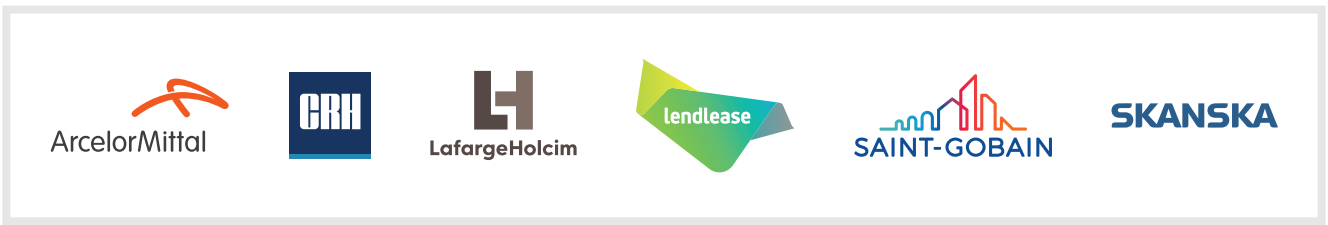
wbcsd

Construction and Building Materials TCFD Preparer Forum

Communicating collective and individual climate-related challenges and action

July 2020

In collaboration with:



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Executive summary

1 Executive summary

The construction sector provides essential products, infrastructure and services that drive growth and productivity and improve social conditions around the world. The sector is built around a complex global value chain that encompasses diverse materials, products and processes and supports the livelihoods of millions of people. In the coming decades, the sector will provide crucial practical solutions to enable society to respond to the challenges of population growth, increasing urbanization and climate change.

Construction and building materials are vulnerable to climate-related transition and physical risks. Transition risks, such as the introduction of carbon pricing policies, have the potential to drive operational costs up throughout the value chain. Physical risks, such as increased severity of extreme weather events, could disrupt supply chains, halt operations and damage valuable assets. But there are also opportunities in improving societal resilience to climate change. The sector will play a dual role – firstly, providing infrastructure that is resilient to a changing climate and extreme weather events, and secondly, reducing its own carbon footprint to reduce emissions and help limit climate change.

To stay resilient in the long term, those operating in the construction sector must manage their exposure to climate-related risks while decarbonizing production processes, product offerings and infrastructure design by incorporating low-carbon solutions. Their ability to do so, alongside commercial viability, will depend on collaborative action across the value chain, development of supportive policy frameworks and investment in innovative, low-carbon technologies.

The Task Force on Climate-related Financial Disclosures (TCFD) Construction and Building Materials Preparer Forum ("the Forum") is a collaboration between ArcelorMittal, CRH, LafargeHolcim, Lendlease, Saint Gobain, Skanska and the World Business Council for Sustainable Development (WBCSD). Forum members collectively represent key players in the construction and building materials value chain. The Forum's collective aim is to advance the implementation of the TCFD recommendations by sharing members' experiences in implementing the recommendations. Members' commentary is supported by examples of effective practice consistent with the TCFD's recommendations and proposals on how disclosures might evolve over the TCFD's "implementation path". This anticipates the development of climate change-related disclosure practices over the three to five-year period following the publication of the recommendations in June 2017.

Three years on from the release of the TCFD's recommendations, corporate reporting on climate change is still evolving. The 2019 TCFD Status Report shows that, although companies have made progress, the pace of implementation is slow and there is scope for improvement in climate-related financial disclosure practices. In particular, disclosures about the potential financial impacts of climate-related issues and the resilience of company strategies under different climate scenarios require more clarity.

The aim of this report is to provide a snapshot of progress, including examples of how Forum member companies are providing effective climate-related financial disclosures. Forum members have explored ways in which participants in the construction and building materials value chain can collectively contribute to the objectives of the TCFD. They discuss some of the challenges in responding to the TCFD's recommendations and meeting the expectations of users of climate-related information. The report also includes perspectives from information users, including investors and other financial market participants, who use climate-related financial disclosures to assess and quantify risk and make decisions about how to allocate financial capital.

MAIN FINDINGS AND THEMES FROM THE REPORT

Strategy: Climate risks and opportunities - Forum members publicly disclose their climate-related risks, which can broadly be categorized into key themes: policy and legal; technology; market; reputation; chronic physical; and acute physical. Member's disclosures typically summarize the potential business impacts of risks and the mitigation measures in place to reduce them.

Members also disclose the business opportunities associated with the low-carbon transition. These include:

- Product and process innovations that reduce the embodied carbon of final products;
- Material innovations that reduce the operational carbon emissions of finished buildings;
- Renewable energy generation and procurement;
- Transport and distribution network optimization; and
- Implementing technologies such as carbon capture, utilization and storage (CCUS).

Forum members acknowledge that, whilst they share many climate-related risks and opportunities, impacts and responses differ depending on where a company operates within the value chain. The decisions and actions taken in one part of the value chain have knock-on effects for those operating in other areas and this can both facilitate and frustrate the transition to a low-carbon, resilient value chain. The Forum recognizes the power of strategic collaboration to drive this transition, realized through dialogue to create alignment on policy advocacy positions; engagement between customers/clients/suppliers to create a shared understanding of expectations and requirements around the low carbon transition; transparency and standardization in emissions reporting and the development of 'green' labelling systems.

Strategy: Strategic resilience - Strategic resilience refers to the way in which a company's strategy supports and prepares it to achieve a resilient state under different climate scenarios. When assessing strategic resilience, users seek forward-looking information, for example climate strategy that goes beyond just carbon performance, to evaluate how a company might cope under different scenarios and in what ways it needs to change.

Forum members demonstrate resilience by disclosing how climate considerations are integrated into governance and risk management processes. In addition, companies can demonstrate resilience through disclosures which highlight how opportunities presented by the low carbon transition are being capitalized on, such as through innovation and research and development activities. To consider long-term strategic resilience some Forum members are exploring scenario analysis, supporting discussions around preparedness and responses to climate change.

Metrics and targets - Metrics and targets demonstrate how companies measure and monitor climate-related risks and opportunities and how they are progressing in implementing a strategic response.

Forum members disclose operational metrics and performance over time, including greenhouse gas (GHG) emissions, carbon intensities and renewable/low-carbon energy use. Forum members are beginning to report forward-looking climate-related financial metrics, such as investments in low-carbon projects.

Construction and building materials companies face specific challenges associated with long-term planning and value chain complexity. In particular, defining Scope 3 emissions context and materiality at different stages in the value chain is a key challenge. Further work and consultation is needed to improve the application and reporting of Scope 3 emissions.

In this report, Forum members provide a table of illustrative metrics designed to enhance disclosure and provide options companies can choose from when communicating climate-related objectives and performance. The expectation is not to report against all of the metrics listed, but to provide options to support TCFD implementation over time.

Developing climate disclosure through collaboration - Forum members outline four critical levers that are necessary to accelerate, improve and develop TCFD implementation approaches:

1. Complementing company-specific climate disclosure with a value chain approach to preparing and interpreting climate-related financial information;
2. Actively supporting collaboration between companies in the construction sector, and their partners, suppliers and investors;
3. Developing practical tools to enhance climate-related disclosure;
4. Securing enabling support from investors and policy-makers to enable corporate climate action and disclosure.

2 Introduction

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BACKGROUND TO THE FORUM, ITS MEMBERS AND PURPOSE

The TCFD Construction and Building Materials Preparer Forum ("the Forum") was established in July 2019.

Coordinated by WBCSD, it comprises representatives from six companies – ArcelorMittal, CRH, LafargeHolcim, Lendlease, Saint-Gobain and Skanska. The senior management of member companies have made public statements in support of the TCFD's work and have welcomed the initiative to enhance transparency regarding climate-related financial risk.

Forum members represent specific parts of the construction and building materials value chain (see Figure 1). Unless otherwise stated, the phrase "Forum value chain" refers to the parts of the construction sector value chain in which Forum member companies operate.

Reference to the "construction sector" covers the sector as a whole, including those parts of the value chain that fall outside of Forum members' direct activities. The construction sector value chain includes:

- Extractors and processors of raw materials;
- Manufacturers of building materials (e.g. steel and cement);
- Manufacturers of other products for the built environment (e.g. equipment, fittings, construction elements);
- Architects and engineers;
- Developers;
- Construction companies;
- Investors and financiers, including local governments and municipalities;
- Insurers;
- Property owners and users;
- Refurbishment and repurposing companies; and
- Deconstruction companies.

In this report, Forum members explore the ways in which they can collectively contribute to the objectives of the TCFD. The Forum's commentary is designed to support investors' understanding of climate risks and opportunities across the construction value chain, including how connections and points of influence within the value chain can support the low-carbon transition.

Figure 1: Activities conducted by Forum members within the "Forum value chain"

	ArcelorMittal	CRH	LafargeHolcim	SAINT-GOBAIN	SKANSKA	lendlease
Raw material extractors and processors	✓	✓	✓	✓		
Manufacturers & distributors of construction materials	✓	✓	✓	✓		
Construction companies					✓	✓
Developers					✓	✓
Property owners and users						✓

FORUM MEMBERS

Alan Knight – ArcelorMittal
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Shane O'Reilly – CRH
Ciarán Collins – CRH
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Paul King – Lendlease

Fabienne Grall – Saint-Gobain
Nicolas Baglin – Saint-Gobain

Emilia Hagberg – Skanska
Annelie Lakner – Skanska
Annika Winlund – Skanska

In this report, the Forum provides a commentary on key areas of the TCFD's recommendations based on members' individual experience of implementing them. This commentary is supported by examples of effective practice that are consistent with the recommendations.

In preparing the report, the Forum received valuable input from the TCFD Secretariat along with representatives of a small group of users of climate-related financial disclosures from across a range of investor and data user types. Users are defined by the TCFD as those who use information prepared by companies to assess and quantify risk and make decisions about how to allocate financial capital, including investors and other financial market participants. A limited consultation with users was conducted to seek their views on how companies can maximize the usefulness of climate-related financial information for financial market participants. User perspectives are summarized for the purposes of this report and presented anecdotally in the "user perspectives" sections.

PURPOSE AND AUDIENCE FOR THIS REPORT

The purpose of this report is to:

- Reflect the current state of climate-related financial disclosure in the construction industry by highlighting how Forum member companies have implemented the TCFD's recommendations;
- Provide insight into the roles of Forum members, both individually and collectively, in supporting the transition to a low-carbon economy;
- Highlight disclosures that demonstrate the role of the sector as a whole in enabling the low-carbon transition;
- Consider how disclosure might continue to develop in the future in line with the TCFD's illustrative implementation path; and
- Explore the role information users can play in helping companies progress their disclosures.

The Principles for Effective Disclosure, as defined by the TCFD (see Figure 2), have been used to identify examples of disclosures that conform with aspects of the TCFD recommendations.

Figure 2: Principles for effective disclosure
(TCFD Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures 2017)

PRINCIPLES FOR EFFECTIVE DISCLOSURE	
Disclosures should	1. Represent relevant information
	2. Be specific and complete
	3. Be clear, balanced and understandable
	4. Be consistent over time
	5. Be comparable among companies within a sector, industry or portfolio
	6. Be reliable, verifiable and objective
	7. Be provided on a timely basis

The audience for this report includes, but is not limited to:

- Construction sector companies seeking to enhance their climate-related financial disclosures;
- The TCFD, in order to provide input into any further deliberations on how the recommendations should evolve over time;
- Investors and other users of climate-related financial disclosures seeking to understand the current state of disclosure practice and scope for future development;
- Investors and other users of climate-related financial disclosures seeking to understand climate risk linkages and differences between actors across the Forum value chain;
- Organizations the TCFD has identified as making a valuable contribution towards adopting the recommendations, including stock exchanges, investment consultants, credit rating agencies, organizations that develop climate-related scenarios etc. so that they can consider what further work is required to support and enhance climate-related financial disclosure; and
- Companies from other sectors looking to implement the TCFD's recommendations.

REPORT STRUCTURE

Following this introduction, the report is organized into five further chapters:

- Chapter 2 **"Context: The construction sector and the climate challenge"** provides an overview of the context in which the construction sector operates and how it is affected by potential risks and opportunities related to climate change.
- Chapter 3 **"Climate risks and opportunities across the value chain"** explores specific climate-related risks and opportunities identified by Forum members, provides examples of current disclosures and describes how climate risks and opportunities manifest across the Forum value chain.
- Chapter 4 "**Strategic resilience"** considers aspects related to the TCFD's recommendation that companies should disclose information about their strategic resilience to climate change, including: integration of climate change considerations into governance and risk management processes; opportunity management and development; and long-term analysis and planning.
- Chapter 5 **"Metrics and targets"** examines the climate-related metrics and targets used by Forum members and explores the associated challenges and ways metrics disclosure can be progressed in the future throughout the Forum value chain.
- Chapter 6 **"Developing climate disclosure through collaboration"** summarizes Forum member views on how climate-related financial disclosure and associated collaborative engagement activities could be developed and enhanced over time.

This report structure reflects the growing maturity and progress made by Forum members since the TCFD recommendations were launched in June 2017. The chapters reflect the topics Forum members decided to prioritize and address. These topics were influenced by current challenges associated with climate-related financial disclosure. For example, the TCFD's June 2019 Status Report identified disclosure of strategic resilience against climate change risks as a priority area for improvement across all sectors. Rather than dealing with this in isolation, in Chapter 4 of this report, members suggest how strategic resilience disclosures may be enhanced in line with the TCFD recommendations by incorporating disclosure about governance, risk management and strategy.

3 Context: The construction sector and the climate challenge

3 Context: The construction sector and the climate challenge

The construction sector plays a crucial role in driving economic growth and improving social conditions across the world. Its diverse global value chain encompasses a wide range of materials, products and activities which come together to create residential, commercial and industrial infrastructure. As the climate changes and economies set out on a path towards decarbonization, the construction sector will play a crucial dual role. First by supporting adaptation and societal resilience through sustainable infrastructure and GHG emissions reductions and secondly by helping to limit and manage climate change.

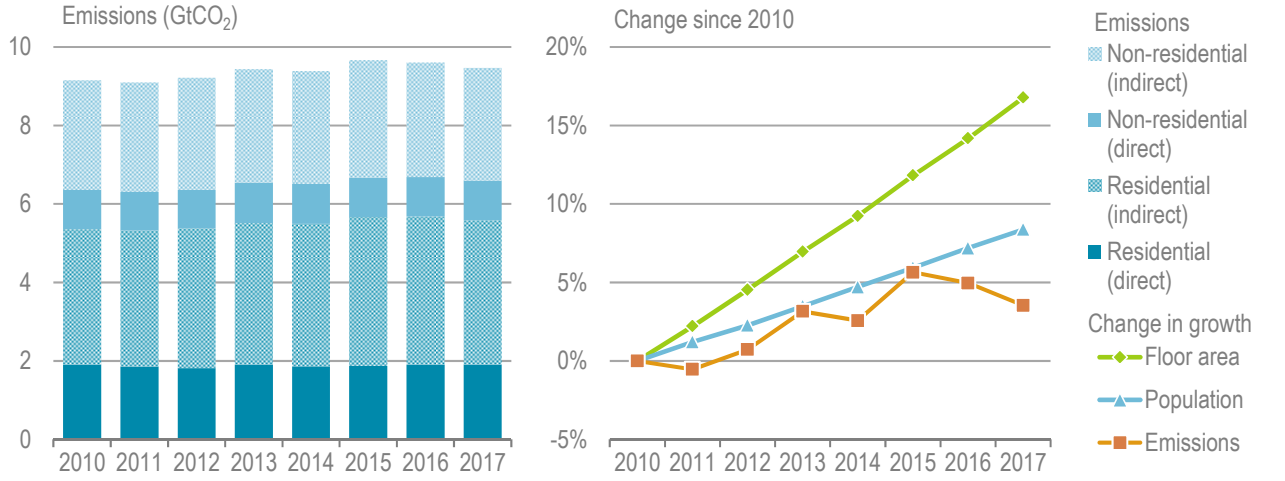
GROWTH IN DEMAND EXPECTED TO CONTINUE

Growth is expected to continue in the construction sector in the forthcoming decades.[1] It will largely be driven by population growth and urbanization, particularly in emerging economies where more than 60% of global infrastructure investment will be required.[2] By 2050, 70% of the global population is expected to reside and work in cities. At present, some 60% of this urban area is still to be built.[3] In developed countries, renovation demand will be a key driver of growth, especially in response to green building regulations and rising electricity expenses. In common with other industries, the construction sector will be affected by a wide range of climate-related economic and regulatory considerations. For instance, differences in regulatory approaches between developed and emerging economies mean that the effect of building standard certifications and carbon pricing frameworks will be clearer in some jurisdictions than in others.

A SIGNIFICANT CONTRIBUTOR TO CLIMATE CHANGE

The construction sector is a high emitter of GHGs; buildings and construction are responsible for 39% of energy-related carbon dioxide (CO_2) emissions globally (when upstream power generation is included).[4] These emissions can be separated into operational and embodied carbon emissions. Operational emissions are generated through the use of buildings – such as through heating, cooling and lighting. Embodied emissions are associated with materials and construction processes and are dependent on the operations of the construction value chain.[5] A large part of Forum members' activities contribute to embodied carbon emissions. Thus, references to carbon emissions in this report relate to the embodied type, unless otherwise specified.

Figure 3: Global buildings energy-related emissions
(Global Alliance for Buildings and Construction, Global Status Report 2018)



Sources: Derived from IEA (2018a); World Energy Statistics and Balances 2018; www.iea.org/statistics and IEA Energy Technology Perspectives buildings model; www.iea.org/buildings.

Despite appearing to have levelled off since 2015 (Figure 3), emissions from the construction sector represent a substantial share of the total global energy-related CO_2 emissions.[6] More significant emissions reductions are dependent on the development and implementation of technologies that decarbonize manufacturing processes - such as those for cement and steel - and on improving the commercial viability of technologies such as Carbon Capture Usage and Storage (CCUS).

With the help of supportive policies and targeted investments, the sector can play a crucial role enabling the low-carbon transition and building climate resilience. The challenge is for governments to develop policies that align competing incentives throughout the value chain and provide a level playing field, for example through a suite of policies that support the adoption of energy efficient technologies, promote use of alternative fuels and raw materials, encourage the development and deployment of CCUS, and also compensate for asymmetric pricing pressures in different regional markets.[7]

RISKS AND OPPORTUNITIES SPAN THE ENTIRE VALUE CHAIN

Many companies have taken steps within their own operations to respond to climate-related challenges. However, tackling climate risks and leveraging opportunities effectively requires action that extends beyond the operational boundaries of individual companies along the whole construction value chain. Like other stakeholders[6,8], Forum members believe that the construction sector can optimize progress towards tackling climate change by taking a holistic, collaborative approach and by collectively harnessing the dynamics of supply, demand and innovation.

