

# HOLCIM'S NET-ZERO JOURNEY

CLIMATE REPORT 2022



# BUILDING PROGRESS

At Holcim we are putting climate action at the heart of our strategy to build a net-zero future that works for people and the planet.



*Cover image: The Eight Gardens complex in the UK is built with ECOPact with 64% lower CO<sub>2</sub>*



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# MESSAGE FROM JAN JENISCH AND MAGALI ANDERSON

Our world is growing, with population and urbanization on the rise. As a global leader in innovative and sustainable building solutions, we are putting climate action at the heart of our strategy to accelerate our world's shift to net-zero. Around the world our 70,000 people are building progress for people and the planet. With this report, we invite all our key stakeholders to join us to make a bigger difference together.

**“At Holcim we are building progress for people and the planet, putting climate action at the heart of our strategy to improve living standards for all.”**

**JAN JENISCH**  
Chief Executive Officer



**“On our net-zero journey, we are walking the talk at Holcim, taking clear science-driven action to win the race for climate.”**

**MAGALI ANDERSON**  
Chief Sustainability  
and Innovation Officer



## DEAR STAKEHOLDERS,

With today's rise in population and urbanization, Holcim has a central role to play to build essential housing and infrastructure to improve living standards for all. That's why we are building more with less to accelerate our world's shift to net-zero.

As a global leader in innovative and sustainable building solutions, Holcim is part of the solution. We are putting climate action at the heart of our strategy, to build progress for people and the planet.

Around the world, we are innovating every day to:

- **Make cities greener from foundation to rooftop**, from our low-carbon materials to our energy-efficiency and renovation solutions.
- **Empower society with smarter infrastructure**, with tailored systems to enable more green mobility, renewable energy and essential sanitation.

- **Improve living standards for all**, increasing access to affordable housing with innovative partnerships and technologies.
- **Drive circular construction to build more with less**, from green concrete made with recycled construction & demolition waste to roofs with upcycled plastic inside.

Across everything we do, we are building progress for people and the planet: from our ECOPact green concrete and ECOPlanet green cement; to our advanced roofing systems, from Firestone to Malarkey Roofing Products; all the way to our specialty building solutions, from 3D printing to magnetizable concrete; and so much more.

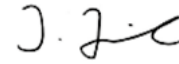
### WE ARE BECOMING A NET-ZERO COMPANY.

On this journey we are taking a science-driven approach, with our industry's first net-zero 2030 and 2050 targets, validated by the Science Based Targets initiative (SBTi). These goals cut across our entire value chain, including Scope 1, 2 and 3 emissions.

With our 70,000 people around the world, we will never stop pushing for progress. This Climate Report is a testimony to their drive to put climate action at the heart of everything we do. We hope that their many achievements, which are reflected in the pages that follow, will inspire you to join us to make a bigger difference together.

The future isn't written. It's built.

Join us to build a net-zero future that works for people and the planet!



**JAN JENISCH**  
Chief Executive Officer



**MAGALI ANDERSON**  
Chief Sustainability and Innovation Officer

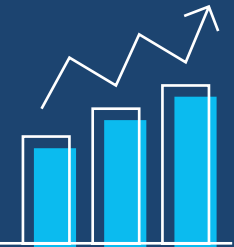



Image: Living tomorrow complex in Belgium is built with ECOPact with 70% lower CO<sub>2</sub>

# 01. ACCELERATING GREEN GROWTH

With today’s megatrends, from the rise in population and urbanization to improving living standards, the construction sector has never been more attractive. We are ready to seize the opportunities ahead with our “Strategy 2025 – Accelerating Green Growth.”

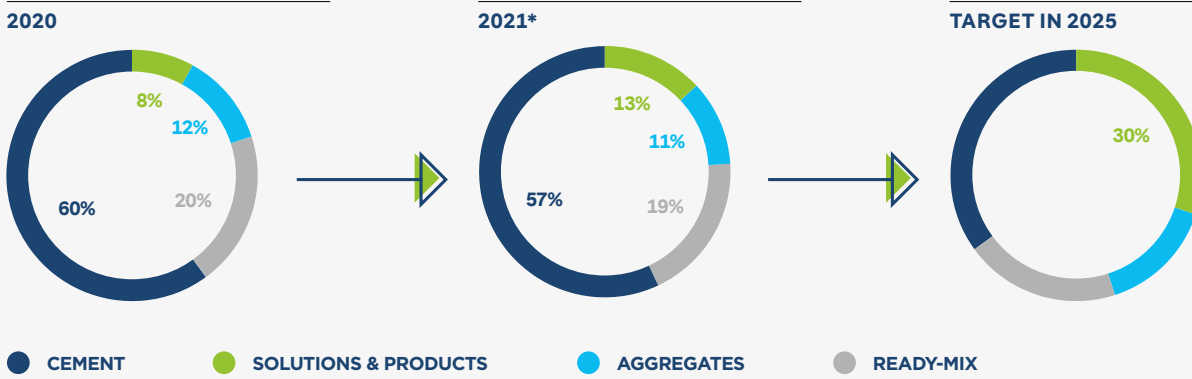
## THE FOUR PILLARS OF OUR “STRATEGY 2025 – ACCELERATING GREEN GROWTH”

 <p><b>ACCELERATING GROWTH</b> Accelerating growth across all markets with leading profitability and cash flow, driven by innovative and sustainable building solutions.</p>	 <p><b>EXPANDING SOLUTIONS AND PRODUCTS</b> Reaching 30% of Group Net Sales by 2025, from new builds to repair and renovation. Becoming global leader in roofing and expanding specialty building solutions, as double-digit growth engines.</p>	 <p><b>LEADING IN INNOVATION AND SUSTAINABILITY</b> Innovating to remain at the forefront of green building solutions and driving circular construction to build more with less.</p>	 <p><b>DELIVERING SUPERIOR PERFORMANCE</b> Fostering a high-performance culture while operating at the highest level of ethics and integrity to deliver ambitious financial and sustainability targets in line with net-zero roadmap.</p>
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## “STRATEGY 2025 – ACCELERATING GREEN GROWTH” INCLUDES AMBITIOUS SUSTAINABILITY TARGETS TO BE ACHIEVED BY 2025:

<p><b>25%</b> of ready-mix sales from ECOPact, with 30% to 100% lower CO<sub>2</sub> footprint</p>	<p><b>10m</b> tons per annum construction &amp; demolition waste recycled in our products and 75 million tons of waste recycled overall</p>	<p><b>500m</b> CHF of Green Capex per annum</p>	<p><b>&gt;40%</b> of financing agreements linked to sustainability goals</p>
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SOLUTIONS AND PRODUCTS: ACCELERATE GROWTH TO REACH 30% OF GROUP SALES BY 2025



\* 2021 includes 9 months' contribution from Firestone; Malarkey Roofing Products acquisition closed in February 2022 and PRB Group acquisition is expected to close in Q2 2022

# EXPANDING SOLUTIONS & PRODUCTS

As a global leader in innovative and sustainable building solutions, Holcim is expanding Solutions & Products to reach 30% of Net Sales by 2025. Holcim is becoming a global leader in roofing with the milestone acquisitions of Firestone Building Products and Malarkey Roofing Products. Its roofing systems cut across residential and commercial applications including green, solar, cooling and clean air technologies. Holcim is also expanding its specialty building solutions to play a bigger role in repair and refurbishment, with advanced energy efficiency and renovation systems. In 2021, Holcim announced the acquisition of PRB Group, the biggest independent specialty building solutions business in France and will continue to expand this segment with strategic investments and acquisitions.



## PRB GROUP

*Sport Hall Dolni Brezany, Czech Republic built with Firestone's UltraPly TPO waterproofing membrane*

### BOLT-ON ACQUISITIONS

Accelerating green growth, Holcim is pursuing a bolt-on acquisition strategy to expand its Aggregates and Ready-Mix Concrete businesses. In 2021, we completed 12 bolt-on acquisitions in mature European and North American markets.

At the forefront of green building solutions, we offer the world's broadest range of green concrete, ECOPact, and green cement, ECOPlanet as well as a unique range of circular aggregates, such as Aggneo.

# 12

bolt-on acquisitions in 2021

# LEADING CEMENT'S GREEN TRANSFORMATION



We are committed to leading cement's green transformation, in line with our industry-first 2050 net-zero targets, validated by the Science Based Targets initiative.

We are decarbonizing cement by increasing our use of innovative low-emission raw materials from calcined clay to construction & demolition waste. In addition, we are increasing our use of alternative fuels to reduce the footprint of our cement operations. For instance, in Europe we operate with over 60% of alternative fuels with sites like Retznei, Austria, already running at 100%.

*Egypt's Iconic Tower is built with ECOPlanet green cement with 60% lower CO<sub>2</sub>*

In 2021, we launched the world's broadest range of green cement, ECOPlanet, delivering at least 30% lower carbon footprint with equal to superior performance compared to ordinary cement (CEM I/OPC) to enable low-carbon construction at scale. This solution contributes to achieving world-class environmental certifications such as LEED®, BREEAM® and HQE®. It is currently being used across 15 markets for a range of high-performance applications, including large structures with very specific technical requirements, such as stadiums, bridges, dams and high-rise buildings. For instance, our ECOPlanet with an 80% lower CO<sub>2</sub> footprint was used in Amazon's new headquarters in Seattle, holding its glass spheres together, contributing to its LEED Gold certification.

## DID YOU KNOW?

### MAKING LOW CARBON THE STANDARD IN THE US

Across the US, we are deploying our OneCem cement with a 10% reduced CO<sub>2</sub> footprint, making it our standard product wherever we can. We kicked off its launch in Texas last year, switching all our production in that key market to OneCem. Building on this success, we have now rolled OneCem out across the Midwest, converting 100% of our production at our two cement plants, Ste. Genevieve in Missouri and Alpena in Michigan. With this shift, we will reduce CO<sub>2</sub> emissions by approximately 300,000 tons this year, which is equivalent to taking over 70,000 cars off our roads.



# THE OPPORTUNITIES WE HAVE ARE ENORMOUS AND WE ARE READY TO CAPTURE THEM

## CIRCULAR ECONOMY: THE OPPORTUNITY OF OUR TIME

Reduce, reuse and recycle across everything we do to build more with less



## INCREASING DEMAND FOR LOW-CARBON BUILDING MATERIAL PRODUCTS

Make low-carbon construction possible with our ECOPact and ECOPlanet lines



## REPAIR, REFURBISH AND RENOVATE BUILDINGS

Repair and renovate buildings to make them last longer



## CONCRETE: KEY FOR CLIMATE MITIGATION AND ADAPTATION

Concrete to help upgrade cities to withstand the impacts of climate change



# OUR NET-ZERO JOURNEY





# 02. OUR NET-ZERO JOURNEY

At Holcim we are becoming a net-zero company, putting climate action at the heart of our strategy to build progress for people and the planet.

Across our net-zero journey, we are focusing on four key levers of action to decarbonize the built environment:

## MAKING GREEN BUILDING POSSIBLE AT SCALE

We are at the forefront of green building solutions to make low-carbon construction possible at scale around the world, from Mumbai to New York.

We launched the world's first global ranges of green concrete, ECOPact, and green cement, ECOPlanet, with a CO<sub>2</sub> footprint ranging from 30% to 100% lower than the local market reference with no compromise in performance. In our "Strategy 2025 - Accelerating Green Growth" we aim to reach 25% of concrete net sales with ECOPact by 2025. Off to a fast start on this journey, ECOPact is already available across all our five regions in 25 markets thanks to the breadth of our green formulation expertise.

## DRIVING CIRCULAR CONSTRUCTION TO BUILD MORE WITH LESS

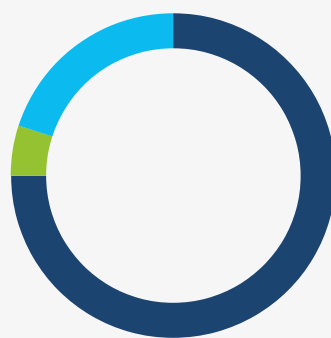
As a world leader in recycling, we are driving circular construction to reduce, reuse and recycle materials wherever we can. In 2021, we recycled 54 million tons of materials across our business and are doubling down on this rate to reach 100 million tons by 2030. To build new from the old, we are scaling up our capacity to recycle construction & demolition waste into new building materials with the objective to reach 10 million tons by 2025. In 2021, we already recycled 6.6 million tons of construction & demolition waste, the

equivalent of 1,000 truckloads every day. In Switzerland we launched the world's first green cement with 20% recycled construction & demolition waste within our ECOPlanet range and are working to deploy this solution across as many markets as possible, starting in Europe. With every roof that we build with our Malarkey Roofing Products, we upcycle the equivalent of five rubber tires and about 3,200 plastic bags.

## EMPOWERING SMART DESIGN AND SYSTEMS

We are deploying a range of technologies to make buildings smarter from foundation to rooftop and at every stage of their life, from design and building to repair and renovation. Our smart roofing systems, from Firestone Building Products' green, solar and cool roofs to Malarkey Roofing Products' clean air technology that actively reduces air pollution,

### OUR CO<sub>2</sub> FOOTPRINT (%)



- SCOPE 1: 119.3 MT CO<sub>2</sub> 75%
- SCOPE 2: 7.0 MT CO<sub>2</sub> 5%
- SCOPE 3: 30.0 MT CO<sub>2</sub> 20%

**Scope 1** emissions account for 75% of our footprint and are at the core of our emissions reduction strategy. Scope 1 includes all emissions that are released directly from our operations. Most of these come from cement production. Over 60% of

our Scope 1 emissions are generated during the decarbonation of the raw materials we use to produce clinker. Fuel combustion necessary to heat the cement kilns is another significant source of emissions. A small share of Scope 1 emissions come from our own power generation and from operations linked to aggregates and ready-mix concrete.

**Scope 2** emissions account for 5% of our carbon footprint. Scope 2 includes indirect emissions from the generation of purchased electricity consumed in the company's owned or controlled equipment.

**Scope 3** emissions account for 20% of our carbon footprint. Scope 3 includes all other indirect emissions generated in our supply chain, such as for transportation and the extraction and production of purchased materials and fuels.

enable more energy efficient buildings and healthier cities. With our specialty building solutions, from our Tector range to Airium, we are making buildings last longer with advanced repair and renovation systems. We are also deploying technologies like 3D printing to build more with less, across a range of applications from affordable housing to bridges and windmills.

#### NEXT-GENERATION TECHNOLOGIES

To accelerate our net-zero journey we are developing next generation technologies, from carbon capture, utilization and storage (CCUS) to concrete-based renewable energy systems.

Advancing our CCUS strategy we are currently running over 30 pilot projects around the world, ranging from recycling CO<sub>2</sub> from our plants into low-emission raw materials for our green cement, all the way to using it as a greenhouse gas for farming or as a source of methanol for aviation fuel.

Working with a range of partners from start-ups to academic institutions, we are developing breakthrough technologies to accelerate the transition to renewable energy, like magnetizable concrete to enable roads to charge electric cars while in motion.

Our net-zero journey is at the heart of all our business segments.

**CEMENT:** Cement sets the foundation of our ambition to lead in innovative and sustainable building solutions. We are committed to leading its green transformation with a clear decarbonization pathway, based on well-known levers through to 2030. At the same time we are developing innovative low-emission raw materials and next-generation technologies, including over 30 pilot projects in CCUS projects, to further accelerate our impact beyond 2030.

Today we offer the world's broadest range of green cement, ECOPlanet, delivering low-carbon and circular benefits with no compromise on performance. ECOPlanet ranges from 30% to 100% lower CO<sub>2</sub> based on our leading green formulation expertise, innovative low-emission raw materials and use of alternative fuels. In this range, we launched the world's first cement with 20% recycled construction & demolition waste inside.

**READY-MIX CONCRETE:** As the green concrete company, we are making it the best material for our growing and urbanizing world. No other material matches concrete's performance benefits. It is resilient, protecting our cities and infrastructure from natural disasters such as effects from flooding. It is durable, fire and earthquake-resistant, versatile, affordable, insulating and available everywhere. It is infinitely recyclable and acts as a carbon sink during its lifespan, reabsorbing part of the CO<sub>2</sub> emitted during its production process.

We offer the industry's broadest range of green concrete, ECOPact, which delivers low-carbon and circular benefits with no compromise on performance. It is sold at a range of low-carbon levels, from 30%-100% reduced footprint compared to the local industry benchmark. Its sustainability profile is driven by low-emission raw materials and decarbonized operations, including the use of alternative fuels. Making low-carbon construction possible at scale around the world, it is available in all five regions across 25 markets.

**AGGREGATES:** Our range of aggregates, from sustainably sourced materials to recycled construction & demolition waste, provide the raw materials for concrete, masonry and asphalt, as well as the foundation







for buildings, roads and landfills. Holcim offers a range of high-value aggregates and solutions for building and infrastructure projects available in many countries around the world. We are driving the circularity of this segment by producing 100% recycled aggregates from construction & demolition waste with brands like Aggneo. In addition, we are pursuing other sustainable practices such as using renewable energy in aggregates operations, restoring quarries after use, preserving biodiversity and even recycling carbon from our operations into recycled aggregates.

**SOLUTIONS & PRODUCTS:** We are continuously expanding our range of Solutions & Products to make buildings smarter from foundation to rooftop, at every stage of their life from design and building to repair and renovation. Our advanced systems, from roofing and waterproofing to insulation, make buildings more energy-efficient, enduring and resilient throughout their life cycle. As a double-digit growth engine for Holcim, this segment will account for 30% of Net Sales by 2025.

With our milestone acquisitions of Firestone Building Products and Malarkey Roofing Products, we are becoming a global leader in roofing systems. We offer a complete range of solutions from commercial to residential, including green, solar and cooling roofs all the way to shingles with clean air technology inside making cities healthier.

## 02. OUR NET-ZERO JOURNEY

### CONTINUED

HOLCIM'S NET-ZERO PLEDGE: PROGRESS TO DATE	
2030 TARGET, HOLCIM WILL	PROGRESS IN 2021
 Accelerate the use of low-carbon and carbon-neutral products, including ECOPact and Susteno	World's broadest range of low carbon materials: ECOPact launched in 25 markets, ECOPlanet launched in 15 markets. ECOPact to reach 25% of Ready-Mix net sales by 2025
 Recycle 100 million tons per year of waste and byproducts for energy and raw materials	Recycled 54 million tons of waste and byproducts for energy and raw materials in 2021
 Scale up the use of calcined clay and develop novel cements and new binders	Calcined clay investments in a new line in France and launch of calcined clay cement in Italy and France
 Double <sup>1</sup> waste-derived fuels in production to reach 37%	Waste-derived fuels in production reached 21% in 2021
 Reach 475 kg of Scope 1 CO <sub>2</sub> per ton of cementitious material	Reduced to 553 kg of CO <sub>2</sub> per ton of cementitious material in 2021
 Operate its first net-zero carbon cement production facility	10+ new carbon capture projects launched in 2021, reaching 30+ projects in 12 countries (vs. 20 projects in 7 countries in 2020)

### OUR NET-ZERO PLEDGE

Taking a rigorous science-driven approach, Holcim's 2050 goals are among the first long-term targets validated by the Science Based Targets initiative (SBTi). Consistent with the new net-zero standard, we have now validated our entire decarbonization pathway across all scopes, setting a reference for our entire industry.

In 2020, Holcim entered a new era in sustainability with our net-zero pledge. Leading the way in green construction, we were the first global building materials company to sign the UNGC's "Business Ambition for 1.5°C" initiative, with intermediate 2030 targets approved by the SBTi in alignment with a net-zero pathway.

We continue to lead the industry on climate with the verification of our Scope 3 intermediate targets.

Our intermediate targets now cover the three "scopes" of carbon emissions as established by the Greenhouse Gas (GHG) Protocol to address both our direct and indirect impact.

### OUR 2030 COMMITMENTS

- Holcim commits to reduce Scope 1 and 2 GHG emissions 21% per ton of cementitious materials by 2030 from a 2018 base year.<sup>2</sup> Within this target, Holcim commits to reduce Scope 1 GHG emissions 17.5% per ton of cementitious material and Scope 2 GHG emissions 65% per ton of cementitious materials within the same timeframe.
- Holcim commits to reduce its Scope 3 GHG emissions by 2030, from a 2020 base year, for the following categories:
  - purchased goods and services by 20% per ton of purchased clinker and cement
  - fuel and energy-related activities by 20% per ton of purchased fuels
  - downstream transportation and distribution by 24% per ton of materials transported.



<sup>1</sup> Compared to 2018 baseline

<sup>2</sup> The target boundary includes land-related emissions and removals from bioenergy feedstocks



**OUR PATH TO 2030**



Our pathway to 2030 is clear. To reach our Scope 1 and Scope 2 commitments, we will reduce our clinker factor, use alternative fuels instead of fossil fuels (or increase our thermal substitution rate) and increase our use of renewable energy. We will invest in proven technologies that produce positive returns. Our 2030 Scope 3 targets will be achieved by focusing on our most material Scope 3 categories.

**OUR 2050 GOALS**

- We will reduce Scope 1 and 2 GHG emissions by 95% per ton of cementitious from a 2018 base year.<sup>3</sup>
- We will reduce absolute Scope 3 GHG emissions by 90% by 2050 from a 2020 base year.

**OUR PATH TO 2050**

Our 2050 targets have been validated by the SBTi aligned with its new net-zero standard. The pathway from 2030 to 2050 leverages the same levers used between 2020 and 2030, while integrating new and advanced technologies. These technologies include novel binders, zero-emission vehicles, low-clinker cements and CCUS technologies.

	SCOPE 1	SCOPE 2	SCOPE 3	
2018	<b>576</b> BASELINE	<b>38</b> BASELINE		
2021	<b>553</b>	<b>34</b>	<b>-0%</b>	Kg CO <sub>2</sub> per ton of purchased clinker and cement
			<b>-9%</b>	Kg CO <sub>2</sub> per ton of purchased fuels
			<b>-9%</b>	Kg CO <sub>2</sub> per ton of material transported
2030	<b>475</b> Kg CO <sub>2</sub> net/t cementitious	<b>13</b> Kg CO <sub>2</sub> /t cementitious	<b>-20%</b>	Kg CO <sub>2</sub> per ton of purchased clinker and cement
			<b>-20%</b>	Kg CO <sub>2</sub> per ton of purchased fuels
			<b>-24%</b>	Kg CO <sub>2</sub> per ton of material transported
2050	 <b>GHG emissions across the value chain validated by</b> 			

**Holcim's 2050 net-zero targets validated by SBTi:**

- Holcim commits to reduce Scope 1 and 2 GHG emissions by 95% per ton of cementitious materials by 2050 from a 2018 base year.<sup>2</sup>
- Holcim commits to reduce absolute Scope 3 GHG emissions by 90% by 2050 from a 2020 base year.

