

Race to Net Zero Carbon Concrete in Mexico

Arturo Gaytan-Covarrubias



Accelerating the World's Transition to Sustainable Construction

We are building a World with lower carbon emissions, clean energy, alternative water and zero waste.

In 2023, CEMEX México customers helped accelerate the world's transition to net-zero emissions construction by avoiding 1.2 millions metric tons of CO₂e, 1.1 billions liters (300 millions US gallons) of fresh water and 31,000 tons of recycled construction waste

[Explore Engagement](#)

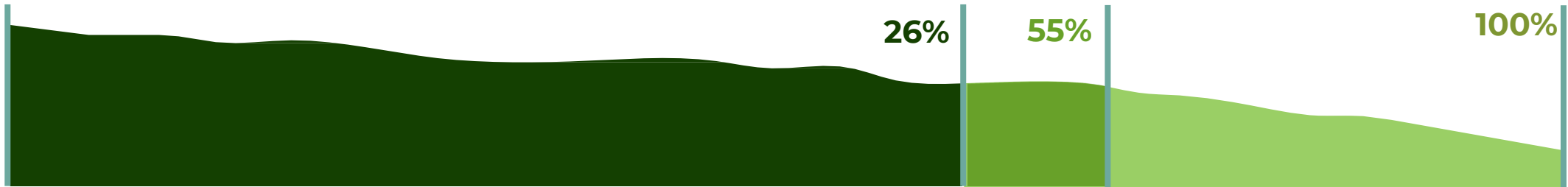
[Explore Fabrication](#)

[Explore Products and Services](#)

[Explore Study Projects](#)

CO₂ net emissions per cubic meter of readymix concrete

2010



355 kgCO₂/m³ - f'c 250
concrete resistance

264 kgCO₂/m³ - f'c 250
concrete resistance

165 kgCO₂/m³ - f'c 250
concrete resistance

ZERO kgCO₂/m³ - f'c 250
concrete resistance

2023 2030

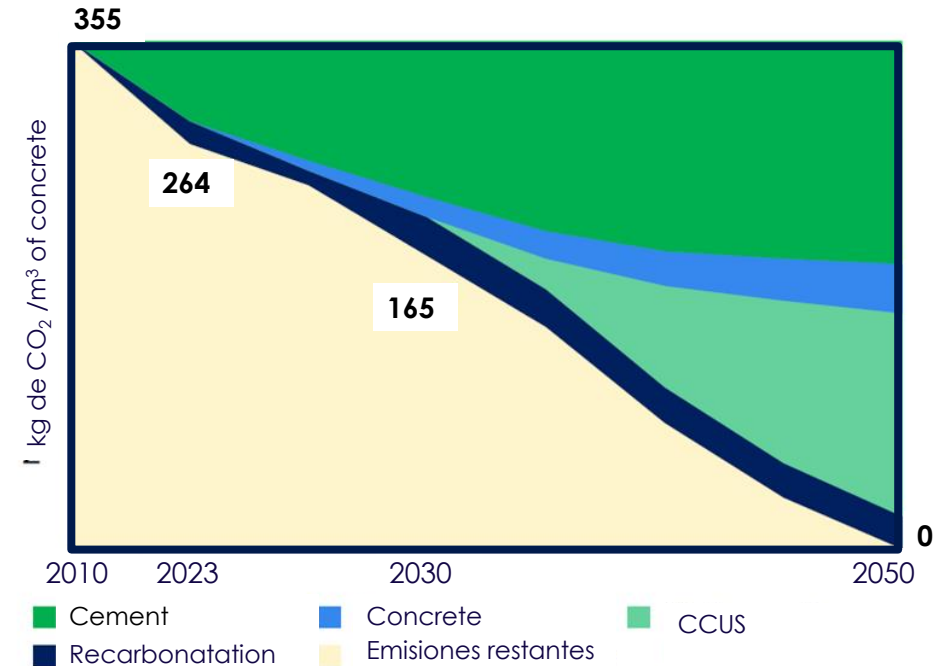
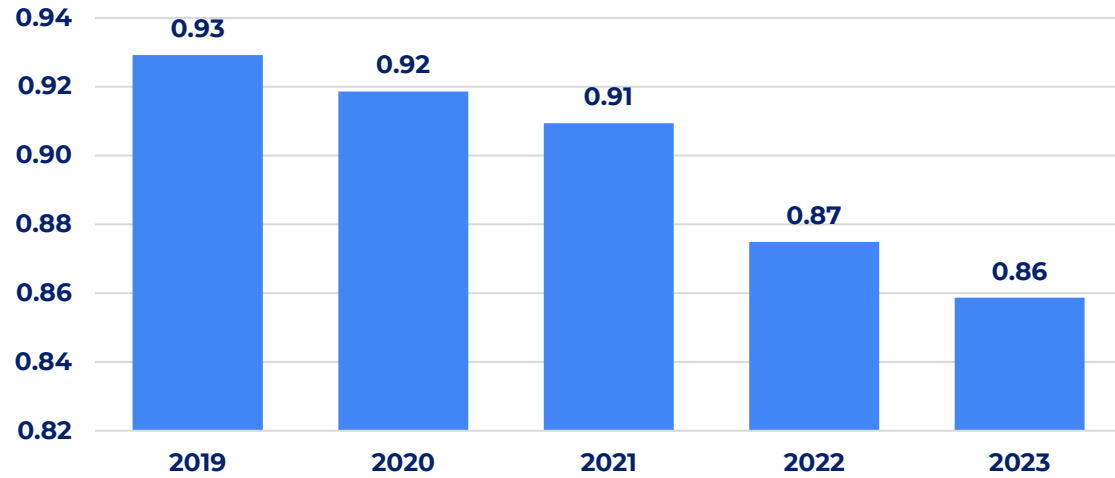
26%

55%

2050

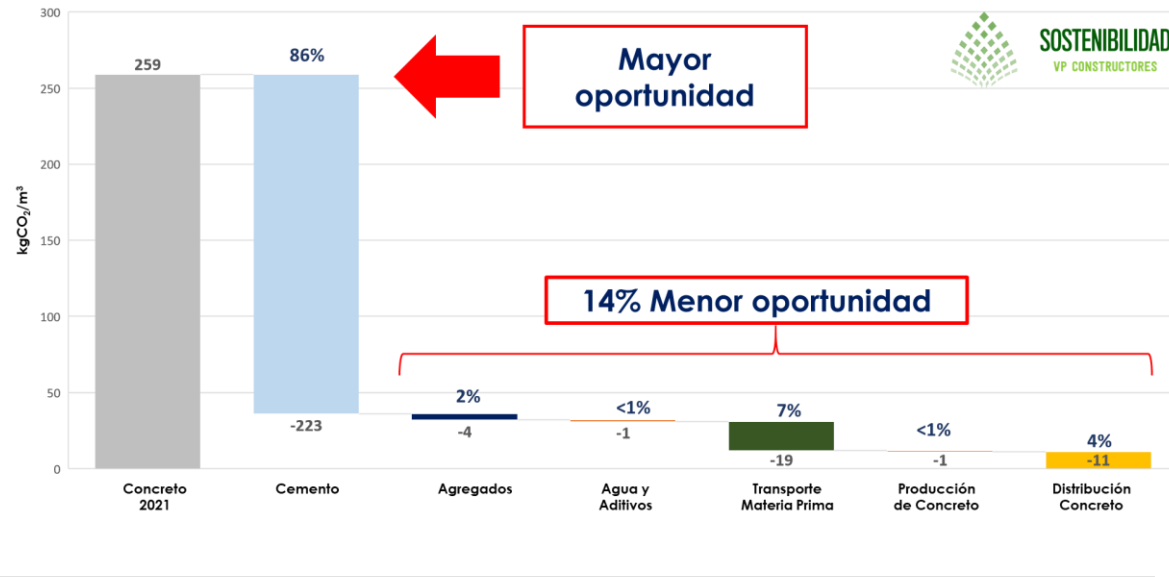
100%

kgCO₂/m³ concreto * f'c (Mpa)



