DECARBONIZING BUILDING

From our operations to our products to buildings in use, we are decarbonizing building for a net-zero future

GREEN OPERATIONS

DECARBONIZING HOLCIM

We are decarbonizing Holcim with green operations, from green energy and mobility to green product formulation, all the way to next generation technologies like carbon capture, usage and storage.

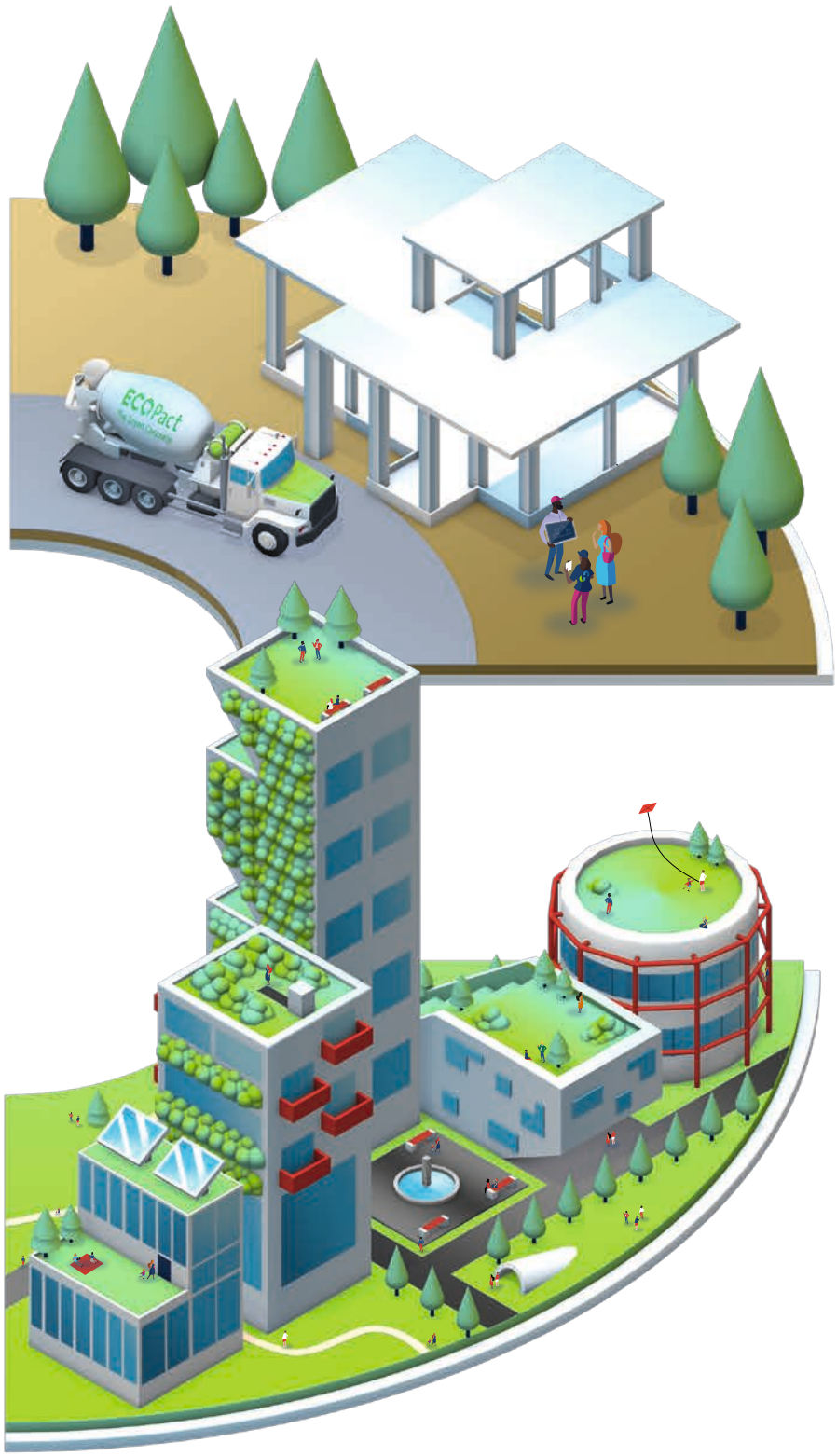
Learn more on pages 50-53.

CIRCULAR CONSTRUCTION

BUILDING NEW FROM OLD

We drive circular construction to build new from the old. As a world leader in recycling we put circularity at the core of everything we do. In Switzerland we launched the world's first cement with 20 percent recycled construction and demolition waste, and upcycle plastic bags in roofing systems.