PHYSICAL RISKS AND OPPORTUNITIES

Acute physical climate change risks include extreme weather events such as flooding, hurricanes, extreme wind and wildfires. Such events can have financial and operational impacts on the construction sector by preventing extractive activities, disrupting supply and distribution routes, delaying construction and damaging infrastructure.[9] Chronic shifts in the climate and environment manifest as increased average temperatures, sea level rise and altered rainfall patterns. These changes influence the energy requirements of buildings and the suitability of locations for new development projects.[10] They may also influence the cost and availability of insurance. As well as the risks, the physical impacts of climate change present opportunities for the construction sector. They include adaptation activities such as creating infrastructure that is resilient to both the acute and chronic impacts of climate change. Mitigation measures include reducing emissions intensity in the construction value chain by developing low carbon materials; providing infrastructure for renewable energy generation; and using CCUS.

TRANSITION RISKS AND OPPORTUNITIES

Transition risks for the construction sector relate to market, reputation, technology and policy/regulatory developments, such as carbon pricing.[11] Companies that generate large amounts of emissions, such as materials manufacturers, are more exposed to the higher operational costs associated with carbon pricing schemes in certain jurisdictions. This has implications for competitiveness in the global market, causing some companies to advocate for policies such as a "green border adjustment", designed to prevent carbon leakage. In December 2019, the European Green Deal proposed a carbon border adjustment mechanism should regional differences in climate ambition persist.[12] While carbon pricing uncertainties remain, some companies are using internal carbon pricing to guide project selection and investment decisions on low-carbon alternatives to mitigate the impacts.[1]

Opportunities for the construction sector continue to grow as activities increasingly focus on 'greening' the built environment. Downstream in the value chain, some construction and development companies see emerging low-carbon regulation as an opportunity to market energy efficient buildings. Rising demand for low-emissions materials is also creating opportunities upstream for materials manufacturers, incentivizing development of carbon-efficient production techniques.[13]

STIMULATING ACTION THROUGH CORPORATE DISCLOSURES

As the climate disclosure landscape evolves and the low-carbon transition progresses, stakeholders are demanding more climate transparency.[9] Stakeholders – including investors, governments, customers and suppliers – are looking to understand how construction companies are assessing their resilience to climate change and adapting their strategies. The TCFD encourages companies to enhance the quality and quantity of climate-related disclosures, focusing on risks, opportunities and strategic resilience to climate change.[11]

Since the TCFD issued its Final Report in 2017, a number of other initiatives have emerged to address the low-carbon transition and increase focus on sustainable development. They include the European Union (EU) Taxonomy for sustainable activities[14] and the EU Non-Financial Reporting guidance.[15] Business-led initiatives have also grown, with the creation of the Climate Action 100+ group and the alignment of the CDP (formerly the Carbon Disclosure Project) and United Nations' Principles for Responsible Investment (UNPRI) questionnaires with the TCFD recommendations.

The TCFD is strongly supported by the business community but there is no consensus on exactly what form disclosures should take. Disclosure practices will naturally evolve as frameworks, methodologies and use cases develop further. The Forum contributes to the enhancement of climate-related disclosures, with members seeking to find an efficient and fair approach to stimulating disclosure action within their markets.

4 Climate risks and opportunities across the value chain

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SUMMARY:

- Forum members' disclosures about climate-related risks summarize the potential impacts of these risks on the business and the mitigation actions in place to reduce them.
- Forum members disclosures about climate-related opportunities reflect the development of low-carbon products and processes, including case studies detailing specific solutions and projects.
- Disclosures about climate-related risks and opportunities are predominantly qualitative.
- This chapter includes a table illustrating key climate-related risks and their impacts, connection and responses across the value chain.
- The Forum is keen to leverage and reflect opportunities for greater collaborative action across the construction value chain, to drive the low-carbon transition and mitigate the impacts of climate-related risks.

In the "Strategy" pillar of their recommendations, the TCFD encourages companies to:

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

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

The first part of this chapter provides examples of how Forum members have responded to the TCFD's recommendations on strategy (parts a and b) along with commentary on the associated challenges and learnings. The second part of the chapter explores how risks and opportunities can be understood across the Forum value chain.

RISK AND OPPORTUNITY EXAMPLES

Forum members commonly disclose their climate-related risks and opportunities – most often in qualitative terms – through their annual and sustainability reports. Disclosures align with the categories used in the TCFD's Final Report which distinguish between transition and physical risks and identify subsets of risks within each category.

Disclosures by members include a description of the risks or opportunities arising from climate change, explanation of the potential business impacts, and details of the way members identify, assess and respond to climate risks. Risk responses often give rise to opportunities, including greater resource efficiency, substitution of materials, development of new products, preparation for regulatory changes and innovation of new technologies.

Figure 4: LafargeHolcim's disclosure of climate-related operational, transition and physical risk
(LafargeHolcim Integrated Annual Report 2019)

KEY OPERATIONAL RISKS

RISK	POTENTIAL IMPACT	OUR RESPONSE
Greenhouse gas emissions & Climate change The cement industry is associated with high CO_2 intensity and LafargeHolcim is exposed to a variety of regulatory frameworks to reduce emissions, some of which may be under revision. These frameworks can affect the business activities of LafargeHolcim. In addition, a perception of the sector as a high emitter could impact our reputation, thus reducing our attractiveness to investors, employees and potential employees. Strategic pillars impacted: 	**Based on TCFD recommendations, LafargeHolcim assesses in a systematic way all potential impacts of climate-related risks:** **TRANSITION RISKS:** POLICY AND REGULATORY: Following the agreement on climate change at Paris COP21, signatory countries are required to communicate reduction commitments and pass implementation regulation. The likely effect of this increasing number of frameworks will be to: i) increase the cost of fossil fuels by carbon price mechanisms, ii) impose more restrictive cap & trade systems and iii) increase the cost to firms of emitting CO_2. In Europe, Phase IV of the European Trading System (ETS) will come into force in 2021, reducing CO_2 allowances. In the absence of efficient border adjustment mechanisms, imports of clinker and cement from outside the EU might bring more competition. TECHNOLOGY: We are currently engaged in several initiatives which require large investments, especially carbon capture and storage technologies. The risk of the cost of technology being significantly higher than existing carbon pricing mechanisms and the lack of integrated deployment of carbon capture in the supply chain ecosystems (transportation, sequestration, etc.), could prevent LafargeHolcim from its successful implementation. MARKET: As the carbon debate intensifies, cement and concrete could be challenged by our customers as the building material of first choice because of perceived high embodied CO_2. In the long term, should regulatory frameworks fail to incentivize consumption of low-carbon products, customers may be unwilling to pay for additional costs and the cement sector's low-carbon roadmap might be compromised. REPUTATION: The risk of being perceived as a large carbon emitter could reduce our attractiveness to stakeholders such as customers, investors, and potential employees. **PHYSICAL RISKS:** Impact of climate change (such as flooding, changes in precipitation patterns or extreme variability in weather patterns) on our operations might lead to higher logistics and transportation costs and reduced production capacities (e.g., delayed planning approval, supply chain interruptions).	LafargeHolcim has already reduced its net carbon scope one emissions per ton of cementitious material by 27% compared to 1990 and remains the best performer among international peers. LafargeHolcim cement is one of the most carbon-efficient in the world. With our target of 520 Kg of CO_2/ton cementitious by 2030, we are among the most ambitious companies in our sector. This target is aligned with the 2° scenario (Paris Agreement, United Nations) and has been validated by the Science Based Targets Initiative (SBTi). More specifically, we have developed two comprehensive sets of actions, short and long terms, to address greenhouse gas emissions and climate challenges along the construction value chain. **Short-term actions:** focused on existing levers to reduce CO_2 emissions (i) improved clinker production technology; (ii) higher usage of alternative fuels and alternative raw materials; (iii) optimization of the cement portfolio with lower CO_2 footprint; (iv) optimization of the concrete product portfolio; (v) increase share of solutions and products with favorable CO_2 impact. In addition and as a response to policy and regulatory risks and opportunities in Europe, a specific short-term response plan to the Phase IV of the new European Trading System was developed and addresses main focus areas: ▪ CO_2 & energy performance, (e.g. increase biomass usage & reduce clinker factor); ▪ Integrate CO_2 in management (e.g. include cost in production to incentivize change management and include CO_2 impact in all M&A and CAPEX decisions); ▪ Scenario planning (e.g. evaluate profitability of exports, manage +/– 15% thresholds as well as 50%, 25%, 10% limits of historical activity levels). As result, over the next years, LafargeHolcim will invest CHF 160m and work on more than 80 projects across 19 European countries with a focus on low-carbon fuels, recycled materials and carbon-efficient solutions, reducing annual CO_2 emissions in Europe by a further 15% representing 3 millions tons by 2022 With regards to physical risk, LafargeHolcim has introduced a new, risk-based Security and Resilience Management System (SRMS) to plan for, respond and recover from all kinds of unwanted events through integrated emergency response, crisis management and business continuity activities. The process is continuously improved by structured self-assessment and implementation of lessons learnt, and assured through a formal audit and performance evaluation programme. **Long-term actions:** Innovation and research and development into (i) Breakthrough technologies such as carbon capture utilization and storage (CCUS) ; (ii) decarbonized fuel and energy; (iii) the development of low-carbon products and solutions (iv) ultimate construction methods to reach low-carbon construction. In addition, initiatives such as our Plants of Tomorrow initiative is the industry's largest roll out of 4.0 technologies; and our open innovation, where we are collaborating with numerous startups. **Advocacy positions:** We engage proactively and transparently with external stakeholders on the basis of positions that are aligned and consistent with the goals of the Paris Agreement. At the global level this is best illustrated through our cooperation with the World Bank's Carbon Pricing Leadership Coalition (CPLC) or the Global Alliance for Buildings and Construction (GABC). Our climate-related advocacy focuses on two main topics: 1. **Carbon pricing mechanisms:** A stable and reliable carbon price is fundamental to accelerate the low-carbon transition. This requires associated policy frameworks that: ▪ Respond dynamically to unforeseen macroeconomic evolutions; ▪ Provide an unconditional level playing field across regions and industries; ▪ Target entire value chains by tackling both supply and demand sides; ▪ Enable carbon cost pass-through, thereby creating financial incentives for carbon-efficient solutions Ultimately, carbon pricing mechanisms must lead to an integration of carbon costs across the entire value chain, thereby creating competitive advantages for carbon-efficient products and solutions. 2. **Construction and building standards:** progressive standards are key to ensure customer acceptance and creating a market demand for low-carbon solutions. In order to drive changes across the construction sector and ensure an adequate focus on the carbon and energy performance of buildings and infrastructure, standards must be based on the principles of material-neutrality and lifecycle performance. It must not be about one material versus another. The focus must be on the overall carbon and energy performance of our buildings and infrastructure.

Figure 5: Skanska's disclosure of climate-related risks
(Skanska Annual and Sustainability Report 2019)

Risk area and description	Potential impact	Mitigation measures/activities
Strategic risks		
→ Climate risks		
■ Physical risks caused by adverse impact from climate change such as extreme weather conditions ■ Not adapting to new climate regulations and demands from investors and customers.	■ Operational cost increases or project delays due to extreme weather conditions ■ Decreased ability to deliver for customers and inability to meet project commitments ■ Lost business opportunities ■ Being at the forefront and driving innovation for new low-carbon solutions creates business opportunities for Skanska.	■ Skanska's climate target of achieving net zero carbon emissions by 2045 will guide the work on reducing the climate impact from the Group's operations ■ Drive innovation and offer new low-carbon solutions to customers ■ Skanska integrates climate resiliency into project development to help cities and communities prepare for and respond to the changing conditions that are an effect of the climate issue.
Operational risks		
→ Environmental risk		
■ Major environmental incident in operations or supply chain or pollution or other negative environmental impacts.	■ Harm to people and ecosystems ■ Negative environmental impact ■ Damaged reputation and loss of license to operate ■ Increasing cost and decreasing profits ■ Fines, penalties, lawsuits.	■ Mandatory ISO 14001 (international environmental management system standard) certifications ensures a systematic approach to managing environmental risk and issues. ■ Skanska engages with suppliers to minimize risks of supply chain environmental breaches ■ Employee training in proper environmental practices ■ Environmental specialists at Group and business unit levels secure compliance with the Group's environmental expectations, which go beyond compliance and include retaining ISO 14001 certification.
→ Resource efficiency		
■ Inefficient use of energy, materials, waste and water.	■ Negative environmental impact ■ Operational inefficiency, increasing costs and decreasing profits ■ Inability to meet project schedule.	■ The Skanska Color Palette secures a strategic approach to future-proofing projects as regards resource efficiency (energy, carbon, materials and water) ■ Improved planning through building information modeling (BIM) and other digital tools to increase efficiency and productivity.

Figure 6: CRH's disclosure of climate change risk
(CRH Annual Report and Form 20-F 2019)

Principal Operational Risks and Uncertainties

Climate Change and Policy

Description	Impact	How we Manage the Risk
The cement industry has recognised the impact of climate change and its responsibilities in transitioning to a lower carbon economy. The Group is exposed to financial, reputational and market risks arising from changes to CO_2 policies and regulations. Risk trend: ↑	Should the Group not reduce its greenhouse gases (GHGs) emissions by its identified targets, the Group may be subject to increased costs, adverse financial performance and reputational damage.	• The Group has delivered on a CO_2 reduction programme from 2007 to 2020. A revised CO_2 reduction programme has been developed to 2030, details of which can be found on page 21 of this Annual Report and Form 20-F. This initiative encompasses all cement plants in our portfolio at present • Operational improvements at plants are focused on reducing the CO_2 footprint of our businesses • For more information please refer to page 21 in this Annual Report and Form 20-F or to our independently-assured Sustainability Report, which is prepared in line with the Global Reporting Initiative Standards and is available on www.crh.com

Key Operational Risk Factors

Climate Change and Policy

Risk	Discussion
Description: The cement industry has recognised the impact of climate change and its responsibilities in transitioning to a lower carbon economy. The Group is exposed to financial, reputational and market risks arising from changes to CO_2 policies and regulations. Impact: Should the Group not reduce its greenhouse gases (GHGs) emissions by its identified targets, the Group may be subject to increased costs, adverse financial performance and reputational damage.	The impact of climate change may over time affect the operations of the Group and the markets in which the Group operates. This could include physical risks such as acute and chronic changes in weather and/or transitional risks such as technological development, policy and regulatory change, and market and economic responses. Efforts to address climate change through laws and regulations, for example by requiring reductions in emissions of GHGs such as CO_2, can create economic risks and uncertainties for the Group's businesses. Such risks could include the cost of purchasing allowances or credits to meet GHG emissions caps, the cost of installing equipment to reduce emissions to comply with GHG limits or required technological standards, decreased profits or losses arising from decreased demand for the Group's goods and higher production costs resulting directly or indirectly from the imposition of legislative or regulatory controls. Manifestation of these increased costs may increase the underlying cost of production of the Group's products which may adversely impact the financial performance of the Group. Stakeholder expectations in relation to climate change continue to increase. The Group is subject to a broad range of additional environmental product information requests by customers in certain regions and increasing levels of disclosure regarding climate-related environmental performance. The Group includes within its offerings products aimed at climate adaptation, including sustainable drainage systems, flood defences and more resilient structures, as well as products that lower the operational carbon footprint of buildings, including high performance glass and glazing products that incorporate innovative thermal break technologies for superior thermal performance, precast concrete flooring and walling elements delivering energy savings, and balcony connector products that reduce thermal bridging, delivering energy saving. If customers' and other stakeholders' sustainability expectations are not satisfied, the Group's product portfolio may be of reduced relevance, the Group's reputation may be harmed and the Group could experience a deterioration in financial performance. Please refer to page 244 of this Annual Report and Form 20-F for further details. In addition, the Group publishes an annual independently-assured Sustainability Report, which is prepared in line with the Global Reporting Initiative Standards and available on www.crh.com.

Figure 7: Saint Gobain's disclosure of opportunities associated with the low-carbon transition
(Saint Gobain Registration Document 2019)

SEIZE THE OPPORTUNITIES LINKED TO THE TRANSITION TO A LOW CARBON ECONOMY

Designing innovative solutions with carbon benefits

Saint-Gobain is innovating to develop solutions to reduce the carbon footprint of buildings throughout their life cycle:

- by reducing their energy consumption during the utilization phase; these are insulation and glazing solutions that improve energy efficiency;
- by reducing the carbon impact of its products and solutions: particularly by developing lighter building solutions, increasing the amount of recycled materials used to manufacture them or by using renewable energy to power its industrial processes.

Measuring the carbon benefits of products and solutions

The innovative solutions developed by the Group to improve the energy efficiency of buildings lessen the negative impacts of the construction sector on the climate and cut consumers' energy bills, while enhancing well-being. They therefore play an important role in the fight against climate change, as they permit through a reduction of energy demand to decrease the quantity of greenhouse gases emitted.

Thus, the benefits offered by the Group's thermal insulation products and glass exceed significantly the impacts associated to their production in terms of energy consumption and greenhouse gas emissions.

In partnership with EY, Saint-Gobain developed in 2015 a methodology that allows for the estimation of greenhouse gas emissions prevented thanks to the utilization of its insulation solutions in Europe. The calculations realized with 2014 sales numbers were updated in 2017 with 2016 sales; the scope of Europe was enlarged to the world. These updating efforts have permitted to confirm the three key teachings of 2015:

- after three months of use on average, the Group's insulation solutions compensate the emissions linked to their production. Beyond these three months, the gains continue to accumulate;
- the Group's insulation solutions produced and sold throughout the World in 2016 have generated, across their lifespan, a potential cumulated net prevention of over 1,200 million tons equivalent CO_2;
- the estimated potential prevention of the said solutions corresponds to about 90 times the Group's greenhouse gas emissions in 2016 over the same geographical scope.

Saint-Gobain's solutions are designed to be used in larger structures. Therefore, in addition to the carbon benefits linked to the products, Saint-Gobain solutions make it possible to reduce the carbon footprint of a building or car throughout their life cycle.

Co-developing solutions for new markets arising from the low-carbon economy

In response to the challenges of population growth and urbanization, it is imperative to design sustainable solutions and contribute to the construction of resilient cities that ensure the well-being of individuals in a context of resource scarcity and climate change. New lightweight constructive methods can be used to meet these challenges. For example, the Group is investing in the fields of prefabrication and 3D printing. The development of prefabricated or off-site construction solutions encourages the use of lighter construction methods using wood or metal structures as an alternative to traditional cement and brick constructions. The transition to a low-carbon economy is also impacting markets related to mobility and energy. Thus, the Mobility BU is working both on solutions to support customers in the transition to vehicles that emit less and less CO_2 and on adapting its offer to the development of hybrid or 100% electric vehicles.