Zero CO₂ concrete Roadmap

CO₂ CONCRETE EMISSION 2021



Cement

- 40% target reduction
- Use of blended cements vs ordinary
- Use of alternative cements
- Use of SCM (fly ash, slag, etc)

Aggregate

- Optimal characteristics to enhance cement consumption
- Non fossil fuels aggregates production.

Water and Admixtures

- 100% Non fresh water
- High performance admixtures to cement optimization
- Non fossil fuels admixtures production.

Raw Material Transport

- Route optimization
- Use of trains > Ship > Auto transport
- Optimal source
- Clean transport

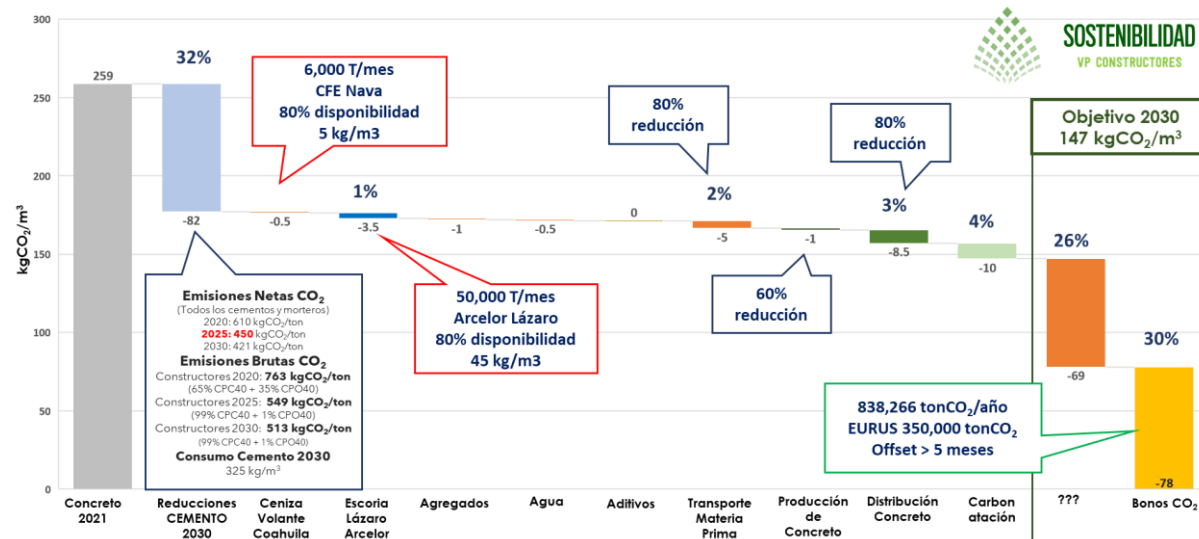
Concrete Fabrication

- Operation electrification (Loaders, engines, etc)
- Use of clean energies
- Generation on site

Concrete Delivery

- Electric and Gas Mixer Trucks
- Route optimization and Driving practices

ROADMAP

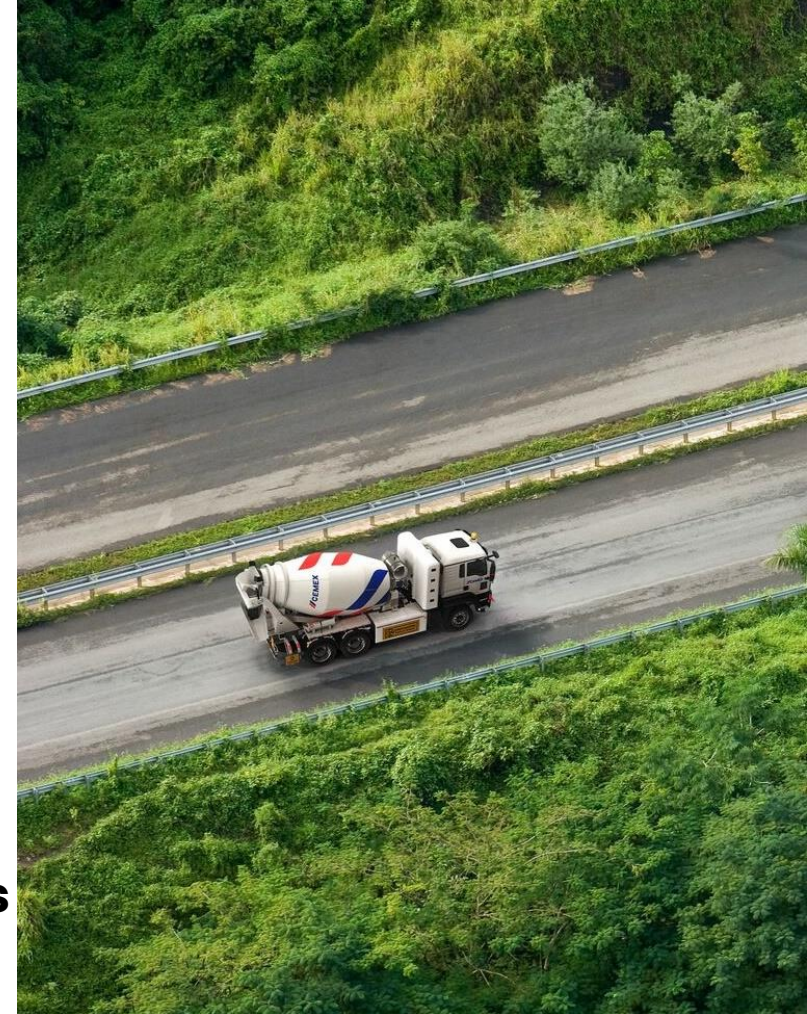
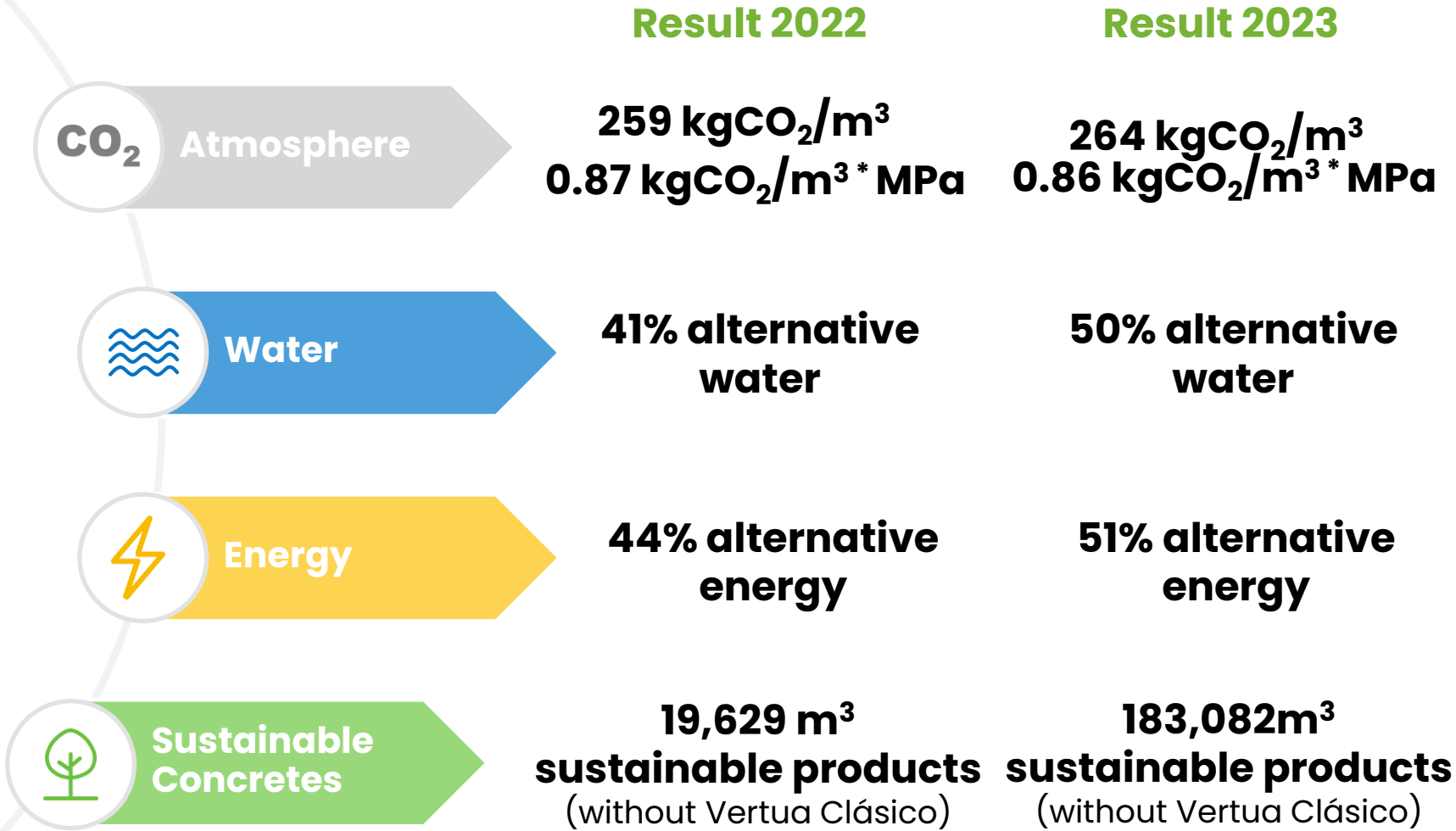