Learn more on pages 60-61.



BUILDING BETTER WITH LESS

DECARBONIZING CONSTRUCTION

We offer the broadest ranges of low-carbon materials such as ECOPact green concrete, delivering 100 percent performance with at least 30 percent less CO_2; as well as enabling smart design systems like 3D printing that can reduce material use by up to 50 percent.

Learn more on pages 54-57.

MAKING BUILDINGS SUSTAINABLE IN USE

DECARBONIZING CITIES

Holcim Solutions & Products, from roofing to insulation, are making buildings more sustainable in use to decarbonize our cities, driving energy efficiency and green retrofitting.

Learn more on pages 58-59.

GREENING OUR OPERATIONS

From energy and mobility to product formulation and next-generation technologies, we are lowering the carbon footprint of our operations.

Energy

We source 28 percent of our thermal energy from biomass, alternative fuels and materials at the end of their life. Using these alternative energy sources helps solve society's growing waste disposal problems and reduces our use of fossil fuels.

Some of our European plants source over 80 percent of this energy from such alternative sources, delivering a high-yield source of energy for producing heat. At a global level, this approach diverted 5 million tons of waste from incineration or landfill in 2022.

Electricity is our other major category of energy use. Here we are moving to decarbonized sources wherever we can, such as solar, wind and hydropower, with Colombia, Switzerland and other advanced markets already operating with 100 percent renewable electricity. Our goal is to reach at least 65 percent renewable electricity by 2030. Where these are not available we are installing solar and wind facilities on our own premises.

We are also pioneers in recovering the waste heat from our operations to generate electricity. Seven waste heat recovery systems operate across our Group today, generating 318 gigawatt hours of carbon-free electricity, equivalent to a carbon savings of 165,000 tons each year. Eighteen more waste heat recovery units are planned.

28%
Share of thermal energy from alternative sources

5M
Tons of waste diverted from landfill

By 2030 we plan to source 65 percent of our electricity from decarbonized sources like solar.

We use a range of electric mobility options in Europe, North America and Latin America.

Mobility

We are leading the transition to green mobility from our quarries to cities, using the greenest and most efficient transport options from electric and biofuel-powered vehicles to railways and barges. We are deploying electric fleets across our operations, from autonomous e-vehicles in our quarries to long haul e-trucks to distribute our materials. We digitalize our transport and logistics with proprietary digital technology platform to optimize load and route efficiency, safety and carbon footprint.

One of the most exciting initiatives is to electrify our own fleet of ready-mix concrete trucks. We are currently piloting a model in Europe that can reduce the carbon emissions by up to 80 percent compared to conventional ready-mix trucks, with the aim to deploy an electric fleet across the region in the coming years. These will reduce the carbon emissions that come from transporting our materials to customers as well as among factories and distribution terminals.

Reducing maritime emissions in the US
We are a founding member of the Blue Sky Maritime Coalition, an industry group which seeks to reduce carbon emissions from waterborne transport in the US through innovation. Because our US business transports a significant amount of material on the ocean, Great Lakes and inland waterways, reducing maritime emissions is a priority in that market.

Transportation currently accounts for 13 percent of our total Scope 3 carbon emissions and can be tackled largely by shifting to a net-zero fleet, as well as working with transport suppliers who share that same commitment.

"Introducing electric vehicles into our operations is essential to reach net-zero emissions."

ALEXANDER SCHELD
Global Head of Cement Logistics

Exploring green formulation at the Holcim Innovation Center

48%
Potential CO_2 reduction from calcined clay

Green formulation

We offer the world's broadest range of green building solutions. These are enabled by our expertise in green formulation, where we use innovative low-emission raw materials to decarbonize our concrete and cement mixes.

One such material is calcined clay. Obtained through the calcination of natural clays at a relatively low temperature, calcined clay is a mineral powder that emits four times less CO_2 during production than clinker, delivering building materials with up to 48 percent less CO_2. Clay is one of the most abundant natural materials worldwide, making it a highly scalable solution for producing low-carbon building materials.

We are expanding this innovation globally. ECOPlanet products using calcined clay cement are currently available in Italy and France, and industrial trials are underway across all regions.

In 2023 we launched Europe's first calcined clay low-carbon cement operation at our Saint-Pierre-la-Cour plant in France. The plant will deliver ECOPlanet green cement with a significantly lower CO_2 footprint compared to standard cement (CEM I). This advanced production line, a world's first, runs on our proximA Tech proprietary technology, and will produce up to 500,000 tons of low-carbon cement per year.