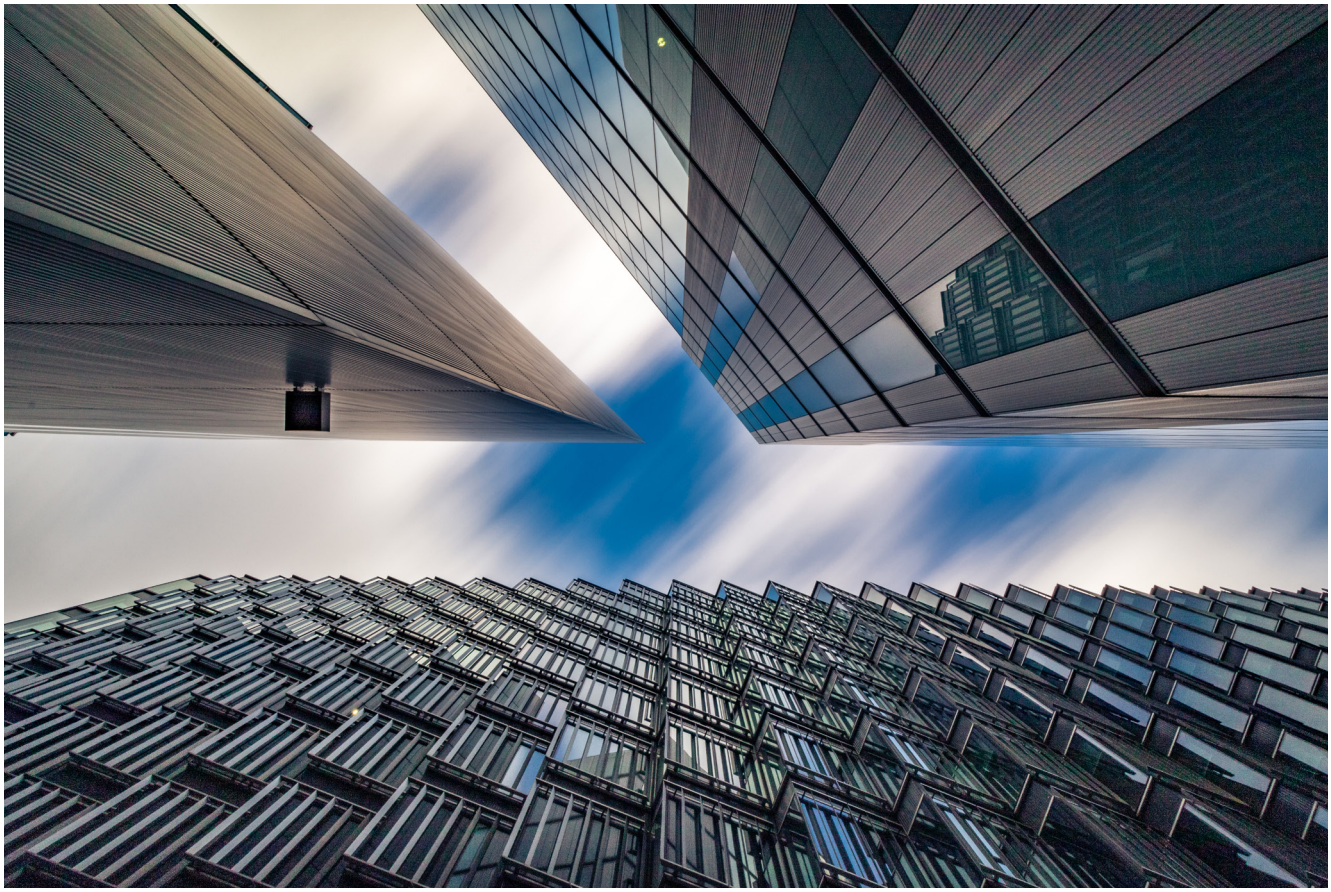
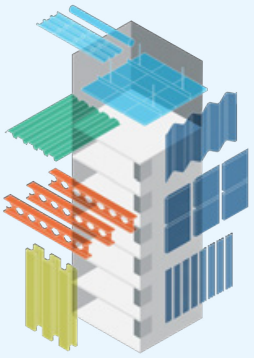


Figure 8: ArcelorMittal's disclosure of physical and market transition climate-related risks and opportunity case studies (ArcelorMittal Climate Action Report 2019)

TRANSITION RISKS Type & status		Response
Market	We have faced the risk of substitution from competing materials displacing steel in particular applications. We have seen this from aluminium and cement due to an excessive focus on emissions from products in their use phase only (where the lightest weight wins) rather than on a whole lifecycle basis (cradle to grave). However, as customers deepen their understanding of embedded and lifecycle emissions of the materials, steel compares favourably, and so we see this risk diminishing. With the switch to electric vehicles, we see opportunities for high-strength steels for battery protection and electrical steels. We also project that the move to wind and solar power generation will require more steel per unit of electricity generated compared to conventional technologies.	We continue to grow opportunities in all these markets, for example via our S-in motion® and Steligence programmes.

PHYSICAL RISKS Type & status		Response
Acute physical risks	Adverse weather events, such as extreme low temperatures in North America, very high winds in Europe and flooding in Spain have on occasion hampered our supply and distribution routes. Our Calvert JV plant is in an area prone to hurricanes and tornadoes, and wildfires are a risk to our sites in Kazakhstan and South Africa. With 3 to 4°C of warming, hurricanes are projected to increase in intensity – along with associated increases in heavy precipitation – but not in frequency.	Our risk management process enables us to build resilience at our plants and in supply chains where extreme events already occur; this may need further development where extreme events are currently rare, but may be more frequent or intense in the future.
Chronic physical risks	Water is crucial to our steelmaking processes and where plants are in areas of water stress, this is even more important. Some facilities are at risk of being affected by long periods of drought conditions.	Where these risks exist, such as in South Africa and Brazil, we have developed local resource management plans to ensure that operational water requirements can be met. We are fully engaged with local stakeholders on this issue.



Steligence®

In 2018, ArcelorMittal launched the Steligence® concept to facilitate the next generation of high-performance buildings and construction techniques for our customers. Built into the holistic Steligence® approach is a broad range of thinner, lighter, high-performance steel solutions. Demonstrating the potential to reduce the embedded carbon footprint of a building by 38%, the Steligence® approach can also enhance its flexibility and economics. Considering the share of global emissions from the built environment, the impact of Steligence® could be particularly significant.

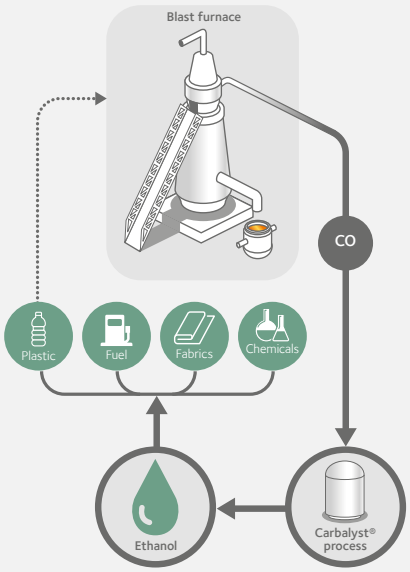
Carbalyst®: capturing carbon gas and recycling into chemicals

The waste gases that result from iron and steelmaking are composed of the same molecular building blocks – carbon and hydrogen – used to produce the vast range of chemical products our society needs. Today most waste gas is incinerated, resulting in CO_2 emissions.

With our partner Lanzatech, supported by the EU Horizon2020 Steelanol project, we are building the first large-scale plant to capture the waste gas and biologically convert it into bio-ethanol, the first commercial product of our Carbalyst® family of recycled carbon chemicals. Thanks to a lifecycle analysis study, we can predict a CO_2 reduction of up to 87% compared with fossil transport fuels, so this bio-ethanol can be used to support the decarbonisation of the transport sector as an intermediate solution during the transition to full electrification. In the future, we will expand the family of Carbalyst® products to other biochemicals and biomaterials.

Construction started recently on a €120 million demonstration facility in Ghent, Belgium. Once completed in 2020, the facility will capture around 15% of the available waste gases at the plant and convert them into 80 million litres of ethanol per year. This result will be a CO_2 reduction equivalent to 100,000 electric vehicles or 600 transatlantic flights per year.

Figure 8: Carbalyst® technology



ADDRESSING RISKS AND OPPORTUNITIES THROUGH SECTOR-WIDE COLLABORATION

As the examples above indicate, Forum members have identified how climate-related risks and opportunities impact their individual businesses, now and in the future. Members contend that greater collaboration between industries, within the construction sector and beyond, is also needed to open up more significant opportunities to drive decarbonization progress at scale.

As public disclosures focus on the performance of individual companies, members rarely articulate instances where progress to address climate change risks and to support climate opportunities depends on collaboration. The absence of disclosures about the scope for collective action limits the potential for investors to allocate finance and drive investment to initiatives that together contribute towards a low carbon economy.

Nonetheless, it is clear that collaboration is occurring within the construction sector. For example, the development of material stewardship standards such as the Concrete Sustainability Council (CSC) or ResponsibleSteel™ aims to give businesses and consumers confidence that the materials are sourced and manufactured in a responsible and sustainable way. CSC certified concrete provides a third party verified performance label about sustainable concrete production including the supply chain. The CSC label can be directly used in Green Building Labels, such as BREEAM and DGNB, as well as in local green public procurement schemes. The CSC is a not-for-profit organization, which has been founded by some Forum members, independent certification institutes and WBCSD. Steel certified under the ResponsibleSteel™ standard has been sourced and produced responsibly at all levels of the supply chain: from mining and production to sale and distribution. The initiative, which involves some Forum members and other stakeholders across the steel value chain, has the potential to play an important role in driving the commitment of steel companies to achieving the Paris Agreement objectives.

CLIMATE-RELATED RISKS TABLE

Table 1 is designed to show that, although individual companies face the same types of climate-related risks, the way in which they are affected and their capacity to respond depends on the activities they undertake, where they sit in the value chain, the jurisdictions in which they operate and their engagement with partner organizations. Table 1 also aims to help investors to interpret individual companies' climate-related disclosures in the context of the wider construction sector and to focus attention and decisions on parts of the Forum value chain where individual or collective action can be most impactful.

Table 1 is intended as useful reference material for risk disclosure. It should not be interpreted as a checklist. The Forum does not expect companies to report against every risk and opportunity listed. Rather the table is designed to help companies consider which risks and opportunities are most material to their business and disclose the relevant information accordingly.

STRUCTURE OF THE CLIMATE-RELATED RISKS TABLE

Columns 1 and 2 - The type and subcategories of risk that affect Forum members are based on Table 1 in the TCFD's Final Report, including policy and legal, technology, market, reputational and physical climate risks.

Column 3 - The main types of business impact, illustrated using the following icons:

	Opportunity for strategic change and/or differentiation
	Collaboration potential
	Increased operational costs
	Business interruption
	Increased capital expenditure and/or project investment

Column 4 - Value chain implications of climate-related risks. Where appropriate, the column is subdivided to show how risks affect different value chain segments – raw material extraction, manufacture and distribution of building products and materials, development and construction – including the impact on those segments and how companies respond.

Column 5 - Influences, connections and collaboration highlights the key factors that could influence impacts and responses such as the interconnection between risks, how they pass through the value chain and collaboration opportunities between value chain segments.

Table 1: Climate-related transition and physical risks across the Forum value chain

CATEGORY	SUB-CATEGORY	IMPACT TYPE	VALUE CHAIN IMPLICATIONS				INFLUENCES, CONNECTIONS AND COLLABORATION
			RAW MATERIAL EXTRACTION AND PROCESSING	MANUFACTURE & DISTRIBUTION OF CONSTRUCTION MATERIALS	DEVELOPMENT	CONSTRUCTION	
Policy and Legal	***Pricing of GHG emissions***		**Possible impact** • Higher carbon taxes and/or emissions allowances costs raise operation and distribution costs. • Increased competition from imported materials/products in the absence of border adjustment mechanisms. **Response** • Capital expenditure to develop and deploy low-carbon extraction/manufacturing technologies and methods. • Decision making and new project selection guided by internal carbon pricing analysis. • Procure competitive low-carbon energy through partnerships with electricity producers (PPAs). • Diversify products and services towards lower carbon materials and products. • Switch to lower carbon distribution methods such as electric vehicles (EVs). • Purchase carbon credits/offsets for un-abatable emissions.		**Possible impact** • More demand for efficient buildings. • More demand for lower embodied carbon. • Higher materials costs if carbon taxes are passed through the value chain. **Response** • Align development processes, decisions and expenditure plans with low-carbon priorities.	**Possible impact** • Requirement to work with lower carbon materials/products. • Higher materials costs if carbon taxes are passed through the value chain. • Demand for companies to reduce their operational emissions. **Response** • Expenditure to adopt new materials and methods. • Innovation to drive increased material efficiency. • Explore options, such as carbon offsetting, to reduce impact of operational emissions.	• Increased GHG emissions pricing drives up relative operational costs of material extractors and producers due to their high levels of emissions. • Increasing cost of high-emissions products provides an incentive across the value chain to substitute low-carbon materials and methods. • Dialogue between value chain actors is critical for the development and deployment of low-carbon alternatives.
	Enhanced emissions reporting obligations		**Possible impact** • Increased operational spend on reporting activities. • Increased scrutiny from investors and other stakeholders on emissions reporting and action taken to mitigate climate change. • Greater stakeholder scrutiny of Scope 3 emissions reporting throughout the value chain. • Increasing discrepancy between legal reporting requirements and stakeholder disclosure expectations in some jurisdictions, requiring companies to produce an increasing number of specific reports. **Response** • Dialogue and collaboration between value chain players and other stakeholders to improve emissions reporting standards, with a focus on Scope 3 emissions calculations and reporting. • More transparent reporting of Scope 1, 2 and 3 emissions across the value chain.				• Similar effects are felt across the value chain. • Opportunity to address Scope 3 GHG emissions challenges through collaboration • Greater transparency supports assessment of environmental credentials across the supply chain and informed engagement between value chain participants. • Opportunities for trade associations to promote best practice in climate-related disclosures. • Scope for investors to specify their information needs and benefit from enhanced reporting when seeking to understand and support transition priorities.

CATEGORY	SUB-CATEGORY	IMPACT TYPE	VALUE CHAIN IMPLICATIONS				INFLUENCES, CONNECTIONS AND COLLABORATION
			RAW MATERIAL EXTRACTION	BUILDING PRODUCTS AND MATERIALS MANUFACTURE	DEVELOPMENT	CONSTRUCTION	
Policy and Legal	***Product specification and regulatory changes***		**Possible impact** • Mandated changes to product specifications, limits on certain materials and other regulatory changes impact production volumes and profitability. • Compliance risks become more material. • Increased demand for low-carbon products and services that conform with specifications. **Response** • Adjust manufacturing output/product mix in response to changes in demand. • Evolve the product portfolio mix in the longer term to adopt lower carbon alternatives. • Stay well informed of regulatory developments.		**Possible impact** • Introduction of new processes and regulations potentially leading to new ways of working, greater compliance costs and increased risk of fines and/or project cancellation. **Response** • Stay up to date and compliant with evolving regulation. • Source from suppliers that are compliant with new product specifications and regulation.	**Possible impact** • Requirement to use materials and conduct activities in conformance with updated specifications. • Project timelines and methods impacted by variation in availability of certain materials. **Response** • Stay up to date and compliant with evolving regulation.	• As sustainability and climate change related regulation evolves the construction value chain may experience changes in product specification requirements and/or operational requirements which may affect the status quo. The impact of this risk is dependent on a company's position in the value chain. Upstream companies may be required to change their product specifications, whilst downstream companies may require new ways of working and greater levels of environmental assessments. Ultimately, these changes are likely to drive the construction value chain towards lower carbon products and operations. • Adjusting to new regulations could require additional expenditures from value chain participants.
	Climate change litigation		**Possible impact** • Climate change litigation risks are nascent but include exposure to damages claims, financial and reputational costs of defending litigation, disruption to operations and enforcement of financial disclosure requirements. **Response** • Use existing risk management processes to manage exposure to climate change litigation. Company risk registers typically include 'exposure to litigation' as a risk. • Monitor developments in climate-related disclosure requirements, including evolving investor and stakeholder expectations regarding climate-related disclosures.				• Impacts depend on the litigation environment and propensity of investors, activist shareholders, cities and states to pursue climate change-related claims against companies and company directors related to disclosure failures. • Climate-related litigation continues to evolve. To date, cases have sought action against companies for their alleged contributions to climate change and for failure to disclose climate change-related financial risks. Most cases have not succeeded due to the difficulty of attributing climate change on any one emitter and uncertainty about the extent to which climate-related risks must be considered and disclosed pursuant to existing financial disclosure obligations. • Reputational damage caused by legal action against a company may limit inward investment.

CATEGORY	SUB-CATEGORY	IMPACT TYPE	VALUE CHAIN IMPLICATIONS				INFLUENCES, CONNECTIONS AND COLLABORATION
			RAW MATERIAL EXTRACTION	BUILDING PRODUCTS AND MATERIALS MANUFACTURE	DEVELOPMENT	CONSTRUCTION	
Techno-logy	***Substitution of existing products and services with lower emissions options***		**Possible impact** • Increased demand for materials, products and services with lower emissions and associated drop in demand for emissions-intensive counterparts. • Pressure from stakeholders to reduce emissions associated with distribution. **Response** • Incorporate lower emissions options into the product portfolio mix. • Assess and communicate the carbon intensity of materials/products using a lifecycle/circular economy approach • Increase R&D spend on developing lower emissions materials and products. • Increase investment and capital expenditure to develop and deploy technologies that lower operational emissions – for example CCUS.		**Possible impact** • Prioritize lower emissions products, services and methods. **Response** • Adopt a holistic approach focused on reducing embedded carbon and operational emissions of the built environment. • Include climate change-related screening in supplier and partner selection to procure lower carbon products and materials.	**Possible impact** • Construction methods and materials increasingly incorporate lower emissions options. **Response** • Ensure capability to incorporate lower emissions materials and products. • Develop a framework for selecting suppliers, materials and products based on sustainability criteria. • Increase collaboration with upstream suppliers to optimize lower emissions materials.	• Downstream demand in the value chain incentivizes investment in the development and manufacture of lower carbon materials and products by upstream players, ultimately inducing a change in the product mix. • Product development and substitution opportunities are enhanced by collaboration across the value chain. Continuous dialogue can optimize the development of solutions, aided by development of 'green' labeling certification schemes for lower emissions materials. • Collaboration with organizations beyond the construction sector could accelerate development of lower carbon substitutes, for example collaboration with academic and financial institutions to support technological innovation and financing.
	Costs to transition to lower emissions technology		**Possible impact** • Higher R&D costs and increased risks associated with developing and bringing pioneering technologies to market. • Increased capital investment to deploy low-emissions technologies in operations. • Loss of competitiveness if low-carbon technologies are operationally less profitable and/or if customers continue to use high-emissions technologies. **Response** • Re-allocate capital based on strategic assessment of lower emissions operations and products. • Advocate for policies and financing solutions to support and de-risk the development of low emissions technologies.		**Possible impact** • Fluctuation in the profitability of projects depending on upstream costs of producing lower emissions materials and products. • Increased profitability of projects where regulatory changes/ government incentives favor low-carbon options. **Response** • Assess the viability of construction projects that utilize low emissions technologies. • Communicate results of viability assessment to help identify solutions and promote adoption/ uptake of these technologies.	**Possible impact** • Construction costs could rise periodically as companies adapt to working with lower emissions materials and methods. **Response** • Provide training and preparation for key actors and employees. • Maintain communication with value chain partners to prepare for disruptive changes.	• The way in which companies transition to low emissions operations, products and services depends on strategic decisions about capital expenditure and re-allocation of resources based on the assessment of risk, opportunities and financial indicators. • Communication between players about customers' preferences and expectations facilitates decisions about allocating capital to lower emissions technologies/products and projects. • Collaborative marketing and customer/public education initiatives can promote consumer understanding of low-carbon technologies and grow the market. • Financial products designed to support low-carbon or "green" innovation and co-created by value chain participants and investors/financiers could play a critical role in providing the capital to develop low-carbon technologies.