Emisiones Netas CO₂
(Todos los cementos y morteros)
2020: 610 kgCO₂/ton
2025: 450 kgCO₂/ton
2030: 421 kgCO₂/ton

Emisiones Brutas CO₂
Constructores 2020: 763 kgCO₂/ton
(65% CPC40 + 35% CP040)
Constructores 2025: 549 kgCO₂/ton
(99% CPC40 + 1% CP040)
Constructores 2030: 513 kgCO₂/ton
(99% CPC40 + 1% CP040)

Consumo Cemento 2030
325 kg/m³

READY MIX CONCRETE SUSTAINABILITY KPI'S



Acting on the main drivers along our value chain to achieve our objectives



1



Sustainable Products & Solutions

Products and solutions incorporating sustainable attributes



3



Circular Economy

Production and consumption model, focused on

- Reduce
- Reuse
- Recycle



Recycled aggregates and returned concrete



Recycled artificial aggregates

5



Innovation & Partnerships

Carbon Capture, Storage and Use



Use of solar energy for clinker production



Carbon by-products



Energy storage



Use of alternative fuels

Hydrogen injection

Clinker Factor (OPC → CPC)

Thermal efficiency in ovens

Low CO₂ Clinker

NG and electric vehicles



Alternative water use:



Reduction in freshwater withdrawal

Quarry restoration



CARMEN RESERVE

Biodiversity action plans focused on endangered species and habitats

Do more with less:

Use of wastes as fuels



Promote policies, regulations and programs

- Waste
- Clean energy
- Low carbon products
- Carbon pricing
- Government and multilateral R&D funding

2



Decarbonizing our Operations

4



Water & Biodiversity

6



Promoting a Green Economy



100% Free Fresh Water

No Dust Facilities

Environmental Management System

Solar Panels in Concrete Plant

Natural Gas Mixer Trucks

Treatment Water Facilities

ZERO Waste Concrete Plants

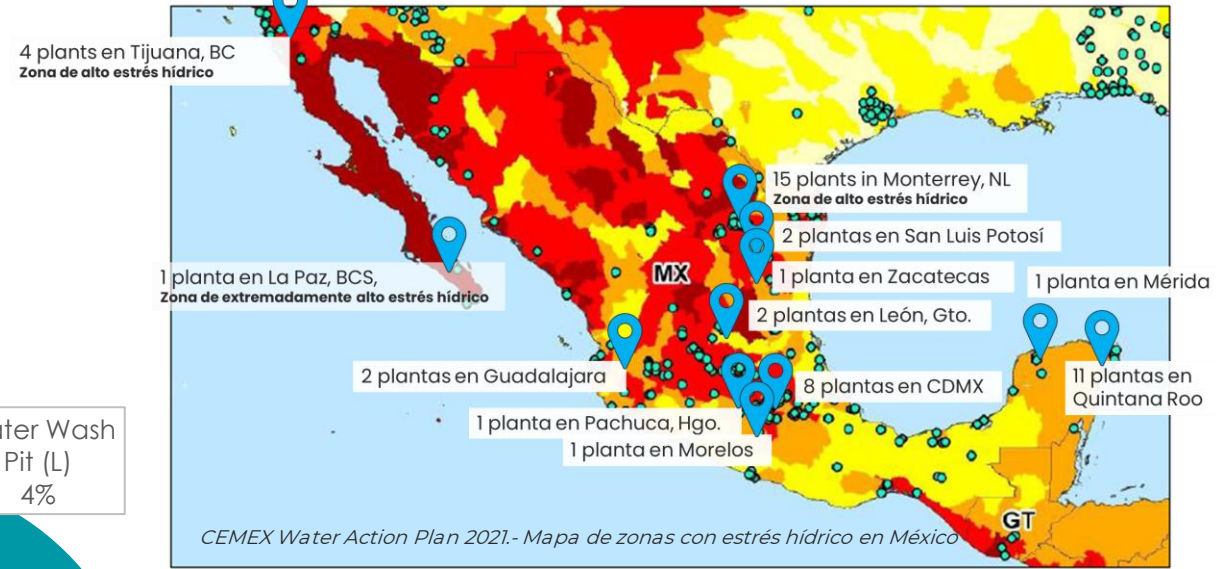
Concrete Waste Treatment on site to Reuse

Solar Lamps

Alternative Water Use

- Exclusively for concrete manufacturing and operational activities such as: Washing of CRs, irrigation of aggregates, yards and roads, filling of CR tanks, etc.)
- Diversify the type of alternative water: Water from other industries (2 A), treated, own recovery (washing pit) and rainwater collected in the plant.
- Ensure the consumption of drinking water for human contact activities and consumption (showers, sinks).