"With innovative raw materials, from calcined clay to construction & demolition waste, we are scaling up green construction."

MILJAN GUTOVIC
Region Head, Europe

Next-gen tech

To accelerate our net-zero journey we are developing next-generation technologies, especially carbon capture, utilization and storage (CCUS). We are running over 50 CCUS and mineralization projects around the world, recycling the CO_2 from our plants across a range of applications from fuel and plastics to agriculture.

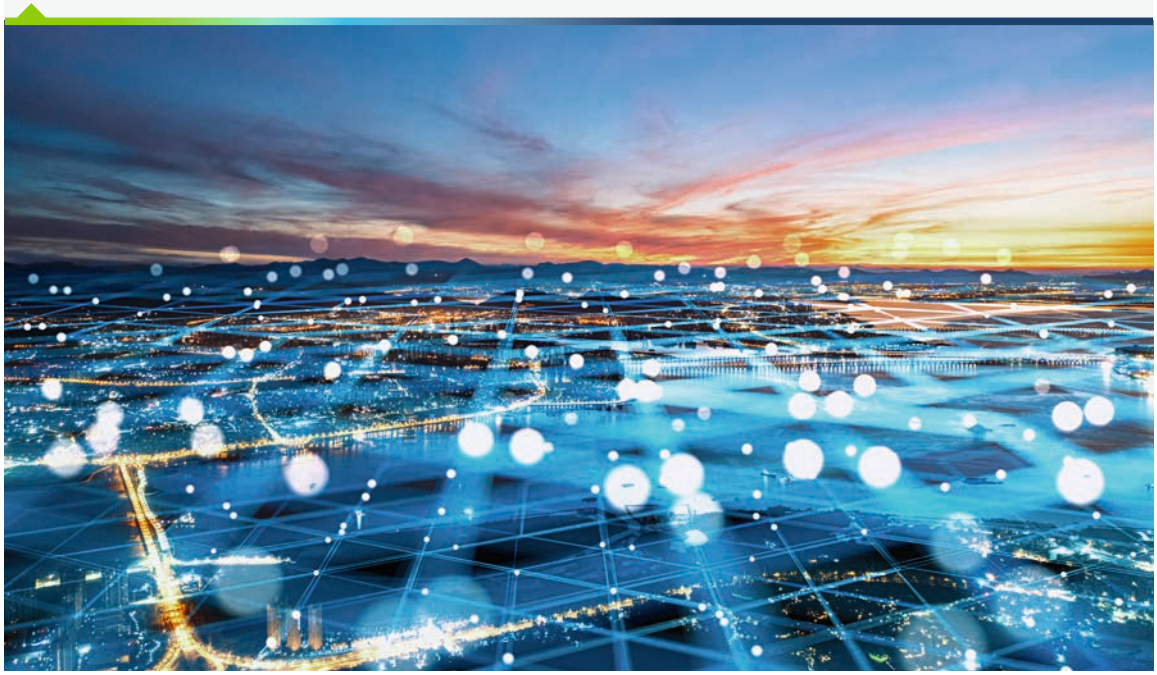
In 2022 we received strong support for this approach from the European Innovation Fund, which awarded us two grants totaling EUR 328 million for CCUS projects in Poland and Germany. The project in Germany will capture carbon from our Lägerdorf plant, then turn it into synthetic fuel for the mobility sector and as feedstock for the chemical industry. In Poland we are building an end-to-end CCS chain, starting with CO_2 capture from our site in Kujawy to offshore storage in the North Sea, with the vision to be a net-zero plant by 2027. Both projects aim to develop highly replicable carbon capture solutions to drive the decarbonization of the building sector.

In Canada our Exshaw Plant is one of ten projects under evaluation for support from the "Call to Action" initiative of Canada's Strategic Innovation Fund (SIF). The SIF supports large-scale, transformative and collaborative projects that help position Canada to prosper in the global economy. With total funding estimated at CAD 457 million, the proposed project will encompass front-end engineering design (FEED) studies and construction of carbon capture, transportation and sequestration infrastructure for the plant.

Other next-generation solutions come from our Plants of Tomorrow program (page 47), which is deploying tools from robotics to predictive maintenance that can help green our operations.

>50
CCUS and mineralization projects

328M
EU Innovation Fund grant awards
EUR, 2022



BUILDING BETTER WITH LESS

Holcim is a key player in making low-carbon construction possible at scale around the world.