<sup>3</sup> The target boundary includes land-related emissions and removals from bioenergy feedstocks

## 02. OUR NET-ZERO JOURNEY CONTINUED

### OUR PATHWAY TO NET-ZERO

Reducing CO<sub>2</sub> emissions is key for us to continue creating long-term value. Our cement is one of the most carbon efficient in the sector. Our Scope 1 and Scope 2 emissions per ton of product are 29% lower than in 1990.

Holcim is among the first companies worldwide to set 2050 net-zero targets validated by the Science Based Targets initiative (SBTi). With these goals, Holcim is the first in its industry with:

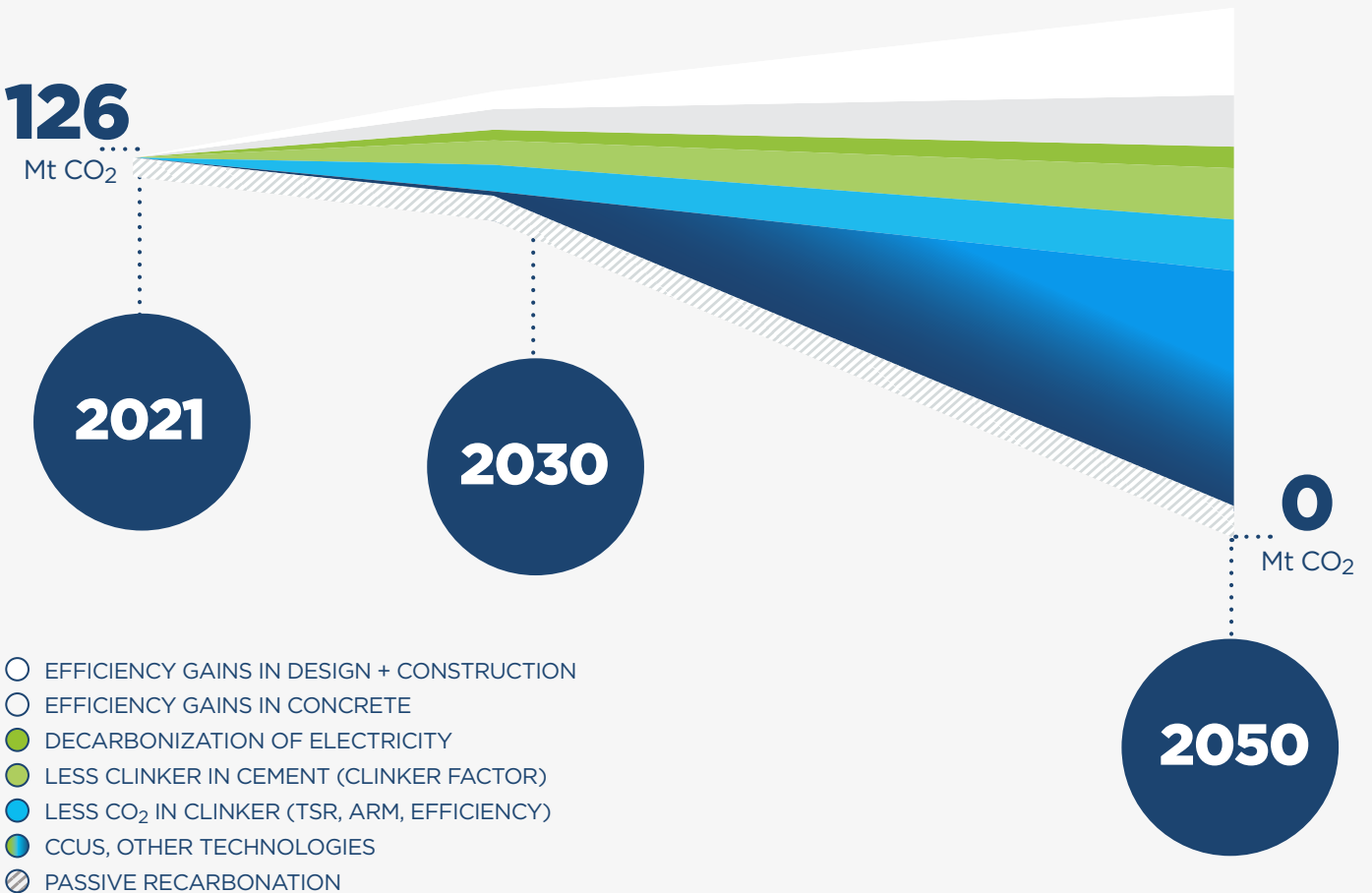
- 2030 and 2050 net-zero aligned targets validated by SBTi, and
- Scope 1, 2 & 3 targets, cutting across our operations and value chain.



*Mvule Gardens in Kenya, Africa's largest 3D-printed affordable housing complex is built with TectorPrint*

### HOLCIM'S PATHWAY TO NET-ZERO

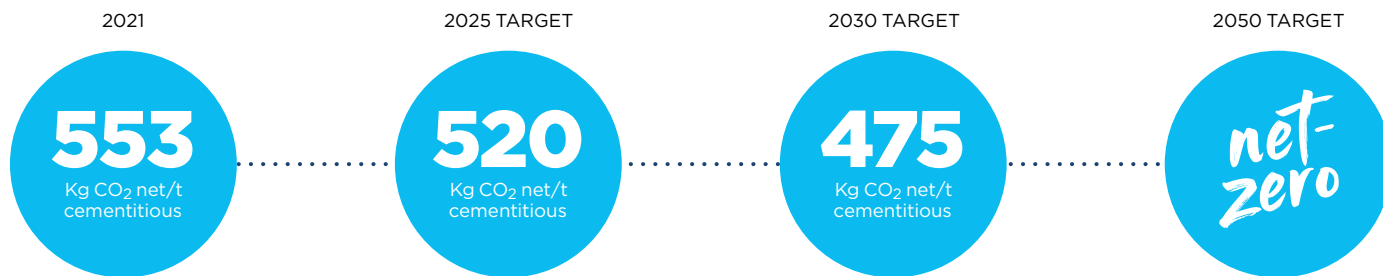
#### OUR ABSOLUTE SCOPE 1 + SCOPE 2 EMISSIONS PATHWAY





# SCOPE 1 GOALS

Scope 1 includes all emissions released directly from our operations. They account for 75% of our footprint and are at the core of our emissions reduction strategy. A number of factors are involved in reducing our Scope 1 emissions to net-zero:



## EFFICIENCY GAINS IN CONSTRUCTION/CONCRETE

The increasing importance of embodied carbon per m<sup>2</sup> of building / infrastructure will move the market to more carbon-efficient construction. "Optimization of cement in applications" refers to the progressive optimization of the structural elements, creating the same functional units with less construction material such as concrete or cement. CO<sub>2</sub> and carbon-efficient construction legislation will trigger construction optimization, leading to less material used per m<sup>2</sup> of building / infrastructure.

## ALTERNATIVE RAW MATERIALS

The use of alternative sources of materials is a key lever to further reduce our CO<sub>2</sub> emissions. Waste materials and byproducts from other industries can be used to replace some of the raw materials used in the production process. We are considering four major categories:

- Decarbonated materials allowing reduction of CO<sub>2</sub> emissions and thermal power consumption, and gains on kiln productivity.
- Basic components (Ca, Si, Fe, Al, S) enabling the supply of the essential minerals required for clinker chemistry and safeguarding quarry lifetime (recycled water also fits in this category).
- Urban mining, which consists largely of construction & demolition waste, is where we aim to close the loop in terms of circularity by recycling what we have contributed to building decades ago.
- Historical landfills and stocks to reuse minerals after pretreatment and avoid the mining of prime ore. This is part of our contribution to "clean the past".

We are working with innovative companies to keep on raising the standards and developing new alternative material streams.

## BUILDING MORE WITH LESS: HOLCIM ITALY

The use of low-emission primary raw materials is a key lever in reducing our carbon impact. Replacing limestone with an alternative that emits less or no CO<sub>2</sub> is an obvious choice. But where can a suitable replacement be found that delivers the necessary quality requirements?

Construction & demolition waste is a highly attractive source of low-emission raw materials. It is abundantly available and has all the properties required for a second life as a primary raw material.

Our plant in Ternate, Italy, has already recognized the potential. Trucks filled with construction & demolition waste arrive at our sites every weekday. What initially started out as only two trucks per day has quickly grown to seven. This construction & demolition waste is pre-processed, meaning that wood, plastics and metals have all been removed, leaving behind only the fine cement powder, sand and aggregates.

Because the cement powder has already been decarbonated, the overall process-related carbon emissions are much lower. The materials also require less heating in the kiln so less fuel is required, further reducing the carbon impact.



Gioia 22, in Milan's Porta Nuova former industrial district, is built with ECOPact green concrete with up to 50% lower CO<sub>2</sub>

## 02. OUR NET-ZERO JOURNEY CONTINUED



### ECOPLANET WITH PROXIMATECH

In July 2021, we launched the first calcined clay-based cement in the French market as part of our ECOPlanet range. Produced from locally sourced materials at our La Malle plant using ProximaTech, Holcim's proprietary calcine clay technology, this ECOPlanet variant has a 34% lower CO<sub>2</sub> profile per ton of cement, compared to Ordinary Portland Cement (OPC). ECOPlanet is designed to enable our ready-mix customers to produce low-carbon concrete while ensuring high performance and durability for all applications, as it:

- Performs as well as OPC, with no impact on the construction system

- Meets the carbon footprint requirements of the new French regulation RE2020 – one of the first regulations in the world to require a 35% reduction of the carbon footprint of the built environment per m<sup>2</sup> of building.
- Is suitable for applications with high durability requirements such as infrastructure projects, construction in difficult environments, long-lifespan (> 50 years) projects, and high volume concreting like bridge piers, dams or large concrete platforms.

ECOPlanet and ProximaTech are examples of how Holcim enables sustainable construction on a large scale by developing and producing its own proprietary low carbon building materials.

### CLINKER FACTOR

It is the production of clinker, the main component of cement, that produces the most CO<sub>2</sub> emissions. The majority of these emissions result from the chemical reaction that occurs when the raw material (limestone) calcinates into clinker during the production process.

This decarbonation process is our largest source of CO<sub>2</sub> emissions, accounting for 48% of our total CO<sub>2</sub> footprint. Replacing the clinker in our final cement products with alternative mineral components reduces the carbon intensity of the cement product. We aim to reduce our clinker content from 70.1% currently to a 65–68% range by 2030, and reduce further down to a 60–63% range by 2050.

The main reduction will not only come from recycling construction & demolition waste and by-products from other industries, but also investing in calcined clay facilities and developing novel cements.

In the coming decades we expect calcined clay and granulated limestone to gradually replace traditional mineral components such as slag or fly ash.

### DID YOU KNOW?

#### WHAT IS THE DIFFERENCE BETWEEN MINERAL COMPONENTS AND ALTERNATIVE RAW MATERIALS?

Mineral components are added at the cement manufacturing stage to replace clinker and produce blended cements. One example of a mineral component is calcined clay.

Alternative raw materials (ARMs) replace the natural raw materials needed to produce clinker, such as limestone and clay. The use of ARMs allows Holcim to reduce the consumption of natural resources and its process CO<sub>2</sub> emissions. ARMs used by Holcim include waste materials from our own plants and byproducts from other industries, such as cement kiln dust, construction & demolition waste, refractory bricks, fly ash, etc.

*Bruins Warrior Arena, Massachusetts, US, built with Artevia, helping achieve LEED certification by the US Green Building Council*

### THERMAL SUBSTITUTION RATE

Taking a circular approach, we will reduce the carbon intensity of our cement by substituting fossil fuels with pretreated non-recyclable and biomass waste fuels to operate our cement kilns.

Preparing, recovering and recycling fuels and materials in our processes enables us to divert waste from landfill and improve the waste management hierarchy at the local level.

To increase this thermal substitution rate, we will be investing in co-processing facilities and process improvements. We aim to increase our thermal substitution rate from 21.3% currently to 37% by 2030 and reach a global performance of 70% by 2050.

### CCUS AND OTHER TECHNOLOGIES

Carbon capture technologies play an essential role in combating climate change and delivering our net-zero journey beyond 2030. To develop blueprints for large-scale deployments of CCUS solutions in transformational sectors, Holcim is partnering with leaders in a range of sectors.

#### DID YOU KNOW?

##### RETZNEI, A LEADER IN ALTERNATIVE FUELS

Heating our kilns with pretreated waste and other alternative fuels is key in reducing our carbon footprint. We recover energy and recycle minerals from waste treatment during the manufacture of cement in a process called “co-processing”.

Our Retznei plant is a champion in this area. It can run with virtually no traditional fuels used to heat the kiln, leading to negative fuel costs. This year, the plant achieved an annual average thermal substitution rate of 97%, running at 100% thermal substitution rate for 86% of the production days.

The plant is equipped to treat waste streams of different qualities that are then fed into the system, ensuring consistent temperatures to comply with quality requirements.

The added benefit of co-processing is that the entire waste input is recycled or recovered without producing any additional residue. Retznei is one of our star achievers, but to achieve our carbon footprint reduction we need to go further. Co-processing is a scalable solution that we are rolling out across the globe with our Geocycle business, which is already operating in 50 countries worldwide.

Today in the European Union (EU), more than half of our plants operate with a 50% alternative fuels, and one third run with 70%.

#### DID YOU KNOW?

##### HOLCIM, A WORLD LEADER IN RECYCLING

Holcim recycled 54 million tons of materials in 2021, up by 17% compared to prior year. It includes 6.6 million tons of construction & demolition waste, representing more than 1,000 trucks per day, advancing its goal to reach 10 million tons of construction & demolition waste by 2025. Our goal is to recycle 100 million tons by 2030. Circularity is at the heart of our net-zero journey driving the following key decarbonization levers:

**Recycling construction & demolition waste to build new from the old**, we recycle construction & demolition waste, as a source of low emission raw materials for new green building products, such as our ECOPlanet range, including Susteno, the world's first green cement with 20% rubble inside. With global construction waste expected to grow to 2.2 billion tons by 2025, we are scaling up our capacity to recycle 100% of concrete-based construction & demolition waste into our green building materials.

**Designing low-carbon building materials** with recycled content inside, ranging from desulfo-gypsum to slag or fly ash.

**Powering our plants with alternative energy** coming from waste at the end of its life cycle.

### ACCELERATING GREEN GROWTH: SCALING UP CIRCULAR CONSTRUCTION

**+17%**

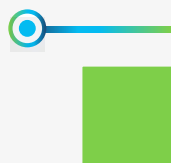
waste recycled increase in 2021

**6.6Mt**

of Construction & Demolition Waste recycled into new products (>1,000 truckloads per day)

Our ECOPlanet green cement range includes the world's first cement with 20% construction & demolition waste inside, launched in Switzerland, Susteno.

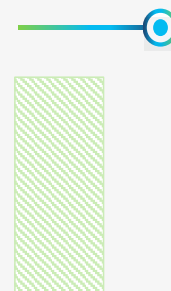
2020  
46 MT



2021  
54 MT



Target 2030  
100 MT



**ECOPlanet**  
The Green Cement



**Susteno**

## 02. OUR NET-ZERO JOURNEY

CONTINUED

# SCOPE 2 GOALS

Scope 2 emissions account for 5% of our carbon footprint. They include indirect emissions from the generation of purchased electricity consumed in owned or controlled equipment.



### OUR SCOPE 2 LEVERS



#### ENERGY EFFICIENCY

Reduction of our electrical consumption



#### WASTE HEAT RECOVERY (WHR) SYSTEMS

Installation of new WHR systems



#### POWER PURCHASE AGREEMENTS (PPAs)

Electricity consumption from local decarbonized PPAs or contracts



#### GRID EVOLUTION

Progressive integration of low-carbon sources in the grid to smartly source decarbonized electricity where commercially feasible

### HARNESSING WIND POWER FOR OUR PLANTS

At our Paulding plant in the US, we've installed three wind turbines to supply clean wind power for the electric needs of our plant, eliminating the equivalent of 9,000 tons of CO<sub>2</sub> per year.

Paulding is just one Holcim plant using renewable sources of energy for electricity consumption.

Altogether, renewables deliver about 8 million gigajoules of electricity to our cement plants, eliminating the emissions of over 1 million tons of CO<sub>2</sub> annually.

This shift to clean energy comes on top of the plant's commitment to heat its operations with 95% of alternative fuels.





#### **DID YOU KNOW?**

#### **REDUCING SCOPE 2 EMISSIONS IN INDIA**

Holcim is investing CHF 100 million in Waste Heat Recovery (WHR) systems in India to advance its net-zero journey.

This investment across six sites will be completed in 2022, doubling Holcim's waste heat recovery systems, which use thermal heat to produce decarbonized electricity.

Installed power will amount to 85 MW with an expected generation of 650 GWh, representing 15% of its Indian business' consumption.

WHR allows us to generate up to 30% of the cement plant's power consumption from the excess heat coming from its production process. This decarbonized energy system reduces both Scope 1 and Scope 2 emissions.

#### **WASTE HEAT RECOVERY**

We have waste heat recovery programs in place designed to use excess heat from cement kilns to generate electricity. We currently operate eight waste heat recovery units in four countries, with a clear plan to triple the number by 2030.

#### **DECARBONIZING POWER SUPPLY WITH RENEWABLE ENERGY**

We will continue to expand our renewable energy portfolio by collaborating with power producers, generating renewable energy on our land by installing wind and solar farms.

A range of solar and wind projects are already operational in our sites in the US and India, as well as, for example, contracts with offsite renewable generators in Argentina covering typically between 20 and 30% of the plants' consumption.

In 2021, Holcim entered into Power Purchase Agreements with decarbonized power generators in several countries for a supply of around 500 GWh of renewable energy to power our operations.

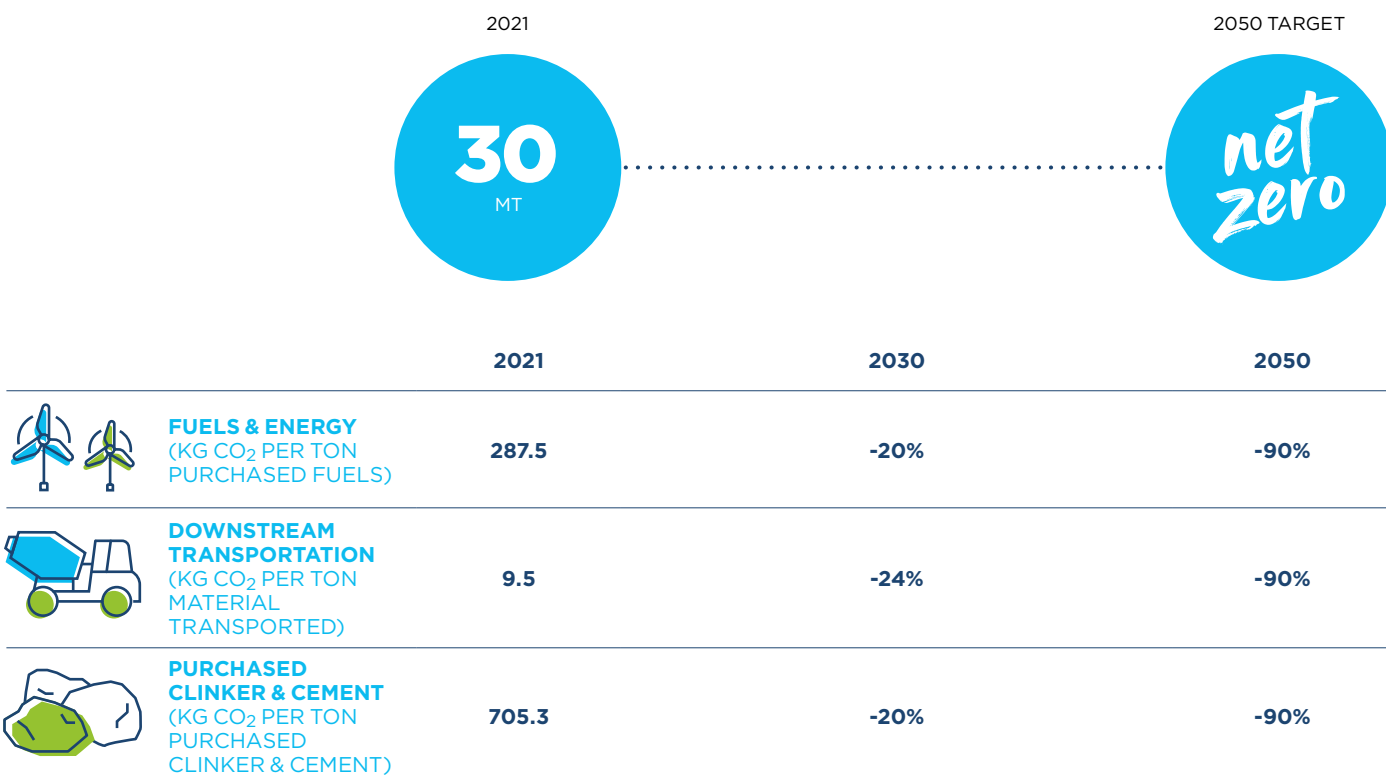
*GE Renewable Energy, COBOD and Holcim co-develop record-tall wind turbine towers with 3D-printed concrete bases reaching record heights up to 200 meters*

## 02. OUR NET-ZERO JOURNEY

CONTINUED

# SCOPE 3 GOALS

Scope 3 emissions account for 20% of our carbon footprint. They include all other indirect emissions generated in our supply chain, such as those from transportation. Our Scope 3 intermediate targets have also been validated by SBTi, marking a new milestone in our industry.



In 2020, we deployed a comprehensive approach to measure the CO<sub>2</sub> emissions from our supply chain. We took this step because we are committed to a rigorous and science-based approach for measuring and reducing our CO<sub>2</sub> emissions, starting with the purchase of clinker and cement, fuels and downstream transportation. These categories account for 75% of our total Scope 3 emissions. The 2020 baseline is a solid foundation based on which we set our 2030 actionable targets, as part of our net-zero journey.



	CO <sub>2</sub>		
UPSTREAM ACTIVITIES	<b>FUELS AND ENERGY</b>	7.4 MT	25%
	<b>CLINKER AND CEMENT PURCHASED</b>	5.9 MT	20%
	<b>BULK MATERIALS</b>	3.9 MT	13%
	<b>SLAG</b>	1.4 MT	5%
	<b>CHEMICALS</b>	0.5 MT	2%
	<b>INBOUND LOGISTICS</b>	1.8 MT	6%
	<b>EQUIPMENT</b>	0.8 MT	3%
	<b>OTHER PURCHASES</b>	1.0 MT	3%
	<b>BUSINESS TRAVEL AND COMMUTING</b>	0.1 MT	<1%
	OWN OPERATIONS		

### DOWNSTREAM TRANSPORTATION

The CO<sub>2</sub> emissions from transporting our materials (to customers, between factories and distribution terminals) account for 23% of our total Scope 3 emissions. We travel approximately 2 billion kilometers by road per year to transport our products, with approximately 95% of these trucks owned and operated by third parties. To reduce emissions from downstream transportation we are taking the following actions:

- optimizing routes and loads
- moving volumes from road to waterways or rail
- training and monitoring drivers' behaviors to increase road safety and reduce fuel consumption
- gradually replacing diesel with eco-friendly fuels.

