strategically placed to allow for redundancies throughout our operations. Greif has a proven record of quickly and efficiently shifting production to other production facilities to meet our customers' needs, which is formalized in our We Got Chu Disaster Response Program, which was put into place in 2017 during Hurricanes Harvey and Irma, which impacted our Texas and Florida operations. Greif purchases property insurance to protect assets from losses associated with fire, flood, wind storm, and earthquake. Such coverage would cover the total loss of a facility and machinery and equipment replacement costs. In addition to asset protection, Greif purchases business interruption coverage, which protects the company from loss of profits due to a loss from covered natural disasters. Business interruption coverage includes contingent coverage, protecting Greif from loss of supply of raw materials and loss of customer business provided that such losses are due to the supplier or customer sustaining a loss due to a covered natural disaster. Greif insurance covers additional costs of shipping if production is temporarily shifted due to climate related natural disasters.

Cost of management

3400000

Comment**Identifier**

Risk 3

Where in the value chain does the risk driver occur?

Supply chain

Risk type

Transition risk

Primary climate-related risk driver

Market: Increased cost of raw materials

Type of financial impact

Increased production costs due to changing input prices (e.g., energy, water) and output requirements (e.g., waste treatment)

Company- specific description

Greif RIPS business, with operations in over 40 countries, accounted for 68% of our global revenue in 2018. RIPS produces multiple lines of steel drums, including our Large, Conical, and Composite steel drums product lines, placing steel among our leading raw material inputs. Accordingly, the price of steel has a significant impact on the profitability of our business. If we are unable to control steel pricing, our margins suffer and we may not be able to offer our customers competitive prices for our products. In 2018, the price of steel fluctuated quite dramatically with the introduction of steel tariffs imported to the United States. Prices rose throughout the year, before falling in November of 2018. As trade tensions grow between the United States and China, the future cost of steel remains unclear. General Steel anticipates costs to gradually rise in 2019 and into the future, though currency instability and a slowing global economy could pose a risk (Source: 2019 Gensteel 2019 Pricing Forecast). We know that active management in the form of lightweighting and downgauging our products to reduce the use of raw materials is needed to mitigate this risk, and have taken steps to do so. Down gauging resulted in \$1 million USD in raw material savings in 2018. Our production costs are at risk of rising due to an increase of fuel, transportation, and natural gas costs. Driver shortages and increasing fuel costs increase our transportation costs. Our PPS operations, located in Riverville, VA and Massillon, OH, are heavily reliant on natural gas, which is forecasted to decrease in price as supply increases over the coming years. This impacts both our production costs, and raw material supply costs.

Time horizon

Current

Likelihood

Virtually certain

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

5000000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

The financial impact is based on the aggregated results of the Greif Enterprise Risk Management committee, who have identified the potential financial impact of raw material price volatility to be approximately \$5 million. Quarterly, the risk committee evaluates the likelihood and financial impact of each risk, as described in C2.2b. As part of rating the risks from (high, medium, low); respondents are asked to provide a quantitative measure of the impact. The quantitative measure is compared to the risk factors (or factors contributing to the risk rating). Financial impact is determined based on the outcome of this process, which is informed by the information detailed in the company-specific description of this risk, as well as the volume of raw materials used in Greif's operations.

Management method

Price volatility is managed by our Global Procurement and Supply Chain team as well as our innovation efforts focused on transforming our product portfolio by developing sustainable packaging solutions based on a set of eight environmental, social, and financial sustainability criteria. Through internally-initiated solutions and collaboration with customers, our innovation efforts focus on dematerialization and green material substitute while continuing to meet performance requirements. In 2018, our dematerialization efforts, which include reductions in steel, lead to \$1 mil. in savings. For example, Greif's line of Composite Steel Drum (Valethene) is produced using steel that is up to 1.5mm thinner than conventional drums. 2018 saw significant changes to how we manage innovation. We combined our Global Innovation and Sustainable Innovation teams into a single Global Innovation Committee and established a formal innovation function in our RIPS North America business. The newly formed committee is comprised of representatives from each of Greif's business units and is responsible for driving collaboration and idea sharing across business units. The new committee structure prevents ideas that may be beneficial to multiple business units from becoming siloed in one area. In RIPS NA's innovation function, innovation priorities are evaluated and prioritized based on potential financial return, sustainability impacts and overall value to Greif and our customers.

Cost of management

3556250

Comment

Cost of management includes: \$3.4 million in R&D investments made in 2018 on sustainability tagged products that, in addition to reducing emissions and energy use, reduce Greif's reliance on virgin raw materials. \$156,250 as an estimate of the salary of the Sustainability Procurement Team that is attributable to time spent on actively managing this risk.

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?

Customer

Opportunity type

Products and services

Primary climate-related opportunity driver

Development and/or expansion of low emission goods and services

Type of financial impact

Increased revenue through demand for lower emissions products and services

Company-specific description

In 2011, Greif conducted a screening of almost 150 customers and competitors, which found that customers are increasingly cognizant of sustainability internally and in their supply chains. 89 percent of customers interviewed agreed that sustainable supply chain practices will become increasingly important over the next ten years. Additionally, approximately 50 percent of customers interviewed agreed that sustainable packaging will become increasingly important to their customers and the importance of shipping sustainably will likely increase even more with introduction of greater fuel/energy taxes and regulation. As a manufacturer of industrial packaging, Greif can play a unique role in helping our customers address these changes. In many cases, empty Greif packaging must be transported to a customer to be filled, and then transported to our customer's customers for use. As such, the manufacture and transportation of Greif packaging can be areas of opportunity for companies to reduce both upstream and downstream costs and emissions. Greif works with our raw material suppliers, transportation partners, and internal teams to develop lighter weight and more energy efficient products and provide transportation and ancillary services to help our customers reduce emissions associated with our packaging (e.g. EcoBalance, NexDRUM®), as described in the estimated financial impact and strategy to realize columns. To manage logistics in an environmentally-responsible manner, Greif uses carriers that are approved through the EPA's SmartWay initiative whenever possible. We include SmartWay certification during our new carrier certification process. Greif's SmartWay-approved carrier base accounts for 88.5 percent of ton miles traveled. From 2014 to 2017, we saved 189,000 tons of CO2 mass emissions through the use of SmartWay carriers.

Time horizon

Current

Likelihood

Virtually certain

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

600000000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

In 2018, Greif realized \$571 million from sustainability-tagged products and began forecasting revenue for some of these product lines in some operating regions (please see C2.6 - Revenues and C4.5a for additional information). The estimated financial impact provided is based on a conservative five percent growth rate across Greif's entire sustainability-tagged product portfolio for one year of sales.

Strategy to realize opportunity

Greif addresses this opportunity by providing tools and collaboration opportunities that allow our customers better access and visibility to how our products impact their value chain. Greif's sustainability-driven products better enable our customers to achieve their goals, and will play an increasing role in differentiating Greif from competitors. Products such as our NexDRUM® plastic drum is produced with 15% less material and results in a 12% CO2 emissions reduction compared with conventional drums. Similarly, our EcoBalance product line is produced using 75% recycled plastic and reduced CO2 emissions 30-53% compared to conventional drums. Our Green Tool allows customers to evaluate the environmental impact of our products, providing our customers with the optimal packaging solution to mitigate emissions. We are working directly with 20 of our customers to take their current Greif product(s) and decrease the raw material input, weight, and increase the use of recycled content. In 2017, Greif established a goal to reduce raw materials/logistical costs used to produce current product offering by 1% and established the Global Innovation and Sustainable Innovation teams. These teams collaborate with customers to increase the number of sustainable products in our portfolio by developing products that are lighter weight, utilize less virgin raw materials in favor of recycled materials and reduce emission associated with our products.

Cost to realize opportunity

3400000

Comment

Cost to realize opportunity represents Greif's 2018 R&D investments in sustainability-tagged products. The efforts of the teams mentioned will build on work that Greif has already done to develop products that support more sustainable supply chain practices and sustainability-driven products.

Identifier

Opp2

Where in the value chain does the opportunity occur?

Customer

Opportunity type

Products and services

Primary climate-related opportunity driver

Shift in consumer preferences

Type of financial impact

Better competitive position to reflect shifting consumer preferences, resulting in increased revenues

Company-specific description

With the advent of social media platforms and more coverage by traditional media, the general public is becoming increasingly attuned to climate change issues. As climate change becomes more salient, industrial manufacturing clients are at risk of changing public perceptions around a company's operations and product lines. Greif, as an industrial manufacturer of products that may be perceived as energy, emissions, and waste intensive, may be adversely impacted by perceived brand and reputational risk. According to RepRisk, occupational health and safety, waste, local pollution, and impacts on local communities and ecosystems are among the top reputational concerns for Greif. By developing products and services that can decrease customers' GHG emissions and waste in their value chain, and publicly communicating our sustainability commitments, Greif can set itself apart from competitors and ensure the success of its reputation. In 2017, Greif conducted our first formal materiality assessment to better inform our sustainability reporting and improve our sustainability strategy. During the process we engaged cross-functional Greif leaders, Greif's Board of Directors, customers, investors, community members, community partners, suppliers and sustainability experts to determine the impacts, risks, and opportunities that are most relevant to Greif and its stakeholders. The assessment confirmed that performance in environmental areas of climate strategy, waste and water are potential areas of opportunity and differentiation. Climate strategy in particular is an area of importance to customers, who use energy and emissions as an input during supplier selection, further confirming climate-related reputation as an area of opportunity for Greif. In 2018, we worked with customers to build a business model around financing and leasing equipment to compress used products, which can then be used to make other products. This model diverts waste from landfill by finding secondary applications for our used products. Items such as fencing, furniture and roadside cones have been produced using Greif materials. These secondary products demonstrate our commitment to working with our customers and developing products to meet their changing needs. In 2018, Greif generated \$571 million in revenue from sustainability tagged products.

Time horizon

Long-term

Likelihood

Likely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

Positive perceptions surrounding Greif's sustainability-driven product lines could trigger an increase in stock price resulting in higher market capitalization for Greif. For example, as of December 31, 2018, Greif (GEF) had 22,007,725 outstanding shares of Class B stock trading at a value of \$44.40 per share. A 1% increase in value due to positive perception would result in an increase of \$0.61 per share, or a new stock value of \$62.03, and an increased market capitalization of \$9,771,430.

Strategy to realize opportunity

In 2016 we established board oversight of sustainability to enhance and continue developing our sustainability program and climate change initiatives. Our Sustainability Steering Committee maintains relationships with sustainable development organizations, including WBCSD and UNGC (of which we are a signatory) and leads our reporting efforts, including our annual CDP response and GRI-aligned sustainability report. We participate in third-party assessments (e.g Sedex, Together for Sustainability, and EcoVadis) and share our results to build trust with our stakeholders and further our reputation as a company that is committed to transparency and continuous improvement. We foster a culture of innovation that encourages sustainable product development and considers the end-of-life of our products. After conducting LCAs on our entire product line, we created Earthminded LCS, which recollects, reconditions and enables reuse of used industrial containers in NA and Europe, and developed the Greif Green Tool, which allows customers to identify and choose Greif products that mitigate the emissions impact of their industrial packaging. In 2018, we combined our Global Innovation and Sustainable Innovation teams into a single Global Innovation Committee including representatives from each of Greif's business units and established an innovation function in our RIPS NA business. The newly formed committee is responsible for driving collaboration and idea sharing across business units.

Cost to realize opportunity

180000

Comment**Identifier**

Opp3

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Resource efficiency

Primary climate-related opportunity driver

Use of more efficient production and distribution processes

Type of financial impact

Reduced operating costs (e.g., through efficiency gains and cost reductions)

Company-specific description

The cost of producing and transporting our products is sensitive to the price of energy. Energy prices, in particular oil and natural gas, have fluctuated in recent years, with a corresponding effect on our production costs. Potential legislation, regulatory action and international treaties related to climate change may result in increases to energy costs. To date, at least 40 countries and 24 subnational regions (states, provinces, etc.) have already or are scheduled to soon make polluters pay with a national or regional price on carbon. Since 1997, there has been a 20-fold increase in the number of global climate change laws, according to the most comprehensive database of relevant policy and legislation (Source: Mapped: Climate change laws around the world). We believe it is likely that the scientific and political attention to issues concerning the extent and causes of climate change will continue, with the potential for further legislation and regulations that could affect our operations and financial condition. Foreign, federal, state and local regulatory/legislative bodies have proposed various measures relating to climate change, regulating GHG emissions and energy policies (for example, California expanded its cap-and-trade program to cover 85% of GHG emissions, impacting five Greif production facilities in Southern California. In China, at least 9 regulatory changes are impacting our operations (China accounts for 2.4% of Greif's Scope 1 emissions), including reductions in hazardous fine particulate matter, capping of particulate matter, and increased air pollution inspections. Examples of these regulations include the Integrated Emission Standards for Air Pollutants and Volatile Organic Compound Emission Standards. Due to these changes in legislation/regulation, we could incur increased energy, environmental and other costs and capital expenditures to comply with the limitations. Failure to comply with these regulations could result in fines to our company and could negatively affect our business, however also afford us the opportunity to proactively improve our energy efficiency, thereby reducing our costs and exposure to these risks. We have entered into short-term contracts to hedge certain of our energy costs, but are also taking more permanent measures that positively impact our business, for example, investing in renewable energy.

Time horizon

Current

Likelihood

Virtually certain

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

10000000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

We are increasing the use of renewables across our business, both through investments in our direct operations and sourcing renewables via energy contracts. The total impact of these programs is estimated annually as we develop facility-level energy roadmaps identifying energy efficiency projects to be completed in the following year. In North America alone we have installed more than 2,000 solar panels, delivering 2.7 mil. kilowatt hours (kWh) of energy and saving more than \$100,000 annually. Throughout our China operations, we source renewable energy through 4,800 solar panels via energy purchase contracts. We are also investing in more energy efficient

equipment in our operations. In 2018, we completed 47 projects resulting in \$2.367 million in savings, including updates to LED lighting in six facilities, saving over 2.3 mi. kWh and \$138,143 annually. In working to achieve our 2020 energy and emissions goal, we estimate a \$10 mil. savings opportunity annually.