CATEGORY	SUB-CATEGORY	IMPACT TYPE	VALUE CHAIN IMPLICATIONS				INFLUENCES, CONNECTIONS AND COLLABORATION
			RAW MATERIAL EXTRACTION	BUILDING PRODUCTS AND MATERIALS MANUFACTURE	DEVELOPMENT	CONSTRUCTION	
Market	***Increased cost of raw materials, shift in consumer preferences***		**Possible impact** • Changes in the cost of carbon intensive raw materials affect demand and profitability of operations. • Increased energy prices affect operational costs. **Response** • Stabilize operational costs to capitalize on raw material price increase. • Adjust production outputs to reflect demand. • Diversify product portfolio to reflect shifting consumer preferences.	**Possible impact** • Changes to input costs for construction products affect demand and profitability. • Demand for substitute goods. • Increased energy prices affect operational costs. **Response** • Diversify product portfolio. • Hedge price volatility of key materials. • Source raw materials more widely, engage with suppliers and vertically integrate operations. • Explore circular economy options.	**Possible impact** • Increased materials costs impact profitability and/or viability of construction projects. • Ability to prioritize use of low-carbon materials jeopardized if they become too expensive. • Increased energy prices affect operational costs. **Response** • Materials price sensitivity assessment and contingency plans for procurement.	**Possible impact** • Increased costs if prices of energy and/or raw materials rise and are passed through the value chain. • Changing customer preferences incentivize use of new materials. **Response** • Improve capacity to satisfy consumer preferences and manage exposure to price volatility. • Develop contingency plans to manage material price fluctuations. • Improve efficiency of energy consumption and material use.	• Exposure to raw material price volatility risks could affect the value chain in different ways, influencing downstream players to seek alternative material/product options and changing the operational costs and demand for products from upstream players. • Increased energy costs would cause operational costs to rise for all value chain participants. • Changing demand could offer opportunities for specialization and diversification, such as the expansion of low emissions services and products.
Reputation	***Changing public perceptions of the sector***		**Possible impact** • Negative public image arising from issues related to sustainability and climate change results in reduced demand for products and services. **Response** • Maintain focus on sustainability reporting, corporate citizenship and environmental responsibility, ensuring this is well documented and transparently communicated. • Maintain strategic focus on minimizing environmental impact and contributing to climate change mitigation and adaptation efforts. • Explore potential for differentiation in the market based on environmental credentials.				• Public sentiment around sustainability and climate change issues affects all value chain players. • Negative perceptions can result in reputational damage and influence customer decisions, whereas positive perceptions create opportunities to attract talent and investors. • Collaboration to develop educational initiatives could help explain the sector's role in climate change adaptation and mitigation and wider societal issues.

CATEGORY	SUB-CATEGORY	IMPACT TYPE	VALUE CHAIN IMPLICATIONS				INFLUENCES, CONNECTIONS AND COLLABORATION
			RAW MATERIAL EXTRACTION	BUILDING PRODUCTS AND MATERIALS MANUFACTURE	DEVELOPMENT	CONSTRUCTION	
Chronic physical risks	***Rising sea levels, increasing mean temperatures, changing precipitation patterns***		**Possible impact** • Flooding risk to sites located in coastal areas. • Water availability risk in some regions due to changing precipitation patterns. • Variation in operational costs where temperature changes affect electricity consumption. • Reduced availability and/or increased cost of raw materials from suppliers affected by water scarcity, flooding or increased operational costs. **Response** • Environmental risk assessment of asset locations, implementation of preventative measures and/or development of alternative risk mitigation strategies. • Diversified portfolio/approach to compensate and cover for business interruptions. • Comprehensive supplier selection criteria and diversification of supplier mix. • Contingency planning in distribution routes.	**Possible impact** • Disruption to business in key markets/coastal areas. • Devaluation of partially completed projects in exposed areas. • Greater demand for climate-resilient infrastructure solutions. **Response** • Change of zoning and development code requirements. • Conduct forward-looking chronic climate risk assessments prior to commencing projects. • Prioritize climate-resilient development approaches.	**Possible impact** • Construction timelines extended or disrupted due to increased frequency/intensity of extreme precipitation/heat days. • Flooding risk to sites located in coastal areas. • Changes in demand for construction projects in particular markets and locations. **Response** • Assess construction delivery timelines based on forecasts that account for chronic changes to climate. • Increase capacity to deliver construction projects in lower risk locations.	• Chronic physical changes have the potential to affect all players in the construction value chain, but companies can prepare and identify opportunities to provide solutions during the gradual onset of risks. • Pre-existing assets in vulnerable locations, such as manufacturing sites and newly built infrastructure in low-lying coastal areas are particularly at risk of devaluation. Assets located in areas exposed to extreme heat could become more expensive to maintain. • Extreme heat and flooding pose a risk to human life and could affect project development and construction timelines in exposed areas. • Changes in the physical environment may result in changes to development and financing requirements and regulations, affecting downstream players in the value chain. • Risk management and strategic decision-making should take account of climate science and long-term forecasts when assessing new sites.
Acute physical risks	***Increased severity and frequency of extreme events***		**Possible impact** • Damage/loss of assets such as manufacturing equipment and buildings. • Lower production capacity and revenue due to extreme weather events. • Disruption and delays in the transportation and delivery of goods. **Response** • Increase resilience of sites/facilities to extreme weather events by improving defenses and implementing contingency plans. • Relocate production sites to less exposed areas where feasible. • Build in flexibility and contingency by diversifying supplier mix. • Insurance arrangements.	**Possible impact** • Unexpected and severe delays to the development process. • Some development sites may become unviable. Extreme cases may require projects to be cancelled. **Response** • Comprehensive evaluation of the physical climate risk exposure of projects. • Contingency planning and insurance arrangements.	**Possible impact** • Construction site damage and challenging/unsafe working conditions. • Delays to project timelines resulting in increased costs. **Response** • Close monitoring of weather forecasts to ensure worker safety and adequate preparation. • Contingency planning and insurance arrangements.	• All value chain participants are exposed to acute physical risks as the climate changes and extreme weather events become more frequent and severe in some locations. • There are opportunities to collaborate and share monitoring and communication efforts relating to early warning/intelligence on extreme events. • Responses that increase resilience include purchasing insurance and assessing and strengthening mitigation options, such as ensuring sites have efficient drainage. • Materials purchasers can diversify their supplier mix to reduce geographical exposure. • Developers can integrate the latest science and forecasts on extreme events into new project assessments to minimize exposure and, as far as possible, promote resilience to extreme climatic events

5 Strategic resilience

5 Strategic resilience

SUMMARY:

- Strategic resilience, in the context of climate change, refers to the way in which a company's strategy supports and prepares it to remain resilient under different climate scenarios.
- Forum members demonstrate strategic resilience to climate change by disclosing:
  - How they integrate climate considerations into governance and risk management frameworks; and
  - Examples of how they are leveraging the opportunities presented by the low-carbon transition, including innovations in their operations and product mix.
  - Forum members are starting to use scenario analysis to explore long-term resilience under a range of possible future states to support complex decision-making and strategic planning.

WHAT IS CLIMATE RESILIENCE?

There is no universally agreed definition of climate resilience. The TCFD's Final Report states that "the concept of climate resilience involves organizations developing adaptive capacity to respond to climate change to better manage the associated risks and seize opportunities including the ability to respond to transition risks and physical risks."

Strategic resilience is threatened by climate-related shocks and stressors that affect the infrastructure, assets, plans, supply chains, products, processes and finances on which a company depends to realize its strategy and objectives.

Resilience can be demonstrated by reference to a number of features including the following, each of which is examined in this Chapter:

a. **The integration of climate considerations into corporate processes**, practices and decision-making including governance, strategy and risk management;

b. **Innovation, R&D of new products and services** that leverage mitigation and adaptation opportunities; and

c. **Future plans to develop the business** supported by **long-term analysis** informed by **scenarios**.

INTEGRATION OF CLIMATE CONSIDERATIONS INTO GOVERNANCE AND RISK MANAGEMENT PROCESSES

In its Final Report, the TCFD notes that *"many investors want insight into the governance and risk management context in which [organizations' financial and operating] results are achieved… [and] that disclosures related to its governance and risk management recommendations directly address this need for context and should be included in annual financial filings."*

In the cases of both governance and risk management, the TCFD expects companies to state whether they have integrated climate considerations into relevant processes. Uncertainty about when, where and how climate risks might materialize, as well as their breadth, magnitude, non-linear development and interconnections with other risks can make them appear remote from current business activity and planning horizons.

Integrating climate change considerations into business processes minimizes the possibility that systemic, non-diversifiable and unpredictable risks will be overlooked in strategic planning to the potential detriment of future performance. By integrating climate considerations into routine decision-making processes, the intention is that companies will develop investment, strategic planning and business development plans that effectively prepare them for shifts in consumer behavior, new regulatory environments and behavioral incentives designed to combat climate change.

The TCFD expects that governance processes applied to climate change *"would be similar to those used for existing public financial disclosures and would likely involve review by the chief financial officer and audit committee, as appropriate."*

In the case of risk, the Task Force asks whether climate change has been integrated into the organization's processes for identifying, assessing and managing climate-related risks. The emphasis on integration of processes is a response to the characteristics of climate-related risks (e.g. their breadth, magnitude, non-linearity and interconnectedness), which need to be considered and captured through governance, risk management and decision-making techniques.

Forum members' governance and management approaches respond to the challenging characteristics of climate-related risks by leveraging diverse skills, knowledge and expertise across committees and working groups. Business processes that integrate climate considerations clearly articulate the roles and responsibilities of those involved, including sign-off of relevant policy, positions, codes of conduct and decision-making procedures. Associated processes and systems support internal and external information flows, reflect the company's culture and values and respond to regulatory requirements and governance codes.

Forum members use a range of approaches to develop the culture, capabilities and practices necessary to manage climate risk. Some members use discussion-based workshops with senior leaders to support a comprehensive understanding of trends, developments and challenges that could impact the achievement of strategic objectives. Climate change, emissions and energy are all topics included in discussions. Other members have developed in-depth interview and survey processes to capture perspectives from relevant leads across multiple jurisdictions and business streams. Some have incorporated climate change within established internal controls, with three lines of defense provided by operational management, group functions and internal audit.

Questions that can support strategic integration of climate considerations and inform assessment of strategic resilience by businesses include:

- How does the low-carbon transition and climate change relate to the organizational purpose and values?
- What opportunities for collaboration and new ways of working could be explored to tackle climate risks collectively?
- What skills, capabilities and knowledge are needed to understand the characteristics of climate-related risks?
- What are the key value creation and business model impacts and dependencies associated with climate change-related risks?
- How might a changing climate and the low-carbon transition impact organizational strategy and objectives?
- How might climate change impact other risks on the risk register? What are the drivers and connections between risks?
- How can the potential impact of climate risk be characterized, measured, observed and understood?

The following examples reflect Forum members' approaches to integrating climate change considerations into governance and risk approaches to ensure threats to strategic resilience are monitored on an ongoing basis.

Figure 9: ArcelorMittal's disclosure of governance organogram
(ArcelorMittal Climate Action Report 2019)

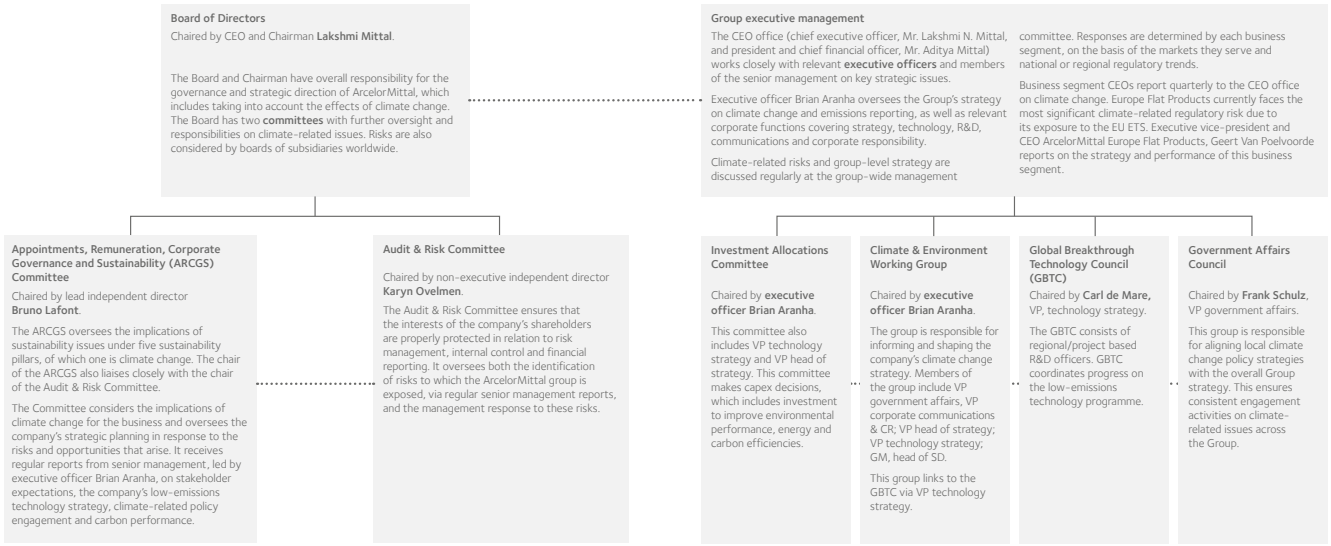


Figure 10: CRH's disclosure of its risk governance framework
(CRH Annual Report and Form 20-F 2019)

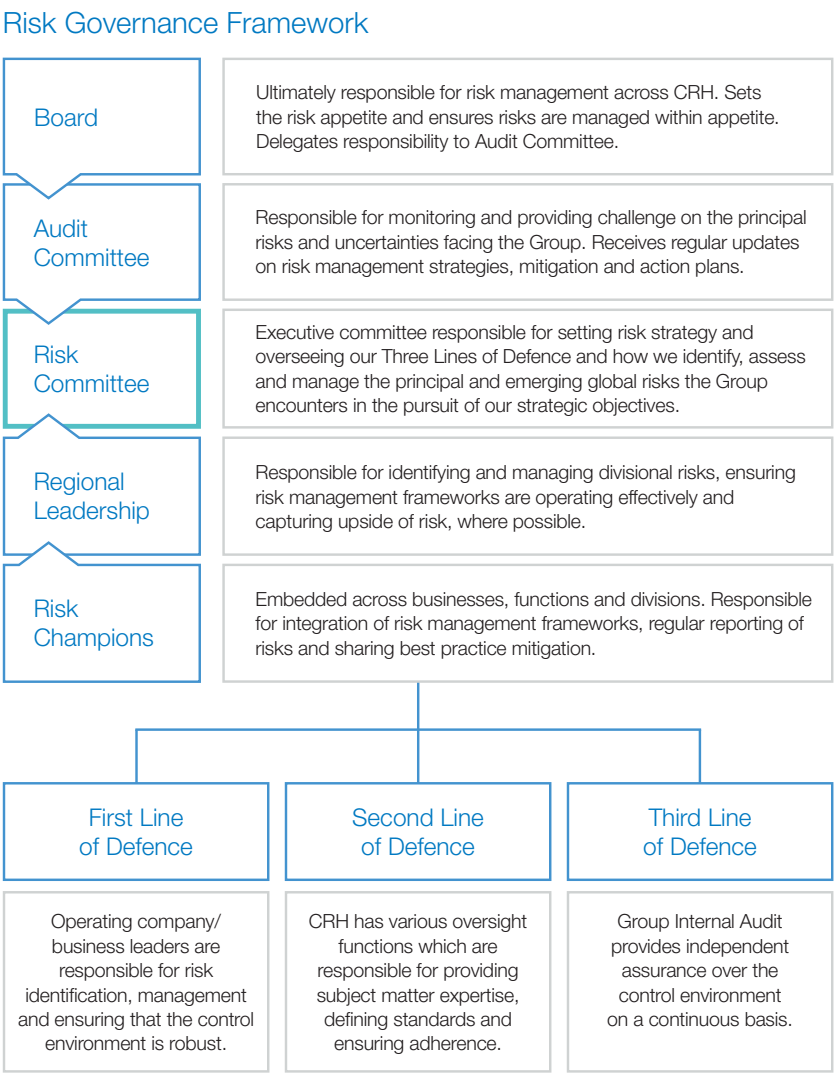


Figure 11: LafargeHolcim's disclosure of its governance approach for climate-related risks and opportunities
(LafargeHolcim Integrated Annual Report 2019)

LAFARGEHOLCIM GOVERNANCE APPROACH FOR CLIMATE-RELATED RISKS AND OPPORTUNITIES

The Board of Directors bears ultimate responsibility for strategy and overall governance of the company.

The HSSC advises the Board on all matters related to sustainable development, including those related to climate and energy. The HSSC reviews and approves the company's climate-related plans and targets.

The Executive Committee is ultimately responsible for execution of the climate and energy strategy, and climate-related issues are managed on an operational level by the Chief Sustainability Officer (CSO), an Executive Committee-level position that was created in 2019. The CSO is supported by a sustainability core team.

Fully half of Research and Development projects are aimed at finding low-carbon solutions. Around 40 percent of our patents have a positive impact on our carbon footprint along the value chain.