### FUELS AND ENERGY

The "cradle-to-gate" emissions related to purchased fuels and energy account for 25% of our total Scope 3 emissions.

The main source of emissions is derived from the extraction, processing and transportation of fossil fuels. To reduce emissions in this category we are working on replacing traditional fossil fuels with locally sourced, alternative and non-extractive fuels derived from waste.

### PURCHASED CLINKER AND CEMENT

Emissions from purchased clinker and cement account for 20% of our total Scope 3 emissions. Our actions to reduce emissions in this category are aligned with the work we do at the sector level to drive down the CO<sub>2</sub> footprint of our sector's operations and products. In addition, we are introducing a requirement that our clinker and cement suppliers provide the CO<sub>2</sub> information related to their products, for example, through Environmental Product Declarations (EPDs), to enable informed decisions and accelerate the purchase of low-carbon products.

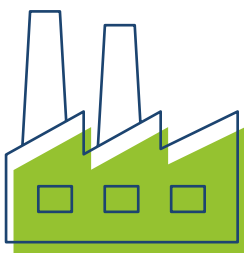
### OTHER PRODUCTS AND SERVICES PURCHASED

All other products and services purchased account for approximately 32% of our total Scope 3 emissions. We expect reductions from including CO<sub>2</sub> requirements in the tendering process and integrating CO<sub>2</sub> as a parameter in the "Total Cost of Ownership" models used to drive purchasing decisions. We also expect CO<sub>2</sub> reductions from innovation and partnerships with suppliers of global categories. For example, we piloted our industry's first autonomous electric haulers in a quarry in Switzerland. This technology, which will eliminate the use of carbon-intensive fuels to power heavy mobile equipment, will reduce CO<sub>2</sub> emissions in quarries by up to 85% and enhance operational safety.

## FIRST MOVERS COALITION

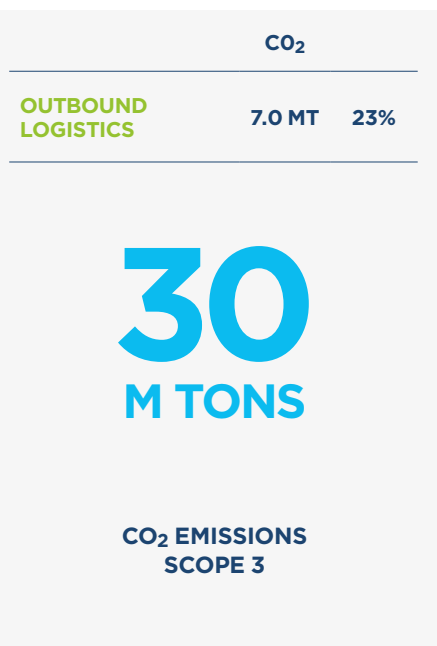
Holcim joined the First Movers Coalition (FMC) as a founding member to drive more green demand and low-carbon technologies to advance our world's climate goals. On the green procurement side, Holcim committed to FMC's trucking ambition of reaching 30% of zero-emission heavy-duty truck purchases or contracts by 2030. On the supply side, Holcim will continue to scale up its green building solutions and next-generation technologies for net-zero construction.

These commitments build on Holcim's industry-first 2050 net-zero goals, validated by the SBTi. The FMC was launched at COP26 by Secretary John Kerry, US Special Presidential Envoy for Climate, and the World Economic Forum (WEF).



SCOPE 1 & 2

DOWNSTREAM ACTIVITIES



### DID YOU KNOW?

**SINCE 2017, WE HAVE OPERATED OUR TRANSPORT ANALYTICS CENTER, AN INDUSTRY-LEADING DIGITAL LOGISTICS PLATFORM POWERED BY ARTIFICIAL INTELLIGENCE**

We developed this data-driven digital platform to become more efficient, safer and reduce CO<sub>2</sub> from our transportation activities.

It is deployed in 55 countries worldwide, covering 1.7 billion kilometers each year, with real-time tracking systems in more than 90,000 trucks. This state-of-the-art data-driven technology allows us to optimize truck utilization, routes and driver behavior.

Through it, we can calculate real-time CO<sub>2</sub> emissions for every single trip.

# 03. DECARBONIZING THE BUILT ENVIRONMENT

Working toward a net-zero built environment, we play an essential role across a building's entire life cycle.

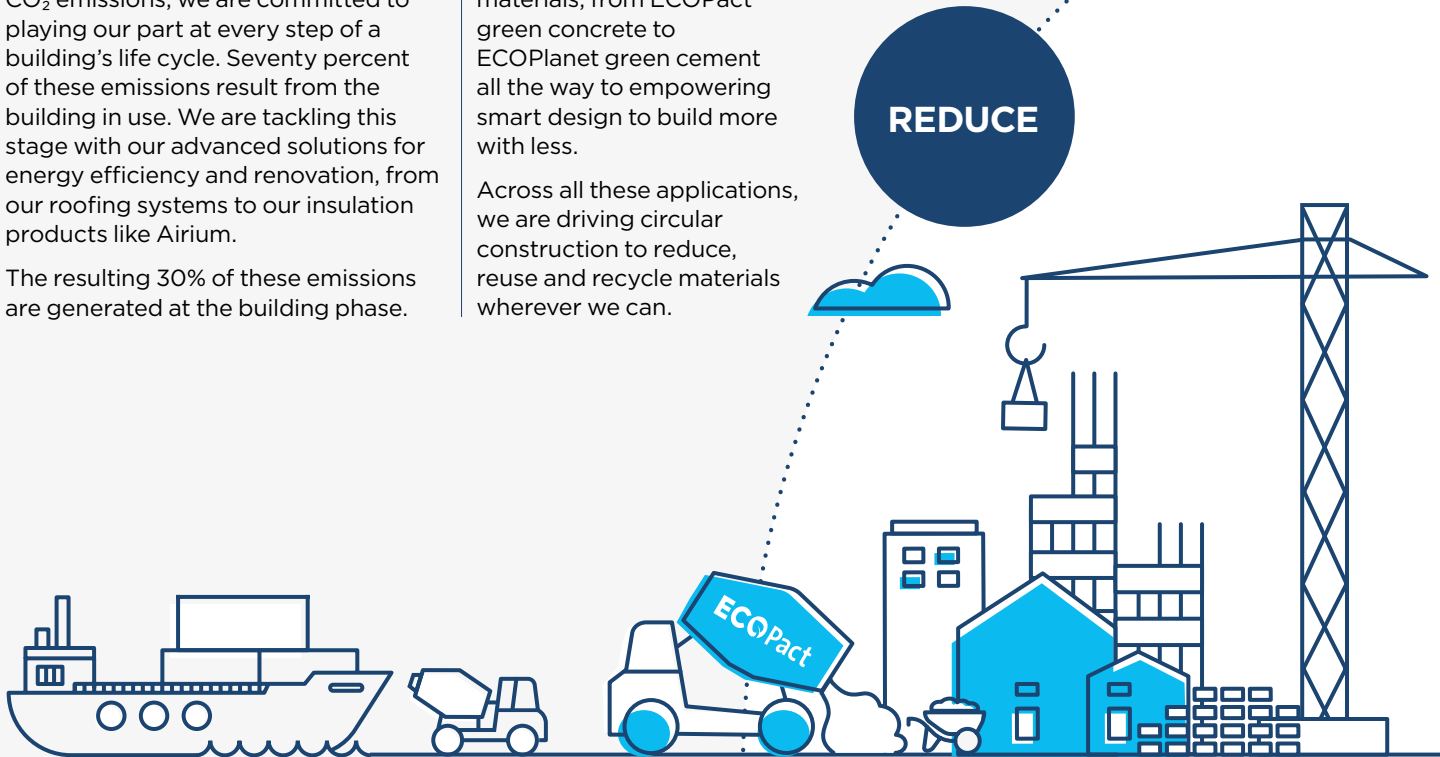
With the construction sector representing 38% of the world's global CO<sub>2</sub> emissions, we are committed to playing our part at every step of a building's life cycle. Seventy percent of these emissions result from the building in use. We are tackling this stage with our advanced solutions for energy efficiency and renovation, from our roofing systems to our insulation products like Airium.

The resulting 30% of these emissions are generated at the building phase.

We are actively addressing this with our low-carbon materials, from ECOPact green concrete to ECOPlanet green cement all the way to empowering smart design to build more with less.

Across all these applications, we are driving circular construction to reduce, reuse and recycle materials wherever we can.

CIRCULAR



## UPSTREAM AND DOWNSTREAM

SUPPLIERS

FUEL

## BUILDING MATERIALS

LOW-CARBON MATERIALS

**ECOPact** **ECOPlanet**

CIRCULAR ECONOMY

**Aggneo**

SMART DESIGN

**DYNAMax**

**TECTOR**  
3D BUILD



REUSE

CONSTRUCTION

RECYCLE



### BUILDINGS IN USE

ENERGY EFFICIENCY FROM FOUNDATION TO ROOFTOP



BUILDINGS ACCOUNT FOR

38%

of the world's CO<sub>2</sub> emissions

30%

are linked to building materials

70%

comes from buildings in use

### 03. DECARBONIZING THE BUILT ENVIRONMENT CONTINUED

#### MAKING BUILDINGS SMARTER

We are making buildings more energy efficient and smarter in use from our advanced roofing systems to our specialty building solutions.

Holcim is becoming a global leader in roofing systems with the milestone acquisitions of Firestone Building Products and Malarkey Roofing Products, cutting across residential and commercial applications.

Firestone Building Products adds more functionality into buildings with its advanced roofing and waterproofing solutions. For instance, the reflective technology in its white TPO, EPDM and Asphalt roofing systems keeps buildings cooler in high heat periods, making buildings more energy efficient. Its green roofs play a key role in combating smog and the urban heat island effect as vegetation naturally contributes to reducing urban temperatures.

Its systems enabling solar roofs contribute to powering buildings with renewable energy in a self-sufficient way. This system was deployed in Apple's headquarters in Cupertino, California, a leading building from a sustainability and circularity perspective.

There is nothing more sustainable than enhancing and improving an existing building through re-roofing. The roof is a building's first defense in keeping the building air- and water-tight as well as energy efficient. Within Firestone building products, re-roofing constitutes over 60% of our business. We work with building owners and specifiers to choose the right roofing system that can enhance their existing building performance, saving energy as well prolonging a building's life. In addition, our Gaco range of liquid applied membranes offers premium waterproofing solutions for roofing applications, for both small repair or

full coating of roofs. Building on Gaco's success in North America, Holcim is rolling out in scale its GacoFlex TechnoProtec waterproofing solutions throughout Latin America.

GacoFlex TechnoProtec is currently available across Holcim's Disensa retail network in Latin America, from Mexico to Colombia, and Ecuador to Argentina.



*Apple Park, Cupertino, US, is built with Firestone EPDM enabling its solar roof*





## FIRESTONE GREEN ROOFING: BRINGING NATURE INTO CITIES

As urbanization increases, we are experiencing a decrease in vegetation areas – that is set to continue with ongoing migration trends to urban centers. A result of urbanization is both a loss of vegetation and biodiversity, and an increase of heat-absorbing surfaces such as roofs and pavement.

A scenario experienced across continents is the urban heat island effect of higher temperatures in urban areas due to man-made surfaces absorbing more solar radiation. The resulting higher temperatures require more energy for cooling.

One of the key levers for mitigating the urban heat island effect is increasing the vegetated area of cities and urban centers. Trees and vegetation naturally absorb CO<sub>2</sub>, which means greener cities not only reduce emissions but also capture and store carbon emitted elsewhere.

*We provide solutions to bring nature into the built environment through our green roofing systems that are modular and circular in design.*

Our Firestone Roofing Products provide solutions that prevent vegetation from degrading structures by stopping roots from damaging buildings. Our protective membranes allow for intensive vegetated roofs that use complex ecosystems with trees, plants and irrigation. We also provide a modular reusable system for extensive vegetation with our skyscraper vegetated roof made from recycled materials.

Holcim's products, including cement, concrete, waterproofing and insulating systems, allow buildings with vertical forests and green walls to be part of cities and reduce temperatures for outdoor and indoor spaces.

*Les Trèfles School, Belgium, is built with Firestone's UltraPly TPO roofing system*

## DID YOU KNOW?

### GREEN ROOFS AND WALLS

Green roofs and green walls are vegetated surfaces of buildings that can reduce temperatures for outdoor spaces, helping to reduce the urban heat island effect in urban environments and also directly lower the indoor temperature.

The vegetation efficiently absorbs heat from the sun, which reduces the internal temperature of a building and lowers the energy consumption by up to

# 30%

during peak periods<sup>4</sup>

<sup>4</sup> Vertical Green Systems for energy saving in buildings. Perez et al. 2014

### 03. DECARBONIZING THE BUILT ENVIRONMENT CONTINUED



#### **MALARKEY ROOFING PRODUCTS: GREEN CIRCLE CERTIFIED**

Holcim welcomed Malarkey Roofing Products into its family this year to advance its leadership in sustainable and innovative roofing.

All Malarkey's shingles are green circle certified for containing smog-reducing technology and upcycled materials inside. With these properties Malarkey shingles have proven to be more durable, longer lasting and with a lower environmental impact.

#### **EACH MALARKEY ROOF HAS THE SMOG-FIGHTING POTENTIAL OF TWO TREES**

With air quality being a concern for all of us, Malarkey launched the industry's first smog-reducing shingles. This clean air technology reduces air pollution while releasing oxygen, making the average Malarkey residential roof work like the equivalent of two trees standing tall in your yard.

#### **MALARKEY ROOFS ADVANCE CIRCULAR CONSTRUCTION**

Continuously advancing its leadership in sustainability, each Malarkey roof contains recycled tires and plastic bags that improve their shingles' strength, durability and impact resistance while reducing landfill waste. Each average-sized roof upcycles the equivalent of about five rubber tires and 3,200 plastic bags in its shingles.

With its manufacturing and distribution footprint across North America, Malarkey Roofing Products are featured in a range of premium projects such as the Island House Hotel on Mackinac Island, Michigan, which won the Bronze Award from the Asphalt Roofing Manufacturers Association for the lasting protection offered to the historic property.





### **PRB GROUP: EXTENDING THE LIFESPAN OF BUILDINGS**

The best CO<sub>2</sub> reduction lever is the one that doesn't need to happen.

This is why extending the life of buildings and infrastructure is so important. We are expanding our range of specialty building solutions to address the renovation needs of buildings. For instance, we recently announced the acquisition of the PRB Group, France's biggest independent manufacturer of specialty building solutions and a key player in its high growth repair and refurbishment market.

With its leadership in sustainability and eco-design, PRB Group is a leading partner to support France's new regulation (RE2020) advancing energy-efficiency in buildings.

Other examples of Holcim's renovation offering include our Ultra-High Performance Concrete Ductal, which is used in overlay applications for bridge and road repairs. Airium insulation is sprayed in attics and roof cavities, and our Tector building specialty solutions are used for interior and exterior refurbishments.

### 03. DECARBONIZING THE BUILT ENVIRONMENT CONTINUED

Holcim is empowering smart design to build more with less with innovative technologies, from 3D printing powered by digital computational design to wireless sensors and Building Information Management (BIM) systems.

#### **BUILDING 4.0: BUILD MORE WITH LESS**

Advances in technology have impacted the way many industries operate in the past decades, with the manufacturing and telecommunication sectors undergoing transformations in how they operate.

Commonly referred to as Industry 4.0, a suite of digital, connected hardware and systems have allowed rapid advances in both products and services. Adapting Industry 4.0 technologies to the construction industry has the potential to decarbonize the built environment by building more efficient buildings with fewer resources.

*Miro, the BREEAM-excellence certified office complex in Bucharest built with DYNAMax, the Ultimate Performance Concrete*



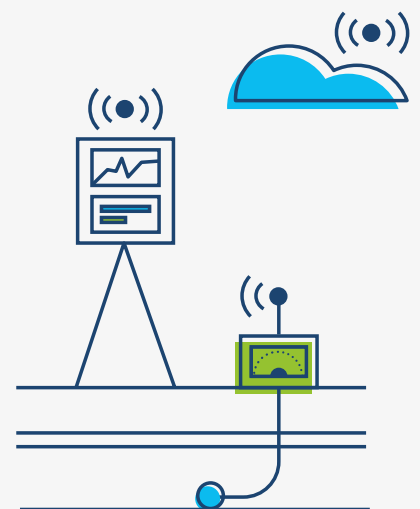
### WIRELESS SENSORS

We are deploying sensor technologies that significantly reduce the carbon footprint of our building materials. These are connected via a wireless network to cloud-based servers that relay data in real time to customers and Holcim's concrete team.

This point of placement data allows both customers and Holcim to make informed decisions to optimize products. Holcim supplied concrete to the Eglinton Light Rail Transit project in Toronto, Canada, where sensors were used to provide data on curing conditions that gave confidence in the representative strength results for concrete that was specifically designed for the project with a low carbon footprint. The project saved around 130,000 tons of CO<sub>2</sub> emissions.

# 130k

tons of CO<sub>2</sub> emissions saved by wireless sensors





## 3D PRINTING: STRIATUS

In July 2021, we launched StriatuS, the first-of-its-kind 3D concrete printed bridge, at the Venice Architecture Biennale. Designed by Zaha Hadid Architects and ETH's Block Research Group in collaboration with incremental 3D, it was made possible by Holcim's proprietary ink, TectorPrint. It establishes a new language for concrete that is digital, environmentally advanced and circular by design.

The structure is composed of 3D concrete printed blocks that stand together solely through compression, with no reinforcements, no mortar and no binders, applying computational design and 3D printing for minimal material use and maximum strength. All the blocks are entirely recyclable.

*StriatuS, the first of its kind 3D concrete printed bridge in Venice is built with TectorPrint, Venice @ Studio NAARO*

### DID YOU KNOW? BUILDING INFORMATION MODELING (BIM)

The digital built environment, which includes the data, cost, time and material properties in a representative model, allows the computational review, modification and collaboration at a fraction of the cost. BIM gives a platform to interrogate and optimize the digital built environment through conventional human-centric design and advanced computational tools at an early design stage where all stakeholders can collaborate.

Using integrated GHG Life Cycle Assessment data and designing for seasonal effects, geotechnical and structural requirements and occupant-use patterns allows designers to find the lowest carbon footprint, optimal occupant use and most economical design before construction begins.

Refurbishment of existing buildings, instead of new buildings, can be done much more efficiently using existing BIM environments to investigate, redesign and reuse of materials in the growing adoption of circularity.

### ENVIRONMENTAL PRODUCT DECLARATION (EPD)

The increased focus on climate change and global warming has highlighted the importance of reducing GHG emissions attributed to the built environment. This scrutiny has highlighted the importance of using LCA tools to quantify the impact of materials, products and buildings with particular focus on CO<sub>2</sub>. Life Cycle Assessment requires credible and accurate data to quantify the total carbon footprint of projects. EPDs allow designers to make informed decisions on which materials give the best overall outcome for each project. EPDs are a publicly disclosed, scientifically quantified and recognized communication of the CO<sub>2</sub> generated by a product across Scope 1, 2 and 3 following a standardized reporting method. The tool provides transparency to all stakeholders in the value chain, which encourages informed consumer behaviors that help decarbonize the built environment.

Accurate and available mass data is crucial to the built environment value chain for the assessment of the whole life carbon footprint of projects to meet net-zero commitments. The application of data associated with the carbon footprint of buildings and materials at the early stage of design allows decisions to be made that facilitate the decarbonization of the built environment.

## RAIL FACILITY - NEW SOUTH WALES, AUSTRALIA

Holcim developed an EPD for concrete that was supplied to the project to assist with the customer's sustainability requirements. The concrete supplied reduced emissions by over 30% in comparison to the local benchmark and forecast to save 1.5 million kg of CO<sub>2</sub> during the project.

The EPD for the concrete gave transparent, credible and verified information to the customer, allowing reduced carbon impact through informed decisions. More projects can profit in the future from Holcim Australia's ability to produce concrete EPDs on demand.

### 03. DECARBONIZING THE BUILT ENVIRONMENT

CONTINUED

#### DID YOU KNOW?

**GLOBALLY, CONCRETE ACCOUNTS FOR 9% OF CO<sub>2</sub> EMISSIONS IN BUILDINGS OVER THEIR LIFE CYCLE**

70% of a building's emissions comes from the energy used to power, heat and cool over its lifetime.<sup>5</sup>

Designing for energy efficiency using high-performing materials and technologies is key to decarbonizing the built environment.<sup>6</sup> Concrete's thermal mass naturally captures and regulates temperature, thus helping reduce the energy demand for heating and cooling buildings.

Holcim's high-performance thermal insulation products, including our Airium and Firestone's insulation systems, help to improve the energy efficiency of buildings.

#### CARBON-EFFICIENT CONSTRUCTION

Smart design and material usage at the beginning of a construction project can reduce the carbon footprint of a building and provide a pathway to net-zero buildings.

Holcim uses solutions that help reduce emissions during the construction and life of a building. Its products improve the energy efficiency of buildings through improved temperature regulation that reduces emissions from heating and cooling.