Strategy to realize opportunity

Greif set a 2020 goal to achieve 10 percent reduction in energy and GHG emissions per unit of production, from a fiscal 2014 baseline. Greif's Sustainability Steering Committee (SSC) is responsible for developing strategies and overseeing tactics to drive progress against this goal. The SSC guides the activities of our Sustainability Management Team, which works with our Global Energy Team, consisting of representatives from each region and business unit to develop and implement annual facility level roadmaps detailing energy and emission reduction initiatives in each Greif facility. For example, in 2018, we awarded the Michael J. Gasser Sustainability Award to a regional team consisting of HR and GSSC representatives from our RIPS business in EMEA for their successful efforts in reducing fuel costs and CO2 emissions. RIPS EMEA modified the company car policy to standardize the types of cars available for use in the region to select more environmentally friendly cars. The updated policy applies to all colleagues in EMEA who renewed their company car. In total, the policy impacted 296 users during the project. The program achieved a \$228,000 reduction in fuel costs and 35% reduction in total CO2 emissions. The RIPS EMEA project truly demonstrates the wide array of possibilities that exist across the business, beyond the operational arena. In 2018 Greif also piloted a REC program in our Delaware and Van Wert facilities.

Cost to realize opportunity

1714194

Comment

Cost to realize opportunity is presented for FY2018 only. We estimate a \$10 million savings opportunity annually through our efforts to increase our resource efficiency through renewables and energy savings projects.

C2.5

(C2.5) Describe where and how the identified risks and opportunities have impacted your business.

	Impact	Description
Products and services	Impacted	Greif's products and services are impacted by each risk and opportunity identified. Mitigating raw material price volatility is one of the primary goals of our efforts to lightweight our product lines. The core of this effort is reducing the amount of virgin raw materials used in our products, which directly impacts our exposure to this risk. Down gauging resulted in \$1 mil. USD in raw material savings in 2018. Our products are impacted by the risk of sea level rise and change in precipitation extremes. 18 of Greif's production facilities are located in areas at risk for flooding due to sea level rise. In 2018, these facilities accounted for over \$511 mil. in revenue. Greif's business continuity and disaster response program, We Got Chu, mandates that all products must be able to be co-produced at multiple facilities so that we can service customer orders in the event of a shut-down. Greif's production and transportation services must account for the potential that products may need to be produced and shipped from back-up production facilities. Each Greif product benefits from our energy efficiency programs as a result of lowered operating expenses impacting our overall cost of production. Since each facility is expected to identify and complete energy efficiency projects each year, all product lines benefit from this opportunity. In 2018, we completed 45 projects, and commenced on two more, leading to an 86,000 metric ton reduction in CO2e, and saving \$2.367 mil. Changes in customer preferences towards low emission packaging require changes to Greif's products to remain competitive. Greif has identified 8 sustainability criteria to factor into new product development, set sourcing goals for green material inputs and launched numerous products. We have identified 16 product and service lines as sustainable. These offerings accounted for more than \$571 mil. in revenue in 2018. Our products and services are impacted by our reputation to the extent that we are able to effectively communicate and prove the benefits to the market/customers. The Greif Green Tool allows our customers to identify the emission impact of their selected Greif products in their value chain, including raw materials, production, transportation, and end-of-life, and evaluate the benefits of moving to low/lower carbon products. Since being developed, over 65 customers have used the tool.
Supply chain and/or value chain	Impacted	Greif's upstream and downstream value chain is impacted by sea level rise and changes in precipitation extremes and drought risk. These risks could result in temporary shut-downs, or long-term relocations, particularly in the case of sea level rise. Our sourcing and procurement strategy is highly dependent on sourcing raw materials in close proximity to our production facilities. Operational changes could lead to changes in spending patterns with suppliers, including short-term reductions in spend and long-term elimination of suppliers. Price volatility may impact suppliers in the event Greif identifies favorable pricing for like materials with alternate suppliers. Conversely, Greif's inability to control pricing could lead to reduced margins, or increased prices to our customers. Supplier performance against our supply chain goals; to reduce raw materials/logistical costs used to produce current product offering by one percent and move from non-green to green material sourcing if it is economically feasible and doing so provides high quality products to our customers by the end of fiscal year 2025, account for 5% of our supplier scorecard. Greif's innovation efforts offer positive impact to our customers, who may experience lowered prices (for Greif products and transportation), increased performance, and/or reduced environmental impact for product changes, but can cause negative impact to suppliers, particularly through our light weighting and downgauging programs. For example, in FY 2018, Greif reduced raw material use by 0.001%, resulting in \$1 million less in spending with our suppliers. That is due to gauge reduction (using less steel), inventory reductions (less demand), water-based paints, etc. Greif's energy efficiency improvements positively impact our customers in the form of reduced Scope 3 emissions as well as improving their reputation of working with sustainable suppliers. In 2017, our Brazil operations migrated to renewable energy resulting in a 70% reduction in emissions. Our NexDrum product offers 12% reduction in emissions, which can benefit emissions reporting for our downstream stakeholders. Our focus on energy efficiency and emissions reductions extends to our suppliers whom we request respond to the extensive ESG EcoVadis supplier questionnaire and comply with our Supplier Code of Conduct which sets climate-related expectations.
Adaptation and mitigation activities	Impacted	Risk of sea level rise and precipitation change has led to adaptation in business continuity via our We Got Chu natural disaster response program, which has required capital and human resource expenditures to establish supply chain redundancies, information technology, and training programs necessary for the program to be implemented. We have made expenditures in insurance policies to protect against the financial impacts of these risks. Greif purchases roughly \$7 million in total loss property insurance to protect assets (facility and machinery and equipment) from losses associated with fire, flood, wind storm, and earthquake. Greif purchases business interruption coverage, which protects the company from loss of profits due to a loss from covered natural disasters, including contingent coverage, protecting Greif from loss of supply of raw materials, loss of customer business provided that such losses are due to the supplier or customer sustaining a loss due to a covered natural disaster, and covers additional costs of shipping if production is temporarily shifted due to climate related natural disasters. Mitigation activities related to realizing our energy efficiency opportunities require capital investment but lead to reduced expenditures, operating costs and production costs. In 2018, Greif invested \$1,714,194 in capital expenditures to complete 47 projects leading to an 88,000 metric ton reduction in CO2e, and saving \$2.367 million, which impacts our overall operating expenses and margins, and cost of goods. Adaptation against raw material price volatility occurs in the supply/value chain area of our business. As outlined in the C2.5 "Supply chain and/or value chain", we have made changes in our organizational structure to address our climate-related risks and opportunities. In 2018, we combined our Global Innovation and Sustainable Innovation teams into a single Global Innovation Committee and established a formal innovation function in our RIPS North America business. The newly formed committee is comprised of representatives from each of Greif's business units and is responsible for driving collaboration and idea sharing across business units. In 2016 we formed our Sustainability Steering Committee and governance structure, as described in C1.2a and C2.2b.
Investment in R&D	Impacted	Greif makes investments in R&D to develop products that protect against raw material price volatility and allow us to address opportunities related to changing customer preferences and reputation. Greif's product development and innovation efforts are supported by R&D investments to develop products that reduce our reliance on virgin raw materials through light weighting, downgauging, improving production methods, and increasing the use of recycled materials without compromising required performance standards and regulations. In 2018, Greif invested approximately \$3.4 million in R&D for our sustainability-tagged products, which represent approximately 15% (\$571 million) of Greif's revenues. Both light weighting and downgauging our products directly reduce the raw materials required to produce our products, such as the DoubleGreen product line Jerrycan, which is produced using 28.5% less polyethylene resin than comparable cans. We also invest in R&D to develop new production methods. For example, to produce our NexDRUM plastic drum, we developed an innovative injection and welding production process that works with reduced material inputs, without negatively affecting the performance and stability of the drum. This process allows us to produce the NexDrum using 15% less material and results in a 12% reduction in CO2 emissions compared to our standard blow molded plastic drum. Since these types of R&D investments directly lead to a reduction in raw materials needed to produce our products, our exposure to raw material price volatility is reduced. In 2018, we realized \$1 million in savings from our downgauging program. These types of investments directly address changes in customer preferences and our reputation. The products developed through our R&D investments, such as those described above, address our customers' increasing demand for more sustainable, reduced emissions and lighter weight products. Promoting and discussing these products through our Products and Services page and Innovation and Supply Chain Management pages of our sustainability report enhance our reputation as an aware and responsible steward of the climate.
Operations	Impacted	Sea level rise and changes in precipitation may lead to operational shut-downs and associated expenses, per the risk description, financial implication and strategy to mitigate described in 2.3a, Greif operations include facilities in low-lying coastal areas and those at risk for hurricanes, for example Florida, Texas, Louisiana, Georgia, Virginia, and North Carolina in the United States. Greif's disaster response program, We Got Chu, mandates that all products must be able to be co-produced at multiple facilities so that we can maintain production in the event of a shut-down. Accordingly, all of Greif's operations, not just those directly at risk of these events, must be prepared to respond to them. As an asset-heavy industrial manufacturer, we have significant energy efficiency opportunity in our direct operations. Our Sustainability Steering Committee and Sustainability Management Team work with our Global Energy Team to develop annual project roadmaps identifying energy efficiency opportunities at each Greif facility. In 2018, 47 energy efficiency projects with a combined impact of 8.9 mil. kWh and \$2.367 mil. in savings were identified across Greif's operations. For example, Greif's Tonawanda, U.S. facility installed a new rapid heater unit resulting in a 1.6 kWh energy reduction and \$32,429 USD savings annually. Our commitment to transparency to support our reputation impacts our operations through third party audits and management of our Environmental Management System (EMS). Greif participates in third-party audits at the request of our customers to establish, protect, maintain, and publicly communicate our practices. Through the end of 2018, Greif participated in 12 third-party audits conducted by Sedex and Together for Sustainability. These audits include evaluation of our energy and emission use and environmental compliance systems. Additional information is available on the EMS and Accreditations & Awards pages of our sustainability report. Realizing our opportunity in changing customer expectations requires our operations to develop new production capabilities, invest in new production equipment and add new products to their production lines. In 2017 we introduced a UN-certified PCR drum. This could only be initially produced in one Illinois facility. In 2019, we will add the ability to produce UN-certified drums in two additional facilities.
Other, please specify	Please select	

C2.6

(C2.6) Describe where and how the identified risks and opportunities have been factored into your financial planning process.