54 concrete plants with 100% alternative water for the manufacture of concrete and 101 plants already using a percentage of alternative water.

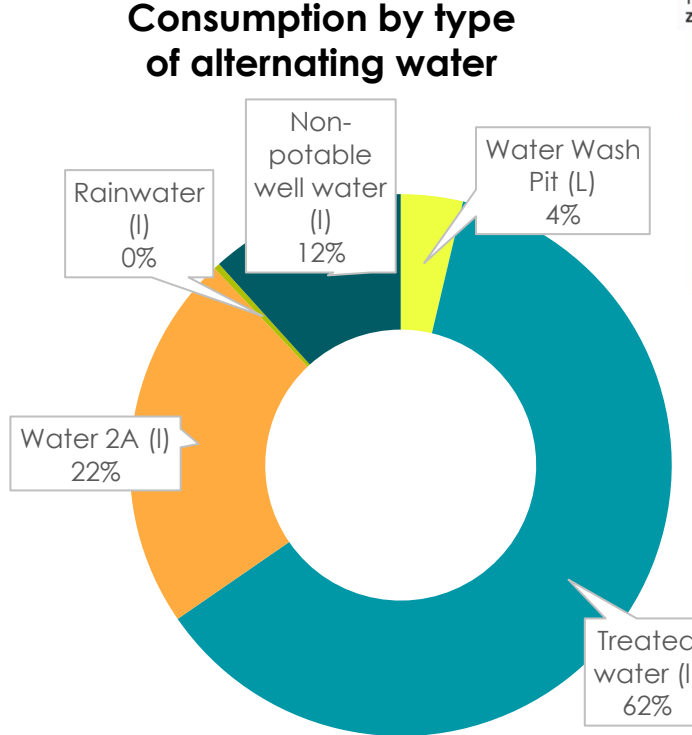
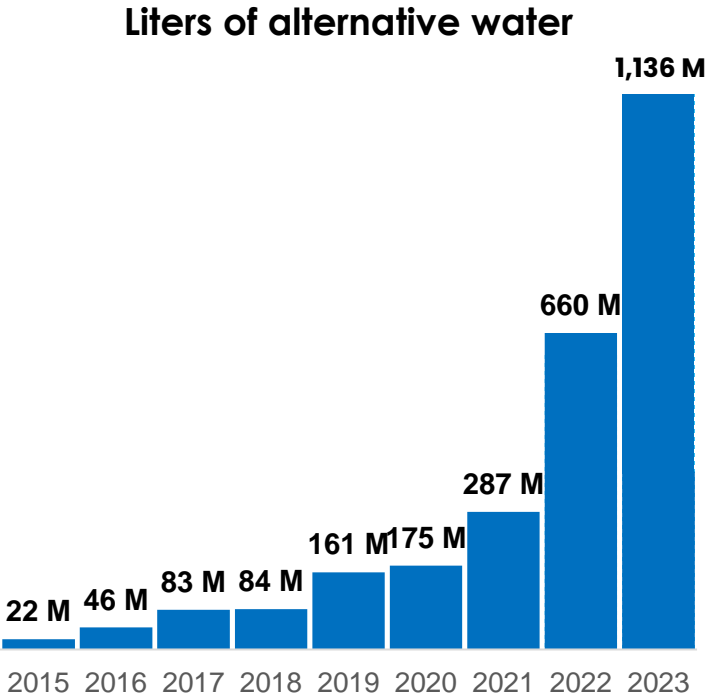


MONTERREY CASE STUDY 2022

An immediate action plan was implemented to transform the use of drinking water into alternative water in the short term. January 2022 – Concrete plants in Monterrey with 20% alternating water.

Identification of new sources of alternative water
Quality validation.

Logistical and economic evaluations
At the end of May: 47% of alternative water, June 70% and September 98%.



2,652 million liters of drinking water replaced

— 2,625 million liters are equivalent to...



— Use of Wind and Solar Energy



Energy

Decarbonizing Concrete Batching Plants

- Supply of electricity, through the EURUS wind farm, to **84** concrete plants.
- In Mexico, in our concrete plants, more than **50%** of our energy is supplied by the wind farm.
- In the **84** concrete plants, **82%** of their supply is wind energy.
- In addition, in **11** concrete plants, we have solar panels for service lighting, as well as external luminaires with solar panels.



Clean Transport



CR's 100% Natural Gas Concrete

125 in 2022 vs 250 in 2023. 10,400 tons CO₂ avoided



Concrete CR's - 100% Electric in Germany, France and UK

Allocation of 2 CRs to Mexico in 2023.