# 70%

of a building's emissions comes from the energy used to power, heat and cool over its lifetime.<sup>5</sup>

*Thammasat University Rooftop Farm (TURF), Asia's largest rooftop farm, is built with Firestone's UltraPly TPO 1.5mm-20,000m<sup>2</sup> green roof in Thailand*

5 Global Alliance for Buildings and Construction, 2020

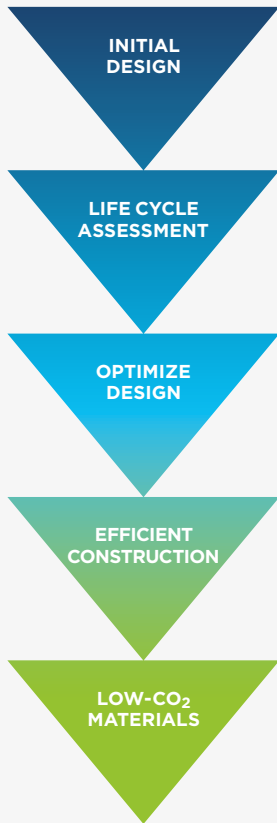
Global status report for buildings and construction

6 International Energy Agency - Tracking Buildings 2020





# DÜSSELDORF BUILDING

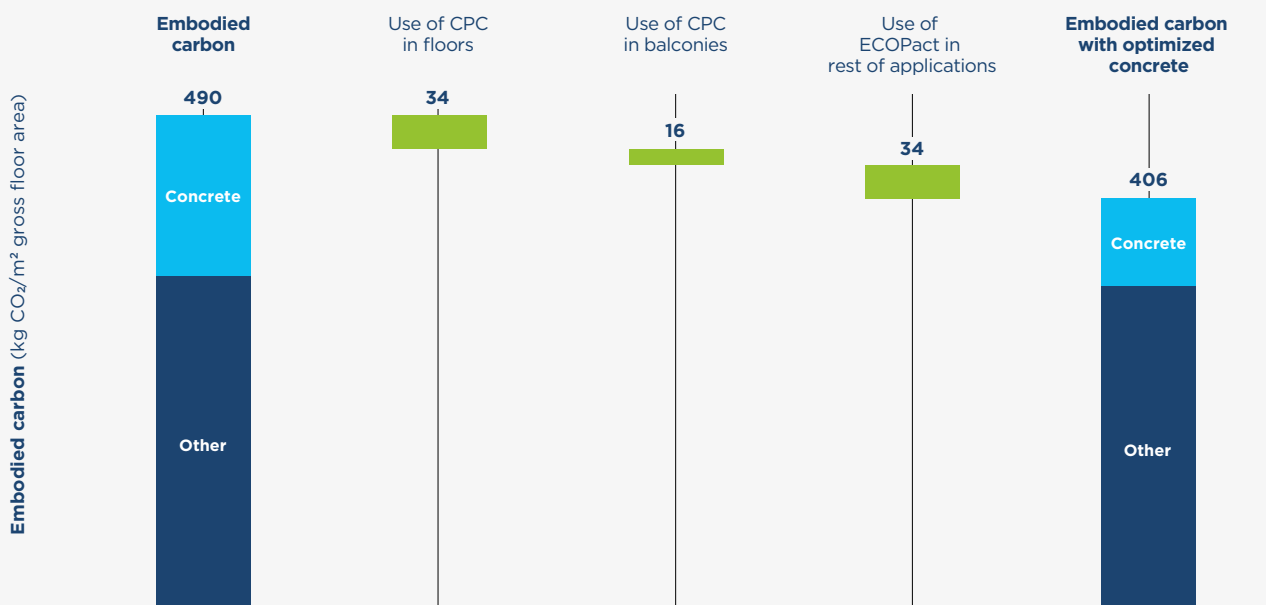


Holcim engaged an independent engineering firm to identify options for reducing emissions created during the construction and maintenance of a building. A Whole Building Life Cycle Assessment (WBLCA) was completed at the initial design stage of a typical multi-residential building in Düsseldorf, Germany.



The WBLCA quantified the operational and embodied carbon values of the building using available data from sources including EPDs, which enabled the identification of reduction opportunities. Replacing materials with ECOPact low-carbon concrete and carbon prestressed concrete (CPC) slabs enabled a 17% reduction in the total embodied carbon of the building.

The World Green Building Council states that building and construction emissions must be halved by 2030.<sup>7</sup> That represents a 5% yearly reduction in how we currently design and construct the built environment. This project shows it is possible to reduce a building's total carbon footprint by 17% through the use of concrete in optimized design, construction and materials.



7 World Green Building Council - Advancing net-zero Whole Life Carbon

# 04. NET-ZERO CONCRETE

An aerial photograph of a modern building with a prominent green roof. The roof is densely packed with various types of plants, including large ferns and broad-leafed shrubs. Several people are seen walking on the ground level of the building, which has a light-colored, possibly concrete, surface. The overall scene is vibrant and green, contrasting with the urban environment.

Concrete is the most-consumed man-made product in the world. We are making it net-zero to build a world that works for people and the planet.



Concrete is the building material for a growing, urbanizing world. No other material matches its performance benefits. It is resilient, protecting our cities and infrastructure from natural disasters such as effects from flooding. It is durable, fire and earthquake-resistant, versatile, affordable, insulating and available everywhere. It is infinitely recyclable and, with our green concrete, we are making it low carbon. Acting as a carbon sink, it reabsorbs CO<sub>2</sub> emitted in its production throughout its lifespan.

**ECOPACT: THE INDUSTRY'S BROADEST RANGE OF GREEN CONCRETE**

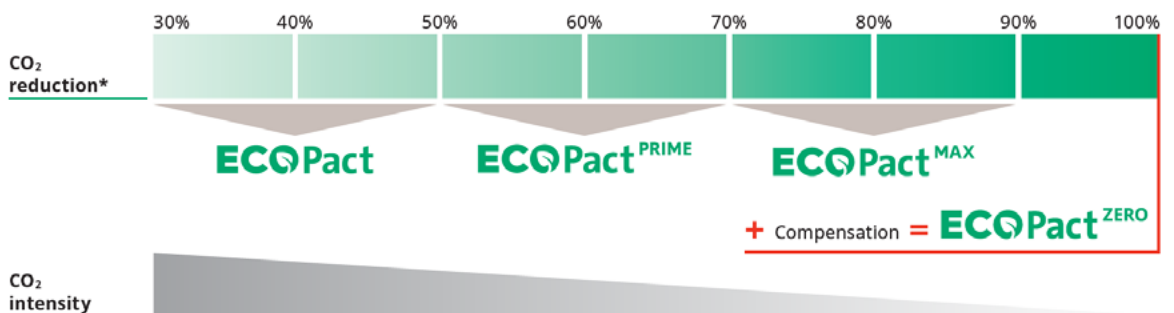
We are accelerating the transition to greener building with the launch of our green concrete ECOPact to enable carbon-neutral construction with no compromise in performance.

ECOPact is the industry's broadest range of green concrete, delivering high-performing, sustainable and circular benefits.

ECOPact green concrete is sold at a range of low-carbon levels, starting with a 30% lower carbon footprint compared to standard (CEM I) concrete. Its sustainability profile is driven by the use of low-emission raw materials and by decarbonizing its operations through, for example, the use of alternative fuels.

ECOPact also offers a carbon-neutral solution, ECOPact Zero, with the remaining emissions currently compensated through offsets as a transition mechanism to full carbon neutrality. Where regulatory conditions allow, ECOPact+ products integrate recycled construction and demolition materials, further closing the resource loop.

**Principal Offer**



CO<sub>2</sub> intensity

Each offer can be enhanced with the addition of recycled concrete aggregates

**ECOPact + - Range**

\*In comparison to a standard mix with CEM I / OPC

## 04. NET-ZERO CONCRETE CONTINUED

### VALUE TO CUSTOMERS

Assists in obtaining environmental certification for projects

Provides assurance of lower CO<sub>2</sub> footprint

Available and consistent across markets and countries

Lower Scope 3 emissions for our customers



Boston University US is built with ECOPact with 30% lower CO<sub>2</sub>

#### DID YOU KNOW?

#### CONCRETE ABSORBS CO<sub>2</sub> THROUGHOUT ITS LIFE CYCLE

In addition to the range of measures taken to reduce our carbon emissions, our final product, concrete, absorbs significant amounts of CO<sub>2</sub> from the atmosphere during its life cycle. This process is called “carbonation” and results from the reaction between the CO<sub>2</sub> present in the air with hydrated cement phases in concrete.

### NET-ZERO CONCRETE

Expanding its net-zero ambition, Holcim commits to the global production of carbon-neutral concrete by 2050.



Carbonation is a slow process that can last for many years and takes place not only in concrete surfaces exposed to CO<sub>2</sub> in the air but also in secondary products such as crushed concrete used as a base course for roads.

Recent studies demonstrate that more than 25% of the CO<sub>2</sub> emissions from the manufacturing of clinker can be reabsorbed by concrete structures and secondary concrete products. References to recarbonation have been highlighted in the IPCC sixth assessment report released in August 2021 “AR6 The Physical Science Basis”.

The impact of carbonation is an important parameter to be considered when comparing the carbon performance of different building materials over their life cycle. Calculation models of CO<sub>2</sub> uptake in concrete are complex and involve many different factors controlling the uptake.

These can include weather (rain and moisture), surface coatings, surfaces under water and soil, and the quality of concrete. Mortars for plastering or coating, fully recarbonate over a five-year period.

Current regulations and GHG inventories guidelines do not yet consider the effects of carbonation. Holcim continues to collaborate with industry peers and key stakeholders to incorporate this aspect into existing GHG inventory and LCA methodologies.

## ECOPACT GREEN CONCRETE MARKS FIRST ANNIVERSARY, ENABLING SUSTAINABLE CONSTRUCTION WORLDWIDE

ECOPact is now available in 25 markets, covering all five of Holcim’s global regions.

Holcim reached this milestone one year after ECOPact’s global rollout, a key pillar in the company’s net-zero journey.

Shortly after its first anniversary, ECOPact green concrete is now available globally in the following 25 markets: Argentina, Australia, Austria, Belgium, Bulgaria, East and West Canada, Colombia, Ecuador, El Salvador, France, Germany, Greece, India, Italy, Jordan, Mexico, Poland, Qatar, Romania, Serbia, Spain, Switzerland, the UK and the US.

Its success has been particularly strong in countries such as India, one of our biggest markets, where ECOPact grew to over 15% of Ready-Mix net sales by the end of 2021.

## ECOPACT GREEN CONCRETE IN THE LARGEST AFFORDABLE HOUSING PROJECT IN ECUADOR

Our Ready-Mix experts in Guayaquil, Ecuador, with support from the Polytechnic University of Littoral, provided ECOPact in a 1,200 unit housing development. The market demand for sustainable housing options, combined with the additional technical benefits in concrete performance met the needs of this demanding project.

The volume commitment for 2021 was 13,000 m<sup>3</sup> for concrete strengths between 18-28 MPa which is typical for this market segment. In total, thanks to ECOPact the project saved 1 million kg CO<sub>2</sub>.

*Affordable housing with ECOPact green concrete, Ecuador with 60% lower CO<sub>2</sub>*



# 05. PRODUCT AND PROCESS INNOVATION

To maintain our position at the forefront of green building solutions, 80% of our resources in innovation are dedicated to sustainability. Holcim Research & Development (R&D) is driven by our customers, who face today's major challenges: achieving energy efficiency, lowering the cost of construction, reducing environmental footprints, and meeting high standards of aesthetics, health, comfort and well-being.

## PLANTS OF TOMORROW

By future-proofing our industrial network, the "Plants of Tomorrow" will create connected, smart, carbon-neutral and energy-efficient sites. Addressing climate change will require the adoption of state-of-the-art, innovative approaches that include digital solutions to maximize clinker reactivity while using alternative materials and fuels and predict product quality. Digital innovations relevant to our climate and energy ambitions include:

### Smart online digital control solutions:

Near-infrared spectroscopy, a digital online control technology, can be used to analyze alternative fuel properties during feeding and compensate for quality variations in real time using an optimal fuel mix. This solution increases the use of alternative fuels and therefore reduces CO<sub>2</sub> emissions.

**CemQ:** Predictive quality models use machine learning algorithms to correlate the quality of each production batch with the relevant production parameters while minimizing the clinker factor. This helps us produce less waste, identify problems early, lower CO<sub>2</sub> emissions and achieve energy savings.

## PARTNERSHIPS AND COLLABORATIONS

We work in a spirit of open innovation with more than 70 leading academic institutions around the world, from MIT and Swiss Federal Institute of Technology (ETH) to Yunnan and Madras universities, in fields ranging from materials science to civil engineering and sustainable construction.

Collaboration is key to innovation and differentiation. At Holcim, we foster an open innovation ecosystem, working with 600+ start-ups to accelerate the best and brightest ideas around the world. This includes Holcim Accelerator, which is an intensive six-month program dedicated to accelerating the growth of innovative companies and start-ups in the building industry. In collaboration with world-class corporate partners, the program offers unique access to high-level technical, market and entrepreneurial expertise.

# 70+

collaborations with universities

# 600+

interactions with start-ups

## DID YOU KNOW?

### 3D PRINTING HACKS

Holcim is calling on the world's brightest students to reinvent the building industry, alongside expert partners across the construction value chain.

Two hackathons have been organized over the past two years to gather the passion and energy of students and young practitioners in the fields of engineering, architecture and material science.

**The Zero Carbon Hack:** Nine competing teams had 48 hours to find solutions to reduce the embodied carbon of a building. Forty-four participants from 13 countries spent a weekend at our Innovation Center for an intense and fruitful competition with our internal experts and our partners.

**The 3D Printing Housing challenge:** mobilizing university teams over a six-month period to reinvent the design and the construction of a reference building with 3D Printing technologies. Sixty-six participants from 10 universities took up the challenge, along with academic mentors and business experts.



*The HiLo unit of the NEST research and innovation building in Switzerland is built with ECOPact green concrete in the lightweight floor system with 33% lower CO<sub>2</sub>*

# HOLCIM ACCELERATOR

## ACCELERATING SUSTAINABLE BUILDING WITH R&D

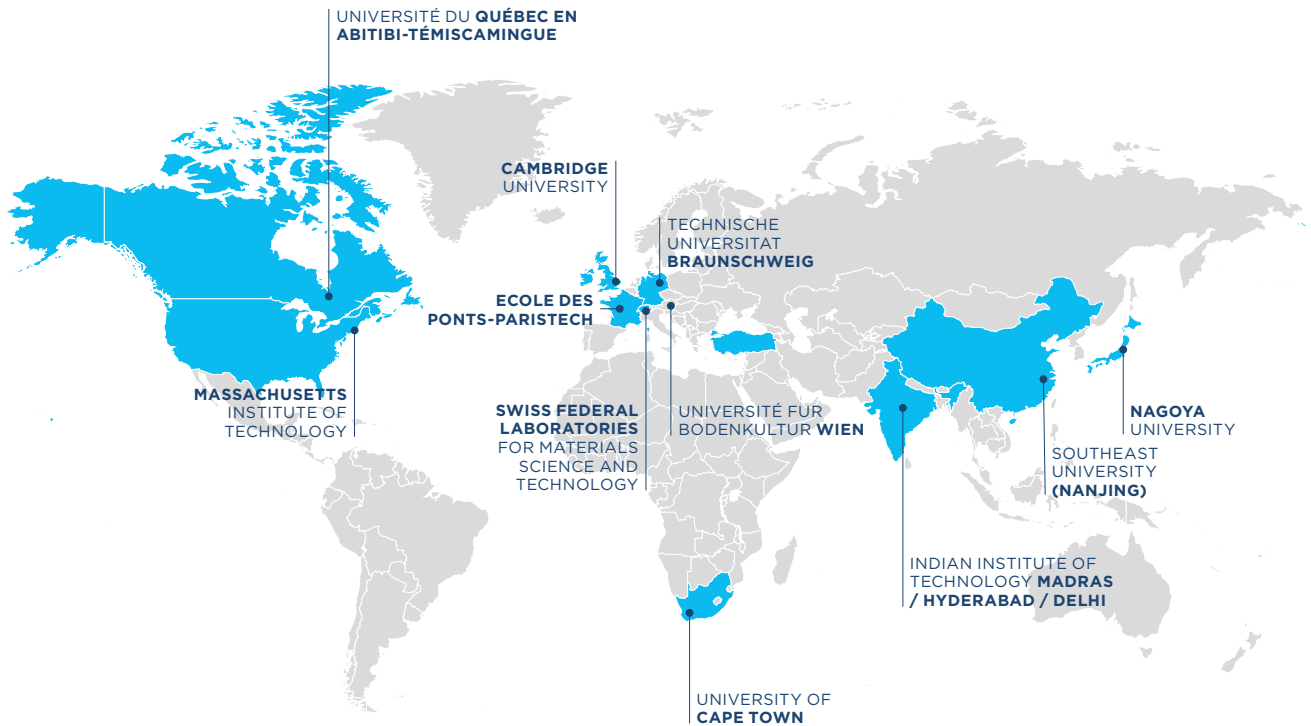
New solutions are helping us and our customers to support a more sustainable built environment. Our expertise in cement chemistry allows our R&D teams to design lower-carbon cements and partner with the world's most advanced start-ups.

### DID YOU KNOW? ACCELERATOR

Led by Holcim with support from world-class corporate partners since 2018, our start-up accelerator program offers a unique program to foster innovation collaboration along the construction value chain. With this program, Holcim provides selected start-ups with unique access to a powerful mix of business and technical expertise, across different markets and geographies.

In addition to our historical partner Sika, a specialty chemicals company, two new corporate partners join us for Season 3 (scheduled in 2021-2022): Mott McDonald, a renowned UK-based engineering consultancy company, and Bouygues Construction, a leading French-based construction company. This third edition is focused on carbon-efficient construction, taking us one step further in our mission to decarbonize the industry. The geographical reach of the program is also extended (compared to the first two seasons), with the onboarding of local teams from nine countries across Europe, North and South America, and Australia.

## SELECTED COLLABORATIONS WITH UNIVERSITIES



## 05. PRODUCT AND PROCESS INNOVATION

CONTINUED

### TECHNOLOGY PARTNERSHIPS IN ACTION

We partner for impact to advance next generation technologies from carbon capture utilization and storage (CCUS) all the way to inductive charging systems that use concrete as a driver of renewable energy.



### BREAKTHROUGH CARBON CAPTURE SOLUTIONS

We're working with Eni, the Italian energy company, to capture CO<sub>2</sub> from our plants into a mineral called olivine. Experts at our innovation center are exploring how carbonated olivine can then replace limestone as a low-emission raw material for our green cement.

### MAGMENT

We're partnering with German startup Magment to advance magnetizable concrete technology for road surfaces, enabling electric vehicles to recharge wirelessly while in motion. Known as "inductive charging," this breakthrough concrete-based solution reduces the need for charging stations, while saving time. Other applications under development include the electrification of industrial floors to recharge robots and forklifts as they work.





## COBOD

COBOD International is a globally leading 3D construction printing company, a self-identified disruptor of the construction industry and a Holcim partner for years. Together, we have been making headlines for breakthrough projects such as 3D-printed windmill tower bases, the world's first 3D-printed school, and most recently Africa's largest 3D-printed affordable housing project.



## TIMBERROC

We are partnering with CCB Greentech in France on a breakthrough solution, TimberRoc, that actually removes CO<sub>2</sub> from the atmosphere. TimberRoc combines timber with cement in a unique formulation to make carbon-negative concrete for precast applications.



## 05. PRODUCT AND PROCESS INNOVATION

CONTINUED

### 19 HOLCIM GREEN SOLUTIONS ENDORSED BY SOLAR IMPULSE FOUNDATION

Holcim is a member of the Solar Impulse Foundation, working with all its partners to make ecology drive our economy.

Nineteen of our building solutions have been labeled among the Foundation's "Efficient Solutions" endorsing products that are good for the planet in a financially viable way.

By scaling up the adoption of these solutions around the world we can accelerate the transition to net-zero.



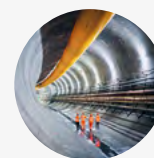
**ECOPACT**  
Green concrete



**ORIS**  
First digital platform for road design



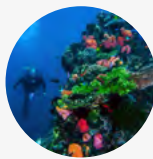
**AIRIUM**  
Insulating foam for energy efficiency



**TERRAFLOW**  
Green cement for efficient backfilling



**DURABRIC**  
Earth-based low-carbon solution for affordable housing



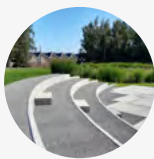
**ARTIFICIAL REEF**  
Bioactive concrete restoring marine ecosystems



**KAWACH**  
High-quality water-resistant cement



**AGGNEO**  
Recycled aggregates for circular building



**HYDROMEDIA**  
Permeable concrete



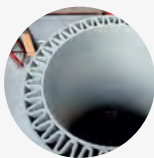
**THERMEDIA**  
Concrete solution reducing heat loss



**PLANET**  
Low-carbon cement bag



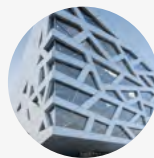
**GEOCYCLE PLANET**  
Socially driven waste collection for plastic neutrality



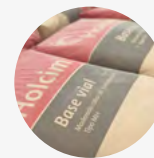
**3D PRINTING**  
Schools in Malawi - building more and faster with less



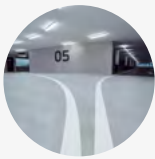
**CIRCULAR EXPLORER**  
Solar-powered catamaran that recovers plastic waste



**DUCTAL**  
Lightweight and Ultra-High Performance Concrete



**BASE VIAL**  
Cement for improved and stabilized soils

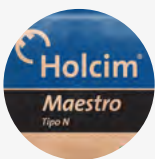


#### SUSTENO

Cement from processed mixed rubble from demolition projects



**ACC GOLD**  
Watershield cement



#### MAESTRO

Low-carbon cement designed for high-quality masonry jobs



## FASTCARB – ACCELERATED CARBONATION OF RECYCLED CONCRETE AGGREGATES

Construction & demolition waste can already be used to create new low-carbon building materials – particularly for aggregates, a key ingredient of concrete. But this recycled rubble made from old concrete is sometimes more porous. This means that it's typically used for applications in road sub-bases rather than concrete.

Our innovation teams set out to produce concrete made from 100% recarbonated recycled rubble. This creates concrete that is high performance and low carbon and paves the way to truly circular concrete.

FastCarb is a technology that creates improved recycled aggregates by adding CO<sub>2</sub> to the reused concrete. The CO<sub>2</sub> is captured from our own industrial processes and reacts with the reused concrete to create a coating that effectively seals the rubble. The result, high-performance 100% recycled aggregates, opens up a world of potential to be used in

other applications.

“The project is part of our quest to achieve carbon neutrality and create an economy that is truly circular,” says Xavier Guillot, Head of Product Certification and Standards, Holcim France. “The really smart part is that the concrete absorbs the CO<sub>2</sub> as part of the process, locking it inside the final product and helping to prevent its release into the atmosphere. The CO<sub>2</sub> can be sequestered from any nearby industrial source, for example a cement, coal or steel plant. This means that cement plants could actively reduce their own carbon emissions as well. It's a great example of the circular economy in practice.”

FastCarb is the outcome of a project partially funded by the French government. The technology has been created by Holcim and 21 academic and industrial partners. In 2021, the pilot was taken to the industrial testing stage at our site in Val d’Azergues, France with some great results: We discovered that the carbon footprint of concrete made with 100% carbonated recycled rubble could be reduced by up to 25%.

*Zurich North America's headquarters, which achieved LEED Platinum® certification and is built with our True Lite Lightweight Aggregate™ and NewCem® cement*

## 05. PRODUCT AND PROCESS INNOVATION

CONTINUED



### HYDROMEDIA

In cities, the ground is often impermeable, which poses a problem for evacuating surface water, recharging groundwater and accumulating heat for people, flora and fauna.

In Aubervilliers, France, the studio, Fieldwork Architecture, aimed to fight the urban heat island effect by providing the community with a quality public space that brought nature into the city.

The innovation of this project lies in the combination of the planting of different species of trees with the creation of a soil covered with Holcim's permeable concrete Hydromedia.

When it rains, water reaches the soil to create a useful reserve to nourish trees and prolong the cooling effect during periods of drought. Rainwater management is optimized and the natural water cycle, usually interrupted in the city, is recreated. Hydromedia also helps to prevent flooding, guaranteeing maximum drainage capacity (500–600 liters per square meter per minute), is 100% recyclable, low maintenance and easy to place.