	Relevance	Description
Revenues	Impacted	Greif's opportunity in changing customer behavior has factored into our revenues forecast through a predicted shift in product mix from conventional to sustainable and/or low emission products (e.g. NexDRUM). 89% of our customers agree that sustainable supply chain practices will become increasingly important (See 2.4a). By introducing more sustainable products into our portfolio, we are offsetting potential revenue losses from conventional packaging and addressing market demand, providing revenue growth. We have begun forecasting revenue for some sustainable products in EMEA and LATAM. We are anticipating growth of 2 to 24% for products that have been forecasted. Revenue is impacted by our reputation, as our sustainability practices are factored into new and existing customer evaluations. Greif responds to supplier scorecards from many of our customers, including those from top 5 global customers, which incorporate sustainability criteria and factor into purchasing decisions. Greif participates in third-party audits at the request of our customers, including evaluations from Sedex and Together for Sustainability, which influence purchasing decisions. More information regarding our audit performance is available on the Accreditations page of our Sustainability Report. 13% of Greif's revenues ship from facilities that are at risk of sea level rise. If these facilities are impacted by these risks, Greif could lose revenues due to lost customer orders. We have accounted for this in our financial planning process by establishing a natural disaster response protocol, We Got Chu, mandating that all of our products can be manufactured at multiple facilities. Greif purchases business interruption insurance coverage, which protects the company from loss of revenue and customer business due to a loss from covered natural disasters. Raw material price volatility has the potential to impact revenues. In the event raw material prices lead to increased prices to our customers, we are at risk of losing their business. We reduce our exposure to this risk, in part, through our efforts to lightweight and downgauge our product lines, providing a revenue opportunity, as Greif's customers are increasingly looking to reduce emissions and transportation costs through industrial packaging. Revenue from Greif's sustainability-tagged products totaled over \$571M, 15% of total revenue.
Operating costs	Impacted	Raw material price volatility poses a direct risk to Greif's operating costs, specifically with respect to energy, water, and transportation costs. Price volatility may be compounded by the risks of sea level rise and changes in precipitation extremes, which may lead to operational shut downs in at risk facilities. In the event of a shutdown, We Got Chu, our natural disaster response protocol, outlines our processes for fulfilling customer orders at back-up production facilities. Changes in production and shipping locations have meaningful impacts on our transportation costs, both incoming for raw materials, as well as to our customer locations. Climate-related weather impacts are consistently included in Greif's Enterprise Risk Management process and are factored into our Sales and Operations Planning process (S&OP), including planning maintenance and upgrades to our existing facilities. Every two years Greif's highest risk facilities are third-party audited to assess natural disaster and safety risks. Based on audit findings, Greif makes capital investments to address those risks, such as upgrading the roof in one of our Houston, Texas facilities to better protect against wind and water damage that was caused by hurricanes. Through our financial planning process, we make capital expenditure decisions on supply chain and infrastructure projects that support business continuity and address climate related risks. Our global procurement team has worked to establish supplier and supply chain redundancies to ensure consistency of supply. We Got Chu protocols are tested in each facility monthly. Our natural disaster response plan was put into place in 2017 during Hurricanes Harvey and Irma, which impacted our Texas and Florida operations. Executing our opportunity in energy efficiency projects has direct impact on our operating costs. In 2018, Greif invested \$1.7 million in capital expenditures to complete 47 energy efficiency projects, reducing CO2e by 88,000 metric tons, resulting in \$2.367 million in savings. For example, Greif's Tonawanda, U.S. facility installed a new rapid heater unit resulting in a 1.6 kWh energy reduction and \$32.429 USD savings annually.
Capital expenditures / capital allocation	Impacted	Greif has allocated human and financial capital to addressing changing customer expectations and addressing our reputational opportunity. Our Sustainability Steering Committee (as described in 1.2a) has access to financial capital to make investments in enhancing our sustainability reputation, including partnerships with organizations such as the World Business Council for Sustainable Development building climate-related social and human capital in the organization, which is used to communicate with our stakeholders on a day-to-day basis, thereby helping us capture our reputational opportunity. For example, in 2017, the SSC conducted a third-party ESG materiality assessment, identifying climate strategy, energy, and emissions among the important topics to our stakeholders. Based on the results of the assessment, Greif assigned owners to high priority ESG topics and set goals and KPIs related to high priority topics, which informed the development of our 2017 Sustainability report, published in accordance with GRI Standards Core reporting requirements. In 2018, we combined our Global Innovation and Sustainable Innovation teams into a single Global Innovation Committee and established a formal innovation function in our RIPS North America business. The newly formed committee is comprised of representatives from each of Greif's business units and is responsible for driving collaboration and idea sharing across business units, as discussed in C2.5. Executing on our energy efficiency opportunity requires the investment of financial capital and impacts our manufactured capital. Since capturing energy efficiency opportunities involves replacing manufacturing equipment in our production facilities, and changes the amount and cost of energy used in our manufacturing processes, realizing our energy efficiency opportunities impacts our manufactured capital. In 2018, Greif invested \$1.7 million in capital expenditures to complete 47 energy efficiency projects, reducing CO2e by 88,000 metric tons, resulting in \$2.367 million in savings.
Acquisitions and divestments	Impacted	Greif's 2018 acquisition and divestment activity was not materially impacted by the identified risks and opportunities due to the acquisition/divestment of some facilities in 2018, however in late 2018 Greif announced the acquisition of Carastar. During the due diligence process the potential impact of Carastar's recycled paper and fibre products business to Greif's overall footprint was considered.
Access to capital	Impacted	Our commitment to sustainability and improving our climate-related disclosures has led to score improvements on rating and ranking frameworks that impact financial capital decisions made by institutional investors. Specifically, Greif's overall Bloomberg ESG score has improved from 29.75 in 2015 to 47.52 as of December 2017. Our Bloomberg environmental score improved from 22.48 to 44.96 over the same period. In that time frame, the number of PRI signatories among Greif's top 25 institutional investors increased from 12 to 15, including an increase from 6 to 8 among Greif's top 10 institutional investors. Our sustainability commitments and reputation impacts our access to human capital in terms of talent attraction and retention, and how we develop human and social capital in our organization. According to a 2016 Cone Communications study, 58 percent of all employees and 79 percent of millennials consider a company's social and environmental commitments when deciding where to work. Greif promotes recognition from external parties on our Accreditations & Awards page of our 2018 Sustainability Report. Our 2017 report is our first report in accordance with GRI, providing greater transparency into our sustainability practices. Key elements of our sustainability performance, including achieving Gold Recognition from EcoVadis in 2018, are featured in Greif's 2018 Annual Report, further extending the reach of our achievements. Due to our board oversight of sustainability, and integration of the Sustainability Steering Committee into our formal governance structure, as described in C1.2a, climate-related considerations are woven into decision making criteria across the organization, impacting the development of social capital/strong relationships with external partners. Primary among these impacts is social capital among our customers, who include sustainability performance in supplier scorecards, and as a potential exclusionary factor in RFPs. Our reputation also leads to collaboration opportunities. Greif has become the industrial packaging supplier of choice for the infant food market after collaborating with industry leaders to develop a food safety center of excellence. Our commitment to sustainability has enabled us to take a leadership position with some of our key trade association partners, including, AF&PA and FBA, as described in CC12.3b.
Assets	Impacted	Executing on our energy efficiency opportunity requires the investment of financial capital and impacts our manufactured capital. Since capturing energy efficiency opportunities involves replacing manufacturing equipment in our production facilities, and changes the amount and cost of energy used in our manufacturing processes, realizing our energy efficiency opportunities impacts our manufactured capital. In 2018, Greif invested \$1.7 million in capital expenditures to complete 47 energy efficiency projects, reducing CO2e by 88,000 metric tons, resulting in \$2.367 million in savings. Innovation efforts undertaken to capture the change in customer preferences have led to intellectual property assets. For example, to produce our NexDRUM plastic drum, we developed a proprietary injection and welding production process that works with reduced material inputs, without negatively affecting the performance and stability of the drum. This process allows us to produce the NexDrum using 15 percent less material and results in a 12 percent reduction in CO2 emissions compared to our standard blow molded plastic drum. In 2017, Greif's North American operations were impacted by changes in precipitation extremes. Our production facilities in Texas and Florida were hit by hurricanes Harvey and Irma, resulting in \$5.3 million of impact to our business, including damages to our fixed manufacturing assets. In recovering from these events, facility upgrades were considered, as called for by our Sales and Operations Planning process (S&OP). Per our S&OP, every two years Greif's highest risk facilities are third-party audited to assess natural disaster and safety risks. Based on audit findings, Greif makes capital investments to address those risks.
Liabilities	Impacted	Liabilities associated with environmental, health and safety claims that may arise from damages resulting from sea level rise or extreme weather events are covered by Greif's comprehensive insurance policies, which, to the extent possible, attempt to mitigate Greif's financial exposure in the event of these risks were to occur. We have made approximately \$7 million in expenditures on insurance policies to protect against the financial impacts of these risks. Greif purchases total loss property insurance to protect assets (facility and machinery and equipment) from losses associated with fire, flood, wind storm and earthquakes. Greif purchases business interruption coverage, which protects the company from loss of profits due to a loss from covered natural disasters, including contingent coverage, protecting Greif from loss of supply of raw materials, loss of customer business provided that such losses are due to the supplier or customer sustaining a loss due to a covered natural disaster, and covers additional costs of shipping if production is temporarily shifted due to climate related natural disasters. In 2017, Greif's North American operations were impacted by changes in precipitation extremes. Our production facilities in Texas and Florida were hit by hurricanes Harvey and Irma, resulting in \$5.3 million of impact to our business, including damages to our fixed manufacturing assets. The insurance policies described above limited our exposure to this impact.
Other	Please select	

C3. Business Strategy

C3.1

(C3.1) Are climate-related issues integrated into your business strategy?

Yes

C3.1a

(C3.1a) Does your organization use climate-related scenario analysis to inform your business strategy?

No, but we anticipate doing so in the next two years

C-AC3.1b/C-CE3.1b/C-CH3.1b/C-CO3.1b/C-EU3.1b/C-FB3.1b/C-MM3.1b/C-OG3.1b/C-PF3.1b/C-ST3.1b/C-TO3.1b/C-TS3.1b

(C-AC3.1b/C-CE3.1b/C-CH3.1b/C-CO3.1b/C-EU3.1b/C-FB3.1b/C-MM3.1b/C-OG3.1b/C-PF3.1b/C-ST3.1b/C-TO3.1b/C-TS3.1b) Indicate whether your organization has developed a low-carbon transition plan to support the long-term business strategy.

Please select

C3.1c

(C3.1c) Explain how climate-related issues are integrated into your business objectives and strategy.

Greif's vision is to become the world's best performing customer service company in industrial packaging. To reach this vision, we must listen to our customers and fulfill their needs to control/reduce costs and environmental impact. Like us, our customers increasingly want to be responsible corporate citizens and part of the solution to climate change. We have long been guided by the four pillars of The Greif Way: ethics, diversity, sustainability, and continuous improvement. As our desires align with our customers', we partner to offer more sustainable solutions, reducing GHG emissions throughout the value chain—from raw materials through end-of-life solutions. Our business strategies, investments, and product and process innovations are informed by our understanding of our most significant economic, environmental and social impacts—through our materiality assessment, product life cycle assessments (LCAs), and consumer trends, conversations, and requests. All of this is pointing to reducing costs and GHG emissions by reducing the amount of raw materials consumed (e.g., steel, resins), turning to an increasing amount of recycled content (e.g. PCR), using more energy efficient manufacturing equipment and processes (using the Greif Business System (GBS)), helping our customers select products that best fits their needs with the lowest GHG impact (using the Greif Green Tool (GGT) and SmartWay partners) and providing reconditioning/reuse/recycling services.

In 2017, we completed a multiyear transformation plan, which included integrating climate change management into our daily operations by refocusing on GBS, our operational excellence program, of which energy conservation is a key component. GBS enables the identification and eradication of inefficiency in everything we do. For example, GBS allows for the collection and analysis of facility fuel and electricity, diesel and gasoline consumed by company-owned and leased vehicles, propane use, and fuel consumed by outsourced delivery vendors. Equipped with sustainability-related impacts, risks, opportunities, trends, and data, our Sustainability Steering Committee sets and embeds our sustainability strategy and goals into our business strategy. In 2017 we completed a third-party-led materiality assessment, involving more than 35 cross-functional Greif leaders and nearly 50 external stakeholders—customers, board members, investors, and community members. This solidified the need for innovation in light-weighting and using recycled or alternative materials, a climate strategy and energy and GHG management and reduction, and end-of-life solutions. Our LCAs (which began in 2008 and are refreshed regularly) enable us to pinpoint our greatest lifecycle CO₂ equivalents—in the raw material production and end of life phases. Therefore, light-weighting of packaging, using recycled material, reconditioning, reuse, and recycling are all key pieces of our business strategy that enable us to meet our customers' demand for environmentally-friendly packaging. A notable outcome of integrating climate change risks into our business strategy is our innovative raw materials breakthroughs. For example, our RIPS Italy team reduced the weight of the GCube IBC by 7% without any performance loss and increased the percentage of post-consumer resin (PCR) from 50 to 75% in their PCR drums, processing a total of 7,400 metric tons of PCR in 2018. These innovations reduced the need for virgin material, thus avoiding emissions and helping to further recycling—PCR drums can be recycled, reconditioned, and used as an input for products outside of the packaging industry. Globally, we are engaging with 20 customers on climate change discussions/low carbon products and 2,534 customers are purchasing lightweight products that provide carbon benefits versus comparable products. In 2018, 93 customers purchased PCR.

Reconditioning steel drums, IBCs, and plastic drums reduces CO₂ equivalents to nearly one third compared to using virgin materials. We provide these services through a program called EarthMinded Life Cycle Services, which leverages a network of Greif joint-venture owned and other third-party owned and operated facilities in EMEA and North America. Participant reconditioners in the network collect used, empty, plastic, steel and IBC containers. FIBC containers are recollected in EMEA through our wholly-owned subsidiary, Rebu. The collected containers are reconditioned so they are suitable for reuse and then reintroduced into trade. In 2018, Earthminded reconditioned and recycled over 3.6 million steel and poly drums and 410,000 IBCs, removing 63,000 metric tons of virgin materials from our supply chain.

In our own operations, we have set Company-wide two- to five-year (medium-term) energy and emissions reduction goals, our global Energy & Emissions Team, plant managers, and employees worldwide are implementing processes improvements resulting in energy and emissions savings. We completed our five-year GHG emissions goal at the end of FY2015 and established new five-year energy and emissions goals to reduce our energy and GHG emissions per unit of production by 10% by 2020 from a 2014 baseline. In 2018, we saw a 4.2% and 10.3% decrease, respectively. To reduce transportation-related emissions, we participate in the EPA's SmartWay Transport Partnership. Our SmartWay approved carrier base accounts for 88.5% of miles travelled. SmartWay certification continues to be part of our new carrier certification process.

Soterra LLC, our timberland subsidiary, manages more than 243,000 acres of timberland in the southern U.S and offers forestry management services. In addition to business value, Soterra's forests provide habitat for wildlife, serve as space for recreational land use, and sequestered more than 37,211,000 tonnes of CO₂ in FY2017, an increase of 1,528,000 from 2017. Soterra follows Sustainable Forestry Initiative guidelines, promoting reforestation, growing and harvesting of trees for useful products with the conservation of soil, air, and water quality, and biological diversity.

Climate change risks are incorporated into conversations we have with our suppliers and customers. In 2010, we debuted GGT to assist our customers in selecting containers that meet their needs while minimizing their carbon footprint. GGT utilizes LCA modeling to identify potential for GHG footprint reduction. In 2018 we updated GGT by enhancing its analytical capability to allow detailed modeling, allowing plant/process specific analysis, updating GGT's underlying data sets and improving the classification of our sustainable products and processes portfolio. We also completed an analysis of the majority of our product portfolio against our 8 sustainable product criteria. Through the analysis we identified products we will consider part of our sustainable product portfolio. All new product launches will be analyzed and added to the portfolio if they meet the criteria.

C3.1g

(C3.1g) Why does your organization not use climate-related scenario analysis to inform your business strategy?

Climate-related weather impacts are consistently included in Greif's Enterprise Risk Management process and are factored into our Sales and Operations Planning process (S&OP), including selecting sites for our new facilities and planning maintenance and upgrades to our existing facilities. Every two years Greif's highest risk facilities are third-party audited to assess natural disaster and safety risks. Based on audit findings, Greif makes capital investments to address those risks, such as the completed upgrades to the fire protection system in our Alsip, Illinois facility in 2017. Through our financial planning process, we make capital expenditure decisions on supply chain and infrastructure projects that support business continuity and address climate related risks. In 2018 we invested in ensuring adequate drainage and raising electrical machinery above ground level to safeguard our Houston, Texas facilities against potential flood and hurricane impacts. Our global procurement team has worked to establish supplier and supply chain redundancies to ensure consistency of supply. We also have a formalized natural disaster response plan, We Got Chu, which is tested in each facility monthly. Our natural disaster response plan was put into place in 2017 during Hurricanes Harvey and Irma, which impacted our Texas and Florida operations. Despite these facilities experiencing manufacturing shut-downs, our business continuity and risk planning efforts allowed us to meet all customer commitments through the events. While we are proud of the protocols we've put in place, we understand and realize that a formal scenario analysis can only serve to improve our climate-related risk and opportunity assessments and mitigation and adaptation plans. To-date, performing a comprehensive scenario analysis has been cost prohibitive and competing demands for resources within our organization have prevented us from conducting one. In 2018, we started vetting scenario analysis frameworks and intend on conducting an analysis within the next two years.

C4. Targets and performance

C4.1

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

Intensity target

C4.1b

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

Target reference number

Int 1

Scope

Scope 1+2 (location-based)

% emissions in Scope

100

Targeted % reduction from base year

10

Metric

Metric tons CO2e per unit of production

Base year

2014

Start year

2015

Normalized base year emissions covered by target (metric tons CO2e)

376

Target year

2020

Is this a science-based target?