Hybrid & Electric Utility Vehicles at CEMEX Mexico



Roadmap to replace 100% CR with gas

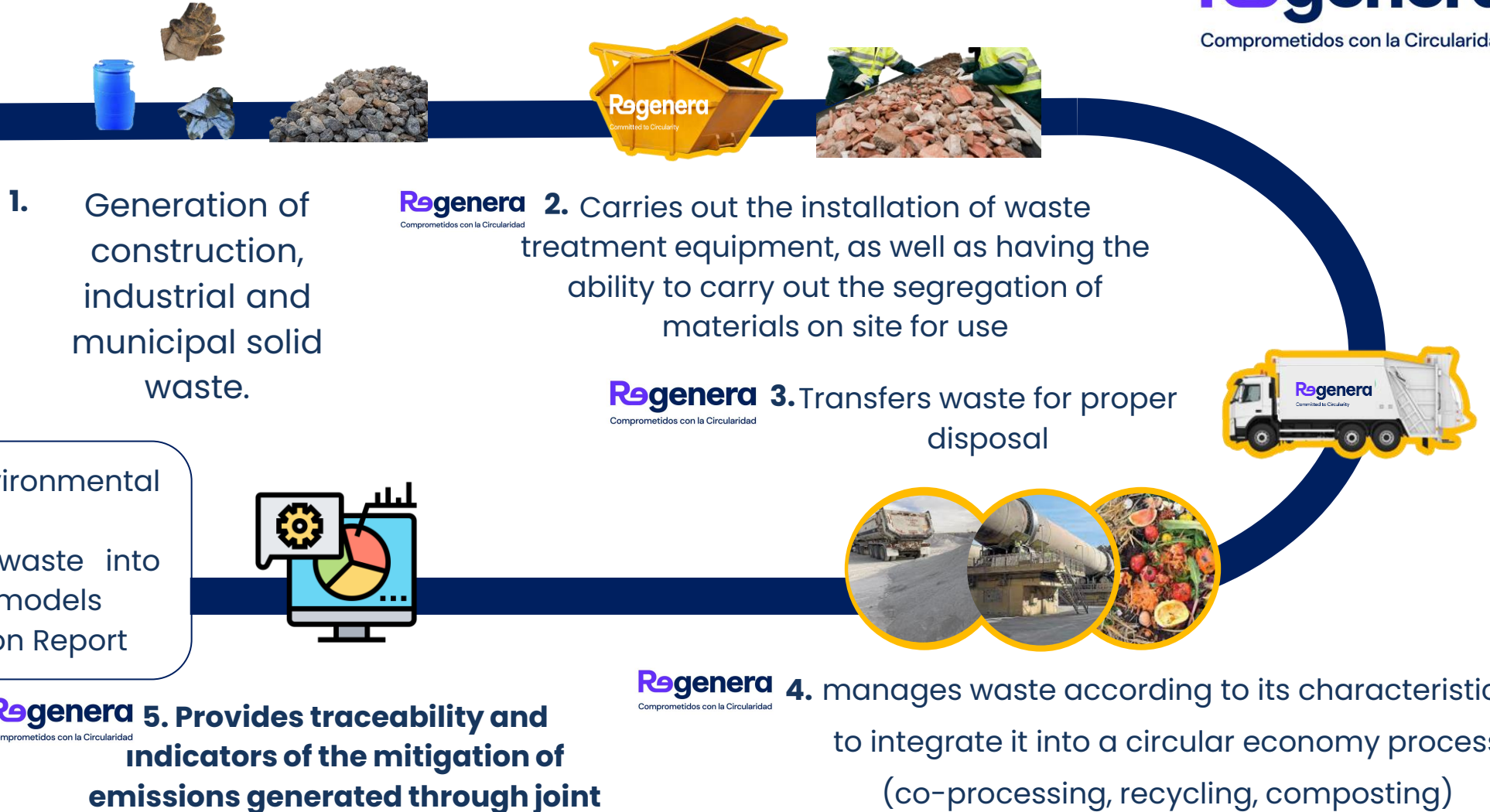


REGENERA Integrating construction waste into the Circular Economy

Regenera

Comprometidos con la Circularidad

We provide solutions through the management of the entire waste chain



- Mitigation of environmental impact
- Reintegration of waste into circular economy models
- Emissions Mitigation Report

VERTUA – Low Carbon Concrete



Vertua = Family of products and solutions with sustainable attributes



Más sostenible por diseño



Main environmental benefits



X 1 =

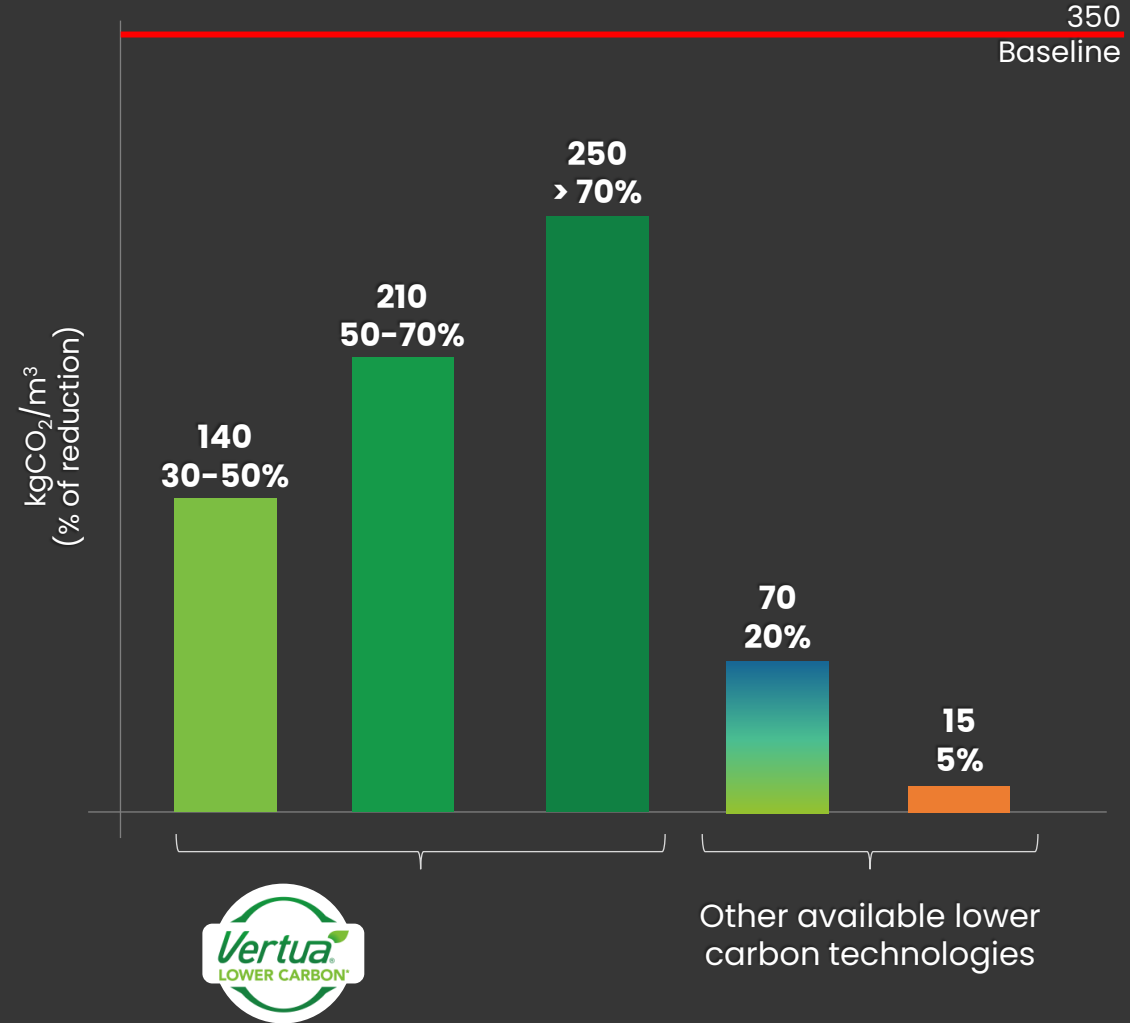


14 trees seedlings grown for 10 years

X 1 =



67 gasoline-powered passenger vehicles driven for one day



*Considering 6 m³ transported in mixer truck

— Integrated waste management

Waste

- SHW Generator
- Landfills
- High Costs



A by-product

- Alternate Raw Material
- Savings on CRM
- ECO Concretes

Project to reduce waste

1. Dehydrated of returned concrete and wash pit sludge
2. Crushing hardened concrete in quarries
3. Mobile Concrete Crusher
4. Reuse of rubble (waste concrete) in cement plant to recover minerals
5. Application of CEMEX Isocycle admixture.

During 2023...

More than 31,000 tons of concrete waste have been recovered, transforming it as a by-product for cement and concrete.

104,058 m³ of concrete have been produced with this recycled aggregate

Our goal is to stop generating special handling waste and instead recover it as a by-product



In 2023:

+35 k projects built with



+1.2 M ton CO₂/m³ (metric tons CO₂e avoid)



+19 M trees
seedlings grown
for 10 years



+4.7 B km not
driven (average
passenger car)



**746 Central
Park**
reforested



118 k laps of
the Earth by car

is a family of concrete made from **recycled, waste** or **by-products** raw materials from other industries.