The Ellinikon, Greece, will be Europe's largest urban regeneration project

At Holcim we are building better with less to decarbonize construction.

We are making low carbon construction possible at scale around the world from Zurich to New York and Mexico to Manila with our green building materials. We launched the world's broadest ranges of green concrete with ECOPact and green cement with ECOPlanet, delivering 100 percent performance with at least 30 percent less CO_2, in line with the most advanced sustainability certifications, from LEED® and BREEAM® to WELL®.

ECOPact in urban regeneration

One of the most exciting applications of our green materials comes from Greece, where we are part of the Ellinikon, the largest urban regeneration project in Europe, supplying ECOPact green concrete.

An EUR 8 billion project of Lambda Development, Greece's leading real estate developer, the Ellinikon is the largest privately-funded investment in Greek history. Designed by Foster + Partners, the urban development on the Athens Riviera will be three times the size of Monaco, spanning 6.2 million m².

Green building solutions

When it comes to building a net-zero future, our materials play an essential role across a building's entire life cycle.

The construction sector represents 38 percent of the world's global CO_2 emissions. Thirty percent of these emissions are generated at the building phase. We address this phase at scale with the world's first and broadest ranges of green concrete, ECOPact, and green cement, ECOPlanet, offering 100 percent performance with CO_2 reduction of at least 30 percent.

The remaining 70 percent of emissions result from the building in use. We tackle this stage with our advanced solutions for energy efficiency and renovation, from our roofing systems to our insulation products like Airium. Across all these applications, we are driving circular construction to reduce, reuse and recycle materials wherever we can.

We also decarbonize building with smart design and solutions like DYNAMax, carbon prestressed concrete and Rippman flooring systems. These solutions use less material per square meter of building or infrastructure, which translates into lower embodied carbon compared to conventional materials.

"With Holcim we can build better with less – emitting less carbon and consuming less natural resources – on a global scale."

PROFESSOR JOSEF KURATH
Founder of CPC and professor at the ZHAW School of Architecture, Design and Civil Engineering

The Ellinikon will include residential, office and retail buildings, as well as medical, educational, sports and cultural facilities, all of which will meet the highest sustainability standards. By using ECOPact green concrete, the project will reduce CO_2 emissions significantly compared to standard concrete.

In Monterrey, Mexico, ECOPact delivered a 30 percent CO_2 savings for GP Vivienda, a developer focused on building housing projects for all tiers of the market – from large affordable housing developments to more exclusive communities – all across the city's metropolitan area.

This is a critical need for Mexico's third largest city, whose population of 5 million people is growing every year. By 2030, an extra 600,000 people will need a place to live.

As a customer who shares our commitment to sustainability, GP Vivienda contacted Holcim to find out about products that can successfully reduce emissions for its projects in and around Monterrey. After discussions with Holcim, GP Vivienda chose ECOPact, the world's broadest range of green concrete. By the end of 2022, Holcim Mexico had supplied more than 50,000m³ of ECOPact for their developments.

Smart design
Another way to build better with less is to empower smart design. Technologies like 3D printing allow builders to reduce material use by up to 50 percent. We make this possible with proprietary technologies such as our 3D concrete

ECOPact
ECOPlanet
DYNAMax
TectorPrint

▼ *Eulach footbridge in Winterthur, Switzerland, built with CPC, weighing 75 percent less than with traditional concrete*

BUILDING BETTER WITH LESS CONTINUED

printing ink, TectorPrint. With 3D printing we are rapidly meeting critical building needs for markets as diverse as Malawi, Kenya, France and Austria. 14Trees, our joint venture with the UK's British International Investment Group, received 2022 FT/IFC Transformational Business Awards for this work in Africa, where we are 3D printing homes and schools.

DYNAMax, our ultimate performance concrete, also enables smart design by reducing material use, which increases living space for occupants at the same time. In Bucharest, for example, we used DYNAMax to build the MIRO office park, which features 23,000 square meters of leasable area spread out over five levels with a large outdoor plaza. MIRO is one of the first buildings in Romania achieving the BREEAM Excellent rating, as well as the WELL Platinum certification for optimized office spaces which improve health and well-being through design.

Speedwell, one of Romania's most dynamic developers and promoters of sustainable buildings, chose DYNAMax for this visionary project. DYNAMax allowed them a faster construction pace and required less materials compared to conventional solutions. Thanks to the use of DYNAMax, Speedwell was able to reduce the concrete volume in the building core by one-third and thus reduce the carbon footprint of the structure by 25 percent compared to conventional concrete.