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

% of target achieved

100

Target status

Underway

Please explain

Greif has achieved 103% of its target and therefore exceeded its FY2020 target in FY2018.

% change anticipated in absolute Scope 1+2 emissions

-3

% change anticipated in absolute Scope 3 emissions

7

C4.2

(C4.2) Provide details of other key climate-related targets not already reported in question C4.1/a/b.

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	0	0
To be implemented*	0	0
Implementation commenced*	2	29
Implemented*	47	25022
Not to be implemented	0	0

C4.3b

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

Initiative type

Low-carbon energy installation

Description of initiative

Natural Gas

Estimated annual CO2e savings (metric tonnes CO2e)

0

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

85000

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

150000

Payback period

1-3 years

Estimated lifetime of the initiative

6-10 years

Comment

Initiative type

Energy efficiency: Building services

Description of initiative

Lighting

Estimated annual CO2e savings (metric tonnes CO2e)

73

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

16000

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

15000

Payback period

<1 year

Estimated lifetime of the initiative

6-10 years

Comment

New LED lights in production area reducing significant energy consumption

Initiative type

Other, please specify (Transportation: fleet, motors and drives)

Description of initiative

<Not Applicable>

Estimated annual CO2e savings (metric tonnes CO2e)

29

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Mandatory

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

6400

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

6000

Payback period

<1 year

Estimated lifetime of the initiative

3-5 years

Comment

Two gas driven forklifts replaced by one electrical forklift. Savings on Energy / Gas contract and maintenance.

Initiative type

Process emissions reductions

Description of initiative

New equipment

Estimated annual CO2e savings (metric tonnes CO2e)

7

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

1600

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

0

Payback period

<1 year

Estimated lifetime of the initiative

6-10 years

Comment**Initiative type**

Process emissions reductions

Description of initiative

Changes in operations

Estimated annual CO2e savings (metric tonnes CO2e)

18

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

4000

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

0

Payback period

<1 year

Estimated lifetime of the initiative

6-10 years

Comment

Optimization of oil pressures.

Initiative type

Energy efficiency: Building fabric

Description of initiative

Insulation

Estimated annual CO2e savings (metric tonnes CO2e)

7

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

1600

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

3200

Payback period

1-3 years

Estimated lifetime of the initiative

6-10 years

Comment

Oil consumption reduction.

Initiative type

Energy efficiency: Building fabric

Description of initiative

Insulation

Estimated annual CO2e savings (metric tonnes CO2e)

7

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

1600

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

1500

Payback period

<1 year

Estimated lifetime of the initiative

16-20 years

Comment

Oil consumption reduction.

Initiative type

Energy efficiency: Building services

Description of initiative

Lighting

Estimated annual CO2e savings (metric tonnes CO2e)

7

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

1600

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

800

Payback period

<1 year

Estimated lifetime of the initiative

3-5 years

Comment

Ongoing replacement of fluorescent tubes by LED lights.

Initiative type

Energy efficiency: Building services

Description of initiative

Lighting

Estimated annual CO2e savings (metric tonnes CO2e)

22

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

4800

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

2500

Payback period

<1 year

Estimated lifetime of the initiative

6-10 years

Comment

New LED lights in storage area reducing significant energy consumption.

Initiative type

Energy efficiency: Building services

Description of initiative

Lighting

Estimated annual CO2e savings (metric tonnes CO2e)

28

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

32082

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

44095

Payback period

1-3 years

Estimated lifetime of the initiative

6-10 years

Comment

New LED lights in storage area reducing significant energy consumption.

Initiative type

Energy efficiency: Building services

Description of initiative

Lighting

Estimated annual CO2e savings (metric tonnes CO2e)

47

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

6156

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

0

Payback period

1-3 years

Estimated lifetime of the initiative

6-10 years

Comment

New LED lights in storage area reducing significant energy consumption.

Initiative type

Energy efficiency: Building services

Description of initiative

Lighting

Estimated annual CO2e savings (metric tonnes CO2e)

5

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

10261

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

15206

Payback period

1-3 years

Estimated lifetime of the initiative

11-15 years

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Compressed air

Estimated annual CO2e savings (metric tonnes CO2e)

345

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

101148

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

0

Payback period

1-3 years

Estimated lifetime of the initiative

Ongoing

Comment

Initiative type

Energy efficiency: Building services

Description of initiative

Lighting

Estimated annual CO2e savings (metric tonnes CO2e)

6

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

1441

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

857

Payback period

<1 year

Estimated lifetime of the initiative

<1 year

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)

2

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

595

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

49

Payback period

<1 year

Estimated lifetime of the initiative

<1 year

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)

4

Scope

Scope 1

Voluntary/Mandatory

Mandatory

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

1969

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

0

Payback period

<1 year

Estimated lifetime of the initiative

>30 years

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)

5

Scope

Scope 1

Voluntary/Mandatory

Mandatory

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

1651

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

0

Payback period

<1 year

Estimated lifetime of the initiative

>30 years

Comment**Initiative type**

Energy efficiency: Processes

Description of initiative

Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)

11

Scope

Scope 1

Voluntary/Mandatory

Mandatory

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

5995

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

0

Payback period

<1 year

Estimated lifetime of the initiative

>30 years

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)

8

Scope

Scope 1

Voluntary/Mandatory

Mandatory

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

2459

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

0

Payback period

<1 year

Estimated lifetime of the initiative

>30 years

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)

18

Scope

Scope 1

Voluntary/Mandatory

Mandatory

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

5573

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

0

Payback period

<1 year

Estimated lifetime of the initiative

>30 years

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)

40

Scope

Scope 1

Voluntary/Mandatory

Mandatory

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

12687

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

22000

Payback period

1-3 years

Estimated lifetime of the initiative

6-10 years

Comment

Installed variable speed drives in main engines to reduce energy consumption.

Initiative type

Low-carbon energy purchase

Description of initiative

Hydro

Estimated annual CO2e savings (metric tonnes CO2e)

21532

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

1400000

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

40000

Payback period

<1 year

Estimated lifetime of the initiative

6-10 years

Comment

Initiative type

Energy efficiency: Building services

Description of initiative

Lighting

Estimated annual CO2e savings (metric tonnes CO2e)

505

Scope

Scope 2 (location-based)

Voluntary/Mandatory

Voluntary

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

92436

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

205003

Payback period

1-3 years

Estimated lifetime of the initiative

6-10 years

Comment

Initiative type

Energy efficiency: Building services

Description of initiative

Lighting

Estimated annual CO2e savings (metric tonnes CO2e)

107

Scope

Scope 2 (location-based)

Voluntary/Mandatory

Voluntary

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

17000

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

35000

Payback period

1-3 years

Estimated lifetime of the initiative

6-10 years

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)

69

Scope

Scope 2 (location-based)

Voluntary/Mandatory

Mandatory

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

11000

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

9744

Payback period

1-3 years

Estimated lifetime of the initiative

6-10 years

Comment

Initiative type

Energy efficiency: Building services

Description of initiative

Lighting

Estimated annual CO2e savings (metric tonnes CO2e)

37

Scope

Scope 2 (location-based)

Voluntary/Mandatory

Voluntary

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

4100

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

75000

Payback period

16-20 years

Estimated lifetime of the initiative

6-10 years

Comment

Initiative type

Fugitive emissions reductions

Description of initiative

Other, please specify (Treatment of VOC air emissions)

Estimated annual CO2e savings (metric tonnes CO2e)

0

Scope

Scope 1

Voluntary/Mandatory

Voluntary

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

41791

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

29851

Payback period

<1 year

Estimated lifetime of the initiative

Ongoing

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Compressed air

Estimated annual CO2e savings (metric tonnes CO2e)

38

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

9004

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

0

Payback period

<1 year

Estimated lifetime of the initiative

Ongoing

Comment

Initiative type

Other, please specify (Changes to product design operations)

Description of initiative

<Not Applicable>

Estimated annual CO2e savings (metric tonnes CO2e)

0

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

51582

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

0

Payback period

<1 year

Estimated lifetime of the initiative

Ongoing

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)

44

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

8377

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

0

Payback period

<1 year

Estimated lifetime of the initiative

6-10 years

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Machine replacement

Estimated annual CO2e savings (metric tonnes CO2e)

145

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

34147

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

82090

Payback period

1-3 years

Estimated lifetime of the initiative

6-10 years

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)

100

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

23685

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

0

Payback period

<1 year

Estimated lifetime of the initiative

6-10 years

Comment

Initiative type

Other, please specify (Waste recovery)

Description of initiative

<Not Applicable>

Estimated annual CO2e savings (metric tonnes CO2e)

0

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

1493

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

0

Payback period

<1 year

Estimated lifetime of the initiative

Ongoing

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Machine replacement

Estimated annual CO2e savings (metric tonnes CO2e)

76

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

11780

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

7000

Payback period

<1 year

Estimated lifetime of the initiative

6-10 years

Comment

Initiative type

Other, please specify (Waste recovery)

Description of initiative

<Not Applicable>

Estimated annual CO2e savings (metric tonnes CO2e)

79

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Mandatory

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

12363

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

0

Payback period

<1 year

Estimated lifetime of the initiative

Ongoing

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Machine replacement

Estimated annual CO2e savings (metric tonnes CO2e)

118

Scope

Scope 2 (location-based)

Voluntary/Mandatory

Voluntary

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

18000

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

180000

Payback period

<1 year

Estimated lifetime of the initiative

11-15 years

Comment

Initiative type

Energy efficiency: Building services

Description of initiative

Lighting

Estimated annual CO2e savings (metric tonnes CO2e)

827

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

75000

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

22000

Payback period

<1 year

Estimated lifetime of the initiative

6-10 years

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)

7

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

1437

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

188

Payback period

<1 year

Estimated lifetime of the initiative

6-10 years

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Compressed air

Estimated annual CO2e savings (metric tonnes CO2e)

56

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

9056

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

1000

Payback period

<1 year

Estimated lifetime of the initiative

6-10 years

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Compressed air

Estimated annual CO2e savings (metric tonnes CO2e)

224

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

36224

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

18000

Payback period

<1 year

Estimated lifetime of the initiative

6-10 years

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)

49

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

10739

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

0

Payback period

<1 year

Estimated lifetime of the initiative

6-10 years

Comment

Initiative type

Other, please specify (Waste Recovery)

Description of initiative

<Not Applicable>

Estimated annual CO2e savings (metric tonnes CO2e)

16

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Mandatory

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

97249

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

0

Payback period

<1 year

Estimated lifetime of the initiative

Ongoing

Comment

Initiative type

Other, please specify (Transportation)

Description of initiative

<Not Applicable>

Estimated annual CO2e savings (metric tonnes CO2e)

2

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

2000

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

0

Payback period

<1 year

Estimated lifetime of the initiative

Ongoing

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)

31

Scope

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

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

6000

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

500

Payback period

<1 year

Estimated lifetime of the initiative

6-10 years

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Machine replacement

Estimated annual CO2e savings (metric tonnes CO2e)

213

Scope

Scope 2 (location-based)

Voluntary/Mandatory

Voluntary

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

32429

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

81560

Payback period

1-3 years

Estimated lifetime of the initiative

6-10 years

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Process optimization

Estimated annual CO2e savings (metric tonnes CO2e)

19

Scope

Scope 2 (location-based)

Voluntary/Mandatory

Voluntary

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

12634

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

37267

Payback period

1-3 years

Estimated lifetime of the initiative

6-10 years

Comment

Initiative type

Energy efficiency: Processes

Description of initiative

Machine replacement

Estimated annual CO2e savings (metric tonnes CO2e)

66

Scope

Scope 2 (location-based)

Voluntary/Mandatory

Voluntary

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

43484

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

630779

Payback period

11-15 years

Estimated lifetime of the initiative

16-20 years

Comment

C4.3c

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

Method	Comment
Internal finance mechanisms	We integrate environmental aspects of our business into our overall business strategy, including mergers and acquisitions, research and development, and operations.
Internal finance mechanisms	Energy and emission reductions are factored into all capital expenditure requests.
Internal incentives/recognition programs	The Michael J. Gasser Global Sustainability Award recognizes superior effort and achievement in furthering the improvement of the environment and the company. The award recognizes teams that create innovative sustainable initiatives in Energy Excellence, Ecosystem Improvement and Sustainable Innovation. Winning teams are recognized by the CEO and the Board, in addition to receiving a trophy and celebratory lunch or dinner. Several of our SBUs provide financial incentives to facilities that reduce energy consumption.
Internal incentives/recognition programs	In 2014, Greif introduced the Plant Olympics program in the drum manufacturing plants of the EMEA region to reinforce a pattern of excellence by ranking each plant as gold, silver, bronze, yellow or red, reward workers for outstanding accomplishments and identify areas of opportunity to promote year-over-year improvements. Due to the success of the program at driving incremental improvements, in 2017, it has expanded globally to include all Greif regions and business units. Ratings are based on safety, people, productivity, customer satisfaction, 5S and sustainability, including climate change. Each facility achieving Gold, Silver or Bronze performance levels across all categories receives a medal recognizing the achievement. In addition, Gold, Silver and Bronze winners receive a non-financial award for the entire plant such as an award dinner.
Employee engagement	Sustainability is a pillar of The Greif Way and plays a key role in driving our business strategy, management and operations. Energy reduction goals are embedded into employee performance reviews throughout the organization, from executive leadership and SVPs to facility managers. Employees are encouraged to incorporate best practices in energy efficiency into their day-to-day operations both at work and at home. Every year, we provide challenges and contests for our employees to reduce energy in our facilities and elsewhere. In our EMEA operations, we offer financially subsidized bicycles to employees to lower emissions and improve the health of our commuters. Our FPS Hadimkoy facility in Turkey developed a sustainability program that focuses on employee engagement. They've identified various success criteria for the plant, including energy and scrap reduction. All employees engaged in monthly meetings to generate improvement ideas. The plant evaluated the ideas, selected projects to implement, set success criteria, and tracked progress monthly. Employees' premiums were tied to the achievement of the identified success criteria. Through the program, the plant reduced their scrap ratio from 12.1 to 10.2 percent, resulting in a 328,000 kWh reduction in energy use, for example, if the plant scrap rate rose above 10.5%, premiums decreased. In 2018, we engaged facilities to participate in Earth Day. We asked each facility to plant trees and to create green zones around the facility. The winning facility planted 65 trees, receiving internal recognition and a catered lunch.