Figure 12: Skanska's disclosure of its sustainability governance procedure
(Skanska Annual and Sustainability Report 2019)

SUSTAINABILITY GOVERNANCE

The management of sustainability follows the Group Governance Framework and internal audit procedures. The Group Governance Framework is decided by the Board. The business units are responsible to comply with what is stated in the Group Policies and Group Procedures and Standards. The framework for sustainability is set by the Code of Conduct, Supplier Code of Conduct, Anti-Corruption Policy, Environmental Policy, Health and Safety Policy, Health and Safety Standard, Health and Safety Reporting Procedure, Green Reporting Procedure, Color Palette Standard, Restricted Substance Standard, Health and Safety Road Map Standard, Procedure of the Code of Conduct Program, and the Community Investment and Sponsorship Standard.

To strengthen Skanska's sustainability ambitions in relevance to business the Skanska Sustainability Business Forum, which includes members from Group Leadership Team, is a body for anchoring strategic decisions. Its aim is to strengthen Skanska's sustainability ambition and its relevance to the business. The governance structure for green bonds is established in the Skanska Green Bond Framework prepared by the Green Bond Committee, which is headed by the Senior Vice President Sustainability.

Sustainability performance is assessed via key performance indicators and the annual Group-wide employee survey (YVOS). Employees are annually evaluated according to their capability to drive sustainability. Sustainability – through health and safety parameters – is part of incentive programs for business unit management teams.

Figure 13: Saint-Gobain's disclosure related to Corporate Social Responsibility/Climate change governance
(Saint-Gobain Registration Document 2019)

Over four sessions, one point on the agenda was dedicated to corporate social responsibility matters, specifically the following topics:

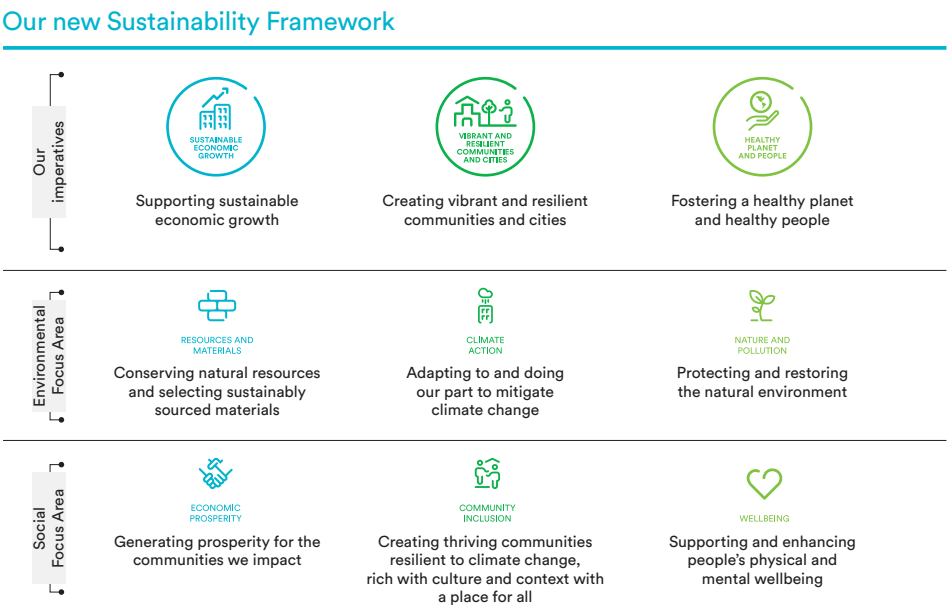
- non-financial results and development of the dashboard to focus on the key challenges;
- climate change and reducing CO_2 emissions (carbon impact of production and contribution of Saint-Gobain solutions) and appearance on the CDP's A List for the first time;
- monitoring of CO_2 and energy roadmaps (reduction of energy consumption, in particular carbon), "R&D, CO_2 and energy" innovation programs;
- corporate social responsibility roadmap;
- compliance program (anti-trust, embargoes, fight against corruption);
- duty of vigilance and adoption of a Human Rights policy;
- human resources policy (in particular, non-discrimination and diversity policy, particularly with regard to the balanced representation of women and men including on governing bodies, professional and equal pay, talent management);
- Health and Safety policy;
- environmental policy, for the purpose of contributing to the emergence of a low-carbon economy capable of preserving the common good.

In addition, in April 2019, the Directors took part in a half-day seminar organized specifically for them by the Group, which was devoted to the circular economy and its challenges for the businesses. External experts, recognized internationally and in complementary fields of expertise, gave presentations to the Directors and discussed the following with them:

- the general outlook for and resources of the circular economy;
- the regulatory approach by country and sector;
- the circular economy in the construction world.

This seminar was intended to give every Director a better understanding of the challenges of the circular economy for the Saint-Gobain Group and its implications for the Group's strategy.

Figure 14: Lendlease's disclosure of its sustainability framework and board activities related to sustainability
(Lendlease Annual Report 2019)



LEVERAGING & REALIZING INNOVATION OPPORTUNITIES

"A resilient company has the capability to self-renew over time through innovation…..and experimentation, by reinventing business models as strategies and circumstances change."[16]

Forum members communicate their organizations' strategic resilience to climate risks by disclosing, amongst other things, information about their innovation activities and R&D of new products and services that leverage climate mitigation and adaptation opportunities. Forum members pursue these opportunities through a number of mechanisms, ranging from open collaborative partnerships to business unit-led projects, connections with academia and dedicated cross-functional R&D centers. The types of opportunities they explore include carbon neutrality, energy efficiency, circularity, high performance materials, insulation, sustainable materials and low-carbon heating and cooling.

Sustainability

Material Issue:
Managing and optimising our performance in the context of challenges facing the built environment, including climate change and social pressures such as population growth and housing affordability.

The Board and Sustainability Committee engaged in the following activities to help deliver inclusive, healthy and adaptable places that can thrive through change.

Board activities and actions:

- Approved the new Lendlease Sustainability Framework for 2020. The new framework responds to the need to plan for future generations and integrates sustainability into all parts of the business
- Continued to support the commitment to reconciliation and the initiatives in the Elevate Reconciliation Action Plan. Supported and approved the Uluru Statement from the Heart
- Five Directors attended the Garma Program in August 2018 supporting Indigenous culture in Australia. In total, seven of the current Board members have attended the Garma Program
- Endorsed management's evolution of the 20 by 20 goals with the aim of continuously improving the environmental performance of the Group's projects and operations
- Engaged with management and discussed the four Lendlease Climate Scenarios created to test business strategies and respond to key trends in line with recommendations of the Task Force on Climate-related Financial Disclosures (TCFD)
- Received reports on the establishment of the 10 year program between Lendlease and the Great Barrier Reef Foundation to support a range of programs to protect critical habitats in the Reef
- Continued to support management in participating in industry roundtables on modern slavery and supply chain

EXAMPLES OF INNOVATION ACTIVITY

LafargeHolcim's Accelerator program focuses on achieving carbon neutrality. Innovative companies are invited to pitch and participate in a six-month program to develop, test and market ideas to build a business around raw materials, industrial by-products, sensors, analytics, software models and new process solutions that support the transition towards neutrality.

Skanska's Deep Green Cooling system provides low energy cooling by transferring ground bedrock chill via a water heat exchanger to cool rooms and air ventilation. Skanska participates in several collaborative R&D projects in Norway. They include Zero Emission Neighborhoods in Smart Cities and Climate 2050, which aims to reduce the societal risks associated with climate change, enhanced precipitation and exposure of the built environment to flood water.

Saint-Gobain spent €78.3 million on environment-related R&D in 2018. Since 2016, its cross-functional R&D program, "Improvement in CO_2 footprint" has coordinated and increased R&D efforts dedicated to improving manufacturing processes and reducing GHG emissions.

Disclosures relating to innovation, research and new products and services are useful where they:

- Explain the variety of approaches taken to pursue mitigation and adaptation opportunities;
- Identify collaborations relating to climate, energy and sustainability;
- Describe relevant patents for mitigation and adaptation technologies;
- Identify resources (financial, human and functional) allocated to climate mitigation and adaptation research;
- Describe the number/ proportion of new products and solutions that address climate-related challenges; and
- Describe the expected contribution, outcomes and impacts of the product/solution in terms of emissions reduction, energy saving, resource efficiency or adaptive capacity.

Figure 15: LafargeHolcim's disclosure on innovation toward carbon-neutral construction
(LafargeHolcim Integrated Annual Report 2019)

With the strongest innovation organization in the industry and an extended global network of regional labs, reducing carbon emissions is a key priority of our innovation agenda.

Half of our innovation projects are aimed at finding low-carbon solutions, whether they are digital tools to empower greener building, breakthroughs in the chemical processes underlying our cement or shaping the construction industry of the future through our contributions to 3D-printed buildings.

Today, around 40 percent of our patents have a positive impact on our carbon footprint along the value chain.

In addition to providing more low carbon solutions, we seek to further differentiate our products offering for improved performance and growth and to develop 300 new products per year by 2022, meeting regional needs with custom-tailored products – more than triple the amount we delivered in 2018.

Figure 16: Saint-Gobain's disclosure on cross-functional R&D including CO_2 footprint reduction
(Saint-Gobain Registration Document 2019)

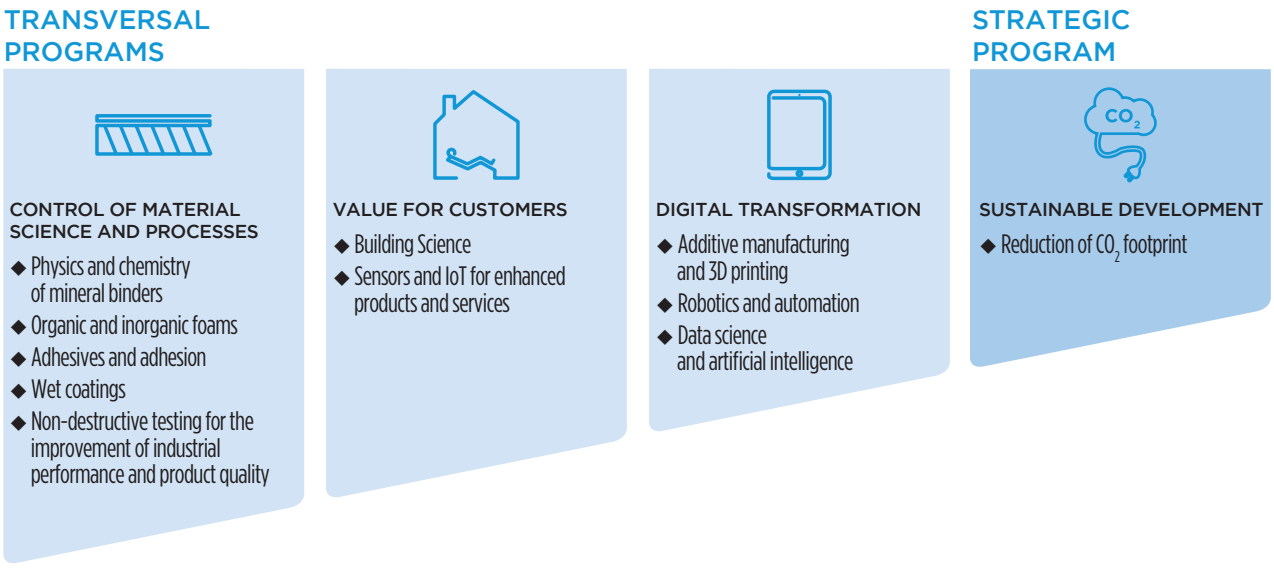


Figure 17: Skanska's disclosure of its Embodied Carbon in Construction Calculator innovation
(Skanska Annual and Sustainability Report 2019)

Helping customers achieve climate goals

Skanska initiated and co-developed a carbon calculator, EC3, enabling Microsoft's headquarters to achieve new levels of carbon reductions. Now an open-acceess tool, Skanska's innovation has enabled more informed design decisions that reduce the carbon embodied in construction.

» Through EC3, we aim to reduce embodied carbon emissions from the redevelopment of our headquarters by 30 percent. «

Katie Ross, Senior Sustainability Manager at Microsoft

Microsoft's global office portfolio consists of more than 3 million square meters of space. Among Microsoft's top priorities is reducing the carbon emissions of buildings to support the company's carbon reduction targets.

With Microsoft and other initial partners, Skanska developed a solution for calculating and reducing carbon emissions embodied in construction – the Embodied Carbon in Construction Calculator (EC3).

"The construction sector hasn't focused so much on sustainability, and the necessary data hasn't been available in an easy-to-consume way. When Skanska presented EC3, we thought EC3 was perfect for our needs. We wanted to help fund its development and pilot it to help improve this tool so it benefits the entire industry," says Katie Ross, Senior Sustainability Manager at Microsoft.

EC3 measures the carbon footprint of materials and compares materials in order to identify the most sustainable solutions for a project. Using this tool, Skanska can help companies achieve ambitious climate goals and advance the Group's own efforts to reduce climate impact further. For Skanska, who decided alongside Microsoft and other initial partners to make the tool publicly available, this tool is a means to drive sustainability across the construction sector by increasing transparency in carbon reporting and reduction.

"Through EC3, Microsoft aims to reduce embodied carbon emissions from the redevelopment of our headquarters by 30 percent. With some materials, we've been able to reduce emissions with no cost premiums," says Katie.

Partnering to meet the most complicated challenges has proven to be a very successful way of working and it creates value both for customers and for Skanska as a company.

"For us, sustainability is a core principle – In our building projects, sustainability has the same priority as the traditional focus areas of cost and schedule. We rely on trusted partners to help us create amazing and highly sustainable workplaces for our employees. We want to be working with partners who can push us as much as we push them – that makes us all better and lets us all move faster", Katie concludes.

Embodied Carbon in Construction Calculator (EC3)
The extraction, manufacturing and transport of building materials represent major sources of carbon emissions. EC3 is a groundbreaking database-driven tool that calculates and compares the carbon footprint of materials based on the environmental product declarations (EPDs) available from suppliers. Skanska conceived of EC3, which it co-created with support from Microsoft and other partners. Skanska then turned to University of washington Carbon Leadership Forum to lead development of EC3 as a public, open-access tool, with support from over 50 industy partners. Publicly available for use in the USA from fall 2019. Skanska will utilize EC3 in all further commercial development projects. The Group is also piloting EC3 in multiple construction projects, supporting both Skanska and the Group's customers in achieving respective carbon targets.

Figure 18: ArcelorMittal's disclosure of process innovation and R&D for circularity, reductions in carbon emissions and energy use
(ArcelorMittal Annual Report 2019)

Developing breakthrough process innovations to deliver cost reduction, sustainability benefits to meet current and emerging environmental challenges, and new product development. The creation of unique processes creates value for the Company and its stakeholders by: enhancing the performance of operations through cost efficiency and improved product quality; promoting process-driven product development; and enabling environmental improvements, including carbon reductions and improvements in air, land and water. Process improvements contribute decisively to the future of the Company, both helping to preserve its license to operate and ensuring its financial sustainability through important management gains.

By-products and circular economy. Work in this area includes the re-use of slag as a valuable product for many applications, which reduces waste while avoiding the ecosystem disruption that can result from the extraction of other materials such as natural stone or sand. For example, the Company is making innovative re-use of slag in the following applications: ballast in offshore wind turbine foundations to replace natural ballast; a construction material for building protection walls to reduce noise and dust; a fertilizer source for agriculture; and the potential reuse of slag from furnaces in water filtration and greenhouse gas capture. Other circular economy initiatives include: working on the use of mining tailings as a secondary raw material, either by finding marketable solutions or generating valuable products to be used in-house; and improving the quality of the scrap the Company uses, as well as exploring automated sorting processes for treating scrap.

Improvement in air, land, water. Work in this area includes research in technology for cleaning fumes from stacks, reducing dust diffusive emissions, cleaning water discharges, and solving water scarcity issues. In 2019, the research on cleaning fumes was extended to investigate a holistic combination of technologies for multipollutant abatement (of dust, SOx, NOx and dioxins) with great success, and significant progress was made on developing improved pleated bags for boosting filters efficiency. Technology on desalination has been implemented at Tubarao, leading to an international award for the most innovative desalination project in 2019 by International Desalination Association. Also in 2019, an industrial demonstrator for waste water from Blast Furnace treatment was launched at Asturias, along with an innovative technology to reduce dust emissions in the chutes transfer with very high efficiency that was validated.

Reductions of carbon emissions and energy use. ArcelorMittal's global R&D division also continues to research processes to support carbon neutrality and energy efficiency. In 2019, significant progress was made in the concept development and engineering of a full H2 MIDREX direct reduction process, and of a pilot plant in Hamburg for cold electrolysis of iron, which will be operational in 2022. Assessment through simulation and experiments of several CO_2 reduction technologies has led to the creation of breakthrough projects that should allow the substantial reduction of blast furnace route CO_2 emissions. Meanwhile, the roll-out of in-house developed solutions, such as smart oxygen sensors and innovative combustion control strategies, is enabling incremental reductions in energy and CO_2 emissions.

The Company's Jet Vapor Deposition ("JVD") technology is an example of process-driven product development, which enables advanced steels for industry. The Company introduced its unique JVD line to create a new generation of coated products with improved quality and enhanced functionality (Jetgal® for automotive applications and Jetskin® for industrial applications).

LONG-TERM ANALYSIS & PLANNING

The TCFD Recommended Disclosure in Strategy c) asks organizations to 'describe the resilience of their strategy, taking into consideration different climate-related scenarios including a 2°C or lower scenario.' The TCFD encourages all organizations exposed to climate-related risks to consider using scenario analysis to help inform strategic and financial planning and disclosures about the resilience of their strategies under a range of plausible climate-related scenarios.

Forum members are exploring and developing a variety of approaches to long-term planning and scenario analysis to support internal decision making, as illustrated in the examples below.

Lendlease has adopted scenario analysis as a means of testing its strategic resilience against potential future climate change outcomes through its "Creating 2050 Future Scenarios."

The analysis applies a range of environmental, social, technological, economic and policy indicators from peer reviewed scientific and academic research, which are viewed through the lens of its Sustainability Framework. The analysis helps the company estimate the business impacts of four possible scenarios:

- Resignation (more than 4°C) - the worst of climate change, used to test physical risks across operations and supply chain.
- Polarization (3-4°C) - disjointed, localized approach to climate change mitigation, used to test longer-term societal risks of climate change impacts.
- Paris Alignment (2-3°C) - delayed action on climate change resulting in a late, uncontrolled and rapid decarbonization pathway, used to test transitional risks of uncontrolled decarbonization.
- Transformation (well below 2°C) - a societally driven controlled and early rapid decarbonization pathway where global emissions peak in 2020 and are close to zero in 2040.