Studies conducted over the summer revealed the combination of Hydromedia and the plants lowered the temperature by an average of 2.5°C, with a maximum decrease of 6°C at 1 pm.

*Lisière d'une Tierce Forêt is built with Hydromedia permeable concrete in Paris, France @Fieldwork Architecture*

We offer solutions for builders and homeowners that make the energy efficiency of their buildings higher and the energy costs lower. For example, with Airium, a mineral insulating foam technology, you can build and insulate at the same time. And with ISO GARD, from Firestone Building Products, you can increase the insulation of roofs.

### PATENTS

Holcim dedicates 80% of its innovation resources to green construction, and our cement process engineers in Holderbank, Switzerland, are dedicated to developing new low-carbon manufacturing processes. As a result, over 65% of Holcim patents relate to sustainable solutions, with the most recent focusing on low-carbon products, calcined clays and improved substitutes to traditional Portland clinker, as well as carbon capture and use from our cement plants. We have 176 patent families in our patent portfolio, balanced across our value chain.

With Firestone Building Products we are expanding our range of innovative and sustainable building solutions in key areas from advanced energy efficiency to renovation systems. With three innovation centers, over 40 patents filed in the last two years and more than 57,000 product approvals and certificates, Firestone continues to create cutting-edge sustainable roofing solutions.

# >80%

share of innovation resources dedicated to green construction

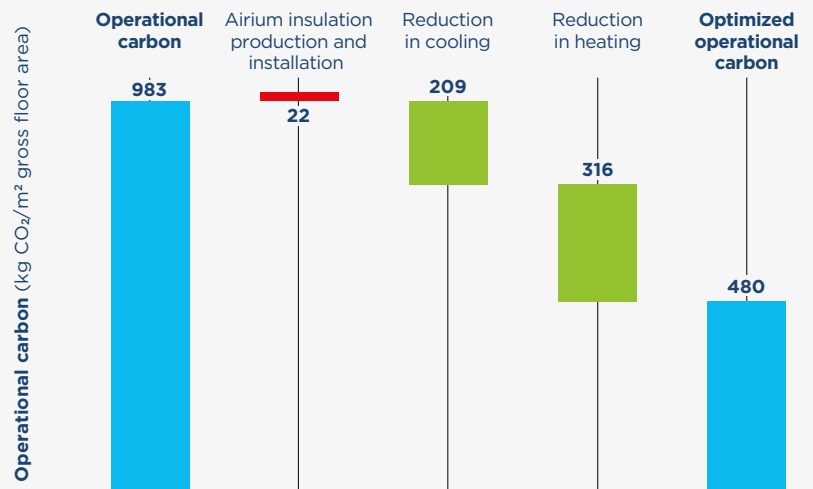
# >65%

share of patents related to sustainable solutions

## AIRIUM FOAM INSULATION

Algeria has extreme temperature variations throughout the country that require efficient thermal insulation to regulate indoor temperatures and reduce emissions related to heating and cooling. Currently only 15% of homes have adequate insulation, causing unnecessary energy-related emissions to be generated. Annually a typical single family household consumes around 100 kWh/m<sup>2</sup> in heating and cooling.

A life cycle assessment (LCA) was carried out to quantify the CO<sub>2</sub> benefits over a 30-year period from the thermal insulation of the roof of a typical single family house in Algiers using Airium insulation. Airium is a cement-based insulation that limits the need for insulation imports; in 2021, it received the Solar Impulse Foundation endorsement for efficient solutions. The use of Airium in the LCA resulted in a reduction of operational carbon of over 50%.



Note: Calculations are for a 107 m<sup>2</sup> house in Algiers, Algeria



**“Holcim’s Airium insulation reduced annual emissions related to heating and cooling by 50%. In just one year, Airium is able to save the CO<sub>2</sub> emissions produced during its production and installation.”**

# 06. OUR CCUS STRATEGY AND TECHNOLOGICAL PATHWAY

Next generation technologies such as CCUS will accelerate Holcim's decarbonization journey beyond 2030.

Carbon capture separates and concentrates CO<sub>2</sub> from industrial processes. The CO<sub>2</sub> can then be safely stored underground, recycled for applications such as fuels and chemicals, or even captured in concrete and mineral components (see FastCarb, page 37).

Carbon capture is a proven solution in other industries with large capture plants operating in all regions. Nevertheless, CCUS needs to be further developed and integrated into the cement process because CO<sub>2</sub> is directly emitted in cement manufacturing from raw materials that cannot be replaced at scale. To this end we are actively partnering with different organizations to make CCUS technically and economically feasible as well as driving in-house developments. Our objective is to create a portfolio of diverse and cost-effective solutions that can be multiplied across the Group to advance our decarbonization journey and create new growth opportunities for the company.

## KEY DECARBONIZATION TECHNOLOGIES FOR THE CEMENT INDUSTRY

There is no "one-type-fits-all" CCUS solution, as the options for the utilization and storage of CO<sub>2</sub> vary from one site to another, and the regulatory environment varies from one country to another.

To address this, we are developing a range of CCUS technologies to give us maximum flexibility across our global footprint.

**Post-combustion technologies** are one encouraging approach. These solutions capture CO<sub>2</sub> in the exhaust gas of a traditional kiln system at the "end of the pipe." The most advanced post-combustion solution is based on liquid solvents like amines, e.g. 30% monoethanolamine solution (MEA). The CO<sub>2</sub> in the exhaust gas is absorbed by the MEA solution, and the CO<sub>2</sub>-rich solvent is then sent to the regenerator where the CO<sub>2</sub> is released and captured in a concentrated form. The solvent is reused and reintroduced to the absorption column. Other interesting post-combustion approaches include CO<sub>2</sub> separation by membranes and adsorption or absorption processes.

# >30

projects with Holcim participation in CCUS worldwide

**Integrated processes** like oxyfuel, the electrification of clinker manufacturing or the calcination of raw materials are possible alternatives to pure post-combustion capture. We are currently engaged in various site-specific investigations to develop integrated concepts. In the oxyfuel approach, air for combustion in the cement manufacturing process is replaced by highly purified oxygen in order to prevent nitrogen in the system and receive a concentrated CO<sub>2</sub> exhaust stream. This solution shows potential advantages over amine-based approaches, in particular for full-scale applications and for new brownfield or greenfield cement plants, such as in projects like Westküste 100.

### DEVELOPING GROUNDBREAKING SOLUTIONS VIA PARTNERSHIPS

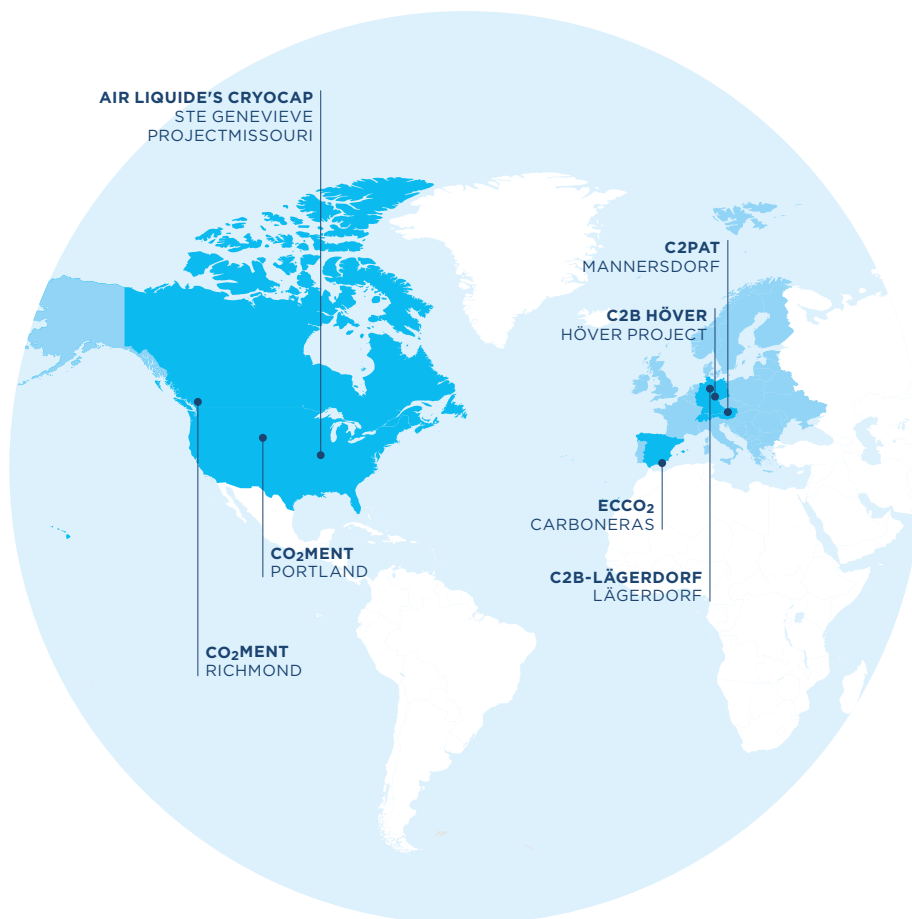
Strategic partnerships are key to speeding up the deployment of CCUS. Working with other multinationals and start-ups in Europe and North America, our 30 pilot projects are evaluated in terms of cost, technical feasibility, compatibility with CO<sub>2</sub> usage opportunities and other aspects of viability and scalability.

From repurposing CO<sub>2</sub> from our plants for use in greenhouses in Spain all the way to alternative fuel in Germany, our objective is to develop different solutions for use and storage that can be combined in different ways and environments.

### C2B-LÄGERDORF

CO<sub>2</sub> from the Holcim Lägerdorf plant in Germany will be transformed into methanol and eventually a synthetic fuel that can be used at nearby airports, for example. This 10-company consortium, based in Germany, is focused on the development of end-to-end sustainable business practices across industries to avoid waste in all sectors. This integrated approach is an industrial example for the required sector coupling in the energy transformation process. As part of the HyScale100 consortium, it has been officially awarded IPCEI (Important Project of Common European Interest) status.

## GETTING READY FOR CARBON CAPTURE: TODAY THE GROUP IS WORKING ON MORE THAN 30 CCUS PROJECTS



### ADDITIONAL 20+ PROJECTS TO TEST CAPTURE AND USAGE TECHNOLOGIES

### THE CO<sub>2</sub>MENT PROJECTS

The CO<sub>2</sub>MENT project in Canada is testing an innovative end-of-pipe solution for CO<sub>2</sub> removal and reuse from a cement plant with partners Total and Svante. Together with Oxy Low Carbon Ventures, LLC (a wholly owned subsidiary of Occidental) we are working on a joint study of a commercial-scale carbon-capture facility at the Holcim Portland Cement Plant in Florence, Colorado (US) to permanently sequester CO<sub>2</sub> underground.

The project was reinforced as the United States Department of Energy's National Energy Laboratory Technology announced that it will support the Holcim CO<sub>2</sub>MENT Colorado Project.

### CARBON2PRODUCTAUSTRIA

In Carbon2ProductAustria (C2PAT) Holcim, OMV, Verbund and Borealis are planning to build a CCU plant with the aim of capturing CO<sub>2</sub> during the production of cement and using it

for the manufacture of high-quality plastics, olefins and green fuels. To this end, the parties plan to build a plant on an industrial scale at the Mannersdorf cement plant site in Lower Austria by 2024.

### CARBON CLEAN AND SISTEMAS DE CALOR

Holcim has added to its portfolio of CCUS pilots with the ECCO<sub>2</sub> project in Spain, in collaboration with Carbon Clean and Sistemas de Calor, which will capture CO<sub>2</sub> from flue gas at its Carboneras plant and use it agriculturally to accelerate crop production. This will increase farm efficiency by reducing the water and soil consumption ratio per kg of vegetable production. Starting with 10% of CO<sub>2</sub> emissions from 2022, the commercial applicability of this viable CO<sub>2</sub> circular economy business model will be scaled up over time.

## 06. OUR CCUS STRATEGY AND TECHNOLOGICAL PATHWAY

### CONTINUED



#### OTHER TECHNOLOGIES

##### Electrification and hydrogen

We believe the “Hydrogen Revolution” is quickly gathering momentum to drive energy transition across several hard-to-abate sectors.

At Holcim, we are assessing its use for two main applications. The first one is to replace fossil fuels with hydrogen as an alternative fuel. Hydrogen will not only help to decarbonize our emissions from transportation activities but also those

from our kilns. While our main focus will continue to be waste-derived fuels, we will explore using green hydrogen as a booster where applicable. Kiln electrification is also being investigated to replace the use of traditional fuels.

Secondly, large amounts of green hydrogen will be required to support our efforts in CCUS as it is required to convert CO<sub>2</sub> into valuable products (for instance in our C2B-Lägerdorf and C2PAT projects).

*Amazon's iconic headquarters in Seattle, is built with ECOPlanet with 70% lower CO<sub>2</sub>*



## WESTKÜSTE 100 / HYSCALE 100 / C2B LÄGERDORF

The C2B project, in Lägerdorf, Germany, is an example of an integrated process of carbon capture and usage in which CO<sub>2</sub> from cement manufacturing will be captured to produce climate-friendly aviation fuel and fuel for heating. Through a cross-industry partnership between Holcim Germany and nine more companies, including Ørsted, EDF Germany and the Westküste University of Applied Science, a real-world laboratory is being created with the aim of mapping and scaling a regional hydrogen economy on an industrial scale.

Westküste 100 couples an ideal natural environment – with the strong winds for energy and excellent geological storage conditions of the west coast of Schleswig-Holstein – with innovative companies that want to actively shape the future and make an important contribution to achieving climate protection goals. Using existing regional

infrastructure, an ecosystem will be created around hydrogen power and carbon capture.

Within the five-year project period, a hydrogen-producing electrolysis plant with a capacity of 30 megawatts is to be installed by Raffinerie Heide. It will provide insights into the operation, maintenance, control and grid serviceability of the plants in order to transfer them to the next scaling step. This could, for example, be an electrolysis plant in the order of 700 MW, for which the electricity is generated by an offshore wind farm. The excess heat from this process will be decoupled in an existing and further developed heat grid and used, for example, in an industrial park.

The Lägerdorf cement plant in Germany has started the engineering study in the context of investment preparation for the conversion to an oxyfuel process. The study is intended to deliver reliable findings concerning the technical and economic feasibility to capture and separate 100% of the CO<sub>2</sub> emissions and drastically reduce NO<sub>x</sub> emissions. The surplus oxygen arising from the hydrogen production will be fed into the cement plant's combustion process, resulting in associated savings of 60% of the current

NO<sub>x</sub> emissions. The CO<sub>2</sub> will be captured, purified, processed and in turn used, together with the hydrogen previously produced, in industrial-scale synthetic hydrocarbon production. A 100% reduction in CO<sub>2</sub> emissions would equate to annual savings of approximately 1 million tons.

In May 2021, HyScale100, being part of the Westküste 100 consortium and linked to the C2B Lägerdorf project, was officially awarded IPCEI (Important Project of Common European Interest) status. In 2022, the C2B Lägerdorf project was presented to the EU Innovation Fund for large-scale projects. This demonstrates our solid ambition to be a first mover in the field of CCUS.

By developing and testing this ambitious project under real conditions and on an industrial scale, Holcim is working toward not only creating more sustainable cement but also more sustainable aviation and heating.



# 07. GOVERNANCE

Holcim’s climate strategy is underpinned by a commitment to transparent governance at the highest level that includes Board oversight, Executive Committee accountability and climate-related performance linked to compensation.

The Board of Directors has the ultimate responsibility for the Group strategy and overall governance of the company, including Holcim’s climate strategy.

Through the Audit Committee (AC) and the Health, Safety and Sustainability Committee (HSSC), the Board of Directors oversees Holcim risk management and Internal Control process, including sustainability and climate change-related risks and opportunities.

The entire Board of Directors is included in the Risk Management process and is thus regularly updated on climate-related risks and opportunities, as well as potential scenarios in carbon price regulation systems such as EU Emissions Trading System (EU ETS). The Holcim process for approval of major climate-related capital expenditures acquisitions and/or divestitures, includes climate and other environmental and societal considerations in the assessment and ultimately requires the approval of the Board.

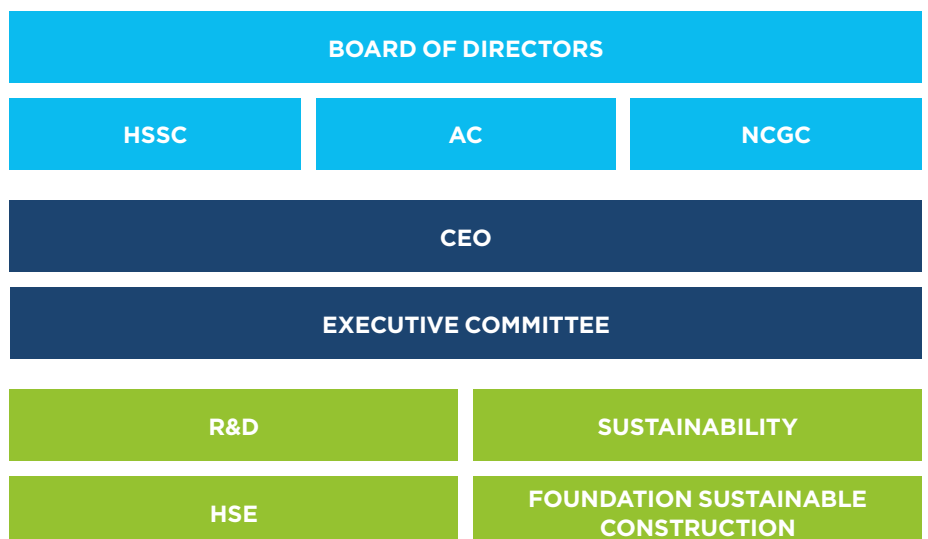
The Nomination, Compensation & Governance Committee (NCGC) proposes the objectives for the Long-Term Incentive Plan, which alongside financial metrics, also includes metrics related to the reduction of specific net CO<sub>2</sub>, waste recycled and the reduction of specific cement freshwater withdrawals. These objectives are then approved by the Board of Directors.

The HSSC advises the Board of Directors on all matters related to sustainable development.

The HSSC reviews and approves the company’s climate-related plans and targets. The HSSC consists of five Board members. The Chairman of the Board of Directors (unless they are a member of the HSSC), the Vice Chairman, the Group CEO, the Group Chief Sustainability and Innovation Officer (CSIO), the Group General Counsel, the Group Head of Security and the Group Head of Health, Safety and Environment participate as invited guests. The HSSC meets at least quarterly.

The HSSC supports and advises the Board of Directors on the development and promotion of a healthy and safe environment for employees and contractors, as well as on sustainable development and social responsibility.

In 2021, the HSSC held four meetings. The average duration of the meetings was approximately two hours. The president of the HSSC then reports to the Board on the conclusions of the meeting. In addition, as a member of the Executive Committee, the CSIO attends part of all Board meetings and presents the sustainability strategy at the Board strategy workshop.



In 2021, the topics discussed at the Board level include Holcim's net-zero 2030 and 2050 targets across Scopes 1, 2 and 3 validated by the SBTi and "Say on Climate".

The Executive Committee is ultimately responsible for the execution of the climate and energy strategy, and climate-related issues are managed at an operational level by the CSIO, an Executive Committee-level position that was created in 2019. The CSIO is supported by a core sustainability team and experts from the countries.

The Group Sustainability team is a cross-disciplinary department that is responsible for developing and overseeing the deployment of the Holcim sustainability strategy, including its four pillars: Climate and Energy, Circular Economy, Nature and People. The team additionally has experts on sustainable construction

and sustainable procurement. The team is responsible for continuous reviews and guides climate-related items that could influence business strategy. They closely monitor any developments concerning climate-related issues by engaging with investors and analysts, non-governmental organizations, policy makers and trade associations.

The R&D team also plays a key role in the deployment of the Group's strategy through the continued development of sustainable solutions. More than 80% of R&D projects were aimed at finding sustainability-related solutions. Around 65% of our patents have a positive impact on sustainability along the value chain.

Holcim's Head of Group Audit is a member of the leadership team and reports directly to the Group CFO. He has direct access to the AC. The Head

of Group Audit oversees the Group Holcim ERM process; consolidates business risks and reports any relevant water risks to the Executive Committee and the AC of the Board.

His key climate-related responsibilities are: developing and managing the Holcim ERM process, ensuring the inclusion of all sustainability topics (including climate and energy-related aspects); ensuring proper implementation of the Holcim ERM process throughout the Group; providing briefs on a quarterly basis to the Audit Committee on climate-related risks and opportunities if necessary or if there are indications of high climate-related risks. A meeting is specifically dedicated to the Group Risk Report where sustainability and climate-related risks are presented and discussed.

## MANAGEMENT INCENTIVES FOR SUSTAINABILITY

With sustainability at the heart of the company's strategy, the Nomination, Compensation & Governance Committee made it part of the long-term incentive plan of the company's top 200 senior leaders worldwide, making it everyone's business at Holcim to advance its net-zero journey.

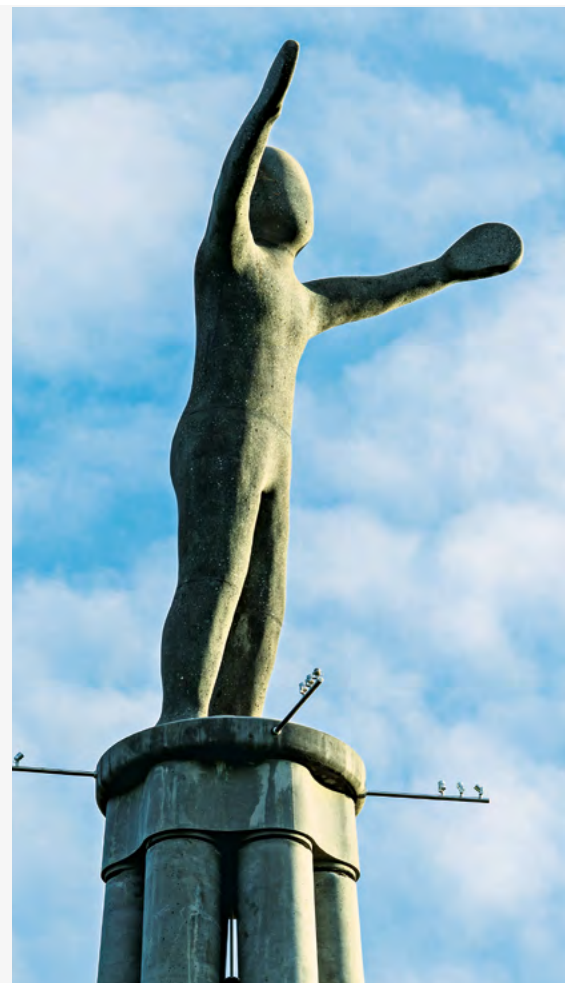
Since its introduction in 2020, senior leaders are incentivized to deliver continuous improvement across the three pillars of the company's sustainability strategy, according to the following key performance indicators:

- **Climate and Energy:** reduction of CO<sub>2</sub> emissions per ton of cementitious material produced with a 50% weight. The 2023 target, set for the 2021 grant of performance shares is 542 kg/ton cementitious.