C4.5

(C4.5) Do you classify any of your existing goods and/or services as low-carbon products or do they enable a third party to avoid GHG emissions?

Yes

C4.5a

(C4.5a) Provide details of your products and/or services that you classify as low-carbon products or that enable a third party to avoid GHG emissions.

Level of aggregation

Product

Description of product/Group of products

Injected IBC plastic pallet (GCube) The injected IBC plastic pallet is a (new) plastic pallet design for the GCube-IBC product range at Greif. It supersedes the old plastic pallet design. Compared to the old pallet design, the new pallet is now made of 100% recycled HDPE. At the same time, the new pallet design is also recyclable, as it can be easily disassembled.

Are these low-carbon product(s) or do they enable avoided emissions?

Low-carbon product

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify (Third-party lifecycle assessments.)

% revenue from low carbon product(s) in the reporting year

0.5

Comment

Greif uses lifecycle assessment studies of our products to determine the carbon footprint of our industrial packaging products. Through our LCA, we determined this product has a lower carbon footprint than our conventional IBC plastic pallet.

Level of aggregation

Product

Description of product/Group of products

Nextainer The Nextainer is a new steel drum design at Greif. Compared to traditional steel drum designs, the Nextainer is more lightweighted but still reaches a comparable vacuum strength, so it allows to save steel / reduce raw materials.

Are these low-carbon product(s) or do they enable avoided emissions?

Low-carbon product

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify (Third-party lifecycle assessments.)

% revenue from low carbon product(s) in the reporting year

0

Comment

Greif uses lifecycle assessment studies of our products to determine the carbon footprint of our industrial packaging products. Through our LCA, we determined this product has a lower carbon footprint than our conventional steel drum design.

Level of aggregation

Product

Description of product/Group of products

Lightweight steel drums (Spiraltainer) The Spiraltainer is a lightweighted steel drum design. Compared to conventional standard bead steel drums, the Spiraltainer still reaches a comparable vacuum strength but with less steel, so it allows to save steel / reduce raw materials.

Are these low-carbon product(s) or do they enable avoided emissions?

Low-carbon product

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify (Third-party lifecycle assessments.)

% revenue from low carbon product(s) in the reporting year

9

Comment

Greif uses lifecycle assessment studies of our products to determine the carbon footprint of our industrial packaging products. Through our LCA, we determined this product has a lower carbon footprint than our conventional bead steel drum design.

Level of aggregation

Product

Description of product/Group of products

New GCube valves The New GCube Valve is a plastic valve for IBCs. Traditional IBC valves (which are superseded by the new GCube valve at Greif) are made of HDPE and PP, but also contain small metal parts that cannot be removed easily, so traditional IBC valves cannot be recycled. The new GCube valve is made of HDPE and PP only, what allows an easy recycling of the valve.

Are these low-carbon product(s) or do they enable avoided emissions?

Avoided emissions

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify (Reduced virgin material use.)

% revenue from low carbon product(s) in the reporting year

0

Comment

GCube valves avoid emission by reducing the amount of virgin materials in Greif's, and our customers' value chain.

Level of aggregation

Product

Description of product/Group of products

NexDrum Nexdrum is a lightweighted plastic drum design. Compared to conventional blowmolded HDPE plastic drums, Nexdrum is produced with less HDPE (15% less material), so it allows to save HDPE / reduce raw materials.

Are these low-carbon product(s) or do they enable avoided emissions?

Low-carbon product

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify (Third-party lifecycle assessments.)

% revenue from low carbon product(s) in the reporting year

0.4

Comment

Greif uses lifecycle assessment studies of our products to determine the carbon footprint of our industrial packaging products. Through our LCA, we determined this product has a lower carbon footprint than our conventional plastic drum design.

Level of aggregation

Product

Description of product/Group of products

Valerex Plastic Drums Valerex is a lightweighted plastic drum design. Compared to conventional blowmolded HDPE plastic drums, Valerex is produced with less HDPE, so it allows to save HDPE / reduce raw materials.

Are these low-carbon product(s) or do they enable avoided emissions?

Low-carbon product

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify (Third-party lifecycle assessments.)

% revenue from low carbon product(s) in the reporting year

0.3

Comment

Greif uses lifecycle assessment studies of our products to determine the carbon footprint of our industrial packaging products. Through our LCA, we determined this product has a lower carbon footprint than our conventional plastic drum design.

Level of aggregation

Group of products

Description of product/Group of products

LATAM Jerrycan Coex - 5, 10, 20 L The COEX jerrycans in LATAM have a layer made of bio-based HDPE resin (supplied by BRASKEM, derived from sugar cane) instead of standard HDPE. Using Bio-based PE instead of standard oil-based PE reduces the climate change impact of the packaging.

Are these low-carbon product(s) or do they enable avoided emissions?

Low-carbon product

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify (Third-party lifecycle assessments.)

% revenue from low carbon product(s) in the reporting year

0.4

Comment

Greif uses lifecycle assessment studies of our products to determine the carbon footprint of our industrial packaging products. Through our LCA, we determined this product has a lower carbon footprint than our conventional jerrycans.

Level of aggregation

Group of products

Description of product/Group of products

LATAM Jerrycan Mono - 5, 10, 20 L The monolayer jerrycans in LATAM contain a significant amount of bio-based HDPE (supplied by BRASKEM, derived from sugar cane) instead of pure standard HDPE. Using Bio-based PE instead of standard oil-based PE reduces the climate change impact of the packaging.

Are these low-carbon product(s) or do they enable avoided emissions?

Low-carbon product

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify (Third-party lifecycle assessments.)

% revenue from low carbon product(s) in the reporting year

0.5

Comment

Greif uses lifecycle assessment studies of our products to determine the carbon footprint of our industrial packaging products. Through our LCA, we determined this product has a lower carbon footprint than our conventional jerrycans.

Level of aggregation

Group of products

Description of product/Group of products

Clean steel drums Clean steel drums (for highly sensitive filling goods) are specially cleaned drums by using highly compressed air treatment. These clean steel drums substitute an alternative manual cleaning process of normal drums right before filling by using solvents. Compared to the manual cleaning with solvents (notable amount of solvents per drum is needed), the clean steel drums just require the usage of compressed air (low energy input).

Are these low-carbon product(s) or do they enable avoided emissions?

Low-carbon product

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify (Third-party lifecycle assessments.)

% revenue from low carbon product(s) in the reporting year

0.1

Comment

Greif uses lifecycle assessment studies of our products to determine the carbon footprint of our industrial packaging products. Through our LCA, we determined this product has a lower carbon footprint than our conventional cleaning process.

Level of aggregation

Group of products

Description of product/Group of products

PCR Drums - Monolayer Monolayer PCR (post-consumer resin) drums are made of recycled (PCR) HDPE. The usage of recycled HDPE instead of virgin HDPE increases the recollection and recycling of HDPE packaging products and significantly reduces the use of virgin HDPE. The environmental impact of using recycled HDPE resin for producing drums is typically significantly lower than the impact of using virgin HDPE.

Are these low-carbon product(s) or do they enable avoided emissions?

Low-carbon product

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify (Third-party lifecycle assessments.)

% revenue from low carbon product(s) in the reporting year

0.1

Comment

Greif uses lifecycle assessment studies of our products to determine the carbon footprint of our industrial packaging products. Through our LCA, we determined this product has a lower carbon footprint than our drums produced using virgin HDPE.

Level of aggregation

Group of products

Description of product/Group of products

PCR Drums - Coex (multilayer) Multilayer PCR drums are HDPE drums which are made of two layers of virgin HDPE and a middle layer of recycled (PCR) HDPE. The usage of recycled HDPE for the middle layer instead of virgin HDPE increases the recollection and recycling of HDPE packaging products and reduces the use of virgin HDPE. The environmental impact of using recycled HDPE resin for producing drums is typically significantly lower than the impact of using virgin HDPE.

Are these low-carbon product(s) or do they enable avoided emissions?

Low-carbon product

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify (Third-party lifecycle assessments.)

% revenue from low carbon product(s) in the reporting year

0.1

Comment

Greif uses lifecycle assessment studies of our products to determine the carbon footprint of our industrial packaging products. Through our LCA, we determined this product has a lower carbon footprint than our drums produced using virgin HDPE.

Level of aggregation

Group of products

Description of product/Group of products

CLCM/EarthMinded LCS network is a recollection and reconditioning service for used drums and IBCs which enables a re-usage of the reconditioned packaging. In the case that a recollected drum or IBC cannot be properly reconditioned anymore, the material of the packaging (steel and plastics) is sent to recycling to enable the re-usage of the materials (e.g. to produce other products made from the recycled materials such as PCR plastic drums).

Are these low-carbon product(s) or do they enable avoided emissions?

Avoided emissions

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify (Reduced virgin material use.)

% revenue from low carbon product(s) in the reporting year

1.8

Comment

CLCM/Earthminded recollection and reconditioning services avoid emissions by reducing the amount of virgin materials required in the industrial packaging value chain. In 2018, CLCM/Earthminded collected over 4.1 million containers removing over 63.1 million metrics tons of virgin steel, high-density polyethylene, and wood from the value chain.

Level of aggregation

Product

Description of product/Group of products

Conical Steel Drums Conical steel drums are open head steel drums with a conical form. Compared to classic cylindrical (nonconical) steel drums, the conical form allows a stacking of empty drums one in another. This leads to a better space utilization of trucks when transporting empty drums (typically 2.000 conical drums with lids vs. only 288 palletized classic cylindrical drums).

Are these low-carbon product(s) or do they enable avoided emissions?

Avoided emissions

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify (Third-party lifecycle assessments.)

% revenue from low carbon product(s) in the reporting year

1.6

Comment

Greif uses lifecycle assessment studies of our products to determine the carbon footprint of our industrial packaging products. Through our LCA, we determined this product has a lower carbon footprint than our conventional plastic drum design.

Level of aggregation

Company-wide

Description of product/Group of products

Greif Green Tool Our Greif Green Tool allows customers to identify and evaluate the total environmental impact of industrial packaging given their individual situation. The tool, a calculator based on the Greif LCA models, highlights interdependent sustainability improvements to reveal unmet potential in GHG footprint reductions. Through inputs such as geographic scope, weight and volume of shipments, distance of transport and trippage rate, the Green Tool provides our customers with the optimal packaging solution to mitigate emissions and maximize value.

Are these low-carbon product(s) or do they enable avoided emissions?

Avoided emissions

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify (Third-party lifecycle assessments.)

% revenue from low carbon product(s) in the reporting year

0

Comment

The Greif Green tool incorporates findings from our LCA's into a tool that allows our customers to evaluate the carbon footprint of their packing selection and transportation methods. This information allows our customers to better understand the emission associated with their packaging choices, and select lower emission options that meet their requirements.

Level of aggregation

Product

Description of product/Group of products

LATAM plastic bottle -1L The PE plastic bottle in LATAM has a new enhanced design with rings. The enhanced design with rings reduces the weight of the bottle by up to 25% compared to the old bottle design with less rings. Less HDPE input is needed which reduces the climate change impact of the product.

Are these low-carbon product(s) or do they enable avoided emissions?

Low-carbon product

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify (Carbon footprint comparison of bottles produced in the new enhanced design with bottles produced in the old design, using data from LCA studies on industrial packaging done at Greif.)

% revenue from low carbon product(s) in the reporting year

0

Comment

Greif uses lifecycle assessment studies of our products to determine the carbon footprint of our industrial packaging products. Through our LCA, we determined this product has a lower carbon footprint than bottles produced in the old design.

Level of aggregation

Product

Description of product/Group of products

JCR jerry cans (Europe) The PE jerry cans in Europe have a new enhanced design. The enhanced design reduces the weight of the jerry cans by up to 15% compared to the old standard design. Less HDPE input is needed which reduces the climate change impact of the product.

Are these low-carbon product(s) or do they enable avoided emissions?

Low-carbon product

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify (Carbon footprint comparison of bottles produced in the new enhanced design with bottles produced in the old design, using data from LCA studies on industrial packaging done at Greif.)

% revenue from low carbon product(s) in the reporting year

0

Comment

Greif uses lifecycle assessment studies of our products to determine the carbon footprint of our industrial packaging products. Through our LCA, we determined this product has a lower carbon footprint than jerry cans produced in the old standard design.

C5. Emissions methodology

C5.1

(C5.1) Provide your base year and base year emissions (Scopes 1 and 2).**Scope 1****Base year start**

November 1 2013

Base year end

October 31 2014

Base year emissions (metric tons CO2e)

368700

Comment**Scope 2 (location-based)****Base year start**

November 1 2013

Base year end

October 31 2014

Base year emissions (metric tons CO2e)

498400

Comment**Scope 2 (market-based)****Base year start**

November 1 2013

Base year end

October 31 2014

Base year emissions (metric tons CO2e)

498400

Comment

C5.2

(C5.2) Select the name of the standard, protocol, or methodology you have used to collect activity data and calculate Scope 1 and Scope 2 emissions.

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

C6. Emissions data

C6.1

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

Reporting year

Gross global Scope 1 emissions (metric tons CO2e)

376681

Start date

November 1 2017

End date

October 31 2018

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

415878

Scope 2, market-based (if applicable)

429735

Start date

November 1 2017

End date

October 31 2018

Comment

C6.4

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

Yes

C6.4a

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

Source

Minor sources at facilities outside of North America. Minor sources could include leased or owned vehicles, fork lifts, yard tractors, landscaping equipment or other mobile sources.

Relevance of Scope 1 emissions from this source

Emissions are relevant but not yet calculated

Relevance of location-based Scope 2 emissions from this source

No emissions from this source

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

Emissions are not relevant

Explain why this source is excluded

The quantity of fuel used for these sources is not available.

Source

Air conditioning refrigerant replacement.

Relevance of Scope 1 emissions from this source

Emissions are not evaluated

Relevance of location-based Scope 2 emissions from this source

No emissions from this source

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

Emissions are not relevant

Explain why this source is excluded

No records of air conditioning maintenance are available.

Source

Process emissions.