Figure 19: Lendlease's disclosure of indicators and parameters used in climate scenarios (Lendlease website)

INDICATORS OF CHANGE

The following section provides details of our Lendlease Climate Scenarios. Unless otherwise stated, all metrics have been sourced from peer-reviewed data in the Reference Point sources.

RESIGNATION | POLARISATION | PARIS ALIGNMENT | TRANSFORMATION

Temperature Range	4°C+ | 7°F+	3-4°C | 5-7°F	2-3°C | 3.6-5°F	<2°C | <3.6°F
Carbon Emissions Pathways, IPCC Assessment Report 5, 2014	RCP8.5	RCP6.0	RCP4.5	RCP2.6
Energy Pathway, International Energy Agency / WEO 2018	Current Policy Scenario (CPS)	New + Existing Policies Scenario (NPS)	Sustainable Development Scenario (SDS)	
Energy Technology Perspectives, IEA/ETP 2017		Reference Technology Scenario (RTS)	2 Degree Scenario (2DS)	Beyond 2 Degree Scenario (B2DS)
Social and Economic Pathways, IPCC Shared Socioeconomic Pathways	SSP5 + SSP4	SSP3	SSP2	SSP1
Cement + Steel: Energy Transition Risks Project		Limited Climate Transition Scenario (LCT)	Ambitious Climate Transition Scenario (ACT)	
CICERO Climate Scenarios	Current Policies (CPS)	New Policies (NPS)	Sustainable Development (SDS)	

REFERENCE POINT

Global Carbon Emissions Peak in Year	2080	2040	2020	2020
Net Zero Annual Global Emissions in Year	After 2100	After 2100	2080	2050
Proportion of New Vehicles are Electric in 2040 (IC1)	<14%	14%	44%	46%

SOCIO-CULTURAL

Residential building energy efficiency improvement per year	<0.6%	0.6%	2%	>2%
Commercial building energy efficiency improvement per year	<1.5%	1.5%	2%	>2%
% of Electricity used for heating and cooling (current 40%)	40-60%	66%	73%	84%
Reduction in carbon intensity of cement by 2060 from 2014	<1%	1%	25%	63%
Reduction in carbon intensity of steel by 2060 from 2014	0%	0%	60%	90%
Proportion of Energy from Renewable Sources by 2060 Globally (2014: 22%)	<36%	36%	72%	83%
Proportion of Energy from Fossil Fuels by 2060 Globally (2014: 65%)	>74%	74%	5%	2%
Total Energy Supply from Low-Carbon Generation by 2040	<50%	50%	85%	95%
Annual Energy Intensity Improvement to 2040	1.9% (CPS)	2.3% (NPS)	3.2% (SDS)	>3.2%
Proportion of Energy Generated Using Carbon Capture and Storage (2014: 0%)	<9%	9%	2%	12%

TECHNOLOGICAL

Cost of Carbon by 2040 (USD/Tonne)	$50	$50	$140	$140
Reduction in Labour Capacity 2100, compared to today. (IC2)	37%	<37%	25%	<25%

ECONOMIC

Sea Level Rise Long-Term (IC3)	8.9m sea level rise	6.4m sea level rise	4.7m sea level rise	2.9m sea level rise
Sea Level Rise, 2100	45-82cm	32-62cm	32-62cm	26-54cm
People displaced by sea level rise, long-term (IC3)	627m people affected	432m people affected	280m people affected	137m people affected
Frequency of extreme rainfall (IC4)	>+36%	>+36%	+36%	+17%
Increase in drought length (months) (IC5)	>18	18	11	9

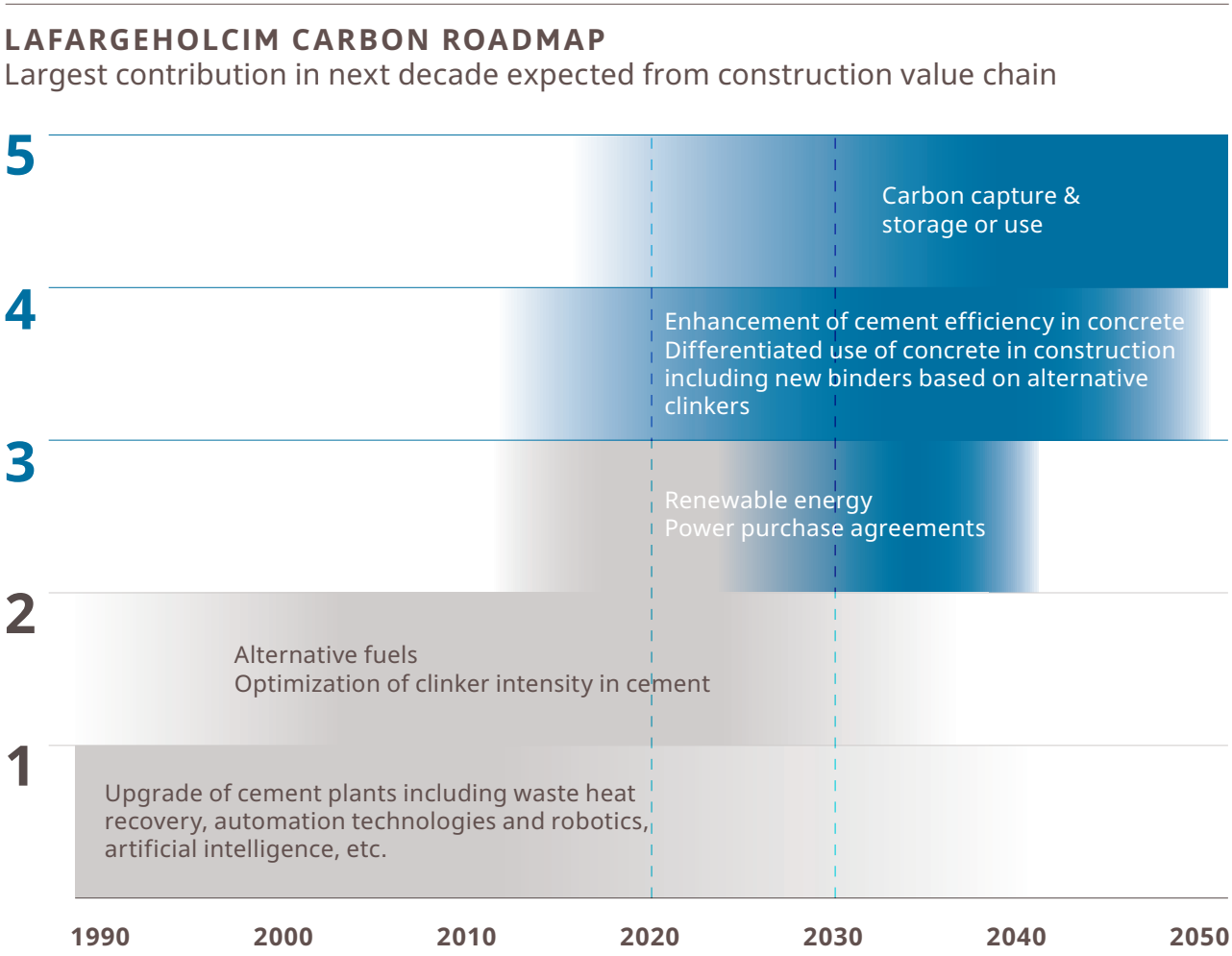
ENVIRONMENT

World Population 2100	7.4-9.3 Billion	12.6 Billion	9 Billion	6.9 Billion
Intergroup Conflict (IC6)	+45.2%	+33.9%	+22.6%	+11.3%
Global Dryland Area Suitable for Malaria Transmission (IC7)			+27%	+19%

POLITICAL

LafargeHolcim describes key construction value chain contributions and actions for the coming decades, highlighting the role of binders and replacement constituents, concrete in construction, use of renewable energy and CCUS.

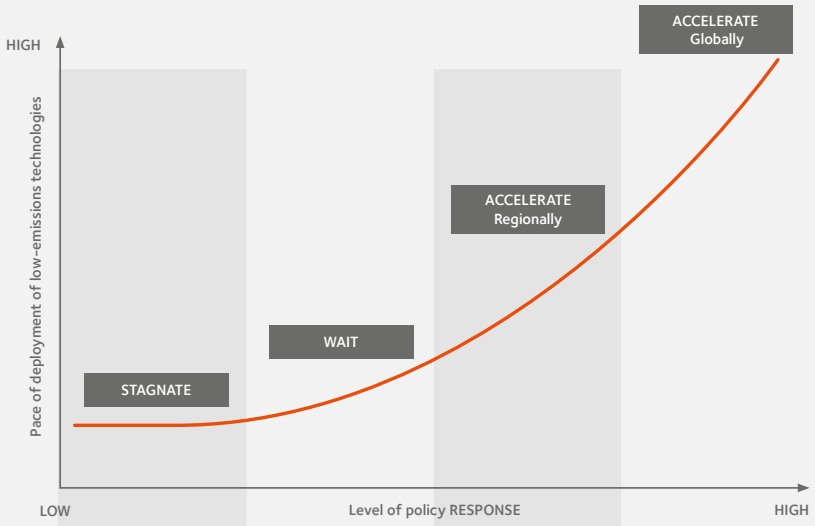
Figure 20: LafargeHolcim's disclosure of its CO_2 efficiency roadmap
(LafargeHolcim Integrated Annual Report 2019)



ArcelorMittal established a cross-functional internal task force to explore thematic scenarios relating to particular policy challenges, such as clean energy infrastructure and allocation by sector and associated enabling conditions. The analysis was conducted through cross-functional discussions about possible transition risk and opportunity developments, asking questions such as:

What happens if/when…? How prepared are we…? How would our decision-making change…? What would we need to do…? How can we improve our position?

Figure 21: ArcelorMittal's disclosure of climate-related policy scenarios
(ArcelorMittal Climate Action Report 2019)



Policy challenge				
Structurally higher operating costs of low-emissions steelmaking	Ineffective mechanism in place to offset structurally higher operating costs of low-emissions steelmakers versus higher-emissions steelmakers	Ineffective mechanism in place to offset structurally higher operating costs of low-emissions steelmakers versus higher-emissions steelmakers	Mechanisms to maintain competitive market by offsetting structurally higher operating costs of low-emissions steelmakers versus higher-emissions steelmakers and imports set in some countries and regions, e.g. green border adjustment	Common global framework is implemented to maintain competitive market to offset structurally higher operating costs of low-emissions steelmakers versus higher-emissions steelmakers
Clean energy infrastructure and allocation by sector	No concerted policy in any market to incentivise and allocate clean energy to steel sector	No concerted policy in any market to incentivise and allocate clean energy to steel sector	Support for clean energy to steelmaking industry from clean power, circular carbon and carbon capture and storage infrastructure provided in only some countries and regions	Support for clean energy to steelmaking industry from clean power, circular carbon and carbon capture and storage infrastructure provided globally
Investment in low-emissions steelmaking technologies (development and roll out)	Limited public support for R&D to bring technologies to commercialisation maturity	Accelerated public support for R&D to bring technologies to commercialisation maturity; some investment support for roll out of technologies	Accelerated public support for R&D to bring technologies to commercialisation maturity; high levels of investment support for roll out of technologies	Accelerated public support for R&D to bring technologies to commercialisation maturity; high levels of investment support for roll out of technologies

STAGNATE

- Lack of access to sufficient and affordable clean energy
- No mechanism to address high risk that steel production is made structurally uncompetitive across countries/regions
- Slow development of low-emissions steelmaking technologies
- No meaningful reduction in global steel CO_2 emissions as production shifts to less carbon-regulated jurisdictions
- Insignificant global progress to goals of Paris Agreement

WAIT

- Technology makes encouraging progress and is potentially ready for significant deployment within 10-20 years
- But only fragmented access to affordable clean energy
- No mechanism to address high risk of steel production being structurally uncompetitive in affected countries/regions
- Marginal steel CO_2 reductions globally as production shifts to less carbon-regulated jurisdictions
- Limited progress towards goals of Paris Agreement

ACCELERATE regionally

- Technology makes encouraging progress and is potentially ready for significant deployment within 10-20 years
- Access to sufficient and affordable clean energy in supportive countries/regions
- Regions with more active climate legislation ensure mechanisms are in place to enable steel production to remain competitive, e.g. green border adjustment
- Significant reductions in steel CO_2 in supportive countries/regions
- Partial global progress to goals of Paris Agreement

ACCELERATE globally

- Technology makes encouraging progress and is potentially ready for significant deployment within 10-20 years
- Access to sufficient and affordable clean energy globally
- Low-carbon legislation in place in the majority of countries, ideally with a common global framework or mechanism to ensure steel production remains competitive globally
- Significant global reductions in steel CO_2
- Global industry alignment with goals of Paris Agreement

Forum members identified various challenges associated with scenario analysis and associated disclosures. These include commercial and market sensitivities, erroneous interpretation of scenario analyses as forecasts, lack of sector/industry-specific data to support analysis, and limited use and utility of scenario-related disclosures. Forum members expect disclosures relating to scenario analysis and long-term planning to develop over time so that:

- There is more of a focus on specific attributes of individual companies, their sector and industry context, markets, products etc.;
- Quantitative information complements qualitative information (as appropriate, given commercial and market sensitivities);
- Processes, sources, parameters, assumptions used for scenario analysis are clear (as appropriate, given commercial and market sensitivities); and
- Strategic responses are identified including changes to the business (e.g., R&D priorities, product portfolio development, strengthening supply chain resilience) and to financial planning (e.g., investments in new technology, new markets).

USER PERSPECTIVES - DEMONSTRATING STRATEGIC RESILIENCE THROUGH SCENARIO ANALYSIS

When considering strategic resilience, investors rely primarily on evidence of companies' future plans for addressing climate change. Many users expect companies to demonstrate their resilience by answering the questions: *How are you going to cope in different climate scenarios? At what point do you need to start changing your behavior?*

Disclosures about strategic resilience assessments based on scenario analysis are useful where they include information about:

- **The company's awareness of and preparedness for change,** including how it might need to adapt under different scenarios;
- **The level of commitment that supports future plans** in terms of governance and management commitment, capital allocation and marshaling expertise within the company;
- **Planning for the transition**, taking account of the company's capabilities and ambition;
- **Assumptions and references** that explain and justify the thought processes behind the assessment, the scenarios used and the assumptions that inform the outcome;
- **Assessment purpose and impact,** explaining whether scenario analysis is being used to inform strategic decisions at board and management levels and, if so, what effect those decisions might have in terms of driving change within the company;
- **Narrative** to explain the use of KPIs and other quantified information;
- **Financial implications under different scenarios,** including impact on revenues, capital expenditure and operational expenditure.

Users clarified their views on whether companies should use standardized scenarios to aid comparability of results. While there was support for an element of comparability in future, users acknowledged a 'one-size-fits-all' approach to scenario analysis is unlikely to be suitable for companies at this stage in the development of climate-related financial disclosure. Users see a benefit in using reference scenarios and allowing preparers to adapt them to suit their needs.

In the absence of company-disclosed scenario analysis, investors often prepare their own estimates of the company's future resilience. However, users prefer and actively encourage companies to provide their own scenario analysis.

6 Metrics and targets

6 Metrics and targets

SUMMARY:

- Metrics and targets enable companies to demonstrate how they measure and monitor climate-related risks and opportunities, implement strategic responses, and progress in mitigating, managing and adapting to key issues.
- Forum members commonly disclose operational metrics including GHG emissions, carbon intensities and energy usage from renewable/low-carbon sources, along with historical trends.
- Forum members are beginning to report climate-related financial metrics, such as investments in low-carbon projects.
- This chapter includes a table of illustrative metrics designed to enhance disclosure and provide options to companies when choosing what to report.

The TCFD recommends that companies disclose the metrics and targets they use to assess and manage relevant climate-related risks and opportunities, where such information is material. The first part of this chapter provides examples of the ways Forum members have responded to the TCFD's recommendations on metrics and targets, together with the associated learnings. The second part of the chapter explores the challenges members face with regards to climate-related metrics and proposes illustrative metrics that the sector could develop in the future.

METRICS EXAMPLES

Forum members commonly disclose *operational metrics*, such as Scope 1, 2 and 3 GHG emissions (where appropriate), as well as historical metrics to enable comparative analysis over time. Carbon intensity (by volume of product or revenue) is commonly disclosed, along with energy usage from renewable/low-carbon sources. Forum members use operational metrics to illustrate efficiencies and progress towards a low-carbon future, including green building projects and sites built to meet a carbon efficiency benchmark.

Forum members present *financial metrics* primarily to demonstrate investments that support the low-carbon transition. Examples include capital investments to increase energy efficiency and green financing activities, including green infrastructure/buildings and green bond issuance.