Professional Concrete ECO CEMEX Water

Fresh water
replacement

- Water from other industries
- Washing pit water
- Treated water
- Rainwater



Plaza Parque Tepeyac, used PET in sidewalks and walkways

Professional Concrete ECO CEMEX Circular

Aggregates
and additions
replacement

- PET
- Tire
- Arqlite (artificial plastic aggregate)

Main benefits

- Promotes circular economy
- ECO Water: Structural and Conventional Concretes, any resistance.
- ECO Circular: Conventional and some Structural Concretes.
- Delivery of certificate with recycled content.



Harp Helú's stadium, built with recycled materials

— Human Factors | Wellness | Architecture

- ✓ Indoor Air Quality
- ✓ Lighting
- ✓ Acoustics
- ✓ Decorative Concrete
- ✓ Heat Island Effect

Apurentia
Architectural

Pavicrete
Concrete
Pavements



- ZERO Volatile Organic Compounds

CEMEX

— Human Factors | **Wellness** | **Architecture**

- Reduction and elimination of maintenance
- Removal of finishes
- Dematerialization



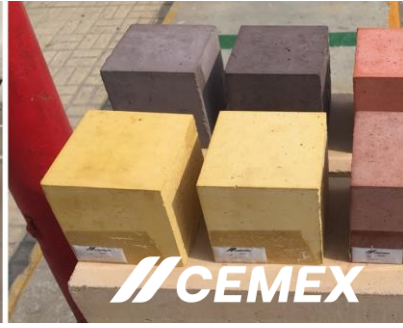
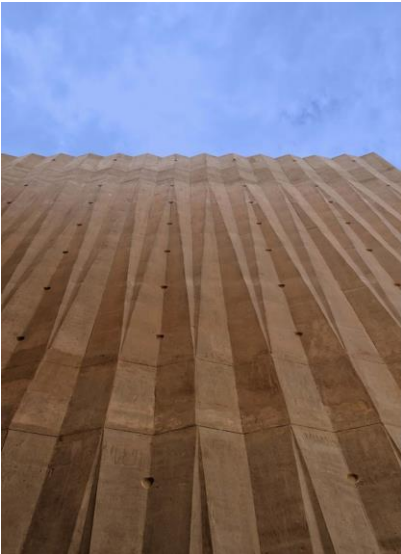
Prints – New Textures and Looks

and an infinite number of textures, finishes and colors, so that the desired effect is obtained.

With exposed surfaces without coatings as a finish in interior and exterior areas in construction.



— Human Factors | Wellness | Architecture



Third Party Sustainability Labeling

Reliable and Sustainable Performance Information

Environmental Product Declaration (EPD)

Life Cycle Analysis (LCA)/ Self declaration)

Health Product Declaration (HPD)

Volatile Organic Compound Report (VOCs)

Solar Reflective Index Report (SRI)

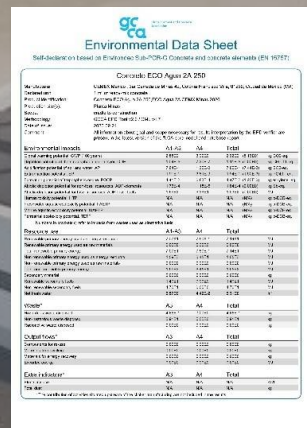
Regionality Material and Recycle Content Report



Environmental Product Declaration

This Environmental Product Declaration (EPD) covers thirty (30) concrete mixes produced by CEMEX México, México City Business Unit at Anáhuac Plant in México City, México.

Company	Plant
CEMEX México	C/ Anáhuac
México City Business Unit	C/ Anáhuac
México	México
México	México

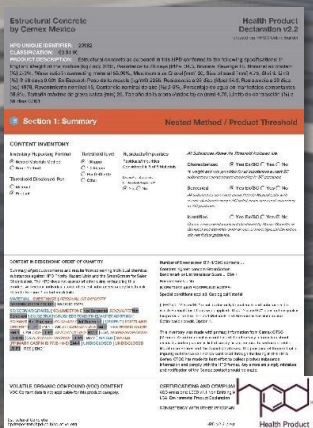


Environmental Data Sheet

Satisfacción basada en Emisiones Sub-Producto Cemento y concreto vendidos (CE 1927):

Contribución ECO Agres DA 250

Indicador	Valor	Unidad	Objetivo
Emisiones de CO2 (kg CO2e/kg de cemento)	100	kg CO2e/kg	100
Emisiones de CO2 (kg CO2e/m3 de concreto)	170	kg CO2e/m3	170
Emisiones de CO2 (kg CO2e/m3 de concreto)	170	kg CO2e/m3	170
Emisiones de CO2 (kg CO2e/m3 de concreto)	170	kg CO2e/m3	170



Health Product Declaration V2.2

HEALTHY MATERIALS - 2019

DECLARACIÓN: Este producto cumple con los requisitos de un HPD de acuerdo a la metodología de declaración de materiales saludables (HPD) de GreenScreen for Building, versión 3.0. Este HPD se basa en los datos de los materiales que se detallan en el Anexo 1. Este HPD se basa en los datos de los materiales que se detallan en el Anexo 1.

Sección 1 - Summary

Indicador	Valor	Unidad	Objetivo
Emisiones de CO2 (kg CO2e/kg de cemento)	100	kg CO2e/kg	100
Emisiones de CO2 (kg CO2e/m3 de concreto)	170	kg CO2e/m3	170



SGS

Informe de Resultados de Ensayos

ANÁLISIS DE COMPUTADOR ORGANIC VOLATILES

Producto	Valor	Unidad	Objetivo
Formaldehído	0.05	mg/m3	0.05
Benceno	0.01	mg/m3	0.01
Tolueno	0.02	mg/m3	0.02



Informe

MEJORA DE LA REFLECTANCIA SOLAR Y EMISIÓN TÉRMICA

CALCULO DEL INDICE DE LA REFLECTANCIA SOLAR

Indicador	Valor	Unidad	Objetivo
Índice de Reflectancia Solar (IRS)	92	%	92



Carta de Producto LEED

El producto es un concreto armado tipo 250 con un valor de IRS de 92.

Indicador	Valor	Unidad	Objetivo
Índice de Reflectancia Solar (IRS)	92	%	92

Sustainability Product Labeling

Transparent Product Information

Quotations

Sustainable Account Statement

Invoices

Certificate

Vertua
Más sostenible por diseño

Plano y forma de pago:

CONDICIONES:

CONDICIONES DE PAGOS:

CONDICIONES DE ENTREGA:

CONDICIONES DE GARANTÍA:

CONDICIONES DE RESPONSABILIDAD:

CONDICIONES DE FORTALECIMIENTO DE CAPITAL:

ESTADO DE CUENTA SOSTENIBLE

DESARROLLOS DELTA

7,277 6,999 97% 1,802 30 K

VOLUMEN TOTAL (m³) VOLUMEN VERTUA (m³) % VOLUMEN VERTUA TOTAL TONELADAS REDUCIDAS DE CO2 ARBOLES EMBARBOSADOS

VOLUMEN VERTUA (m³)