Relevance of Scope 1 emissions from this source

Emissions are relevant but not yet calculated

Relevance of location-based Scope 2 emissions from this source

No emissions excluded

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

Emissions are not relevant

Explain why this source is excluded

Steel drum manufacturing generally involves painting exterior and coating interior surfaces. Emissions of solvents or combustion products of solvents have not been included in the inventory.

C6.5

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

Purchased goods and services

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

1812000

Emissions calculation methodology

Technical Guidance Document average-data method.

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

Explanation

Capital goods

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

87000

Emissions calculation methodology

Technical Guidance Document average-data method.

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

Explanation

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

Evaluation status

Relevant, calculated

Metric tonnes CO2e

178000

Emissions calculation methodology

Technical Guidance Document average-data method.

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

Explanation

Upstream transportation and distribution

Evaluation status

Relevant, calculated

Metric tonnes CO2e

151000

Emissions calculation methodology

Technical Guidance Document fuel-based method.

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

Explanation

Waste generated in operations

Evaluation status

Relevant, calculated

Metric tonnes CO2e

61000

Emissions calculation methodology

Technical Guidance Document average-data method.

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

Explanation

Business travel

Evaluation status

Relevant, calculated

Metric tonnes CO2e

7000

Emissions calculation methodology

Technical Guidance Document spend-based method.

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

Explanation

Employee commuting

Evaluation status

Relevant, calculated

Metric tonnes CO2e

22000

Emissions calculation methodology

Technical Guidance Document average-data method.

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

Explanation

Upstream leased assets

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

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

<Not Applicable>

Explanation

Greif does not lease any upstream assets that are not already included in Scope 1 and 2.

Downstream transportation and distribution

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

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

<Not Applicable>

Explanation

It is Greif's practice to deliver finished products to customers using transportation paid for by Greif.

Processing of sold products

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

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

<Not Applicable>

Explanation

Greif's products are typically finished packaging products and no further processing by the customer is required.

Use of sold products

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

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

<Not Applicable>

Explanation

Greif's products do not directly consume any energy during use nor do they release any direct GHG emissions.

End of life treatment of sold products

Evaluation status

Relevant, calculated

Metric tonnes CO2e

549000

Emissions calculation methodology

Technical Guidance Document average-data method.

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

Explanation

Downstream leased assets

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

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

<Not Applicable>

Explanation

Greif does not lease any assets to third parties that are not already included in Scope 1 and 2.

Franchises

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

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

<Not Applicable>

Explanation

Greif does not have franchise operations.

Investments

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

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

<Not Applicable>

Explanation

As a manufacturing company, Greif does not make investments with the objective of making profit.

Other (upstream)

Evaluation status

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

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

<Not Applicable>

Explanation

Other (downstream)

Evaluation status

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

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

<Not Applicable>

Explanation

C6.7

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

Yes

C6.7a

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

Row 1

Emissions from biologically sequestered carbon (metric tons CO2)

224000

Comment

C-AC6.9/C-FB6.9/C-PF6.9

(C-AC6.9/C-FB6.9/C-PF6.9) Do you collect or calculate greenhouse gas emissions for each commodity reported as significant to your business in C-AC0.7/FB0.7/PF0.7?

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
0.000208

Metric numerator (Gross global combined Scope 1 and 2 emissions)
806700

Metric denominator
unit total revenue

Metric denominator: Unit total
3873800000

Scope 2 figure used
Market-based

% change from previous year
5

Direction of change
Decreased

Reason for change
Greif's intensity figure has decreased from previous years due to increasing revenues and decreasing emissions. Emission reductions are primarily from emission reduction activities and completed energy reduction projects as described in C4.3a and C7.9a, including increased use of renewable energy and completion of 47 energy efficiency projects.

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	290281	IPCC Fifth Assessment Report (AR5 – 100 year)
CH4	85900	IPCC Fifth Assessment Report (AR5 – 100 year)
N2O	500	IPCC Fifth Assessment Report (AR5 – 100 year)

C7.2

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

Country/Region	Scope 1 emissions (metric tons CO2e)
United States of America	326900
China	8978
Netherlands	4952
France	3699
Russian Federation	3298
Singapore	2848
Belgium	3220
United Kingdom of Great Britain and Northern Ireland	2834
Germany	1581
Italy	1833
Spain	1677
Brazil	1530
Portugal	1239
Canada	1360
South Africa	1205
Sweden	1026
Turkey	806
Malaysia	871
Argentina	841
Czechia	1095
Mexico	729
Israel	545
Hungary	560
Chile	496
Poland	391
Saudi Arabia	716
Viet Nam	298
Costa Rica	53
Austria	0
Kenya	199
Colombia	196
Egypt	186
Algeria	100
Romania	106
Philippines	119
Morocco	89
Nigeria	27
Guatemala	47
Venezuela (Bolivarian Republic of)	0
Greece	31
Australia	0
Ukraine	0
Denmark	0

C7.3

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

By business division

By facility

C7.3a

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

Business division	Scope 1 emissions (metric ton CO2e)
Paper Packaging (PPS)	284249
Rigid Industrial Packaging and Services (RIPS)	80820
Life Cycle Services (LCS)	8861
Corporate	932
Flexible Products and Services (FPS)	459
Tri-Sure	1360
Soterra	0

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
Riverville	183936		
Massillon	75274		
Mason (MPM)	9049		
Houston	9302		
Harrisburg (SPC)	7552		
Alsip	7194		
Arkadelphia	4983		
Louisville (MCC)	4199		
Cincinnati (CCI)	4239		
Warminster	3644		
Pioneer	2848		
Europoort	3158		
Ghent	2655		
Florence	2497		
Taicang	2078		
Rouen	2248		
Oak Creek	2047		
Ellesmere Port	1842		
Caojing	1482		
Ningbo	1812		
Tianjin	1417		
Huizhou	1627		
Martorell	1468		
Merced	1661		
Melzo	1547		
Van Wert	1867		
Povoa	1239		
St. Francis	1268		
Vreeland	946		
Laudun	1105		
Perm	876		
Delaware	932		
Santo Amaro	726		
Petaling Jaya	871		
Loevenich	845		
Auburndale	977		
Falkenburg	820		
Fontana	760		
Asterweg	848		
Tigre	841		
Indianapolis	8		
Vologda	585		
Burton on Trent	978		
Usti nad Labem	1095		
Omsk	643		
Stoney Creek	736		
Baytown	610		
Mobeni	695		
Winfield	739		
Tonawanda	661		
Belleville	624		
Ein Hahoresch	545		
Cuernavaca	586		
Almasfuzito	560		
Lier	566		
Zhuhai	509		
Istanbul	467		
Hamburg	566		
Vanderbijlpark	510		
Pudahuel	496		
Volgograd	632		
Rybnik	391		
Samandira	245		
Aratu	313		
Vung Tau	298		
San Jose	53		
Windsor Locks	310		

Facility	Scope 1 emissions (metric tons CO2e)	Latitude	Longitude
Lille	346		
Beloyarsk (Upakovka)	271		
Memphis	265		
Naperville	326		
Vienna	0		
Castenedolo	177		
Morgan Hill	144		
Cornell	290		
Carrol Stream	360		
Esteio	229		
St. Gabriel (Evans)	239		
Rio de Janeiro	262		
Angarsk	241		
Mombasa	199		
Mendig	158		
Vaesterhaninge	206		
Monterrey	143		
Lithonia	269		
Sadat City	186		
Jubail	468		
Lavonia	209		
Wright City	224		
Riyadh	248		
Bradley	234		
Algeria	100		
Englishtown	186		
Bottanuco	109		
Sultanbeyli	79		
Cartagena	128		
Botosani	106		
Don Benito	209		
Manilla	119		
Casablanca	89		
Lockport	159		
Charlotte	144		
Thirsk	13		
Bogota	68		
Mt. Sterling	76		
Kazan	48		
Araucaria	0		
Hadimkoy	16		
Ede	0		
Guatemala	47		
Apapa	27		
Mandra	31		
Fort Worth	43		
Shanghai	52		
Hazleton	13		
Muhlhoff	12		
Valencia	0		
Punto Fijo	0		
La Palma	12		
Campana	0		
Changzhou	0		
Negresti	0		
Zhitomir	0		
Zhenjiang	0		
Vicksburg	0		
Uberaba	0		
San Roque (Cadiz)	0		
San Juan	0		
Rheine	0		
Pine Grove	0		
Maehuala	0		
Pelahatchie	0		
Montceau	0		
Manaus	0		
Ageuda	0		
Londrina	0		

Facility	Scope 1 emissions (metric tons CO2e)	Latitude	Longitude
Kiev	0		
Kaluga	0		
Jackson	0		
Izegem	0		
Huckelhoven	0		
Hochi Minh City	0		
Hedehusne (Roskilde)	0		
Grove Hill	0		
Penrith	0		

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)	Purchased and consumed electricity, heat, steam or cooling (MWh)	Purchased and consumed low-carbon electricity, heat, steam or cooling accounted in market-based approach (MWh)
United States of America	301514	301514	551911	
China	17194	17194	27205	
Turkey	16279	16279	34896	
Italy	10558	15177	31765	
Germany	8154	13318	18163	
Netherlands	7422	8470	15934	
Israel	5865	5865	10286	
Brazil	3459	3165	28741	2444
Malaysia	4593	4593	6997	
Romania	4314	5691	13315	
Argentina	3615	3615	9602	
Russian Federation	3603	3603	10010	
Singapore	3255	3255	8206	
Ukraine	3519	3519	8268	
South Africa	2615	2615	2753	
Poland	2655	3075	3667	
Morocco	2360	2360	3443	
United Kingdom of Great Britain and Northern Ireland	1600	2101	5715	
Belgium	1799	1280	10422	
Mexico	2210	2210	4748	
Portugal	896	1191	3100	
Saudi Arabia	1134	1134	1584	
Canada	715	715	4749	
Czechia	896	1036	1679	
Spain	731	1321	2950	
Greece	528	632	1007	
France	708	772	13469	
Chile	663	663	1493	
Viet Nam	582	582	1294	
Hungary	345	431	1257	
Algeria	214	214	419	
Colombia	303	303	1374	
Egypt	301	301	655	
Australia	161	161	211	
Venezuela (Bolivarian Republic of)	7	7	24	
Philippines	620	620	1017	
Sweden	157	333	12743	
Austria	143	143	945	
Denmark	59	143	283	
Kenya	60	60	315	
Nigeria	36	36	88	
Costa Rica	4	4	347	
Guatemala	32	32	79	

C7.6

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

By business division
By facility

C7.6a

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

Business division	Scope 2, location-based emissions (metric tons CO2e)	Scope 2, market-based emissions (metric tons CO2e)
Paper Packaging (PPS)	242124	242124
Rigid Industrial Packaging and Services (RIPS)	129495	140912
Flexible Products and Services (FPS)	29002	30461
Tri-Sure	10132	11113
Life Cycle Services (LCS)	3219	3219
Corporate	1873	1873

C7.6b

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

Facility	Scope 2 location-based emissions (metric tons CO2e)	Scope 2, market-based emissions (metric tons CO2e)
Riverville	190322	190322
Massillon	39195	39195
Houston	9911	9911
Hadimkoy	8153	8153
Samandira	6919	6919
Alsip	7816	7816
Ein Hahores	5865	5865
Castenedolo	5280	7590
Bottanuco	4097	5889
Lockport	5851	5851
Petaling Jaya	4593	4593
Caojing	3714	3714
Lavonia	4946	4946
Negresti	4119	5434
Mason (MPM)	4050	4050
Changzhou	3564	3564
Mt. Sterling	3264	3264
Pioneer	3255	3255
Mendig	3063	5003
Zhitomir	3197	3197
Carrol Stream	3358	3358
Europoort	2812	3210
Taicang	2389	2389
Asterweg	2881	3288
Harrisburg (SPC)	2890	2890
Louisville (MCC)	2983	2983
Hazleton	2596	2596
Cincinnati (CCI)	2685	2685
Zhenjiang	2523	2523
Rybnik	2655	3075
Casablanca	2360	2360
Bradley	2753	2753
Huckelhoven	2291	3741
Van Wert	2150	2150
Florence	2185	2185
Tigre	1780	1780
Ningbo	1321	1321
Delaware	1873	1873
Santo Amaro	1478	1342
Ellesmere Port	1009	1326
Campana	1295	1295
Vanderbijlpark	1387	1387
Lier	1154	821
Warminster	1487	1487
Arkadelphia	1515	1515
Tianjin	1185	1185
Maehuala	1444	1444
Huizhou	1356	1356
Lithonia	1235	1235
Mobeni	1228	1228

Facility	Scope 2 location-based emissions (metric tons CO2e)	Scope 2, market-based emissions (metric tons CO2e)
Melzo	1181	1698
Loevenich	1114	1820
Zhuhai	907	907
Povoa	859	1143
Muhlhoff	913	1492
Wright City	994	994
Vologda	841	841
Naperville	960	960
Araucaria	172	156
Kazan	940	940
St. Francis	764	764
Londrina	603	547
Oak Creek	634	634
Usti nad Labem	896	1036
Riyadh	693	693
Sultanbeyli	752	752
Belleville	596	596
Baytown	742	742
Mandra	528	632
Ghent	553	394
Cuernavaca	649	649
Uberaba	575	522
Pudahuel	663	663
Merced	630	630
Martorell	500	905
Perm	532	532
Auburndale	652	652
Burton on Trent	464	609
Hamburg	683	1116
Indianapolis	0	0
Ede	1359	1551
Manaus	380	345
Istanbul	455	455
San Juan	539	539
Rouen	556	605
Winfield	506	506
Vreeland	369	422
Charlotte	454	454
Volgograd	402	402
Omsk	390	390
La Palma	378	378
Almasfuzito	345	431
Algeria	214	214
Beloyarsk (Upakovka)	322	322
Jubail	441	441
Windsor Locks	252	252
Shanghai	236	236
Sadat City	301	301
St. Gabriel (Evans)	242	242
Kiev	322	322
Penrith	161	161
Fontana	211	211
Morgan Hill	189	189
Memphis	198	198
Englishtown	224	224
Vung Tau	276	276
Botosani	195	258
Hochi Minh City	306	306
Fort Worth	149	149
Thirsk	127	166
Valencia	7	7
Rio de Janeiro	138	138
Cartagena	154	154
Manilla	620	620
Bogota	149	149
Monterrey	116	116
Tonawanda	131	131
Falkenburg	141	298
Stoney Creek	119	119
Angarsk	117	117
Rheine	90	147