- **Circular Economy:** quantity of recycled waste derived resources with a 25% weight. The 2023 target, set for the 2021 grant of performance shares is 60 million tons of waste recycled.
- **Nature:** reduction of freshwater withdrawal per ton of cementitious material produced with a 25% weight. The 2023 target, set for the 2021 grant of performance shares is 243 liters/ton cementitious.

Those targets are substantial improvements compared to the targets applicable to the performance shares granted in 2020 and are in line with our long-term net-zero ambition.

*The Hope Sculpture, a 23-meter high installation built with Holcim's ECOPact Max green concrete with zero clinker content for COP26 in Glasgow with 70% lower CO<sub>2</sub>*



# 08. CLIMATE-RELATED OPPORTUNITIES AND RISKS

## CIRCULAR CONSTRUCTION: THE OPPORTUNITY OF OUR TIME

Circularity is the opportunity of our time. The world economy has grown to unprecedented levels, with global GDP now exceeding USD 94 trillion. On this trajectory, our linear economy of “take-make-waste” is set to consume 2.3 planets by 2040. To make our future work for people and the planet, we need to shift gears to a circular economy of “reduce-reuse-recycle”.<sup>8</sup>

Most of the carbon efficiencies achieved in cement and concrete manufacturing since 1990 are related to the reuse and recycling of waste-derived products. These are still at the core of our strategy.

### Reducing materials and CO<sub>2</sub> footprint by empowering smart design

With today’s rise in population and urbanization, we expect to build 10 billion square meters of floors each year to house more than two billion additional people in cities by 2050. Circular systems will make a real difference.

A recent example of this is an innovative lightweight flooring system we developed in partnership with ETH that has an 80% lower carbon footprint compared to traditional structures.

With its smart design it uses 50% less materials, with no steel reinforcements inside, making it easy to recycle at its end of use with a clean separation of materials.

It was made possible with Holcim’s ECOPact green concrete, which can contain up to 95% recycled raw materials inside.

## LINEAR TO CIRCULAR ECONOMY



## CIRCULAR CONSTRUCTION IS

### SOCIALLY INCLUSIVE

creating new jobs and business models. For instance, it is estimated that every 10,000 tons of waste that is recycled can create more than 100 jobs, while the repairing and leasing economy could create exponentially more.

### CLIMATE-FRIENDLY

in line with the world’s urgency to keep global warming within 1.5°C. Reaching 85% material recycling rate across our economy would reduce CO<sub>2</sub> emissions by up to 50 billion tons, the equivalent of taking 10 billion cars off our roads.

### NATURE POSITIVE

with regenerative business models that will increasingly substitute resources drawn from nature with recycled materials, thus preserving biodiversity and reducing water use.

### Recycling materials across all our operations and products

Holcim is a world leader in recycling. In 2021, we recycled over 54 million tons of materials across our business, on our way to doubling this to 100 million tons by 2030 as part of our net-zero roadmap.

Urban mining and recycling construction & demolition waste to build more with less are key priorities on this journey. Our goal is to recycle at least 10 million tons of construction & demolition waste by 2025 to build more new buildings from old ones.

As concrete is infinitely recyclable, we are building up the capacity to recycle 100% of concrete-based construction & demolition waste with proprietary technologies and systems. Our innovations range from advanced crushing technologies, to extract the highest quality materials and ensure a clean separation of resources, to smart recycling hubs to collect, sort and deploy materials, all the way to digital technologies to map and manage material flows efficiently.

<sup>8</sup> WBCSD (2021): Circular Economy/Green Tech Report - A “Paris Agreement” for Recycling the Earth’s resources

Susteno 3R was launched in Switzerland in 2020 using high-quality processed mixed granulate from demolition projects. In line with the Swiss progressive construction standards and regulations, it was the world's first green cement, with 20% recycled construction & demolition waste inside. As regulations across Europe and beyond advance to adopt more circular models, Holcim has identified clear opportunities to be at the forefront of circular construction by deploying solutions like Susteno in as many markets as possible.

In addition, our co-processing of waste to recover energy and recycle minerals during the manufacture of cement is an inherent opportunity to mitigate the rising cost of traditional fuels. In plants where high rates of substitution have been achieved, fuel costs have been reduced significantly, even reaching a negative cost.

#### Repairing and renovating buildings to make them last longer

We are constantly expanding our range of smart building solutions to repair, refurbish and renovate buildings, from roofing and waterproofing all the way to insulation systems, making them smarter and more energy efficient.

Our roofing systems cut across residential and commercial applications and enable a range of systems from green and cooling to solar roofs. Another example is our Airium insulating system that helps to improve the energy efficiency of buildings while being fully recyclable and more durable than traditional insulation systems.

#### INCREASING DEMAND FOR LOW-CARBON BUILDING MATERIAL PRODUCTS

As a global leader in innovative and sustainable building solutions, our products play an essential role in the development of greener buildings and more liveable cities.

The demand from our customers for low-carbon building materials has grown significantly, as has the number of net-zero commitments of different actors in the construction value chain.

The demand for Holcim's new low-carbon solutions is helping us to reduce our Scope 1 emissions, as well as to reduce the Scope 3 emissions of our customers and help them reach their decarbonization goals.

Opportunities will arise and the sales of the ECoPact range of green concrete are forecast to increase to 25% of our Ready-Mix net sales in 2025.

## CONCRETE AS A THERMAL BATTERY: A BREAKTHROUGH SOLUTION FOR ENERGY MANAGEMENT IN CITIES

Holcim is developing a breakthrough energy storage technology together with INSA Lyon and ENGIE's Corporate Research Center, ENGIE Lab CRIGEN, to serve as an alternative to batteries.

The solution is based on cement hydration, storing heat as energy and releasing it when needed in an infinitely repeatable cycle. This next-generation approach offers an alternative to conventional batteries that is local, safe, affordable and recyclable.

This innovation is based on leveraging the unique properties of a specific cementitious material that can absorb 300 kWh of energy per cubic meter and release it later through hydration.

It is designed to store the surplus energy that runs through a heating network and release it when needed through a hydration trigger. This cycle can be repeated infinitely. Holcim and its partners will investigate how to efficiently integrate this solution into a heating network and the broader energy infrastructure.

This innovative approach could help meet the demands of renewable energy storage while optimizing urban heating networks in line with Holcim's vision to build greener cities.

Holcim is also partnering with the German startup Magment to improve its magnetizable concrete technology for road surfaces that enable electric vehicles to recharge wirelessly while in motion. This breakthrough concrete-based solution reduces the need for charging stations while saving time.

Holcim is putting its expertise to work in many ways to accelerate the world's transition to renewable energy, from 3D printing windmill towers to enabling roads that recharge electric vehicles.

Being at the forefront of decarbonizing our manufacturing process and building material products is a clear opportunity as both carbon pricing mechanisms and supportive norms and regulations continue to evolve.

#### CONCRETE: A MUST FOR CLIMATE MITIGATION AND ADAPTATION

While Holcim's net-zero pledge outlines its efforts to mitigate the ongoing effects of climate change, concrete will be key to adapting to the consequences of global warming by protecting society and the environment in an affordable manner.

Cities will need to be built and upgraded to withstand the impacts of climate change, as the frequency and severity of extreme weather events such as floods, hurricanes, earthquakes, droughts and sea rise are increasing across the planet.

#### A must for resilient cities

Holcim's products, such as its reinforced concrete, are the best solution to build stronger, climate-resilient cities that will last longer. Concrete provides fire and flood

protection including protection of people, animals, goods, property and the environment.

Thanks to its high thermal mass, concrete minimizes energy requirements during heat or cold waves, thus reducing CO<sub>2</sub> emissions from energy consumption.

#### A must for efficient water management

Concrete plays a vital role in guaranteeing a safe, secure supply of drinking water. It contributes to the development of dams and other water reservoirs.

#### Coastal protection

In addition, coastal infrastructure will become important across the globe to mitigate impacts from rising sea levels and storm surges.

#### A must for climate mitigation

90% of our electricity must come from renewable sources by 2050. Concrete will be the material of choice to build more wind, solar and hydropower around the world, accelerating the transition to renewable energy.

## 08. CLIMATE-RELATED OPPORTUNITIES AND RISKS

### CONTINUED

#### CLIMATE-RELATED RISKS

Climate-related impacts are becoming an increasingly critical topic to be addressed by the companies because of their anticipated effect on financials and future performance. As part of our risk assessments, the Group Risk Management team reviews the climate-related risks with regard to the Group's policies and regulations, market-related expectations, reputation, technologies and the physical impacts of climate change.

Holcim is committed to ensuring the transparency of its climate-related risks and opportunities. Holcim therefore supports the voluntary recommendations of the Financial Stability Board, Task Force on Climate-related Financial Disclosures (TCFD) and the EU Taxonomy. The identification, assessment and effective management of climate-related risks and opportunities are fully embedded in our ERM process, which is subject to continuous improvement.

Holcim has proactively mapped International Financial Reporting Standards (IFRS) to climate-related matters. Although IFRS does not yet refer explicitly to climate-related matters, effects on applying IFRS might be triggered by the climate-related risks. While we have already initiated this path to transparency in our 2021 annual report, including disclosing the potential financial impacts as a result of climate change (refer to Note 1.4 Climate change related impacts on page 184), we have taken a further step forward here by linking each risk triggered by climate change to the relevant IFRS (IAS) standard.

The Group makes estimates and assumptions concerning the future, including on climate-related matters. There is considerable uncertainty over assumptions and how they will impact the Group's business operations and the cash flow projections. Holcim constantly assesses its assumptions to be consistent with the risk management and commitments made by the company to investors and other stakeholders.

*Generali tower built in Milan, Italy, by Zaha Hadid Architects, which used Holcim materials to achieve the LEED certification*



DESCRIPTION OF THE RISK

Following the agreement on climate at Paris COP21, signatory countries are required to commit to a CO<sub>2</sub> emissions reduction pathway. The likely effect of this is a growing number of CO<sub>2</sub> regulations that will increase the cost of emitting CO<sub>2</sub>.

In the EU, the introduction of phase IV of the ETS in 2021 reduced CO<sub>2</sub> allowances and exposed Holcim to increased pricing of CO<sub>2</sub> emissions.

On 14 July 2021, the European Commission published a broad legislative package "Fit for 55" aiming to support the EU's journey toward decarbonization and its objective to reach climate neutrality by 2050. Our net-zero pledge is fully aligned with this initiative. Nonetheless, if initiatives such as the Carbon Border Adjustment Mechanism (CBAM) are not designed to sufficiently protect EU competitiveness, our business may come under pricing pressure due to imports from regions with less stringent CO<sub>2</sub> regulations.

THE IMPACTS

The most likely impacts would be an increase in production, operation and distribution costs caused by the rise in carbon taxes, price of emissions allowances and reduction of free allowances. In addition, the absence of efficient border adjustment mechanisms in the EU might bring more competition around imports of clinker and cement. In the longer term, however, one of the possible side effects of more stringent CO<sub>2</sub> regulations and associated environmental measures will be to reinforce the competitive advantage of our leading position as the most carbon effective player since our low-carbon footprint may be reflected in the final price of the product.

In parallel, CO<sub>2</sub> regulations may impact our financial reporting as follows:

**Financial impacts**

Useful lives of assets may be affected by the climate-related matters because of transitional risks such as obsolescence and legal restrictions or physical risks as there is the potential for operations to be adversely impacted by extreme variability in weather patterns. The change in useful lives has a direct impact on the amount of depreciation or amortization recognized each year. Management's review of useful lives has taken into consideration the impacts of the Group's 2030 targets (refers to IAS 16 and IAS 38). It can also lead to the impairment of operating assets that no longer comply with more stringent environmental measures (refers to IAS 36).

The climate-related matters may affect the level of provisions recognized, such as site restoration provision and litigation provision as a result of the levies imposed by governments for failure to meet climate-related targets or new regulations, requirements to remediate environmental damages on Holcim's sites or due to existing obligations now being considered more likely. Some contracts may become onerous as a result of climate-related changes, which would potentially decrease the Group's revenue or increase its operating costs (refers to IAS 37).

OUR RESPONSE

Our response is built around our industry-leading approach to the reduction of CO<sub>2</sub> emissions. Holcim has already reduced its net Scope 1 and 2 emissions per ton of cementitious material by 29% compared to 1990 and leads the industry among international peers.

In line with our 2025 strategy and 2030 target, Holcim is maximizing existing technologies and processes, such as its reduced clinker content, increased use of waste-derived fuels and alternative raw materials, WHR and renewable energy portfolio.

Significant work is underway. In 2019, Holcim decided to put in place a region-wide decarbonization roadmap and to invest CHF 160 million until 2022 into around 80 emissions reduction projects across Europe (with a focus on low-carbon fuels, recycled materials and carbon-efficient solutions). Holcim is also investing CHF 100 million in WHR across six sites in India to reduce 0.5 million tons of CO<sub>2</sub> emissions per year.

Beyond 2030, Holcim is preparing the future today by piloting more than 30 CCUS projects in Europe and North America. Working with other multinationals as well as start-ups, our objective is to create a portfolio of diverse and cost-effective solutions that can be multiplied across the Group to advance our decarbonization journey and create new growth opportunities for the company.

In parallel, Holcim proactively and transparently engages with external stakeholders and supports the implementation of effective carbon pricing mechanisms in order to:

- provide a level playing field on carbon costs between domestic producers and importers (e.g. carbon border adjustment mechanisms)
- support the enforcement of reliable carbon prices and investments in low-carbon technologies (incl. regulatory stability)
- develop carbon pricing mechanisms that encompass both supply (carbon emissions) and demand (carbon consumption).

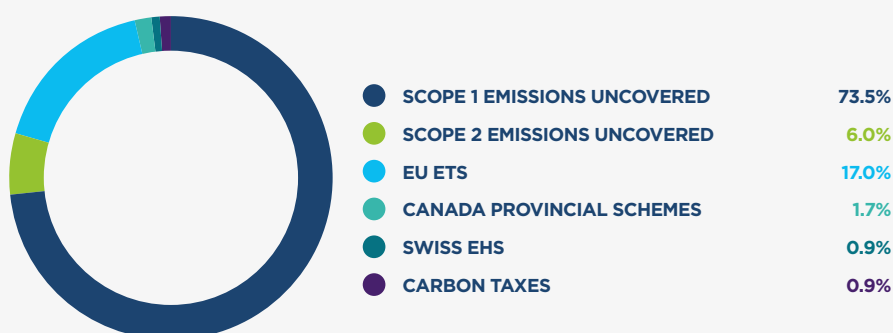
→ Further details in relation to our climate-related advocacy positions are included in section 14 of this report.

OVERVIEW OF OUR EXPOSURE TO CO<sub>2</sub> REGULATIONS

Currently, the emissions of our operations in Europe under the EU ETS represent 17% of the Group's Scope 1 emissions. The rest of our operations that fall under carbon trading schemes outside the EU represent less than 3% (Canada, Colombia, Mexico and Switzerland).

In other regions, more stringent CO<sub>2</sub> regulations may be implemented, especially in emerging economies such as China and India, or in mature economies such as the US and Australia.

COVERAGE OF HOLCIM SCOPE 1+2 EMISSIONS BY CO<sub>2</sub> PRICING SCHEMES



## 08. CLIMATE-RELATED OPPORTUNITIES AND RISKS

CONTINUED

### EUROPEAN<sup>9</sup> DECARBONIZATION ROADMAP

Our Enterprise Risk Management process has been fundamental to effectively manage transition risks. The major evolutions of the EU regulatory framework (ETS phase IV) were anticipated two years in advance, enabling our Group to establish the decarbonization taskforce and design a specific short-term response plan to support the transition to phase IV of the ETS in 2021.

In 2019, Holcim launched a region-wide decarbonization roadmap to invest CHF 160 million by 2022 in more than 80 projects that have a significant potential for carbon reduction. These technologies will allow us to maximize the use of alternative fuels, alternative raw materials and calcined clay and to reach our circular economy and green energy targets. Some of them are described below:

#### CONSTRUCTION & DEMOLITION WASTE

In Austria, construction & demolition waste is replacing raw materials, generating significant CO<sub>2</sub> savings. In 2021, our two Austrian plants co-processed over 200,000 tons of construction & demolition waste as an alternative raw material, amounting to 20,000 tons of CO<sub>2</sub> savings per year.

<sup>9</sup> Holcim's European Decarbonization Roadmap includes operations in the EU27 countries plus Switzerland and the UK. Switzerland has successfully linked its GHG emissions trading with the EU ETS and the UK has its own ETS.

#### CALCINED CLAY

Given the decreasing availability of slag and fly ash, calcined clay is becoming an effective way to produce low-carbon and high-performance cement.

Holcim is at the forefront of innovation and has developed a patent-pending technology that allows the clay calciner to run 100% with alternative fuels, leading to a very efficient calcination process with close to zero CO<sub>2</sub> emissions. Five calcined clay projects are currently being implemented in France, Italy, Switzerland and the Czech Republic.

#### THERMAL SUBSTITUTION RATE

Since the decarbonization roadmap and investment in 2019, Europe has made considerable progress in substituting fossil fuels with pretreated non-recyclable and biomass waste fuels. These investments led to reaching a 61% thermal substitution rate across our plants in Europe.

Additional modernizations of existing plants will allow us to further reduce our CO<sub>2</sub> footprint along with digital-driven efficiencies (resources and energy) and cost improvements, such as an integrated plant modernization project in Poland of over EUR 100 million replacing three old kilns with one state-of-the-art line.

#### Alignment with "Fit for 55"

On 14 July 2021, the European Commission published the broad legislative package "Fit for 55", making a clear commitment to reach climate neutrality by 2050.

**Holcim's decarbonization roadmap in Europe is aligned with the EU's**

long-term target, as well as the 2030 target of reducing CO<sub>2</sub> emissions by 55% on a 1990 basis.

#### Impacts of carbon pricing and reduction of CO<sub>2</sub> allowances

Carbon pricing, applicable in several markets where the Group operates but most notably in Europe, is embedded in cash flow projections generally based on a three-year financial planning period using business plans approved by management. At year-end 2021, cash flow projections were based on a four-year financial planning period to align with the Group's Strategy 2025 - accelerating green growth.

Holcim continues to monitor the emergence of new CO<sub>2</sub> regulatory developments, which will be factored into its business plans once enacted. The EU Commission recently announced the establishment of the CBAM. This will form an essential policy tool to build the "low-carbon business case" in the long run and secure continued investments in low-carbon technologies across European assets.

Free allowances are expected to decline at an accelerated pace as of 2026. Given the investments and the projects that will be implemented in coming years and that will lead to a significant reduction in emissions, Holcim is confident it will remain competitive and retain its leading position in Europe.

*France's Millau Viaduct, the world's highest bridge, uses Holcim cement and concrete*





**MARKET RISK**

**DESCRIPTION OF THE RISK**

**THE IMPACTS**

**OUR RESPONSE**

As the carbon debate intensifies, cement or concrete could be challenged as the building material of choice because of its perceived high embodied CO<sub>2</sub>. 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. Moreover, high CO<sub>2</sub> prices could also lead to a preference for alternative building materials with a lower price and a lower environmental footprint.

On the supply side, as the call for decarbonization impacts our whole supply chain beyond 2030, inflationary pressures in raw materials, energy and transportation are possible.

The impacts include reduced demand for products with volume or price decreases, leading to revenue losses. At the same time, however, and as long as there is no viable substitute to cement on a global scale that is affordable and local, those new market conditions might support a growing demand for low-carbon products and solutions, thus potentially increasing our market share in the range of green cement and sustainable solutions.

Increase in prices of mineral component (MIC) such as slag and fly ash challenges the CO<sub>2</sub> reduction roadmap as the integration of MIC in our cement production process is a key lever for the reduction of clinker factor and thus reduction of our CO<sub>2</sub> footprint. Concurrently, this risk might also reduce Holcim's profitability.

**Financial impacts**

Impairment testing is performed at the cash generating unit (CGU) level and in assessing the valuation of a CGU, future cash flows have been estimated. This includes making assumptions in relation to the impact of climate-related matters on future profitability.

The cash flow projections are generally based on a three-year financial planning period using business plans approved by management. At year-end 2021, cash flow projections were based on a four-year financial planning period to align with the Group's Strategy 2025 - accelerating green growth (refers to IAS 36).

The impact of climate-related matters could result in higher costs and reduced revenues affecting the future taxable profits on which the recognition of deferred tax assets are based. Business plans used for the recognition of deferred tax assets have been aligned with those used in the impairment process, taking into account climate-related impacts (refers to IAS 12).

Our approach is to meet customer needs along the whole construction value chain by developing and delivering products, solutions and technologies that address today's major challenges of the construction business: achieving energy efficiency, lowering the cost of construction and reducing the environmental footprint.

Holcim already has an important range of products and brands that are sustainable low-carbon products and solutions. From our sustainable cements Susteno and ECOPlanet to the ECOPact global range of green concrete, Holcim offers solutions with cutting-edge materials and innovation. The Group is continuously developing and introducing new products with lower CO<sub>2</sub> emissions, realizing opportunities related to the circular economy and sustainability performance.

Leading the circular economy, Holcim will recycle 75 million tons of materials across its business, including 10 million tons of construction & demolition waste by 2025. In line with our 2025 strategy, Holcim will remain at the forefront of green building solutions with 25% of ready-mix net sales coming from ECOPact, which offers a 30 to 100% lower CO<sub>2</sub> footprint. Also, we will continue to deploy smart technologies, from 3D printing to using green mineral components like calcined clay, and we will further develop next-generation technologies.

In the long term, portfolio changes with the development of our Solutions & Products business line will contribute to a shift to a business model that offers integrated solutions and systems specifically designed to tackle climate change challenges, such as: energy efficiency, cooling effects, extending the longevity of building materials and enhanced options to generate renewable energy.

With regard to changing market conditions for mineral components, Holcim has implemented a strong set of actions such as changing input mixture (development of alternative MIC or new binders), and strategic sourcing through common initiatives with suppliers and the development of imports.

*Torre Avalon, Mexico, is built with iConcrete digital solution and ECOPact green concrete with 30% lower CO<sub>2</sub>*



## 08. CLIMATE-RELATED OPPORTUNITIES AND RISKS

### CONTINUED

#### REPUTATION

##### DESCRIPTION OF THE RISK

The risk of being perceived as a large carbon emitter could reduce our attractiveness to stakeholders such as customers, investors and potential employees. The Group's inability to meet its commitments (net-zero pledge), if materialized, would compound damage to the Group's reputation. In addition, litigation on the basis of climate action failure is emerging and could also damage our reputation. We may not have a sufficiently robust talent pipeline if we cannot attract and retain talent due to perceived weak environmental credentials.