PLAZA MONTERREY 6,999 7,277

TOP 10 OBRAS CONCRETO VERTUA

OBRA PLAZA VOLUMEN VERTUA VOLUMEN VERTUA TOTAL TONELADAS REDUCIDAS DE CO2

50% DE SUS OBRAS SON TOTALMENTE VERTUA

Propuesta factura

PRO/SRV	PRODUCTO	DESCRIPCIÓN
30111505	20078909	F'CB00 28DIAS REV20 TMA2 30% REDUCCION CO2
		PLANTA: D081 / 493 kgCO2/m3 / Baseline: 736 kgCO2/m3
		REMISION: D081000015450

*Emisión de concreto en kgCO₂ por m³

*Emisión de concreto de referencia en kgCO₂ por m³

DATOS DEL CLIENTE

50060232 LONCIN DESARROLLOS S.A. DE CV JAVIER BARRIOS SIERRA 540 TORRE 1 No. LOMAS DE SANTA FE C.P. 01210 ALVARO OREGON Ciudad de México Tel: 553402475 RPC: LD6131103076 Uno del CFCU: P01

SUCURSAL/OBRA

60561515 ORIGINAL FEDERAL PERIFERICO SUR No. 4271 AMPLIACION FUENTES DEL FEDERAL C.P. 14140 TLALPÁN Ciudad de México Tel: 553402475

CANTIDAD	UM	CVEUM	PRO/SRV	PRODUCTO	DESCRIPCIÓN
18.000	M3	MTQ	30111505	20000448	4-350-3-32-40
4.000	M3	MTQ	30111505	20020350	F'CB400 28DIAS REV48 TMA2 ALTA RESISTENCIA
105.500	M3	MTQ	30111505	20000278	MMD45 28 DIAS REV14 TMA20 NORMA P
					80.5 M3 Vertua Clásico / 250 kg de CO2 reducidos
					25 M3 / 250 kg de CO2 reducidos

Vertua concreto bajo en carbono

FELICIDADES por contribuir al cuidado del PLANETA

CLIENTE: Juan Ignacio Posada Torres

PROYECTO: Luna Llena – Ensenada, Baja California.

Este certificado reconoce el ahorro de CO₂ con el uso de 10 m³ de concreto Vertua. Clásico equivalente a:

CO₂ 0.977 Toneladas CO₂

Manejar 6,311 kilómetros

Decremento anual de 49 árboles

Footprint

LUIS FRANCO VP Ventas e Constructores

Vertua

LOWER CARBON LOWER EMBODIED CO₂

BASELINE CLASSIC PLUS ULTRA

350 KgCO₂/m³ 30-50% REDUCCION 50-70% REDUCCION >70% REDUCCION

150 KgCO₂/m³

LEARN MORE!

Label

Sustainable Construction Training Program

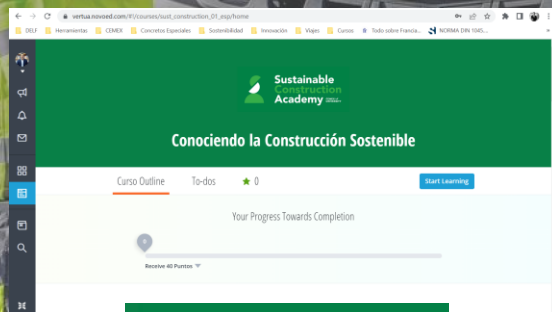
Empowerment of our Clients through the positioning of SUSTAINABILITY through different strategies...



**CEMEX://
UNIVERSITY**

Training

CEMEX University
Sustainability Construction
Academy



Calculators

Online tool that estimates actual Vertua's CO₂ emission reductions.



Reference Documents

Papers regarding the theoretical and technical information about climate change and global warming



Promoting the circular economy

Proyecto Bancas Arquitectónicas,
Centro Comercial Santa Tomás,
Ensenada, Baja California
Concreto ECO con PET Triturado

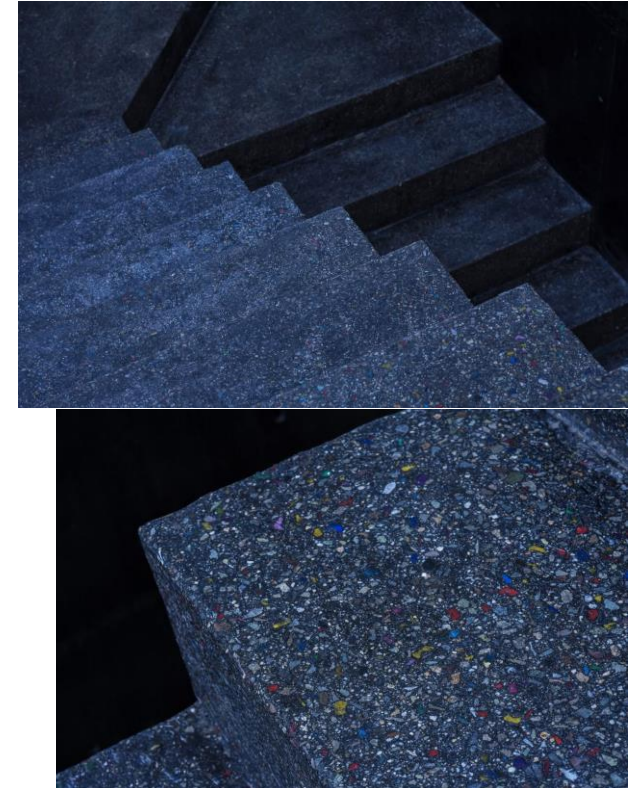


- Concreto ECO f'c 250 con PET Triturado
- PET utilizado equivalente a 2,800 botellas.

Proyecto Escaleras
Plaza Comercial Iturbide
Ensenada, Baja California
Concreto ECO con PET Triturado



- Concreto ECO f'c 250 con PET Triturado
- PET utilizado equivalente a 7,700 botellas.



ECO Concrete | Crushed Concrete



Alfredo Harp Helú Stadium CDMX 2017

CONCRETO
PROFESIONAL^{MR}
eco

Concrete made with crushed
concrete aggregate

- Conventional concrete f'c 150 kg/cm²
- 150 m³
- 30% substitution of coarse aggregate
- Sidewalks of the underground parking

ECO Concrete | Crushed Tires



Paseos del Florido, VIVEICA, Tijuana



LLANCRETO
eco
CONCRETO
PROFESIONAL^{MR}
eco

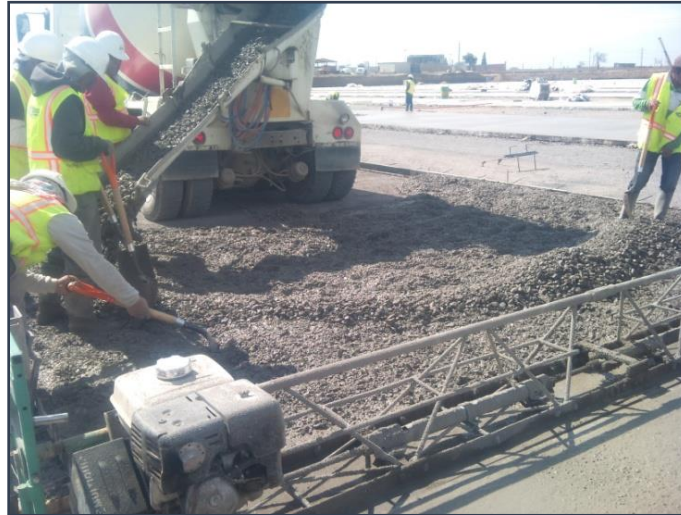
- Area: 40,000 m² of concrete
- Reuse of 1,000 tires
- Reduction of sources of infection.
- Reduction of emissions into the environment from tire burning.
- Release of tire storage yards.
- Reduction of volume changes due to thermal expansion and contraction
- Improved anti-skid properties and noise reduction