Facility	Scope 2 location-based emissions (metric tons CO2e)	Scope 2, market-based emissions (metric tons CO2e)
Aratu	67	67
Cornell	108	108
Izegem	92	66
Don Benito	132	238
Laudun	93	101
Vienna	143	143
Lille	52	57
Hedehusne (Roskilde)	59	143
Esteio	46	46
Mombasa	60	60
Apapa	36	36
Ageuda	37	49
San Jose	4	4
Guatemala	32	32
Vaesterhaninge	17	36
Punto Fijo	0	0
Montceau	7	8
San Roque (Cadiz)	99	179
Kaluga	60	60
Grove Hill	11	11
Jackson	9	9
Pine Grove	7	7
Vicksburg	4	4
Pelahatchie	1	1

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	6	Increased	1	Greif's non-CO2 biomass emissions increased by 6 tonnes from FY17 to FY18. This represents less than a 1% increase over FY17. $(6/797,600) \times 100$. This increase was partly offset by Greif's purchase of electricity in Brazil from a renewable energy source. Market-based scope 2 emissions were reduced by approximately 300 tonnes as a result of this purchase.
Other emissions reduction activities	25000	Decreased	3	FY18 emission reduction projects reduced s1 and s2 emissions by approximately 25,000 T CO2e. Emission reduction projects have reduced emissions in FY18 by approximately 3% from FY17. $(25,000/797,600) \times 100$
Divestment	0	No change	0	There were no divestitures in FY18.
Acquisitions	0	No change	0	There were no acquisitions in FY18.
Mergers	0	No change	0	There were no mergers in FY18.
Change in output	17000	Increased	2	After accounting for emission changes associated with a change in renewable energy consumption, emission reduction activities, and change in methodology, the increase in emissions from FY17 to FY18 due to an increase in output is approximately 41,000 TCO2. This represents a 5% increase. $(17,000/797,600) \times 100$
Change in methodology	7400	Decreased	1	The only change in methodology from FY17 was to update certain emission factors. This caused an increase in s1 and s2 emissions of 7400 T CO2e. This represents a 1% increase in emissions. $(7,400/797,600) \times 100$
Change in boundary	0	No change	0	There was no change in the emissions inventory boundary during FY18.
Change in physical operating conditions	0	No change	0	There were no known changes in physical operating conditions during FY18 that would impact company emissions.
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 undertakes this energy-related activity
Consumption of fuel (excluding feedstocks)	Yes
Consumption of purchased or acquired electricity	Yes
Consumption of purchased or acquired heat	No
Consumption of purchased or acquired steam	No
Consumption of purchased or acquired cooling	No
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 MWh
Consumption of fuel (excluding feedstock)	HHV (higher heating value)	690600	1562800	2253400
Consumption of purchased or acquired electricity	<Not Applicable>	2400	857100	859500
Consumption of purchased or acquired heat	<Not Applicable>	<Not Applicable>	<Not Applicable>	<Not Applicable>
Consumption of purchased or acquired steam	<Not Applicable>	<Not Applicable>	<Not Applicable>	<Not Applicable>
Consumption of purchased or acquired cooling	<Not Applicable>	<Not Applicable>	<Not Applicable>	<Not Applicable>
Consumption of self-generated non-fuel renewable energy	<Not Applicable>	3900	<Not Applicable>	3900
Total energy consumption	<Not Applicable>	696900	2419900	3116800

C8.2b

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

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

C8.2c

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

Fuels (excluding feedstocks)

Wood

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

495302

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

495302

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Comment

Fuels (excluding feedstocks)

Waste Paper and Card

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

37374

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

37374

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Comment

Fuels (excluding feedstocks)

Black Liquor

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

157960

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

0

MWh fuel consumed for self-generation of steam

157960

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Comment

Fuels (excluding feedstocks)

Distillate Oil

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

51692

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

51692

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Comment

Fuels (excluding feedstocks)

Motor Gasoline

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

2282

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

2282

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Comment

Fuels (excluding feedstocks)

Jet Gasoline

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

1135

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

1135

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Comment

Fuels (excluding feedstocks)

Kerosene

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

106

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

106

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Comment

Fuels (excluding feedstocks)

Liquefied Petroleum Gas (LPG)

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

6740

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

6740

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Comment

Fuels (excluding feedstocks)

Natural Gas

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

1456585

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

569327

MWh fuel consumed for self-generation of steam

763932

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

123325

Comment

Fuels (excluding feedstocks)

Other, please specify (Non-road diesel)

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

1082

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

1082

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Comment

Fuels (excluding feedstocks)

Propane Gas

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

23508

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

23508

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Comment

Fuels (excluding feedstocks)

Diesel

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

19634

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

19634

MWh fuel consumed for self-generation of steam

0

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

0

Comment

C8.2d

(C8.2d) List the average emission factors of the fuels reported in C8.2c.

Black Liquor

Emission factor

94.4

Unit

kg CO2 per million Btu

Emission factor source

40CFR98 subpart AA Table A-1

Comment

Diesel

Emission factor

73.96

Unit

kg CO2 per million Btu

Emission factor source

USEPA Emission Factors for Greenhouse Gas Emissions 9 March 3018.

Comment

Distillate Oil

Emission factor

73.96

Unit

kg CO2 per million Btu

Emission factor source

USEPA Emission Factors for Greenhouse Gas Emissions 9 March 3018

Comment

Jet Gasoline

Emission factor

72.22

Unit

kg CO2 per million Btu

Emission factor source

USEPA Emission Factors for Greenhouse Gas Emissions 9 March 3018.

Comment

Kerosene

Emission factor

75.2

Unit

kg CO2 per million Btu

Emission factor source

USEPA Emission Factors for Greenhouse Gas Emissions 9 March 2018.

Comment

Liquefied Petroleum Gas (LPG)

Emission factor

61.71

Unit

kg CO2 per million Btu

Emission factor source

USEPA Emission Factors for Greenhouse Gas Emissions 9 March 2018.

Comment

Motor Gasoline

Emission factor

70.22

Unit

kg CO2 per million Btu

Emission factor source

USEPA Emission Factors for Greenhouse Gas Emissions 9 March 2018.

Comment

Natural Gas

Emission factor

53.06

Unit

kg CO2 per million Btu

Emission factor source

USEPA Emission Factors for Greenhouse Gas Emissions 9 March 2018.

Comment

Propane Gas

Emission factor

62.87

Unit

kg CO2 per million Btu

Emission factor source

USEPA Emission Factors for Greenhouse Gas Emissions 9 March 2018.

Comment

Waste Paper and Card

Emission factor

94.4

Unit

kg CO2 per million Btu

Emission factor source

USEPA Emission Factors for Greenhouse Gas Emissions 9 March 2018.

Comment

Wood

Emission factor

94.4

Unit

kg CO2 per million Btu

Emission factor source

USEPA Emission Factors for Greenhouse Gas Emissions 9 March 2018.

Comment

Other

Emission factor

73.96

Unit

kg CO2 per million Btu

Emission factor source

USEPA Emission Factors for Greenhouse Gas Emissions 9 March 2018.

Comment

C8.2e

(C8.2e) 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	41800	37900	3900	0
Heat	437100	437100	0	0
Steam	94800	94800	490400	0
Cooling	0	0	0	0

C8.2f

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

Basis for applying a low-carbon emission factor

Off-grid energy consumption from an on-site installation or through a direct line to an off-site generator owned by another company

Low-carbon technology type

Solar PV
Wind

Region of consumption of low-carbon electricity, heat, steam or cooling

North America

MWh consumed associated with low-carbon electricity, heat, steam or cooling

3900

Emission factor (in units of metric tons CO2e per MWh)

0

Comment

Greif generates 3,900 MWh of electricity on site at eight facilities using a combination of solar PV and wind technology. The quantity of electricity generated was not verified, however.

Basis for applying a low-carbon emission factor

Contract with suppliers or utilities (e.g. green tariff), supported by energy attribute certificates

Low-carbon technology type

Hydropower

Region of consumption of low-carbon electricity, heat, steam or cooling

Latin America

MWh consumed associated with low-carbon electricity, heat, steam or cooling

1800

Emission factor (in units of metric tons CO2e per MWh)

0

Comment

Five Greif facilities in Brazil purchased in 2018 approximately 4,300 MWh of electricity from the grid under a Power Purchase Agreement with a low-carbon electricity producer. While there is currently no mechanism in Brazil to verify the low-carbon energy emissions factor, the generator has provided an energy attribute certificate for 1,800 MWh of the energy purchased.

C9. Additional metrics

C9.1

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

C10. Verification

C10.1

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

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

C10.1a

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

Scope

Scope 1

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

Greif 2018 CDP Verification Statement.pdf

Page/ section reference

All.

Relevant standard

ISO14064-3

Proportion of reported emissions verified (%)

100

Scope

Scope 2 location-based

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

Greif 2018 CDP Verification Statement.pdf

Page/ section reference

All.

Relevant standard

ISO14064-3

Proportion of reported emissions verified (%)

100

Scope

Scope 2 market-based

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

Greif 2018 CDP Verification Statement.pdf

Page/ section reference

All.

Relevant standard

ISO14064-3

Proportion of reported emissions verified (%)

100

C10.1b

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

Scope

Scope 3- all relevant categories

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Attach the statement

Greif 2018 CDP Verification Statement.pdf

Page/section reference

All.

Relevant standard

ISO14064-3

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, we do not verify any other climate-related information reported in our CDP disclosure

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)?

No, and we do not anticipate being regulated in the next three years

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?

No, and we do not currently anticipate doing so in the next two years

C12. Engagement

C12.1

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

Yes, our suppliers

Yes, our customers

Yes, other partners in the value chain

C12.1a

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

Type of engagement

Innovation & collaboration (changing markets)

Details of engagement

Run a campaign to encourage innovation to reduce climate impacts on products and services

% of suppliers by number

20

% total procurement spend (direct and indirect)

80

% Scope 3 emissions as reported in C6.5

51

Rationale for the coverage of your engagement

Greif focuses our supplier engagement efforts on our largest suppliers by spend and on raw materials that are most commonly used in our business, which are also most subject to climate-related raw material price volatility (steel and resin). We chose to engage our largest suppliers as they have the largest impact on our footprint. We formally collaborate with these suppliers via our Global Sourcing and Procurement, Global Innovation and Sustainable Innovation Teams to identify opportunities for material down gauging, light weighting products and identifying more environmentally friendly materials.

Impact of engagement, including measures of success

Our innovation and collaboration efforts led to the launch of new products lines and reduced costs. For example, the EcoBalance™ product line in North America, which is produced using approximately 75 percent recycled plastic and reduces CO2 emissions 30 to 53 percent compared to comparable conventional products. Our down gauging program led to \$1 million in savings from reduced raw materials use in 2018, a figure higher than anticipated.

Comment

Percentage of Scope 3 emissions are provided for emissions from purchased goods and services (63% of scope three emissions) for the 80% of suppliers (by spend) being engaged in this activity.

Type of engagement

Compliance & onboarding

Details of engagement

Included climate change in supplier selection / management mechanism

% of suppliers by number

100

% total procurement spend (direct and indirect)

100

% Scope 3 emissions as reported in C6.5

63

Rationale for the coverage of your engagement

Greif has publicly posted its Supplier Code of Conduct on its website and will incorporate sustainability measures into its Supplier Scorecard, Supplier Selection Criteria and Supplier Quality Audits / Criteria of grading suppliers at their facilities. We also empower our suppliers to act on potential violations of the Code of Conduct, including reporting suspected violations committed by Greif employees, by providing a hotline for our suppliers to call should they observe a peer or Greif employee displaying values that are inconsistent with our Codes of Conduct. We expect all suppliers to adhere to our Supplier Code of Conduct as any violations along our supply chain have the potential to expose us to reputational risk.

Impact of engagement, including measures of success

Sustainability criteria accounts for 5% of our supplier scorecard.

Comment

Percentage of Scope 3 emissions are provided for emissions from purchased goods and services (63% of scope three emissions) for the 100% of suppliers (by spend) being engaged in this activity.

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)

70

% Scope 3 emissions as reported in C6.5

44

Rationale for the coverage of your engagement

In 2016, Greif conducted an EcoVadis assessment of its top 25 suppliers, providing Greif with a better understanding of: • Which of our suppliers are leading in sustainability (suppliers who received gold or silver ratings). We chose to engage our largest suppliers as they have the largest impact on our footprint. This engagement has a favorable impact on our relationship and helps us prioritize the suppliers on which we focus our deeper engagement. • Activities implemented by our suppliers to reduce their emissions, which will in turn have a positive impact on our scope 3 emissions. • A foundation by which we were able to develop a sustainable procurement program and set goals. The results of the EcoVadis study aided in the creation of our revised Supplier Scorecard and inform our ongoing engagement efforts.

Impact of engagement, including measures of success

As a result of our engagement efforts, we created our first set of supplier sustainability goals. These goals have a FY2017 baseline and a target completion year of 2025. This "Green Procurement" Vision focuses on: 1) A one percent reduction in overall material used to produce current product offerings by using innovative materials 2) Moving from Non-Green to Green Material Sourcing if it is economically feasible and doing so provides high quality of product to our customers. We score each of our top 20 suppliers on a supplier scorecard (which accounts for approximately 70% of our supplier spend) that considers cost, quality, delivery, value-added services, technical support and environmental and social criteria. We track supplier scorecard performance in Greif's Quality Control System, allowing us to tie quality issues to specific suppliers. If a supplier gets a low score, we expect corrective action to happen.

Comment

Percentage of Scope 3 emissions are provided for emissions from purchased goods and services (63% of scope three emissions) for the 70% of suppliers (by spend) being engaged in this activity.