##### THE IMPACTS

###### Financial impacts

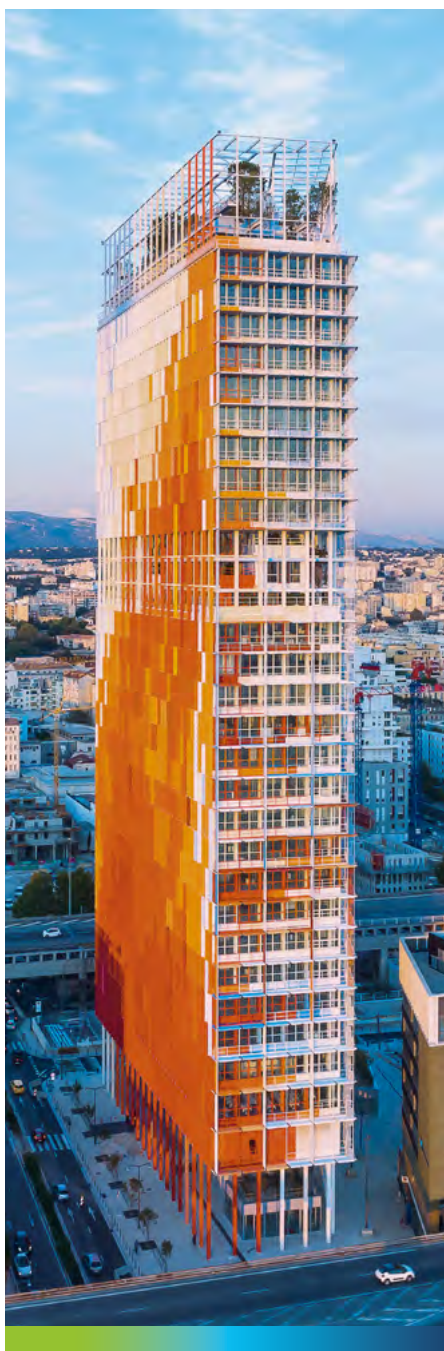
A damaged reputation, especially among investors and regulators, could hamper the Group's access to capital, increasing financing costs in the short term. It could additionally reduce growth outlook in the mid-term due to less attractiveness to investors.

Holcim has increased diversification of financial assets with, for example, sustainability-linked bonds, which are linking our funding with our sustainability objectives. This could have an impact on the Group's financial expenses in the event the Group does not reach the targets that have been set (refers to IFRS 7).

##### OUR RESPONSE

Our response to this risk mainly relies on the reduction of our CO<sub>2</sub> footprint as described in the "Policy and Regulatory" section. Our CO<sub>2</sub> reduction roadmap follows a best-in-class approach and will contribute to transforming the Group into a global leader in innovative and sustainable building materials and solutions. In addition, in order to reflect the credibility of our sustainability commitments to investors, Holcim continues to offer investors debt linked with its sustainability objectives.

Holcim intends to pursue its journey with sustainability-linked finance instruments in the capital, money and loan markets, and the company is committed to reaching more than 40% of sustainable financing by the end of 2025.



## SUSTAINABILITY-LINKED FINANCING FRAMEWORK

To recognize the role of sustainable finance in supporting the transition to a low-carbon and more resource-efficient economy, Holcim has put in place a Sustainability-Linked Financing Framework to link funding with its sustainability objectives.

It started with CO<sub>2</sub> reduction in line with the company's 2030 climate targets and was updated with the full 2050 net-zero pathway endorsed by the SBTi. Following Holcim's nature-positive strategy launch, it also added "specific freshwater withdrawal" in its cement operations.

A third-party opinion was provided by ISS ESG and confirmed the alignment of the framework with the sustainability-linked bond principles, which are published by the International Capital Markets Association. The framework is also aligned with the United Nations Sustainable Development Goals 6 "Clean Water and Sanitation", 9 "Industry, Innovation and Infrastructure", 11 "Sustainable Cities and Communities" and 13 "Climate Action".

*La Marseillaise, France, is built with Ductal ultra-high performance concrete*

In 2021, Holcim completed further sustainability-linked financing transactions that include (i) the sustainability-linked syndicated revolving credit facility for an amount of EUR 3 billion and a maturity of five years, with two 1-year extension options and environmental and social KPIs and (ii) a new 10-year USD 100 million sustainability-linked private placement, issued in September and based on its 2030 CO<sub>2</sub> Scope 1 reduction target.

Additionally, costs for all new or refinanced committed corporate bilateral bank facilities have been linked to Holcim's ESG performance. At the end of 2021, the sustainable financing ratio stands at 30%.

Furthermore, in January 2022, Holcim continued to lead the building materials industry in sustainability-linked financing with two inaugural sustainability-linked bonds issued in the Swiss Franc market linked to 2025 and 2030 CO<sub>2</sub> Scope 1 reduction targets. Bond investors will be entitled to a higher coupon should the company not meet its climate objectives, as was the case in previous sustainability-linked bond transactions.

# >40%

financing agreements linked to sustainability goals by 2025

DESCRIPTION OF THE RISK

THE IMPACTS

OUR RESPONSE

<p>The risk of the cost of technology or new investments being significantly higher than existing carbon pricing mechanisms and the lack of integrated deployment of carbon capture in the supply chain ecosystem (transportation, sequestration, etc.), could prevent Holcim from achieving its targets.</p> <p>The pathway from 2030 to 2050 integrates new and advanced technologies including novel binders, zero-emission vehicles, low-clinker cements and scaled up CCUS. As of today, the development of those next-generation technologies, especially CCUS, relies on pilot projects that are still to be evaluated in terms of cost, technical feasibility, compatibility with CO<sub>2</sub> usage opportunities and other aspects of viability and scalability.</p>	<p><b>Financial impacts</b></p> <p>There could be significant costs to transition to lower emissions technology with a major escalation of Capex (Capex significantly higher than the CO<sub>2</sub> price increase) and growing operational costs.</p> <p>Useful lives of assets may be affected by climate-related matters because of transitional risks such as technological obsolescence. It can also lead to the impairment of operating assets (refers to IAS 36).</p> <p>Sustainability is now a key factor considered by the Group in any investment decision. The transition to lower-emission technologies will impact the allocation of the future Capex. The Group's R&amp;D expenditures is aligned with the Group's R&amp;D strategy focusing on new and alternative technologies as a result of diverse research initiatives that will either impact Capex or R&amp;D costs in the statement of income depending on the success of the initiatives (refers to IAS 16 and IAS 38).</p>	<p>Our response is to maximize the deployment of existing technologies in the pursuit of our 2030 targets and will start laying the groundwork for our net-zero journey.</p> <p>In line with its 2030 target, Holcim leverages existing technologies and processes, such as its reduced clinker content, increased use of waste-derived fuels and alternative raw materials, WHR and renewable energy portfolio.</p> <p>Beyond 2030, Holcim is preparing the future today by piloting more than 30 CCUS projects in Europe and North America. Working with other multinationals as well as start-ups, our objective is to create a portfolio of diverse and cost-effective solutions that can be multiplied across the Group to advance our decarbonization journey and create new growth opportunities for the company.</p>
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## GREEN CAPEX AT HOLCIM

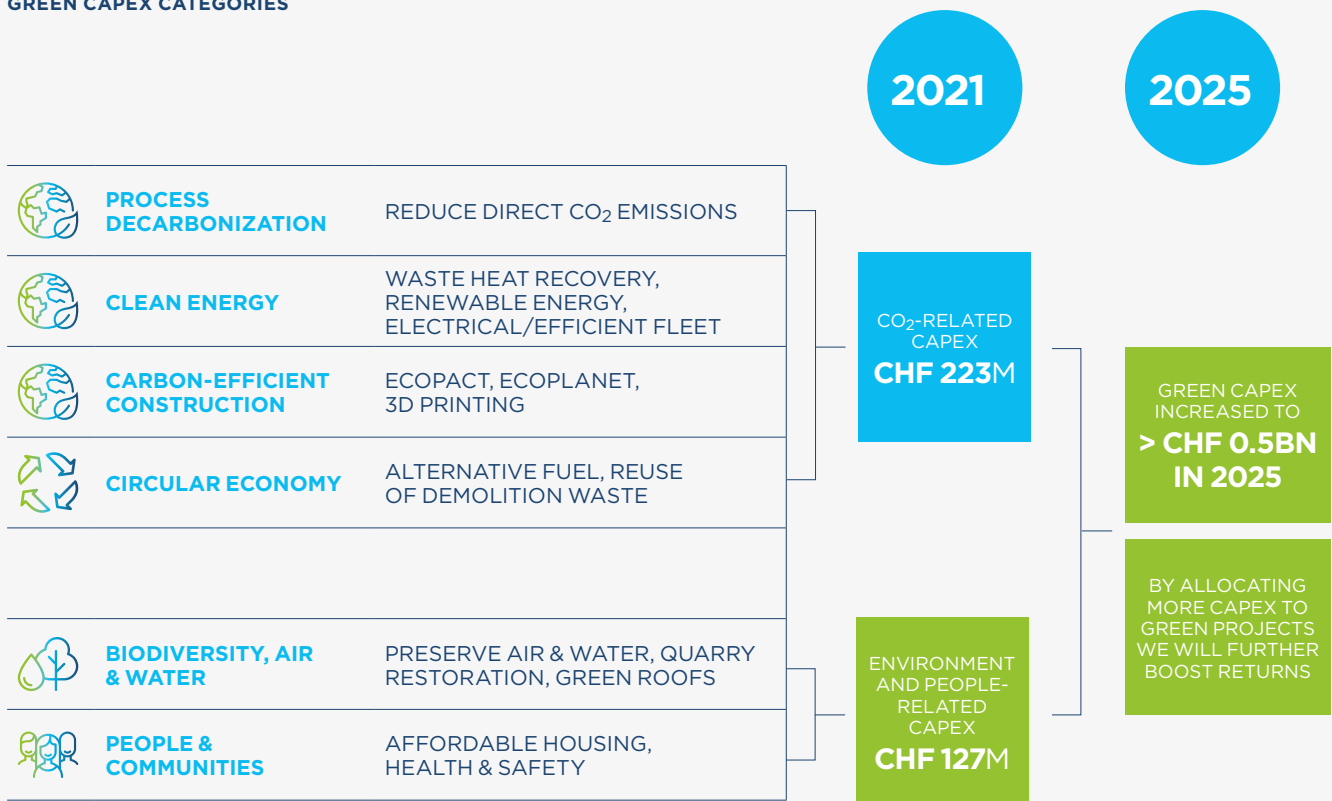
At Holcim, we have put sustainability at the core of our strategy to build a net-zero future. Our focus on green investments is a fundamental aspect of this strategy.

As part of its Green Capex program, Holcim invested CHF 223 million in CO<sub>2</sub>-related projects in 2021 to accelerate CO<sub>2</sub> reductions in line with our targets.

Holcim will increase its annual green capital expenditure to CHF 500 million by 2025. These investments will

impact all our operations and geographies and will encompass existing technologies with proven returns.

### GREEN CAPEX CATEGORIES

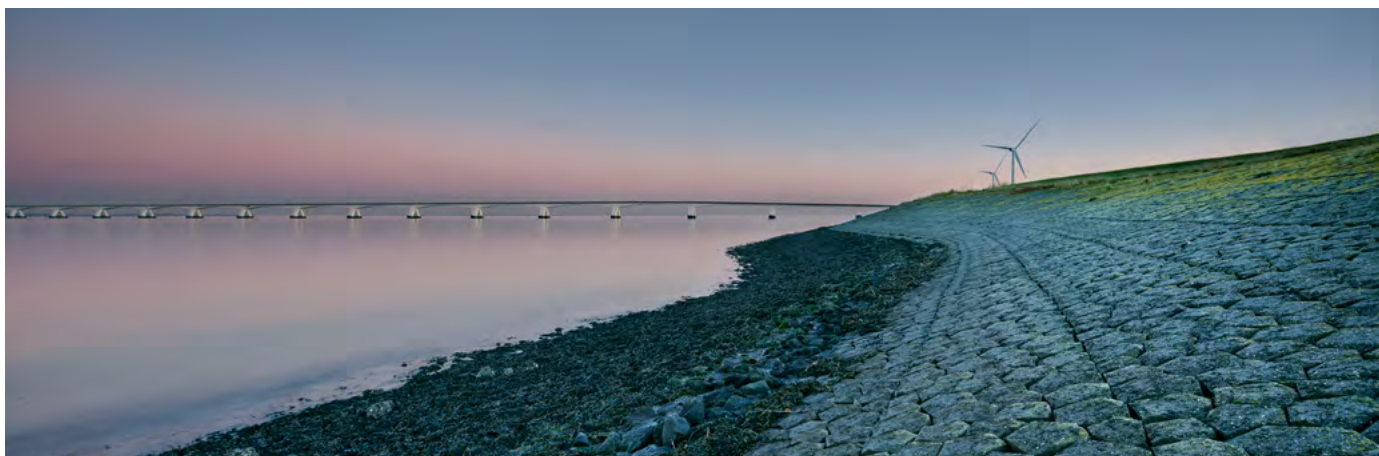


## 08. CLIMATE-RELATED OPPORTUNITIES AND RISKS

### CONTINUED

#### PHYSICAL RISK

DESCRIPTION OF THE RISK	THE IMPACTS	OUR RESPONSE
<p>The physical impacts of climate change (such as flooding, changes in precipitation patterns or extreme variability in weather patterns) have the potential to disrupt our operations – both our on-site operations and transportation activities – leading to higher logistics and transportation costs, reduced production capacities (e.g. delayed planning approval, supply chain interruptions) and even reputational damages.</p> <p>Our business is particularly exposed to significant variations in river water levels affecting river-based supply chains and product delivery including when very low (Rhine in 2018) or very high (Mississippi in 2019).</p>	<p>In addition, the Group operates in areas exposed to water scarcity, which could lead to potential disruptions in our operations. Using the World Resource Institute (WRI) Aqueduct Water Tool, 23% of our sites are already located in medium, high and very high water risk areas. Water scarcity is growing and the risk exposure is being continuously monitored.</p> <p><b>Financial impacts</b></p> <p>Physical deterioration of our production assets would result in potential impairment (refers to IAS 36).</p> <p>The climate-related matters may affect the value of inventories as they may become obsolete as a result of a decline in selling prices or an increase in costs. In the application of IAS 2, the cost of inventories that are not recoverable must be written down to their net realizable value.</p> <p>The change in the climate may imply more regular and intense climate events that can have a significant impact on our production with business interruption, accident or damages. This may increase our insurance costs due to the higher amounts at stake or more frequent insured cases (refers IFRS 17).</p>	<p>Holcim has introduced a risk-based Security and Resilience Management System to plan for, respond to and recover from all kinds of unwanted events through integrated emergency response, crisis management and business continuity activities.</p> <p>To be prepared to deal with variations in river water levels, especially flooding events, our logistics departments have developed well-prepared response plans that involve a change in product sourcing from our network of plants, additional storage options for inventory and an adaptation of the modes of transport used. This allows Holcim to better manage physical risks, overcome business interruptions and ensure the delivery of our products and services to our customers.</p> <p>With regard to water scarcity, a Water Stewardship Program has been launched aiming to reduce our specific freshwater withdrawal and return the water we use. As a result, Holcim is currently one of the lowest withdrawers of liters of freshwater per ton cementitious in the industry.</p> <p>Additionally, we have significantly invested in the development of sustainable solutions, led by our Technology Center in Switzerland and in our R&amp;D Center in Lyon, France. Today we have a broad portfolio of products specifically designed to decrease freshwater demand, increase water availability, improve water quality and preserve natural water flows.</p> <p>Aligned with the outcomes of the physical climate risk assessment, Holcim is reinforcing its response capabilities to a larger range of events. The responses are tailored at the site level to the nature and the magnitude of the threat.</p>



### PHYSICAL CLIMATE-RELATED RISKS SCENARIO ANALYSIS

As part of Holcim’s scenario analysis, acute and chronic physical climate-related risks have been assessed as part of a pilot study done with CelsiusPro, including a representative sample of exposed locations and supply chains across our regions.

The pilot aimed to quantify the potential financial impact on Holcim based on changes to climate hazards at a site level. In addition, climate change-induced changes to transportation along supply chains were investigated.

Three climate scenarios (representative concentration pathways 2.6, 4.5 and 8.5) were considered based on the Intergovernmental Panel on Climate Change Fifth Assessment Report. The scenarios consider greenhouse gas concentration trajectories in the

atmosphere and relate to a 1.5°C–2°C, 2°C–3°C and >4°C increase in the global average surface temperature in 2100.

For each location the changes to acute physical climate hazards such as flood, wind, precipitation, wildfire and hail and chronic hazards such as heat and drought were assessed for each scenario and the years 2025, 2030, 2050 and 2100.

*Zeelandbrug, Netherlands is built with Holcim Basalton Quattroblock*


# PHYSICAL CLIMATE-RELATED RISKS SCENARIO ANALYSIS

## CONTINUED


### PHYSICAL CLIMATE-RELATED RISKS

● ACUTE


● CHRONIC




**PRECIPITATION**  
Maximum daily precipitation (in mm) for a predefined event




**FLOOD**  
Inundation height and extent for predefined flood event, incl. riverine, coastal flood impacted by sea level rise and tidal levels




**WIND**  
Maximum one-minute sustained wind speed for a predefined event representing extreme winds like hurricanes



**WILDFIRE**  
Number of fires that ignite and grow to a detectable size



**DROUGHT**  
Water stress of locations based on an index describing precipitation and evaporation



**HEAT**  
Blend of days per year exceeding temperatures of 35°C and 38°C

Temperature Change	IPCC Scenario	2025	2030	2050
1.5 – 2°C	RCP 2.6	✓	✓	✓
2 – 3°C	RCP 4.5	✓	✓	✓
> 4°C	RCP 8.5	✓	✓	✓

Representative concentration pathway (RCP 2.6, RCP 4.5, RCP 8.5)  
Intergovernmental Panel on Climate Change

### LOCATIONS FOR PHYSICAL CLIMATE-RELATED RISKS SCENARIO ANALYSIS

#### THEODORE, US

**Reason:** It resides next to the Deer river in the vicinity of the Gulf of Mexico. This makes it prone to hurricanes, flooding and extreme precipitation.

The plant is currently most impacted by floods, wind, heat, hail and precipitation. The risk of damage due to hail and cold weather will reduce over the next decades, while heat and extreme precipitation risks will intensify. The wind and flood risks will stay relatively stable with only a slight increase.

#### VAL D'AZERGUES, FRANCE

**Reason:** Located next to a river and is impacted by frost – this is expected to change with a warming climate.

Val d'Azergues is currently exposed to flood, wind, precipitation and cold. While heat is less of a current problem, the number of heat days will double over the next 30 years. The cold days with temperatures below zero will likely halve in the same period.

#### LA UNION, THE PHILIPPINES

**Reason:** Proximity to the coast. Coastal sites in the Philippines will be predominantly exposed to flooding induced by sea level rise, typhoons and storm surges.

The location most impacted by climate change is La Union in the Philippines. It is exposed to significant increases in heat days and flood risk due to sea level rise. Furthermore, the risk of being impacted by wind is significant and is likely to remain stable with climate change. Extreme precipitation will increase marginally.

#### MACUSPANA, MEXICO

**Reason:** High business relevance and its exposure to wildfires and hurricanes.

In the current climate, Macuspana is severely impacted by heat and extreme precipitation. With climate change, the number of heat days will increase even further. The risk of wildfires is currently moderate, but a substantial increase in the conditions leads to a higher future risk.

#### ASHAKA, NIGERIA

**Reason:** Heat and drought conditions in Sub-Saharan Africa and to investigate the impact of climate change on these extremes.

Ashaka in Nigeria will see a sharp increase in days of extreme heat exceeding temperatures of 38°C. Events of extreme precipitation will also increase with climate change. The higher variability of precipitation will result in droughts that will require mitigation strategies.

#### WADI, INDIA

**Reason:** High production volume and it is already impacted by heat stress and drought conditions.

Wadi is located in one of the most drought and heat-prone regions globally. The heat days will increase even further. The drought risk is also very high and has the potential for further intensification.

## 08. CLIMATE-RELATED OPPORTUNITIES AND RISKS

CONTINUED

### PHYSICAL CLIMATE-RELATED RISKS SCENARIO ANALYSIS

CONTINUED

#### I) IMPACTS ON OUR ASSETS

Six Holcim locations in geographic regions that are especially vulnerable to climate change were selected as a first step to better understand physical climate risk in order to manage respective risks accordingly.

#### II) IMPACTS ON OUR SUPPLY CHAIN

The disruption of supply chains by climate extremes can pose a significant threat to Holcim's business operations. An example of this is the Mississippi River, which acts as an important waterway for Holcim to efficiently and affordably transport products to distributors and construction sites.

The river basin has a long history of droughts and floods that affected economic activities along the Mississippi River (e.g. flooding in April 2011 and the drought in 2021). High and low water levels can impede planned transportation schedules causing delays. This results in business interruptions and additional costs. The vulnerability of the Mississippi transport system to climate extremes is amplified by an aging infrastructure and climate change. For example, the 2016 South Louisiana flooding is already substantially more likely to occur compared to pre-1990.

In general, there is a high year-to-year and intra-year variability of the river heights of the Mississippi. An increasing trend of spring time high water level extremes has already been observed over the past two decades compared to pre-1990 water levels.

Based on a likely increase in precipitation extremes with a changing climate, high water levels are expected to occur more frequently in both a 2°C and 4°C scenario by 2050.

Low water level extremes will likely occur more frequently in 2°C scenarios but decrease in a 4°C world. Hence, in the near term, the drought-flood variability will be a considerable challenge, while in the long-term, high water levels will dominate the supply chain risk.

#### III) OPPORTUNITIES

A range of opportunities can be seen twofold, either as a reduction in the implications of perils or as an increase in the demand for Holcim's products.

Two examples of the former are the French location of Val d'Azergues where the number of frost days will decrease in coming decades and the Theodore plant in the US where the number of days needed for hail formation will decrease substantially until 2050 making the hail risk negligible for the site. In terms of the latter, opportunities may arise from physical climate risks that result in an increased demand for sustainable resilient construction material.

Holcim is already a leader in bridging the infrastructure gap, which will be widened further by climate change and can assist people and communities with solutions such as water-repellent buildings to mitigate extreme precipitation impacts.

*Georgetown University's new 12-story residential building uses ECOPact green concrete with 46% lower CO<sub>2</sub> to achieve LEED Platinum certification*





*Circular Explorer, the recycling catamaran, powered by 100% renewable energy, recovering plastic from our oceans*

# 09. SCENARIO ANALYSIS

Holcim has developed two distinct and plausible climate change scenarios, including one adhering to the Paris Agreement, to test the resiliency of the organization in different climate change futures.