CIRCULAR BY DESIGN

Striatus was designed to place material only where needed, significantly reducing its environmental footprint. With no reinforcement and using dry assembly without binders, it can be repurposed repeatedly.

◀ *Global product campaign: ECOPact green concrete - the world's broadest range of low-carbon concrete*

Materials of the future

We are constantly searching for low-carbon materials that can help the world build better with less using smart design. One breakthrough in 2022 was carbon prestressed concrete (CPC), one of our innovative precast solutions. CPC won the Bauma Innovation Award 2022 in the "Construction" category and was certified as a cradle-to-cradle™ solution in Germany.

Using high-strength concrete reinforced with prestressed carbon fibers, CPC slabs use a proprietary process and patented technology that gives them the same load-bearing capacity as traditional reinforced concrete slabs while being up to five times thinner and lighter. In addition to enabling resource-efficient construction systems, the absence of steel means extending its service life up to 100 years, at the end of which the CPC systems can be disassembled and reused or fully recycled.

We recently used CPC to build a footbridge in Switzerland. With timber, this nine-meter span would weigh 26 tons. With CPC, the same footbridge weighs an extremely low 14 tons. That's 46 percent less than timber.

Over the whole service life, the CO_2 footprint of the CPC bridge is up to three times lower than a timber bridge. CPC is a key element of industrializing construction similar to timber solutions, but with superior performance and a lower embodied carbon footprint. Through smart design, CPC helps us build better with less: construction systems using the thin, precast plates of concrete reduce material use by up to 80 percent and CO_2 emissions by up to 75 percent, driving industrialized, circular and low-carbon construction.

Environmental performance: verified

To demonstrate the environmental profile of our solutions in a transparent way, we provide accurate, third-party verified information on CO_2 savings with environmental product declarations (EPDs). In the US, for example, our OneCem and ECOPact green solutions are all backed with EPDs. All our countries are now building their EPD roadmap so that our customers can generate EPDs on demand, with plant and product-specific data, to verify their low-carbon benefits. We offered 1,840 EPDs as of the end of 2022.

Read more online here

MAKING BUILDINGS SUSTAINABLE IN USE

We are decarbonizing cities with our broad range of solutions from roofing to insulation, driving energy efficiency and green retrofitting.

Futuristic Kindergarden, Galicia, Spain – 640 m² circular roof was covered with UltraPly TPO thermoplastic roofing membrane

Seventy percent of the CO_2 emissions in the construction sector are generated by buildings in use. We're expanding our solutions, from roofing and insulation to advanced mortars and green retrofitting, to reduce this footprint.

Energy efficiency
A building's roof plays an essential role in determining its energy efficiency. We are becoming a global leader in this segment, on target to reach USD 4 billion (pro forma) in net sales by 2025, with solutions ranging from Elevate's green, cool and solar-enabling flat roof systems, all the way to Malarkey's sustainable residential shingles. In 2022 we crossed a milestone by transitioning all of Elevate's insulation board production facilities to ISOGARD™, meaning that all of them now make roofing insulation that provides maximum thermal efficiency, which translates to lower operational emissions (see box).

Green retrofitting
In some regions, up to 80 percent of the existing building stock will still be in use by 2050. Our green retrofitting systems make them last longer in a sustainable way. Complementing the "new build" market, our range of specialty building solutions generate up to 80 percent of their sales in the repair market, from PRB's facade systems to Cantillana's insulation boards.

Bringing nature into cities
In addition to reducing the operational emissions of buildings, our products bring more nature into cities to make cities more livable. For example our green roofs bring vegetation and nature into cities, reducing the heat island effect and improves air quality. Hydromedia permeable concrete recharges groundwater, allowing urban forests to grow and limiting the impact of heavy floods.