Figure 22: ArcelorMittal's disclosure of key metrics including emissions
(ArcelorMittal Climate Action Report 2019)

Summary of key metrics

Metric	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Steel production (Mt crude steel)	113.9	102.3	73.1	92.5	92.2	88.6	90.9	93.4	92.7	90.4	92.9	**91.5**
BF-BOF / DRI-EAF / scrap-EAF ratio	77:8:15	77:8:15	79:7:15	78:7:15	79:8:14	79:8:13	79:8:13	80:8:12	81:7:11	85:6:9	84:7:9	**83:7:10**
Total CO_2 emissions ($MtCO_2$) – steel only[22,23]	244	227	164	201	194	189	195	196	198	193	196	**194**
Scope 1	203	189	135	167	163	159	162	167	168	167	170	**167**
Scope 2	24	23	18	19	18	17	18	14	14	12	13	**12**
Scope 3	17	15	11	15	13	13	16	14	15	14	13	**15**
Avoided CO_2 emissions from slag used in cement ($MtCO_2$)	11	10	7	8	9	9	10	10	10	10	11	**11**
Avoided CO_2 emissions from use of scrap steel ($MtCO_2$)	53	44	33	41	40	38	40	40	38	35	38	**37**
Average CO_2 intensity (tCO_2 / t crude steel)[24]	2.14	2.22	2.25	2.18	2.10	2.14	2.14	2.10	2.14	2.14	2.12	**2.12**
Average BF-BOF CO_2 intensity (tCO_2 / t crude steel)	2.44	2.54	2.57	2.48	2.38	2.40	2.41	2.35	2.37	2.33	2.31	**2.33**
Average scrap-EAF CO_2 intensity (tCO_2 / t crude steel)	0.74	0.67	0.65	0.66	0.67	0.66	0.70	0.63	0.61	0.53	0.60	**0.66**
Change in crude steel carbon intensity since 2007 (target – 8% by 2020)	0.0%	3.3%	2.6%	0.3%	-4.3%	-4.1%	-3.3%	-5.8%	-4.1%	-5.2%	-6.2%	**-5.6%**
% sites below ArcelorMittal carbon efficiency benchmark	13%	19%	22%	28%	31%	33%	30%	38%	38%	42%	50%	**44%**
Approvals for energy efficiency capital investment projects (million USD)[25]	–	–	–	–	–	–	–	180	11	108	373	**247**

Figure 23: Lendlease's disclosure of environmental data aggregated by region
(Lendlease Global Sustainability Framework FY19 Environmental Data and Summary Basis of Preparation)

Region and Respective Business Breakdown	Sum of FY19 Energy (kWh)	Sum of FY19 Electricity Use (kWh)	Sum of FY19 Natural Gas (MJ)	Sum of FY19 Fuels (Diesel, Gasoline, LPG, Ethanol, Biodiesel) (litres)	Sum of FY19 Renewables Produced (kWh)	Sum of FY19 Renewables Consumed (kWh)	Sum of Renewables Exported (kWh)	Sum of FY19 Total Emissions (TCO2-e)	Sum of FY19 Total Scope 1 Emissions (TCO2-e)	Sum of FY19 Total Scope 2 Emissions (TCO2-e)	Sum of FY19 Total Potable Water (kL)	Sum of FY19 Total Waste (Tonne)	Sum of FY19 Total Waste to Landfill (Tonne)	Sum of FY19 Total Waste Diverted (Tonne)	Sum of Hours FY19	Sum of Area (m2) FY19	Sum of ILU FY19
Americas	163,087,934	83,045,318	33,110,484	2,932,916	19,984,892	17,276,706	2,708,186	60,249	13,728	46,520	2,781,605	65,629	17,880	47,746	14,025,111	926,466	-
Construction	57,815,210	17,367,369	13,969,272	2,626,551	-	-	-	14,549	9,348	5,201	131,792	45,807	8,771	37,035	14,025,111	-	-
Defence	98,891,232	62,585,658	15,852,012	306,365	19,984,892	17,276,706	2,708,186	43,583	3,716	39,867	2,642,156	6,974	3,148	3,826	-	857,200	-
Investment Management	4,777,587	1,488,386	3,289,201	-	-	-		1,509	664	845	6,549	11,145	4,510	6,635	-	40,690	-
Lendlease Tenancy	1,603,905	1,603,905	-	-	-	-	-	607	-	607	1,109	1,703	1,451	251	-	26,576	-
Asia	70,773,088	54,055,224	35,285	1,550,629	58,198	58,198	-	34,707	4,157	30,551	429,182	40,426	13,510	26,916	16,474,060	349,909	-
Construction	26,298,279	10,918,593	35,285	1,451,254	-	-	-	12,255	3,837	8,418	165,227	30,953	12,861	18,093	16,474,060	-	-
Investment Management	42,581,397	42,514,712	-	792	58,198	58,198	-	21,723	2	21,721	262,441	9,413	613	8,800	-	339,172	-
Lendlease Tenancy	1,893,392	621,919	-	118,583	-	-	-	689	317	372	1,514	60	36	23	-	10,737	-
Australia Construction	441,857,165	68,052,806	4,606	35,457,629	63,294	63,294	-	150,266	92,687	57,580	850,638	1,202,308	637,645	564,663	41,246,026	70,198	-
Building	73,443,812	11,556,243	4,606	5,799,560	23,208	23,208	-	25,512	15,588	9,924	251,265	723,407	550,075	173,332	18,184,487	-	-
Engineering	353,562,300	50,978,310	-	28,785,855	40,086	40,086	-	117,739	74,731	43,008	569,360	477,343	86,319	391,024	21,468,269	-	-
Lendlease Tenancy	242,610	241,211	-	130	-	-	-	175	0	175	144	29	3	26	-	7,607	-
Services	14,608,443	5,277,042	-	872,084	-	-	-	6,840	2,367	4,473	29,840	1,529	1,248	281	1,603,270	62,591	-
Australia Head Offices	2,039,804	2,039,804	-	-	-	-	-	1,666	-	1,666	580	48	5	43	-	39,766	-
Lendlease Tenancy	2,039,804	2,039,804	-	-	-	-	-	1,666	-	1,666	580	48	5	43	-	39,766	-
Australia Property	158,015,248	121,260,008	32,881,334	213,021	2,077,230	1,700,043	377,187	102,817	6,669	96,148	2,042,440	21,610	11,676	9,934	1,793,792	2,099,869	12,656
Development	3,454,493	3,237,788	-	20,213	167,126	2,009	165,117	2,708	54	2,654	9,196	-	-	-	1,793,792	-	-
Retirement Living Assets	30,929,195	13,462,092	15,014,608	160,329	519,900	519,900	-	15,524	3,267	12,256	495,936	194	67	127	-	-	12,656
Investment Management	122,124,227	103,114,442	17,866,044	2,478	1,349,240	1,137,170	212,070	83,357	3,344	80,013	1,505,209	21,391	11,602	9,790	-	2,082,527	-
Lendlease Tenancy	1,507,333	1,445,686	20,682	-	40,965	40,965	-	1,228	4	1,224	32,526	24	8	17	-	17,342	-
Europe	18,343,783	13,007,261	970,599	407,812	1,015	1,015	-	2,674	1,269	1,405	92,389	57,234	1,192	56,042	9,492,489	109,030	-
Construction	10,570,400	6,246,694	4,077	403,589	-	-	-	1,537	1,079	457	52,806	54,411	1,162	53,250	9,492,489	-	-
Investment Management	5,593,445	4,610,646	937,521	4,223	-	-	-	750	185	566	23,607	2,695	-	2,695	-	104,953	-
Lendlease Tenancy	2,179,948	2,149,932	29,001	-	1,015	1,015	-	387	5	382	15,976	127	30	97	-	4,076	-
Grand Total	854,117,012	341,460,421	67,002,309	40,562,006	22,184,630	19,099,257	3,085,373	352,379	118,509	233,869	6,196,833	1,387,254	681,909	705,345	83,031,478	3,595,236	12,656

Figure 24: Lendlease's disclosure of shadow carbon price and carbon emissions
(Lendlease Annual Report 2019)

- Shadow price on carbon integrated into Investment Committee investment decisions – $20USD/Tonne in 2020, rising to $100USD/Tonne in 2030 and $140USD/Tonne by 2040
- In 2014, we set 20% by 2020 targets for energy, water and waste on an intensity basis. We disclose our annual scope 1 and 2 carbon emissions on our website

In FY20, we will embark on a process to co-design the new beyond 2020 metrics and targets with each of our businesses. The targets will be related to our new Sustainability Framework and informed by our TCFD scenario planning activities.

15%

Reduction in emissions intensity in FY18 from FY14

Our investment management business has reduced gross carbon emissions over the last five years whilst increasing floor area. The result is a 15 per cent reduction in emissions intensity on emissions per floor area.

27%

Increase in gross emissions in FY18 from FY14

Our construction business has seen an increase in gross carbon emissions in FY18. The increase in emissions can be attributed to increased construction activity in general as well as an increase in tunnelling activities.

Figure 25: CRH's disclosure of alternative raw materials & fuels
(CRH Sustainability Report 2019)

Alternative raw materials

Waste materials and by-products from other sectors serve as valuable raw materials to replace a portion of the finite raw materials or clinker used in our cement manufacturing. These co-processing materials currently include fly ash, ground granulated blast-furnace slag (GGBS) and quarry overburden. For example, EQIOM, part of our Europe Materials Division in France, receives inert wastes from construction sites to be used as alternative raw material or fuel within cement production. It is estimated that, through these actions, EQIOM could divert up to 75,000 tonnes of inert material annually from landfill by 2026.

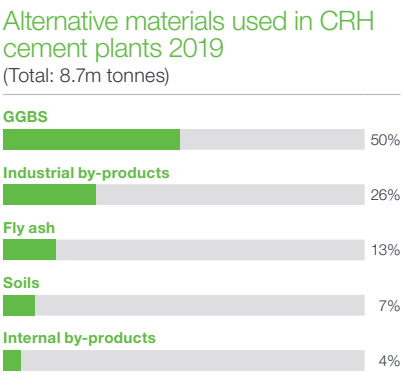
In 2019, we used a total of 8.7m tonnes of alternative raw materials in our subsidiary cement plants. Our ambition is to further reduce our clinker factor (the proportion of clinker in each tonne of cement) through increasing our use of alternative materials. In some cases, we are limited by market and functional requirements and the availability of alternative materials. However, we are continuously working to overcome supply-side barriers and to optimise clinker mineralogy to improve product quality and further the development of blended cements.

Alternative fuels

By substituting traditional fossil fuels with alternative fuels we conserve natural resources, reduce CO_2 emissions, deliver financial efficiencies and support the circular economy. CRH is a leading user of alternative fuels. Using alternatives to fossil fuels is key to reducing the carbon intensity of cement production. Alternative fuels typically used by our cement plants include solid recovered fuels (SRF), waste tyres, solvents, used oil and carbon-neutral biomass (meat and bone meal, wastewater treatment plant residue, rice husk, etc.).

Our efforts generated successful results in 2019, with 2.2m tonnes of alternative fuels used by our subsidiary cement plants, providing 33% of fuel requirements for our cement plants, an increase from 30% in 2018. In the European Union, alternative fuels provided 48% of total energy consumption in our cement plants.

However, there remain limitations in the availability of alternative fuels for cement production in some markets and we continue to work with our wider stakeholders to address these barriers.



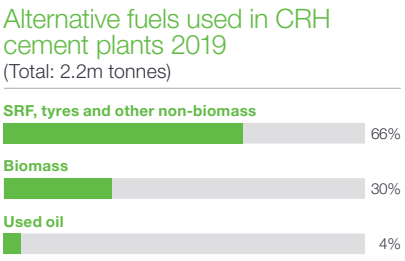


Figure 26: Saint-Gobain's disclosure of climate change and circularity related CSR dashboard metrics
(Saint-Gobain Registration Document 2019)

	OBJECTIVES	INDICATORS 2018	INDICATORS 2019
Climate change To contribute to the emergence of low-carbon economy capable of preserving the common good	Reduce our **carbon emissions by 20%** by 2025 (base 2010)	11.7%	**14.5%**
Circular economy To change the way we design, produce and distribute our products and solutions to develop the circular economy	**Reduce the use of virgin natural raw materials** (sand, gypsum)	9,024,612 AVOIDED TONS	**8,461,903 AVOIDED TONS**
	Reduce non-recovered waste by 50% by 2025 (base 2010)	15.9%	**11.5%**

Figure 27: LafargeHolcim's disclosure of progress towards CO_2 targets
(LafargeHolcim Integrated Annual Report 2019)

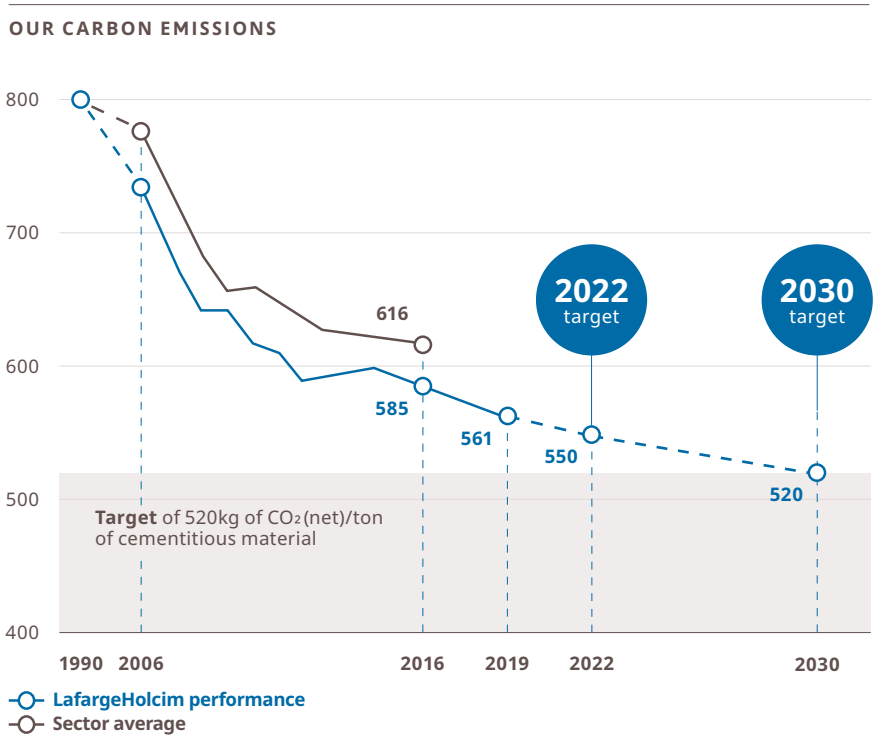


Figure 28: Skanska's disclosure of green financing, building certification, carbon emission and energy reduction
(Skanska Annual and Sustainability Report 2019)

Carbon emissions

-28%

Reduction of carbon emissions since 2015.

Certified commercial buildings share of total divestments

90%

Share of total value, corresponding to SEK 15.4 billion, of divested offices in the Commercial Property Development business stream, certified with WELL, LEED (Platinum or Gold) or BREEAM (Excellent).

Energy reduction in new office buildings

-37%

Annual energy reduction in divested office buildings developed by Commercial Development Nordics, Europe and USA compared to average.

Green financing

82%

Percentage of total central debt that is Green according to the Skanska Green Bond Framework, or other green requirements demands.

Figure 29: Skanska's disclosure of energy usage and intensity
(Skanska Annual and Sustainability Report 2019)

Total energy usage

MWh	2019	2018	2017	2016	2015[2]
Fuel usage (non-renewable)	715,541	1,021,815	1,023,242	1,121,646	1,278,787
Fuel usage (renewable)	182,218	69,621	68,094	54,482	271
Electricity usage	331,167	241,495	272,979	263,246	259,479
Non-renewable	211,551	114,531	154 ,363	143,037	104,502
Renewable	119,617	126,964	118,616	120,209	154,977
District heating usage	12,275	10,499	11,740	3,721	573
District cooling usage	36,739	623	1,499	2,597	196
Total energy usage	1,277,940	1,344,054	1,377,555	1,445,692	1,539,306
Energy intensity[1]	7.23	7.88	8.57	9.55	9.94

1 Total energy MWh/MSEK revenue, according to segment reporting
2 Carbon emission data for 2015 i reviewed. The data for energy usage 2015 has not been updated accordingly

Figure 30: CRH's disclosure of sustainability ambition, targets and context
(CRH Annual Report and Form 20-F 2019)

Our ambition is to have a culture of safety and wellness working towards zero harm

Our target:

Zero
fatalities
in any year

Why is This Important?

There are multiple hazards associated with our industry. Because of this we integrate an emphasis on safety into everything we do.

We are focused on eliminating fatalities and accidents in our activities and on working with others to drive safety improvements across our industry.

Our ambition is to play our part in addressing climate change as we strive for carbon neutrality along the cement and concrete value chain by 2050

Our target:

33%
CO_2 reduction to 520kg net CO_2/tonne cementitious product by 2030, compared with 1990 levels

Why is This Important?

As society comes to terms with the urgency and challenges of climate change, we believe we have a responsibility to create high-performance, low-carbon materials and products to deliver a more climate-resilient world. Our CO_2 emissions reduction roadmap is a science-based target (SBT) at a 2° scenario that has been independently verified to be in line with the Paris Climate Agreement objectives.

Our ambition is to be a business where everyone has the same opportunity to develop and progress

Our target:

33%
female senior leadership by 2030

Why is This Important?

We recognise inclusion and diversity as critical to sustaining competitive advantage and long-term success. We are committed to building an organisation where inclusion and diversity is a core leadership value, bringing new ideas, perspectives and ways of engaging with people. Therefore, it is vital we understand the barriers to inclusion and diversity and create purposeful change that benefits us all.

Our ambition is to offer more solutions that contribute to a sustainable built environment

Our target:

50%
revenue from products with enhanced sustainability attributes by 2025

Why is This Important?

Our customers are shaping the sustainable built environment of the future.

There is a demand on us to provide the innovative materials and solutions that will enhance the customer's vision for sustainability while ensuring a practical approach to construction.

SUSTAINABLE DEVELOPMENT GOALS

Published in 2015, the United Nations' (UN) Sustainable Development Goals (SDGs) are a call to action for a better and more sustainable future. We have assessed the detailed targets behind each of the 17 SDGs and identified the four that most closely align to where we, as a building materials company, can have the most impact and influence.

CHALLENGES ASSOCIATED WITH CLIMATE METRICS

- **Time horizons and forward-looking information** – Many players in the construction value chain are involved in long-term projects that take years to complete and they create buildings and infrastructure that last for decades. Forum members recognize that addressing climate risks and opportunities is often a long-term exercise and that metrics should illustrate plans, performance and progress over time. However, members perceive a disconnect between the investor focus on short-term financial performance metrics and the development of long-term strategies and plans out to 2050. Further dialogue is needed between investors and companies to help incentivize and reward proactive measures to plan for the long-term while recognizing and responding to commercial and market sensitivity challenges.
- **Scope 3 GHG emissions** (as defined in Figure 31) – Forum members highlighted challenges associated with value chain activities and forces outside of their control that affect embodied and operational carbon. As part of the SBT4buildings initiative, WBCSD members – including Preparer Forum members – have sought to develop a comprehensive understanding of carbon emission interdependencies across the value chain and the actors who can influence decisions.

Figure 31: Emission scopes as defined by the GHG protocol
(UK Green Building Council)[17]

Emissions type	*Scope*	*Definition*	*Examples*
Direct emissions	Scope 1	Emissions from operations that are owned or controlled by the reporting company	Emissions from combustion in owned or controlled boilers, furnaces, vehicles, etc.; emissions from chemical production in owned or controlled process equipment
Indirect emissions	Scope 2	Emissions from the generation of purchased or acquired electricity, steam, heating, or cooling consumed by the reporting company	Use of purchased electricity, steam, heating, or cooling
	Scope 3	All indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions	Production of purchased products, transportation of purchased products, or use of sold products

CHOICE OF METRICS

In common with other TCFD Preparer Forums, the Construction and Building Materials Forum has devoted time to considering the type, purpose and usefulness of metrics for climate-related financial disclosure.

Forum members recognize that metrics are used for a variety of purposes including:

- Functional, i.e. as measures of output and inputs to analytical models;
- Strategic, i.e. to manage business efforts to address climate change; and
- Analytical, i.e. to assess the effects of climate change on financial performance and prospects.

As climate disclosure in response to the TCFD's recommendations evolves, Forum members also observe the need for existing metrics to be refined to enhance accuracy and comparability, for new types of metrics to be created and for gaps in the universe of available metrics to be filled.

The Forum has developed Table 2 to illustrate a range of useful metrics companies in the construction sector can consider using in their disclosures. Forum members do not expect companies to report against all the metrics listed. The purpose of this table is to enhance disclosure and provide options when choosing metrics to communicate climate-related objectives and performance depending on their activities, impacts, dependencies and priorities.