As part of Holcim’s aim to align with the Task Force on Climate-related Financial Disclosures (TCFD) recommendations, the Group has continued to develop distinct and plausible climate change scenarios to test the resilience of the organization in different climate change futures.

Two scenarios have been considered to present Holcim’s assessment on climate related transitional and physical risks. A “Paris Agreement aligned” scenario (1.5°C), where Governments and Industries are coordinated to make carbon neutrality possible and an “Ineffective Collective Action Against Climate Change” scenario (2.7°C–4.4°C Degrees Scenario).

The Paris Agreement-aligned scenario is favorable for Holcim, its shareholders and the global community. New market conditions will support a growing demand for low-carbon products and solutions, increasing our market share in the range of green cement, concrete and sustainable solutions. Holcim’s sustainability leadership brings strategic resilience to the Group, and Holcim is well positioned to build on its net-zero journey and help create a net-zero future that works for people and the planet.

A lower pace of transformation will lead to an “Ineffective Collective Action Against Climate Change” scenario, as the construction value chain continues to be fragmented and stimuli are not in place to decarbonize at the pace and scale required. While this is not Holcim’s strategic direction, the group will adapt to cover the market needs while continuing to drive circular and low carbon construction.

In all cases, Holcim is well positioned for the future, with its leadership in Ready-Mix Concrete and the expansion in Solutions & Products. Concrete is versatile, affordable, insulating and infinitely recyclable. In addition, it is resilient, durable, fire and earthquake resistant, protecting our cities and infrastructure from natural disasters. For all these reasons concrete is a must for climate change adaptation and currently there is no viable substitute at scale.

This chapter aims to summarize the outcome of this exercise. Holcim will continue to develop its climate scenarios analysis to understand emerging opportunities.

Holcim considers in this assessment the impact of each scenario on our ambition to become a net-zero company and a leader in sustainable construction material, thus delivering a profitable growth in a low-carbon economy.

Depending on the risk or opportunity, this assessment embraces either a quantitative assessment of our ability to generate green growth in line with our Strategy 2025 or a qualitative assessment of the impacts on our reputation and credibility to stakeholders.

These scenarios do not constitute definitive outcomes for Holcim. This scenario analysis exercise relies on assumptions that may or may not eventuate, and scenarios may be impacted by additional factors to the assumptions disclosed.





New CAP Group Headquarters, Milan, is built with ECOPact green concrete with 35% lower CO<sub>2</sub> to achieve LEED Gold certification

	PARIS AGREEMENT ALIGNED SCENARIO	INEFFECTIVE COLLECTIVE ACTION AGAINST CLIMATE CHANGE
Temperature range by 2100	1.5°C	2.6°C–4.4°C
Reference Scenarios	IEA net-zero Emissions Scenario (NZE) Source: IEA World Energy Outlook 2021	IEA Stated Policies Scenario (STEPS) Source: IEA World Energy Outlook 2021 IEA Reference Technology Scenario (RTS) Source: IEA Technology Roadmap - Low Carbon Transition in the Cement Industry
Carbon Emissions Pathway, IPCC 5th Assessment Report Used for Physical Risk assessment	Carbon Emissions Pathway: RCP 2.6	Carbon Emissions Pathway: RCP 8.5
Cement Demand	Trend following NZE: Growth until 2030 in emerging markets From 2030–2050 demand decreases due to smart design	Trend following RTS until 2030: Growth until 2030 in emerging markets Marginal growth after 2030
CO <sub>2</sub> price (USD / t CO <sub>2</sub> )	NZE: Advanced economies: 2030: 130, 2050: 250 Selected emerging markets (incl. China, Russia, Brazil, South Africa): 2030: 90, 2050: 200 Other emerging markets: 2030: 15, 2050: 55	STEPS: EU: 2030: 65; 2050: 90 Canada: 2030: 55; 2050: 75 Colombia: 2030: 15; 2050: 30 China: 2030: 30; 2050: 55

# 09. SCENARIO ANALYSIS

## CONTINUED

● Risk to be watched continuously by Holcim and risk governance to be adjusted accordingly to limit negative business impact.

● Opportunity improving the conditions to deliver our strategy and having a positive business impact.



PARIS AGREEMENT-ALIGNED SCENARIO		INEFFECTIVE COLLECTIVE ACTION AGAINST CLIMATE CHANGE SCENARIO	
RISKS	OPPORTUNITIES	RISKS	OPPORTUNITIES

### 1. POLICY AND LEGAL

1.1 CO <sub>2</sub> prices & other climate policies	2030		
	2050		

### 2. MARKET

2.1 Access to mineral components	2030		
	2050		
2.2 Cost of fossil fuels / energy	2030		
	2050		
2.3 Circular construction (recycling materials, smart design and driving repair and renovation)	2030		
	2050		
2.4 Demand for low-carbon building materials	2030		
	2050		

### 3. TECHNOLOGY

3.1 Decarbonization of supply chain (energy and transportation)	2030		
	2050		
3.2 Deployment of breakthrough technologies at a large scale	2030		
	2050		

### 4. REPUTATION

4.1 Impact on Group's stakeholders	2030		
	2050		

### 5. PHYSICAL

5.1 Chronic - higher average temperatures and sea level rise	2030		
	2050		
5.2 Acute - extreme events (flooding and heat)	2030		
	2050		

### PARIS AGREEMENT-ALIGNED SCENARIOS

In the Paris Agreement-aligned scenario, Governments and industries are aligned to make carbon neutrality possible. The cement industry is making significant efforts toward net-zero development and innovation, while climate change mitigation and adaptation have a growing importance. Carbon capture, utilization and storage technologies are developing at a pace consistent with the industry's transition to net-zero. Demand for low-carbon and material-efficient solutions and those that mitigate the impacts of climate change accelerates. Physical impacts of climate change are manageable without significant business or societal disruption. Holcim's sustainability leadership brings strategic resilience to the company. Holcim is well positioned to build on its net-zero journey and build a net-zero future that works for people and the planet.

## PARIS AGREEMENT-ALIGNED SCENARIO

### 1. POLICY AND REGULATORY

Consistent with our net-zero strategy, reliable and stable carbon prices in all regions facilitates long-term investment decisions in low-carbon technologies and encourages significant changes across the building material and construction value chain. It will also support the collective effort to create a CO<sub>2</sub> transportation and storage network at a large scale in line with the needs of other industries.

### 2. MARKET

While decarbonization of the construction value chain progresses, focus is on reducing operational emissions in the built environment, and circular construction is progressively endorsed by norms and regulations globally. This results in a higher demand of low-carbon and circular building materials and of our Solutions and Products segment. Simultaneously, as the cement, steel and energy industry decarbonize, the availability of supplementary materials such as fly ash or slag decreases. Holcim mitigates this risk by securing respective sources of limestone, construction & demolition waste or byproducts from other industries but also by investing in calcined clay facilities and developing novel cements with new binders. By the progressive transition to greener energy sources, Holcim's dependency on fossil fuel decreases.

### 3. TECHNOLOGY

Holcim will profit from the overall decarbonization efforts in society due to a) the earlier readiness and affordability of breakthrough technologies, such as kiln electrification, hydrogen and most importantly CCUS; and b) efforts in our own value chain / suppliers, which will reduce our Scope 3 emissions. Additionally, we will expect supplementary cementitious materials like calcined clay to become mature.

### 4. REPUTATION

In the short term, Holcim's cement production segment remains in the spotlight as a CO<sub>2</sub> intensive business, bringing reputational risks. However, as the net-zero roadmap is delivered and Holcim is seen as a keen contributor to mitigate climate change, its reputation, trust and credibility grows and the strategy is aligned with the expectations of a 1.5 degree world.

### 5. PHYSICAL

Extreme precipitation and flooding impacting sites and supply chains in affected areas will require further protective measures and mitigation plans. Today, 30% of our sites are located in areas with medium to extremely high water stress, which explains why appropriate governance and management in water consumption, recycling and treatment are already required today.

### INEFFECTIVE COLLECTIVE ACTION AGAINST CLIMATE CHANGE SCENARIO

Ineffective collective action against climate change creates a misalignment between our efforts to reach net-zero emissions and the applicable regulations, resulting in a competitive disadvantage that a zero-carbon strategy imposes on our company compared to other sectors. Limited benefit would be taken from the development of low-carbon and material and energy-efficient solutions. Physical impacts of climate change are severe including water stress and extreme weather events. Holcim develops a strong response strategy in order to protect its assets and adapt to new market demand features.

## INEFFECTIVE COLLECTIVE ACTION AGAINST CLIMATE CHANGE SCENARIO

### 1. POLICY AND REGULATORY

A limited number of CO<sub>2</sub> pricing schemes hampers the deployment of breakthrough technologies at the pace needed, making it more challenging for Holcim to deliver on its net-zero target. Also, with fragmented decarbonization efforts in the construction value chain, it is more difficult to benefit from the competitive advantage coming from a low-carbon footprint.

### 2. MARKET

As there are few regulatory incentives to use low-carbon products and to recycle, there is a limited increase in the sales of our green cement and concrete. The demand of our circular materials and our products and solutions will be driven by urbanization, the need to protect natural resources, and increased fossil fuel prices. By 2030, while the average clinker factor reduces moderately, the availability and costs of mineral components will remain virtually unchanged compared to today's levels. By 2050, the price of these materials timidly increases as some decarbonization of industries is underway leading to a limited negative impact. On the other hand, with the slower transition to greener energy sources, the demand for fossil fuels remains strong.

### 3. TECHNOLOGY

Significant additional efforts will be needed from Holcim to reach its Scope 1 targets as governments are slow in implementing the necessary policies to scale up breakthrough technologies such as kiln electrification, hydrogen and CCUS and the network and infrastructure around it. Scope 3 targets are challenged as suppliers do not decarbonize at the necessary pace.

### 4. REPUTATION

The slow pace in required regulatory incentives will bring additional challenges to Holcim's decarbonization journey, increasing progressively the respective reputational risks.

### 5. PHYSICAL

Extreme weather events like extreme precipitation, flooding and excessive heat days will increase significantly in frequency and intensity. In the long term, these may be significantly intense to make protection measures at existing locations insufficient, hence having a severe financial impact on sites and supply chains. Further risks, such as wildfire and windstorms, will increase and become significant threats.

# 10. ADVOCACY POSITIONS AND TRANSPARENCY


We are committed to living up to the responsibilities that come with becoming the global leader in innovative and sustainable solutions. As a responsible company, we thrive with our people and communities wherever we operate. While we are a global business, we operate very locally in around 60 countries. Thus, employing local people, compliance and respecting human rights, implementing sustainable procurement and establishing good and open relationships with our communities are at the core of our business.

Given the scale of today’s sustainability challenges, no single organization can tackle it alone. Building progress for people and the planet will require unprecedented collaboration:

- **Between industry and policy makers** in order to facilitate the development of the business case that is necessary to guarantee short and long-term investments in the development and deployment of next generation technologies such as CCUS, as well as developing market demand for low-carbon and circular products.
- **Across the construction value chain** to fully integrate sustainability and full life cycle performance alongside existing criteria (such as safety, cost and durability) in a way that respects the principles of material neutrality and life cycle performance.
- **With our people and communities** through a proactive stakeholder engagement that focuses on awareness, dialogue and collaboration and is designed to create shared value.


Holcim supports enabling public policy frameworks, such as the “Fit for 55” policy package presented in the EU in July 2021, in so far as such initiatives work as market enablers to build the decarbonization business case to ensure that decarbonization investments enhance competitiveness and to create demand for low-carbon products and solutions.

**NET-ZERO PATHWAY ENABLERS**




### CARBON PRICE

- Level playing field with importers
- Reliable carbon prices




### MARKET DEMAND

- Evolving standards
- Market uptake of low-carbon products



### CARBON CAPTURE

- Infrastructure and networks
- Recognition of carbon removal



### ENERGY

- Competitive renewable energy
- Incentivize fossil fuel substitution

## EFFECTIVE CARBON PRICING MECHANISMS

The net-zero transition will require large-scale and sustained investments across the entire construction value chain. Some of the needed technologies go beyond any single industrial sector and form societal endeavors that require public support and acceptance. Carbon pricing mechanisms will play a central role in the carbon-neutral economy and must be designed in a way that embeds carbon costs across whole value chains to ensure low-carbon solutions are competitive. This requires:

- **A level playing field between domestic producers and importers:** where carbon prices are in place, a level playing field on carbon costs between domestic producers and importers is necessary to ensure that low-carbon solutions remain competitive (e.g. through carbon border adjustment mechanisms).
- **Reliable carbon prices:** carbon prices must be reliable to sustain the business case and investments in low-carbon technologies. Uncertain carbon price dynamics fueled by speculation must be avoided.
- **Encompassing consumption:** carbon costs must progressively be absorbed in products and solutions in order to render carbon-efficient solutions more competitive. This entails carbon pricing mechanisms that encompass both supply (carbon emissions) and demand (carbon consumption).

## MARKET DEMAND FOR LOW-CARBON PRODUCTS AND SOLUTIONS

Holcim is committed to leading the transition toward low-carbon and circular construction by developing and introducing green products and solutions worldwide. From its ECOPact green concrete range all the way to ORIS, the industry's first digital platform for sustainable road construction developed with IBM, Holcim will accelerate our world's green transformation with innovative and sustainable building solutions.

Accelerating this effort requires regulatory environments and building standards that incentivize greater and faster market uptake of low-carbon products by:

- **Integrating sustainability performance** in building codes, public procurement and product standards, alongside traditional criteria (safety, performance, durability and affordability).
- **Ensuring that construction policies and standards integrate harmonized life cycle assessments for buildings** to reflect the desired CO<sub>2</sub> and circularity performance and to respect the principles of material and technology neutrality.
- Involving actors across the construction value chain in **integrating life cycle carbon performance and circularity principles** in business models and in all decision-making processes.

## CARBON CAPTURE TECHNOLOGIES

Large-scale deployment of advanced technologies such as CCUS technologies is broader than the technical challenges faced by individual industrial sectors. It forms an economy-wide endeavor that requires large-scale investment in CO<sub>2</sub> transportation and storage networks, social acceptance of permanent storage technologies and the creation of large-scale demand for captured CO<sub>2</sub> as an industrial feedstock.

No single solution will be perfectly scalable everywhere as different environments present different conditions (e.g. technological, geological and legislative) that will be favorable for one solution or another. This requires a flexible yet unequivocal regulatory framework that:

- **Recognizes all carbon capture technologies (CCUS) in carbon accounting** and verification mechanisms as carbon mitigation avenues for hard-to-abate sectors.
- **Continues research and innovation support for the development of CCUS technologies** and Capex/Opex support for the full industrial scaling up of those technologies.

*Free Waldorf School, Germany is built with Firestone RubberGard EPDM 1.5 mm*



## 10. ADVOCACY POSITIONS AND TRANSPARENCY

### CONTINUED

#### ENERGY

The low-carbon transition and the use of associated technologies (e.g. CCUS) will significantly increase the energy needs of industry. This requires:

- **Improved access to abundant and competitively priced low-carbon energy.**
- **The recognition, in the regulatory framework, of technologies such as co-processing** that enable the substitution of fossil fuels and primary raw materials with non-recyclable residual and biomass waste.
- **The enforcement of waste legislation and its management hierarchies** (incl. landfill bans for waste that can be recovered and/or recycled in industry).

#### ZERO-EMISSION TECHNOLOGIES FOR HEAVY DUTY VEHICLES

Countries, cities and companies all over the world are working hard to define their implementation plans for adequate e-charging infrastructure, high-power charging equipment on the electricity grid, hydrogen stations and effective and coordinated approaches to urban vehicle access regulations.

We recognize this transition has started with transit buses and the next phase is urban delivery and service vehicles. A later stage would be heavy goods movement vehicles, operation within our cities and then connecting our cities.

We recognize and appreciate the progress made over the past few years on the availability of zero-emission freight and heavy duty vehicles. This has enabled Holcim to bring its first electric ready-mix vehicles into operation in Switzerland. However, the market is still characterized by limited availability and high prices. On the other hand, vehicle suppliers, even if willing to scale up the production, are not yet convinced of sufficient demand.

The use of zero-emission heavy duty vehicles is one of the key levers for Holcim to reduce CO<sub>2</sub> from transportation activities. We signed the “Call for Action for Zero-emissions heavy duty vehicles” coordinated by the Transport Decarbonization Alliance” with the aim of demonstrating the demand for the zero-emission trucks and ensuring availability for our suppliers. In parallel Holcim has joined the FMC, launched by the US State Department and the WEF, and has committed under the First Movers Coalition’s trucking workstream to ensure that at least 30% of our heavy-duty new truck purchases are zero-emission trucks by 2030, with the same being required from our trucking service providers.

#### Trade Association Climate Review

In support of our advocacy positions, in 2020, we assessed the memberships in our main trade organizations around the world to ensure that there are no major misalignments with the Group’s policy positions on climate change. We selected 20 organizations that reflect both the size of the Group’s financial contribution to the organizations (above CHF 250,000) and the Group’s geographical footprint. All in all, these organizations represented roughly 80% of the total amount that the Group paid to trade organizations in 2020.

The organizations were assessed by reviewing their public positions using their website, media releases, publications, social media, questionnaires and, when needed, discussions with the local public affairs team. Five criteria, based on our net-zero pledge and policy enablers, were at the core of this assessment:

- support of the Paris Agreement and net-zero agenda
- support of the use of carbon pricing mechanisms
- development of an industry roadmap to net-zero
- acknowledgement of the need of advanced technologies, including CCUS, to further decarbonize (mainly for cement industry associations)
- support of the need to introduce low-carbon and/or net-zero products on the market.

It was found that none of the selected organizations had material misalignment or diverging views with Holcim’s policy positions. Should major divergences in position appear, Holcim will dissociate itself from the trade association’s position and related activities or, in extreme cases, renounce its mandates within the organization and/or its membership.

After this review, we decided to pursue our work with all the organizations included in the scope. The Group intends to be an active contributor to the climate roadmaps that some of these organizations are currently working on. We will continue to assess the climate policy positions of our trade association memberships on a periodic basis.



*Central Bank of Iraq building is built with Ductal*

## SUMMARY OF ORGANIZATIONS AND POSITIONS

	SUPPORTS PARIS AGREEMENT AND NET-ZERO AGENDA	SUPPORTS CARBON PRICING MECHANISMS	EXISTENCE OF A NET-ZERO ROADMAP	RECOGNIZES THE NEED OF ADVANCED TECHNOLOGIES, INCLUDING CCUS	SUPPORTS INTRODUCTION OF LOW-CARBON AND/OR NET-ZERO PRODUCTS
<b>WORLDWIDE</b> GCCA	● Yes	● No formal position	● Work in progress	● Yes	● Yes
<b>EU</b> CEMBUREAU	● Yes	● Yes	● Yes	● Yes	● Yes
<b>SWITZERLAND</b> CEMSUISSE	● Yes	● Yes	● Work in progress	● Yes	● Yes
<b>SWITZERLAND</b> ECONOMIESUISSE	● Yes	● Yes	● No formal roadmap but net-zero commitment to 2050	● Yes	● Yes
<b>UK</b> MPA	● Yes	● Yes	● Yes	● Yes	● Yes
<b>BELGIUM</b> FEBELCEM	● Yes	● Yes	● Work in progress	● Yes	● Yes
<b>SPAIN</b> OFICEMEN	● Yes	● Yes	● Yes	● Yes	● Yes
<b>FRANCE</b> SFIC	● Yes	● Yes	● Yes	● Yes	● Yes
<b>FRANCE</b> UNICEM	● Yes	● Yes	● Not relevant	● Not relevant	● Yes
<b>GERMANY</b> VDZ	● Yes	● Yes	● Yes	● Yes	● Yes
<b>POLAND</b> SPC	● Yes	● Yes	● Yes	● Yes	● Yes
<b>AUSTRIA</b> VÖZ	● Yes	● Yes	● Work in progress	● Yes	● Yes
<b>US</b> PCA	● Yes	● No formal position	● Work in progress	● Yes	● Yes
<b>US</b> NRMCA	● No formal position but supports low-carbon concrete	● No formal position	● No formal position	● Yes	● Yes
<b>CANADA</b> CAC	● Yes	● Yes	● Work in progress	● Yes	● Yes
<b>BRAZIL</b> SNIC	● Yes	● Yes	● Roadmap with PA 2°C scenario for cement	● Yes	● Yes
<b>AUSTRALIA</b> CCAA	● Supports decarbonization efforts and will formalize its position in 2021	● Not formal position given policy context	● Work in progress	● Yes	● Yes
<b>NEW ZEALAND</b> CONCRETE NZ	● Yes	● Yes	● Yes	● Yes	● Yes
<b>PHILIPPINES</b> CEMAP	● Yes	● No formal position	● No	● No formal position	● Yes
<b>INDIA</b> CMA	● Yes	● No formal position	● No	● No formal position	● Yes

## 10. ADVOCACY POSITIONS AND TRANSPARENCY

### CONTINUED

#### TRANSPARENCY

As a global leader in our industry, Holcim adheres to the highest standards when it comes to how we manage and operate our business day to day, everywhere around the world. This includes ensuring transparency on our performance and progress against our climate-related targets, and disclosure of climate-related risks and opportunities.



In the results of the 2021 CDP assessment, for the second consecutive year, Holcim has been given an “A” score for tackling climate change. We have been recognized for leadership in corporate sustainability by securing a place on the CDP’s prestigious “A List” for tackling climate change. In addition, we received a score of “A-” in the CDP ranking for water.



We use a comprehensive and rigorous approach for calculating climate-related indicators. Our process for reporting all non-financial indicators is reviewed and the calculation of selected indicators, including our CO<sub>2</sub> performance, is subjected to independent limited assurance opinion, most recently by EY & Associés.



Holcim is a member of the Global Reporting Initiative (GRI) Community and supports the mission of GRI to empower decision makers everywhere, through GRI Sustainability Reporting Standards and its multi stakeholder network, to take action toward a more sustainable economy and world. The disclosures in our reporting suite are aligned with the GRI and SASB Reporting Frameworks.



We use the Global Cement and Concrete Association (GCCA) Sustainability Guidelines for the monitoring and reporting of CO<sub>2</sub> emissions from cement manufacturing (Previously WBCSD-CSI Cement CO<sub>2</sub> and Energy Protocol version 3.1) to calculate CO<sub>2</sub> emissions between the 1990 baseline and the reporting year. To calculate Scope 2 emissions we align with the GHG Protocol Scope 2 Guidance.



Holcim has been a supporter of the TCFD since July 2017. With the company being identified as a reference in providing effective climate-related financial disclosures, Holcim was invited to participate in the TCFD Preparer Forum for the construction sector and contributed to the promotion of TCFD recommendations for better communication on climate-related risks and opportunities.



Our Scope 3 emissions are calculated following a comprehensive and rigorous accounting methodology aligned with the GHG Protocol. We are the first company in the sector to have Scope 3 near-term (2030) and long-term (2050) reduction targets validated by SBTi.





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