C12.1b

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

Type of engagement

Collaboration & innovation

Details of engagement

Other – please provide information in column 5

% of customers by number

15

% Scope 3 emissions as reported in C6.5

15

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

Greif works with a multitude of customers to allay greenhouse gases in their supply chain. We prioritize customers that desire to impact their sustainability goals, including energy and emissions, and reduce costs. We collaborate with these customers frequently in an effort to develop products that meet their needs and those of others in the industry. We regularly meet with customers to identify collaborative joint projects to reduce each other's carbon emissions. In addition, we meet with customers during conferences such as Interpack and send out updates to all customers regarding our sustainability-related products, achievements, and news. In 2014, we also held our first customer sustainability meeting in Latin America, where we engaged with customers to promote more sustainability policies and actions in the region. In 2010, we developed the Greif Green Tool to assist customers in selecting the most efficient container for their needs. The tool enables companies to evaluate the GHG emissions associated with different shipping scenarios and assists customers in calculating their scope 3 GHG emissions. In total, over 65 customers have used the tool. In 2018, Greif created reports from the Greif Green Tool for fourteen global key customers to show the environmental impact associated with industrial packaging supplied by Greif. These reports can be used as a baseline for our customers to improve emissions associated with their shipping practices. In one case, we also developed an environmental scorecard and carbon footprint tracking tool for one of our largest customers. Additionally, Greif creates comparative scenario analyses for customers aiming to reduce emissions through use of our sustainability-tagged products. This past year, we updated the Greif Green Tool by enhancing its analytical capability to allow detailed modeling, allowing plant/process specific analysis, updating the tool's underlying data sets and improving the classification of our sustainable products and processes portfolio. We also completed an analysis of the majority of our product portfolio against our eight sustainable product criteria. Through the analysis we identified the products we will consider part of our sustainable product portfolio. All new product launches will be analyzed and added to the portfolio if they meet the criteria.

Impact of engagement, including measures of success

We measure the success of customer engagement through customers actively engaged in sustainability discussions, number of customers completing a Green Tool Analysis, and revenue from sustainability-tagged products. In 2018, we achieved: • 20 customers actively engaged in sustainability discussion • 14 customers completing a Green Tool Analysis • \$571 million in revenue from sustainability-tagged products (15% of total revenue) Size of engagement and percentage of scope 3 emissions are provided as a percentage of revenue attributable to sustainability tagged-products, which are viewed as an outcome of these engagements. In 2018, we received an invitation from Together for Sustainability to speak at an event. Several of our customers attended the event, including Lanxess, Covestro, IFF, Evonik, Wacker, AkzoNobel, Eastman, BASF, Brenntag. We gave another presentation to a group of employees from one of the largest chemical companies. They selected us as a "Global Key Preferred Partner" – one of the reasons for this selection was our sustainability efforts.

C12.1c

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

In 2017 Greif completed our first formal materiality assessment, engaging stakeholders along our value chain to determine significant impacts, risks, and opportunities that are most relevant to Greif and its stakeholders. Our materiality process involved mapping our value chain. As disclosed on the [Stakeholder Engagement & Materiality](#) page of our sustainability report, Greif's value chain consists of raw material suppliers, transportation and distribution partners, customers, end-of-life services (fulfilled by EarthMinded Life Cycle Services (LCS)/CLCM network) and external stakeholders that influence our activities, including investors, communities in which Greif operates and sustainable development organizations in which Greif participates.

Greif engages with our transportation and distribution partners daily to incorporate climate-related factors into our logistics decision-making processes. Since 2014 we have formally partnered with the [EPA's SmartWay](#) program to manage logistics in an environmentally-responsible manner. Greif uses carriers that are approved through the EPA's SmartWay initiative whenever possible. We include SmartWay certification during our new carrier certification process. Greif's SmartWay-approved carrier base accounts for 88.5 percent of miles traveled. From 2014 to 2017, we have saved over 189,000 tons of CO2 mass emissions through the use of SmartWay carriers.

Greif engages investors in our climate-related strategy through formal earnings calls, daily interactions, sustainability reporting, and active responses to sustainability assessments, including CDP and EcoVadis. Greif engages the communities in which we operate through our public reporting, including our sustainability report, and public meetings in certain cases. For more information on community engagement related to our CLCM joint venture, please visit [Cicmwi.com](#).

Greif engages with the World Business Council for Sustainable Development (WBCSD) and the UN Global Compact (UNGC). Greif began engaging with WBCSD in 2009 to demonstrate our commitment to providing business leadership as a catalyst for change toward sustainable development. Greif is proud to have hosted the first Midwest WBCSD conference in 2011, and again in 2012 and 2013, to discuss and share ideas and strategies about how to respond to some of the key environmental and business sustainability questions we face today and to share best practices. We are proud to have partnered with WBCSD to publish [From Cradle to Grave: Greif's Life Cycle Analysis](#), a case study on how we implement Life Cycle Analysis in our business. We continue to engage with WBCSD quarterly and are participating in a pilot with them to better ingrain climate-related risk into our enterprise risk management approach.

C12.3

(C12.3) Do you engage in activities that could either directly or indirectly influence public policy on climate-related issues through any of the following?

Trade associations
Funding research organizations

C12.3b

(C12.3b) Are you on the board of any trade associations or do you provide funding beyond membership?

Yes

C12.3c

(C12.3c) Enter the details of those trade associations that are likely to take a position on climate change legislation.

Trade association

International Confederation of Plastic Packaging Manufacturers (ICPP).

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

The ICPP's mission is "to promote the safe and efficient manufacturing, use and recycling of plastics packaging." This includes the fields of international transport of plastics packaging and test methods. The ICPP indirectly engages in the realm of climate change through advocating for, and encouraging environmentally sound practices in the management of the packaging life cycle.

How have you influenced, or are you attempting to influence their position?

Our Product Management and Development Director is the President of the ICPP. In this capacity, Greif, along with the ICPP, work with the United Nations' (UN) Committee of Experts on the Safe Transport of Hazardous Goods to promote regulatory aspects of the transport of dangerous goods, international standardization and lessen environmental impact of transportation.

Trade association

American Forest and Paper Association (AF&PA).

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

The AF&PA works to advance the sustainability of the U.S. pulp, paper, packaging and wood products manufacturing industry through public policy and marketplace advocacy. The organization engages directly in climate change and has set an industry-wide goal to reduce GHG emissions by at least 15 percent from 2005 to 2020. The program was recognized by the U.S. Environmental Protection Agency (US EPA) during the 2012 Climate Leadership Conference. Other AF&PA goals include increasing paper recovery and energy efficiency, and promoting sustainable forestry. These goals contribute directly toward climate change mitigation. Between 2005 and 2010, AF&PA membership has reduced their GHG emissions by 10.5 percent, and AF&PA member managed forests and forest products store approximately 10 percent of annual U.S. carbon dioxide emissions, playing a pivotal role in reducing climate change impacts.

How have you influenced, or are you attempting to influence their position?

Greif's Chief Executive Officer serves as a Director for the AF&PA, in addition to serving on the board of directors and executive committee. Through our membership in the AF&PA, Greif helps to set goals aimed at reducing GHG emissions and mitigate the effects of climate change, establish long-term planning goals, form industry committees to work on the most critical sustainability opportunities, and publish annual sustainability reports for the public. By supporting these activities, Greif reinforces the AF&PA's commitment to addressing climate change. Various Greif leaders occupy other AF&PA positions: General Counsel, Resource Committee member, Chairman Containerboard sector, Water subcommittee, Workplace Health and Safety subcommittee, Recovered Fiber Sector group, and Containerboard Sector group.

Trade association

World Business Council for Sustainable Development (WBCSD).

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

The WBCSD works with the global business community to create a sustainable future business, society and environment. The WBCSD's Vision 2050 promotes a global transition to sustainable business including the halving of carbon emissions worldwide through a shift to low-carbon energy systems, the halting of deforestation, incorporating carbon externalities into the marketplace and improving demand-side energy efficiency. Through its Action 2020 initiative, the WBCSD provides solutions for companies to utilize carbon sinks and capture and storage technologies promote zero emissions and increase climate change resilience.

How have you influenced, or are you attempting to influence their position?

Greif's Senior Vice President and Group President, Rigid Industrial Packaging & Services - Americas, and Global Sustainability, Ole Rosgaard, directly manages Greif's partnership with the WBCSD.

Trade association

SERRED (Association of European reconditioners).

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

According to SERRED's website, they provide environmental services to its business partners "by collecting, transporting, cleaning and reprocessing millions of packaging every year. Packaging reuse saves energy and the production of greenhouse gases, making our community a better place in which to live."

How have you influenced, or are you attempting to influence their position?

EarthMinded EMEA's LCS Product Director serves as SERRED's president while other Greif employees hold membership. EarthMinded LCS serves as a means to recondition and remanufacture industrial drums and intermediate bulk containers. By EarthMinded representatives participating in SERRED, Greif brings its leadership and expertise in packaging sustainability.

Trade association

Fiber Box Association (FBA).

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

In response to the growing demand for sustainability practices, the Fibre Box Association formed a sustainability committee to help in "defining and articulating the sustainable practices of the corrugated packaging industry." The FBA promotes sustainable forestry practices and recycling.

How have you influenced, or are you attempting to influence their position?

Tim Bergwall, Greif's Senior Vice President and Group President of Paper Packaging & Services and Soterra LLC, , serves as on the FBA's board of directors and as a chairman. Through his leadership, Pete reinforces the FBA's position on climate change by commissioning lifecycle analyses and carbon foot-printing for the industry as a whole, establishing long-term planning goals, forming industry committees to work on the most critical sustainability opportunities, and publishing annual sustainability reports for the public.

Trade association

Reusable Industrial Packaging Association (RIPA).

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

The Reusable Industrial Packaging Association (RIPA) promotes policies and practices that encourage additional use and reuse of reusable industrial and transport packaging. Packaging reuse reduces greenhouse gas emissions and RPCCA seeks to encourage greater use of such packagings by corporations where practical and feasible.

How have you influenced, or are you attempting to influence their position?

Container Life Cycle Management LLC is a member of RIPA.

Trade association

European Industrial Packaging Association (EIPA).

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

The consumption of fossil-based fuels and raw materials cannot be truly considered as 'sustainable', by the simple fact that the natural processes for production of oil, gas and minerals occurs over millions of years, yet they are obtained, refined and consumed within a matter of months. Ideally the manufacture of sustainable industrial packaging, along with the manufacture of any tools or equipment used in such a process, would include use of renewable energy sources such as wind, solar, tidal and wave energy.

How have you influenced, or are you attempting to influence their position?

As Chairman of EIPA, Greif has worked to create a standardized definition for Sustainable Industrial Packaging and worked to create a shared view of the circular economy among industry partners.

C12.3d**(C12.3d) Do you publicly disclose a list of all research organizations that you fund?**

No

C12.3f**(C12.3f) What processes do you have in place to ensure that all of your direct and indirect activities that influence policy are consistent with your overall climate change strategy?**

[The Greif Way](#), which outlines Greif's core tenets, and our [Environmental Health and Safety Policy](#) cover climate change and inform our organizational strategy, including how we both directly and indirectly influence policy through our activities. Sustainability is a critical component of The Greif Way and permeates our organization. Interaction between Greif and groups influencing climate change are coordinated from our Corporate Headquarters through Ole Rosgaard, Greif's Senior Vice President and Group President, Rigid Industrial Packaging & Services - Americas, and Global Sustainability (as of FY2019, Ole has been promoted to Sr. Vice President of RIPS and Global Sustainability), with input from the Board and Peter Watson, Greif's CEO. All Greif employees are expected to engage with our value chain in accordance with our [Code of Business Conduct](#), which set expectations for Compliance with Laws, Regulations and Policies, People and Planet, and Business Ethics. The policies set forth in the Code of Business Conduct are written to ensure our activities are consistent with our business strategies, including our overall climate change strategy. In 2017, we conducted our first robust materiality assessment. The assessment revealed Ethics & Compliance to be a material topic for our organization. Our [Ethics and Compliance](#) policies are reported as part of our 2018 Sustainability Report. Additionally, we have established a goal to provide online training of the Greif Code of Business Conduct and Ethics to 100 percent of employees with access to computers by 2025.

C12.4

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

Publication

In mainstream reports

Status

Complete

Attach the document

Greif-Annual Report-2018.pdf

Page/Section reference

Content elements

Governance
 Strategy
 Risks & opportunities

Comment

Publication

In voluntary sustainability report

Status

Complete

Attach the document

Greif2018SustainabilityReport.pdf

Page/Section reference

Content elements

Governance
 Strategy
 Risks & opportunities
 Emissions figures
 Emission targets
 Other metrics

Comment

C14. 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.

C14.1

(C14.1) Provide details for the person that has signed off (approved) your CDP climate change response.

	Job title	Corresponding job category
Row 1	President and Chief Executive Officer	Chief Executive Officer (CEO)

SC. Supply chain module

SC0.0

(SC0.0) If you would like to do so, please provide a separate introduction to this module.

SC0.1

(SC0.1) What is your company's annual revenue for the stated reporting period?

	Annual Revenue
Row 1	

SC0.2

(SC0.2) Do you have an ISIN for your company that you would be willing to share with CDP?

Please select

SC1.1

(SC1.1) Allocate your emissions to your customers listed below according to the goods or services you have sold them in this reporting period.

SC1.2

(SC1.2) Where published information has been used in completing SC1.1, please provide a reference(s).

SC1.3

(SC1.3) What are the challenges in allocating emissions to different customers, and what would help you to overcome these challenges?

Allocation challenges

Please explain what would help you overcome these challenges

SC1.4

(SC1.4) Do you plan to develop your capabilities to allocate emissions to your customers in the future?

Please select

SC2.1

(SC2.1) Please propose any mutually beneficial climate-related projects you could collaborate on with specific CDP Supply Chain members.

SC2.2

(SC2.2) Have requests or initiatives by CDP Supply Chain members prompted your organization to take organizational-level emissions reduction initiatives?

Please select

SC3.1

(SC3.1) Do you want to enroll in the 2019-2020 CDP Action Exchange initiative?

Please select

SC3.2

(SC3.2) Is your company a participating supplier in CDP's 2018-2019 Action Exchange initiative?

Please select

SC4.1

(SC4.1) Are you providing product level data for your organization's goods or services?

Please select

Submit your response

In which language are you submitting your response?

English

Please confirm how your response should be handled by CDP

	Public or Non-Public Submission	I am submitting to	Are you ready to submit the additional Supply Chain Questions?
I am submitting my response	Public	Investors Customers	Yes, submit Supply Chain Questions now

Please confirm below

I have read and accept the applicable Terms