ELEVATE

Malarkey Roofing Products

ISOGARD™ HD

PRB Produits de Revêtement du Bâtiment

cantillana

Hydromedia

All Malarkey shingles are GreenCircle Certified thanks to their smog-reducing technology and use of upcycled materials

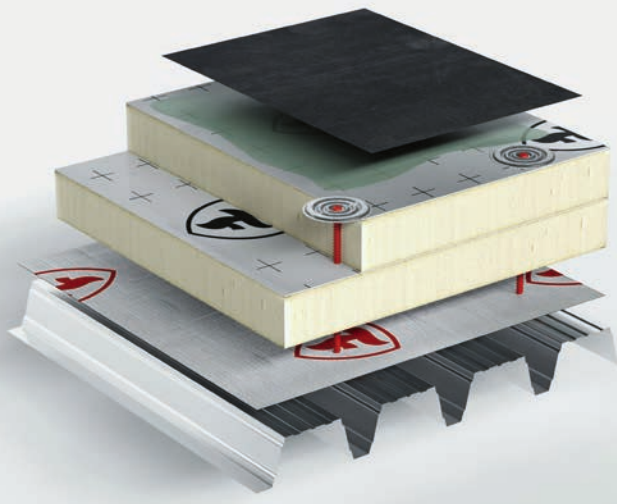
Improving air quality

With the 2022 acquisition of Malarkey, we entered residential roofing. In addition to improving home insulation, Malarkey's shingles are also the most sustainable in the market. Malarkey Roofing Products won the prestigious Green Circle certification for upcycling about 3,200 plastic bags for the average roof.

Malarkey shingles also improve air quality. In 2018, Malarkey integrated smog-reducing technology across its entire product range. That means each average-sized roof has the smog-fighting capacity of two to three trees so that now, 400,000 roofs later, Malarkey has applied the equivalent of over 1 million trees of smog-reducing power.

WHY ISOGARD™

Roof insulation acts as a barrier to heat loss and gain, improving a building's overall energy efficiency. Elevate ISOGARD™ provides better thermal performance compared to leading competitive products on the market today.



CIRCULAR CONSTRUCTION

We are driving circular construction to build new from the old.

At Holcim we see circularity as the business opportunity of our time.

Circular construction is essential to decarbonizing building. That means recycling materials to build new from old. It means reducing the footprint of building across its lifecycle. And finally, circular construction means regenerating ecosystems to build for nature.

We recycled 34 million tons of materials across our business in 2022, making us one of the world's largest recyclers. Construction & demolition waste (CDW) accounted for 6.8 million tons of that, equal to more than 1,000 truck loads each day. We want to double down on this rate to reach at least 10 million tons of CDW by 2025 to build more new buildings from old ones.

As concrete is infinitely recyclable, we are building up the capacity to recycle 100 percent of concrete-based CDW 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.

Product engineers at the R&D center at Holcim Switzerland's site in Siggenthal

Circularity in practice

Driving the circular economy addresses the challenges of climate change and resource scarcity at the same time. We use innovative solutions to return waste to the material cycle, recycling CDW and then returning that material into new building, through products such as Susteno, our resource-saving cement (see box).

The Recycling Center Ostschweiz (RCO)

The Recycling Center Ostschweiz (RCO), a joint venture between Holcim Switzerland (AG) and Zürcher Kies & Transport AG, specializes in recycling building materials. Spread over an area of almost 18,000 m², this unique facility sorts, treats, crushes and reuses CDW, recycling 100 percent of the materials it receives.

The center receives a wide range of CDW and turns it into high-quality gravel or mixed granules. The recycled – and recyclable – building materials are used in a wide range of applications, such as in certified concrete for the construction sector as well as certified aggregates for road and civil engineering. To stay at the forefront of both innovation and sustainability, the RCO recently installed a new soil washing system that removes pollutants and foreign matter, using recycled rainwater in the process.

◀ *Recycling Center OstSchweiz (RCO) by St. Gallen, Switzerland*

The innovative processes employed at the RCO ensure a significantly higher product quality and usefulness for new construction. Today the RCO can process around 200,000 tons of such material per year and supply it back to the construction sector – enough to supply construction of more than 500 single-family houses with recycled building materials.

The RCO's new company building is itself made with a high proportion of recycled material, with the concrete elements entirely made of EcoPact+, containing Susteno cement and 70 percent recycled concrete aggregates. It serves as a showroom of the many advantages of sustainable and circular economy in building.

Susteno, the circular cement

Susteno is the world's first resource-saving cement with 20 percent recycled construction & demolition waste(CDW) inside.

Susteno is made using high-quality material taken from demolition projects, resulting in a cement that closes the loop on CDW to build new from the old and preserve nature.

We introduced Susteno in Switzerland four years ago. Our experience shows that customers can enjoy the sustainability benefits that circular cement offers without compromising performance. We are well prepared to expand our circular range in 2023, first in Europe, taking advantage of upcoming changes in building norms. Our goal is to make circular cement accessible to more customers as standards evolve, enabling circular construction at scale.