The table:

- Incorporates and builds on metrics recommended by the TCFD for the Materials and Building sector;
- Includes relevant metrics developed by organizations such as the European Bank for Reconstruction and Development;
- Includes metrics designed to measure climate change opportunities and risks and to show the benefits of actual/ prospective mitigation and adaptation measures;
- Includes metrics designed to measure physical climate change risks;
- Should be read in conjunction with Chapters 3 and 4 of this report on the basis that, as well as demonstrating operational progress, metrics should convey information about a company's climate-related risks, opportunities and strategy.

Effective methodologies for measurement and reporting will need to be developed and agreed over time. In the meantime, companies that choose to disclose against these metrics should explain their approach to the metrics, including any relevant definitions and the organizational and operations boundaries to which the metrics apply, (for example whether they are limited to directly owned and controlled operations, facilities and sites, or whether they extend into the supply chain).

Given different activities, impacts, dependencies and priorities, across the construction and building materials value chain, certain metrics in Table 2 maybe more relevant than others (e.g. raw material extraction v. materials manufacture v. construction), and some not applicable to a given company. Companies are encouraged to consider options available and report on those that are most relevant and material.

Table 2: Illustrative climate-related metrics for construction sector companies

Category	Metric	Unit(s)
Energy consumption	Total energy consumed - percentage from coal, natural gas, oil and different renewable sources[a]	GJ and %
	Total energy intensity[b]	GJ/(business factor - tons of product, amount of sales, number of products)
	Scope 2 electricity purchased/consumed[c]	GJ or %
GHG emissions	Scope 1 and 2 GHG emissions[d]	Tons CO_2e
	Scope 3 emissions[e]	Tons CO_2e
	Emissions intensity	Tons CO_2e/revenue[f]
	CO_2 emissions avoided[g]	Tons CO_2e
Water use	Freshwater withdrawn in regions with high or extremely high baseline water stress	Tons & %
	Manufacture/production/operating water intensity	Tons water/ (unit production/output)
	Recycled water used in manufacture/production/operations	% of total water used or tons recycled water / (unit production/output)
Physical impacts and climate resilience	Insurance coverage of gross high-risk sites[h]	%
	Projected changes in production, operational expenditure or capital expenditure due to climate change[i]	Currency
	Current projects/solutions supporting physical climate resilience (e.g. heat stress, flooding etc.)	Number &/or %
Carbon pricing	Internal carbon price	Currency
	Scope of emissions covered by an ETS/carbon taxation regime	%
	Total costs of carbon tax paid	Currency
Investments and R&D	Investment (Capex) in low-carbon alternatives	Currency
	Revenues/savings from investments in low-carbon alternatives (e.g. R&D, equipment, products or services)	Currency
	Innovative climate-related collaboration agreements (e.g. with academics, technology partners)	Number
	New low-carbon or climate resilient products	Number &/or % (e.g. market size, growth potential)
	Products and solutions (e.g. materials, properties) certified as sustainable	Number &/or %
	Development pipeline targeting climate mitigation/adaptation criteria	Number &/or %
Expenditures	Expenditures (OpEx) for low-carbon alternatives (e.g. R&D, technology, products or services)	Currency
	Materials used/purchased certified as sustainable	%
Green finance	Value of capital raised through green financing/green bond issuance	Currency
	Financial performance of green projects or products	Currency & % (e.g. ROI, sales, growth)
	Portfolio of green projects	Number &/or %
	Pipeline for green projects	Number &/or %

[a] Could disclose on-site generated energy vs. purchased renewable energy sources where applicable.

[b] Reporting energy intensities by revenue is an option to align to the GHG Protocol.

[c] Companies could report on this metric using a breakdown between thermal fuel consumption and electricity consumption, and/or internal/external electricity consumption, for example.

[d] Companies should provide a comprehensive description of the methodologies, scope and approach used to calculate or estimate the metrics. Companies could provide emissions break down aligning with business segments, units, products, geographies etc.

[e] Companies should provide a comprehensive description of the methodologies, scope and approach used to calculate or estimate their Scope 3 emissions, including which categories are included (i.e. upstream, downstream etc.).

[f] For raw material extractors, an alternative unit could be kg CO_2/ton of cementitious material or kg CO_2 / cubic meter of concrete. For constructors, an alternative unit could be kg CO_2 / functional unit of construction or kg CO_2 /sqm of building.

[g] Avoided emissions disclosures can show the benefits of low emission choices a company has made. A counterfactual is required for this metric which may be easier to determine for industrial production than for developers and constructors. An industry standard would aid comparability, consistency and understanding.

[h] Adapted from EBRD's recommended metric of 'number of sites and business lines exposed to relevant climate impacts' due to the challenges of choosing to disclose net or gross impact.

[i] Where appropriate & feasible, further discussion and dialogue is required with users on the interpretation and use of such information.

USER PERSPECTIVES - METRICS AND TARGETS

Many companies in the construction sector have disclosed operational data such as water, waste and emissions for over a decade. In order to support their analyses, users increasingly require more granular operational data broken down by jurisdiction, activity, site etc.

As well as operational metrics, users value metrics used by businesses to plan for and manage climate strategies, including estimates of the way in which climate change could impact financial performance.

Users acknowledge that climate-related financial disclosure is still evolving. They noted the following challenges and developments relating to metrics and targets:

- **Comparability:** Investors support standardization of metrics and targets to facilitate benchmarking across industries and comparative analysis over time. At this stage in the development of climate-related financial disclosure, investors acknowledge that comparisons between companies and within industries remains challenging;
- **Confidence:** Assurance, verification, controls and process integration support user's confidence in climate-related financial information, but challenges remain in relation to balance, completeness and quality of climate-related disclosures;
- **Use of taxonomies:** Users highlighted the importance of alignment with typologies that structure and classify projects and activities in relation to climate-related risks, opportunities, mitigation and adaptation. Users acknowledged that the development of such approaches are challenging but noted the EU Sustainable Finance Taxonomy efforts.

The following is a summary of metrics users find useful in disclosures:

Operational metrics

- **Carbon intensity and footprints:** to assess the effectiveness of a company's climate strategy and to formulate ESG ratings and scoring;
- **Forward-looking information** reflecting a company's potential for future emissions reductions, including reduction targets and pipeline projects and investments that will enable their achievement;
- **Scope 3 emissions:** to assess supply chain risk, although Scope 3 reporting techniques require further development in order for information to be useful;
- **Product-level emissions,** for example carbon per ton of product;
- **Asset-level data** including GHG emissions from particular plants or sites to assess the location and degree or risk and potential for technology such as CCUS to minimize emissions and risk;
- **GHGs beyond carbon,** for example methane.

Financial metrics

- **Capital expenditure (Capex)** to assess what proportion of total Capex is allocated to 'green investments' and to corroborate disclosures about the company's climate strategy;
- **Revenues** including the percentage of a company's revenue that comes from low-carbon activities and/or managing climate change;
- **R&D investments** including resources allocated to ESG matters as a proxy for how a company will change in the future. Gaps between company investment and resources could potentially be identified as opportunities for capital deployment from investors;
- **Return on investment** to assess the payback on 'green' projects, noting whether internal carbon pricing has been used or not.
- **Financial outcomes of scenario analysis** to assess, amongst other things, the performance of 'green' investments under different climate scenarios.

7 Developing climate disclosure through collaboration

7 Developing climate disclosure through collaboration

As the examples in this report show, Forum member companies are already responding proactively to the TCFD's recommendations. However, the TCFD's 2019 Status Report shows that, while progress has been made, the pace of implementation needs to accelerate, and the quality of information must improve. The final chapter of this report considers four ideas that could be progressed to enhance climate-related financial disclosure within the construction sector over time:

- Complementing company-specific climate disclosure with a value chain approach to preparing and interpreting climate-related financial information;
- Actively supporting collaboration between companies in the construction sector, their partners, supply chains and investors;
- Developing practical tools to enhance climate disclosure; and
- Securing enabling support from investors and policy-makers for corporate climate action and disclosure.

A VALUE CHAIN APPROACH TO PREPARING AND INTERPRETING CLIMATE-RELATED FINANCIAL INFORMATION

While individual efforts and practices are advancing, Forum members are keen that their disclosures and associated actions should also be understood against the context in which they, their partners, supply chain and the wider sector operates.

Members recognize that climate change cannot be addressed by any one company, sector or agency alone. This being the case, the TCFD Construction and Building Materials and Food, Agriculture and Forest Products Preparer Forums[18] are the first to have taken a value chain approach to the TCFD's recommendations.

The value chain approach to preparing and interpreting climate-related financial disclosure is designed to serve three main purposes:

1. **To help users of information understand the relative feasibility and impacts of individual corporate action versus collective action on climate change.**
2. **To illustrate that, despite facing many of the same risks, companies in the construction sector are affected by and respond differently to risks depending on their position in the value chain.** For example, as Table 1 in this report shows, all companies are exposed to increased costs associated with GHG emissions, but the extent and impact of these costs will vary depending on the company's activities. Similarly, some companies have more capacity or opportunity to substitute carbon-intensive materials while others' risk exposure is linked to asset portfolio profiles. Forum members are keen that users of information are able to interpret companies' exposure to risk and assess the efficacy of responses based on an understanding of their position in the value chain and the incentives and decarbonization routes available to them.
3. **To encourage and facilitate collaboration across value chains.** As the Energy Transition Commission notes in its report "*Mission Possible: Reaching net-zero carbon emissions from harder to abate sectors by mid-century*", despite heavy industries being hard to decarbonize, the ambition is possible, particularly if companies, partners, investors and others work together. The report notes various examples of collaborative activity that support the low-carbon transition. They include projects between producers and users of steel to increase and improve the quality of steel recycling and collaboration across value chains to improve material efficiency and recycling.

ACTIVE SUPPORT FOR COLLABORATION

A dominant theme of Forum members' discussions was the need for companies in the construction sector and their partners, supply chains and investors to collaborate in tackling climate change. Collaboration mechanisms are in their infancy and are often established on an ad hoc basis. Forum members identified the need for more structured and outcome-focused collaboration channels as a key way of enhancing disclosure and climate action. The Forum has identified the need for collaboration between:

1. ***Companies within the construction sector, their supply chains, clients, partners and key sectors such as energy*** to support, climate innovation and standardization.

    a. **Innovation** – As this report shows, the capacity of individual companies to act on, and therefore make disclosures about, their climate strategies depends on a combination of demand for their products, customer preferences, public procurement requirements, available technologies, investment, R&D, signals from investors and so on.

    Innovation in response to climate change is encouraged and expedited when designed and supported through two or more of these features coming together across the value chain. For example, the European Union supports the Low Emissions Intensity Lime and Cement (LEILAC) project, designed to pilot breakthrough carbon capture technology that enables Europe's cement and lime industries to reduce emissions while retaining international and cross-sectoral competitiveness. The project is supported by a consortium of partners from the cement, chemicals, clinker, lime and minerals industries as well as academics, software modelers and life cycle analysis experts.

    b. **Standardization** – Companies and investors find value in platforms such as BRE Global a multi-disciplinary group focused on making the built environment safer, more efficient and sustainable, and ResponsibleSteel™ a multi-stakeholder standard and certification initiative that enables users to assess aspects of companies' climate performance or commitment with reference to known criteria.

2. ***Organizations that request climate information, enablers, providers and users.*** Climate-related information that reaches the public domain is based on a combination of:

    a. **Recommendations and provisions set by requestors of information** such as the TCFD;

    b. **Guidance** from enabling organizations, such as the World Resources Institute (WRI), on how to prepare climate-related information;

    c. **Corporate preparers of information** that conform with requests for information (based on a and b above) and develop disclosure techniques internally and based on peer practice;

    d. **Feedback from and action by investors** in response to climate disclosures. Insights from investors summarized in this report were particularly valuable in informing Forum members about the needs of climate information users. As other TCFD Preparer Forums have noted, dialogue between preparers and users of climate information is crucial to align understanding of information needs and identify the information of most use to investors. For example, Forum members have questioned whether quantified Scope 3 GHG emissions information is as useful to investors as information about the way in which companies are able to influence climate outcomes in the supply chain.

Climate-related financial disclosures are likely to be most effective where all the actors involved agree on the information to be provided and how it should be prepared and presented.

3. ***Companies, investors and national, regional and international policy makers.*** Since the TCFD's recommendations were issued in 2017, significant policy developments have been introduced or signaled that affect the way companies prepare and investors use climate-related information. These include:

   a. **The EU Green Deal** – proposes a legal commitment for the EU to achieve climate neutrality by 2050, including interim milestones and targets. The objectives of the Green Deal will be addressed through financial and real-economy policy across the private and public sectors. Energy and resource efficient building and renovation are likely to make a crucial contribution towards achieving the Deal and are reflected in corporate disclosure.

   b. **The EU Regulation on the Establishment of a Framework to Facilitate Sustainable Investment**, widely referred to as the Taxonomy Regulation – is a key is a key enabler of the Green Deal. A full description of the implications for the construction sector is beyond the scope of this report. However, the Taxonomy has many points of alignment with the TCFD's work, including that all companies assessing their resilience to climate physical risks should disclose the results and actions taken in response. Certain construction activities (including manufacture of cement, iron and steel, construction of new buildings, building renovation, renovation measures, and acquisition and ownership of buildings) fall within scope of the Taxonomy on the basis that they have the potential to make a substantial contribution to climate change mitigation or adaptation. Companies undertaking such activities that are subject to the EU Non-Financial Reporting Directive must make reference to the Taxonomy in their disclosures, including descriptions of how and to what extent their activities are associated with Taxonomy-aligned activities. The disclosures must explain the proportion of turnover, capital and, if appropriate, operational expenditure aligned with the Taxonomy.

   c. **Public procurement policies** – designed to support the low-carbon transition can support the construction sector's climate ambitions. As Skanska notes in their 2019 Annual Report, "providing value to society is part of the public procurement process in several markets and understanding what criteria are most important to public customers is vital to identifying business opportunities."

   d. **Requirements for banks and insurers** – The Bank of England has released plans to introduce a mandatory climate "stress test" for major banks and insurers in 2021. The test will be used to assess resilience to climate-related risks and to identify the adjustments required for the financial system to remain resilient. Banks and insurers within scope of the test requirements are likely to perform financial analysis of individual companies in their portfolios with a view to assessing how they are positioned in relation to climate risks and opportunities. In order to achieve this, banks and insurers are expected to encourage companies to use the TCFD's recommendations. Although the Bank of England's plans are targeted at UK banks and insurers, there is evidence of other jurisdictions taking similar action.

   e. **Prospect of regulation** – In a speech at the Tokyo TCFD Summit in October 2019, Governor Mark Carney referenced the UK and EU intentions to make TCFD disclosure mandatory within two years.

PRACTICAL TOOLS TO PREPARE FOR AND ENHANCE CLIMATE DISCLOSURE

Climate information that reaches the public domain reflects the actions taken and decisions made within companies. Given the characteristics of climate change, the fast-moving policy landscape and evolving societal expectations, decision-making about how to respond to climate change and what to disclose in response to the TCFD's recommendations is increasingly complex. Effective decision-making will be assisted by the collaborative efforts described above. However, Forum members have identified the following techniques that also promise, with more development and testing, to aid complex decision-making in preparation for climate disclosure.

1. **Convening cross-disciplinary teams** to shape an approach to disclosure and evaluate content suitable for responding to the TCFD's recommendations.

2. **Dynamic risk assessment** as an evolution of more traditional risk assessment methodologies. This expands the criteria for assessing risks beyond likelihood and impact to take account of future trends, how risks might connect with each other and the velocity with which impacts might affect the business. It can be used to adapt risk management processes to take account of the unique characteristics of climate change-related risk, including its breadth, scope, scale and uncertainty. WBCSD's report "An Enhanced Assessment of Risks Impacting the Food and Agriculture Sector" provides insight into the way in which Dynamic Risk Assessment might be applied to climate change and other risks. The report builds on WBCSD's work with COSO to develop guidance on Applying Enterprise Risk Management (ERM) to Environmental, Social and Governance (ESG) Risks.

3. **Integrated Performance Management** ("IPM") to support management decision-making that depends on evaluating a range of factors including risk, governance, ethics, environmental issues and social impacts, how they interact and how they drive performance. As a management approach, IPM may be used to evaluate how climate change considerations interact with other factors driving business success, supporting the preparation phase of climate disclosure.[19]

4. **Techniques for achieving decarbonization** – The TCFD's recommendations are designed to elicit information for investors on how organizations are preparing to transition to a lower carbon economy. Disclosures might refer to established techniques that help companies with their decarbonization activities such as Science Based Targets.

As members of WBCSD and construction industry fora, Forum members also rely on and encourage use of complementary tools developed by WBCSD and industry bodies, including circular economy metrics.

SECURING ENABLING SUPPORT FROM INVESTORS AND POLICY-MAKERS FOR CORPORATE CLIMATE ACTION AND DISCLOSURE

Forum members are keen that their efforts to implement the TCFD's recommendations are supported by investors and policy-makers and associated enabling conditions.

Forum members call on investors to:

i. Take account of opportunities (both current and potential) in addition to the climate risks to which companies are exposed when assessing climate disclosures;

ii. Be clear and transparent about their motivation for using climate-related financial disclosure. In particular, whether their primary interest is to protect investments against climate risks, to support decarbonization efforts or both.

iii. Actively support climate leadership including innovation designed to accelerate the low-carbon transition;

iv. Engage with companies and encourage collaboration; and

v. Encourage and recognize the use of financial instruments to finance climate action, including transition bonds, infrastructure green bonds, revolving credit facilities and other financing mechanisms that reward the achievement of climate- or sustainability-related goals.

In common with other industries, Forum members welcome the certainty, incentives and support that government policy and regulation on climate change can provide. Forum members recognize the value of carbon pricing, prospective green border adjustments and sector-specific roadmaps that allow governments to assess corporate actions against Nationally Determined Contributions and other policy targets.

Forum members call on policy makers to:

i. Introduce policies consistently across sector and jurisdictions; and

ii. Provide certainty and long-term public guarantees in order to support long-term decision making and investment where costs would otherwise be prohibitive.

8

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ABOUT WBCSD

WBCSD is a global, CEO-led organization of over 200 leading businesses working together to accelerate the transition to a sustainable world. We help make our member companies more successful and sustainable by focusing on the maximum positive impact for shareholders, the environment and societies.

Our member companies come from all business sectors and all major economies, representing a combined revenue of more than USD $8.5 trillion and 19 million employees. Our global network of almost 70 national business councils gives our members unparalleled reach across the globe. WBCSD is uniquely positioned to work with member companies along and across value chains to deliver impactful business solutions to the most challenging sustainability issues.

Together, we are the leading voice of business for sustainability: united by our vision of a world where more than 9 billion people are all living well and within the boundaries of our planet, by 2050.

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