ECO Concrete | Crushed Tires

Volkswagen México Plant Puebla, Puebla

Railyard
20,000 m³
Llancreto MR 38



LLANCRETO
ECO

ECO Concrete | Crushed Tires

Volkswagen México Plant Silao, Guanajuato

- Volume: 6100 m³ aprox.
Specification: The product was supplied in $f'c=200\text{kg/cm}^2$, (Llancreto)
- Name of the project: VW Silao Plant
- Year of construction: Dec 2011- May 2012
- Client: Inmobiliaria y Constructora Alhemos SA de CV



LLANCRETO
eco



ECO Concrete + Ultra Low Carbon Concrete

Design Week 2021, México (CDMX)

Elaboration of Benches Design Week - VERTUA Ultra Eco photoluminescent

Project Litholux –
SUSTAINABLE AND ENERGY TRANSITION PROJECT
Sustainable urban benches – Design Week Mexico 2021 – 2022
Design and collaboration with architect Carlos Barba and
engineer Esteban Astudillo.

Concrete

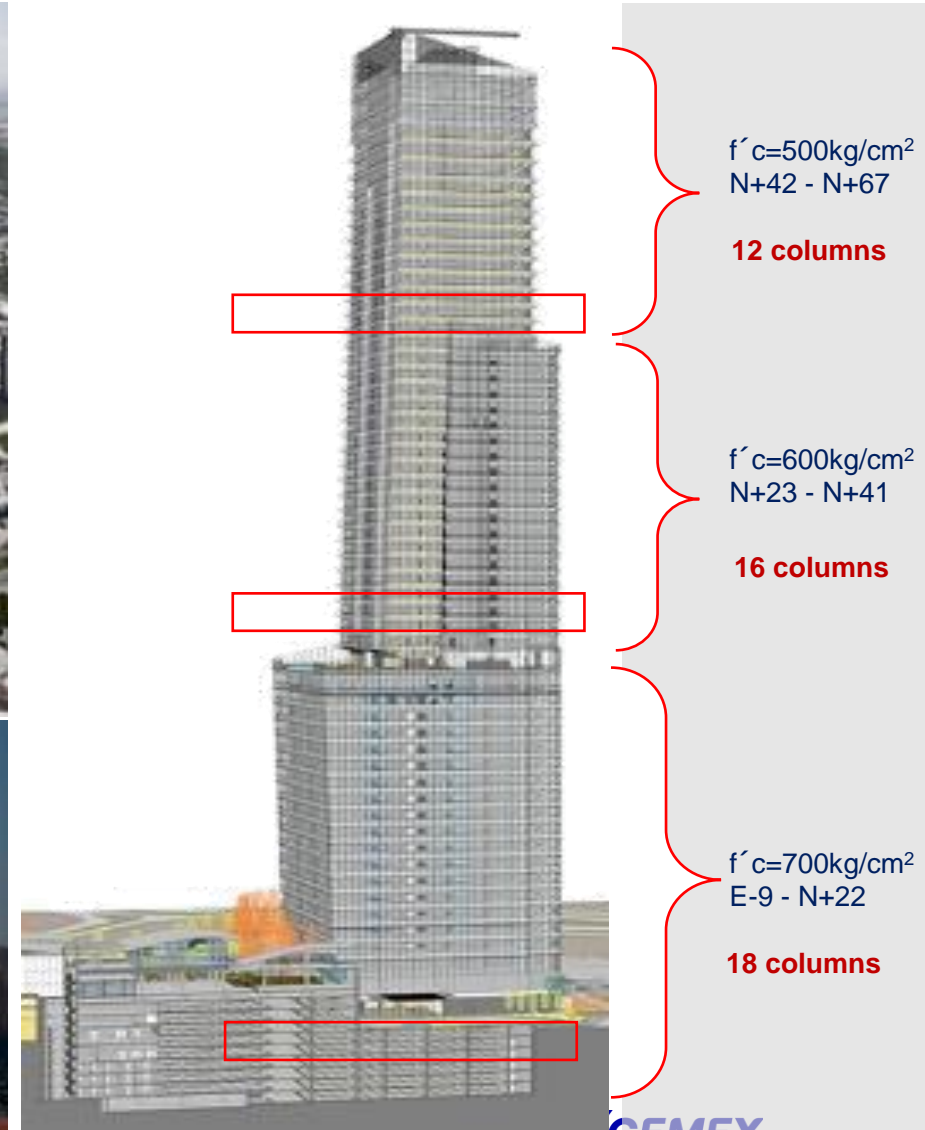
- Vertua Ultra – 90% reduction in CO2 emissions
- Alternate Water
- Shredded PET
- Crushed Concrete
- Artificial Aggregate - Arqlite
- Photoluminescent aggregates



High Strength Concrete

Torre KOI, Monterrey

- Construction completed: 2016
- 279.5 metros de altura
- 69 floors (20 offices, 36 apartments, 236) and 9 parking levels
- Mixed use, (offices, apartments and hotel)
- High Strength Concrete
 - Columns $f'c = 700, 600$ y 500 kg/cm^2
 - Post-tensioned slabs $f'c = 500 \text{ kg/cm}^2$
- Value of the apartments, $\$80,000/\text{m}^2$
- Lower level area: $2,000 \text{ m}^2$
- Upper levels área: $1,000 \text{ m}^2$
- 14 average columns per level
- 0.45 m^2 plus area per columns optimization (6.3 m^2 per level – 277 m^2 total increase)
- 110 kgCO_2 reduction per column – 65 tonCO_2
- 588 columns (N23 to N67)

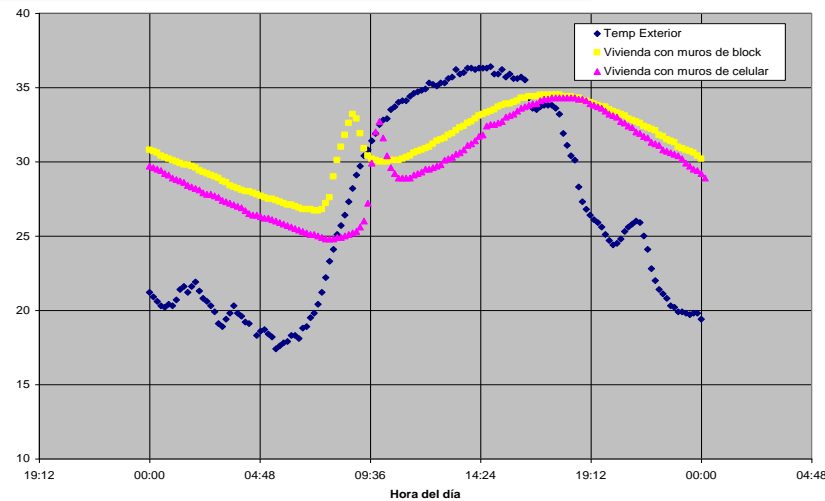


Lightweight Concretes

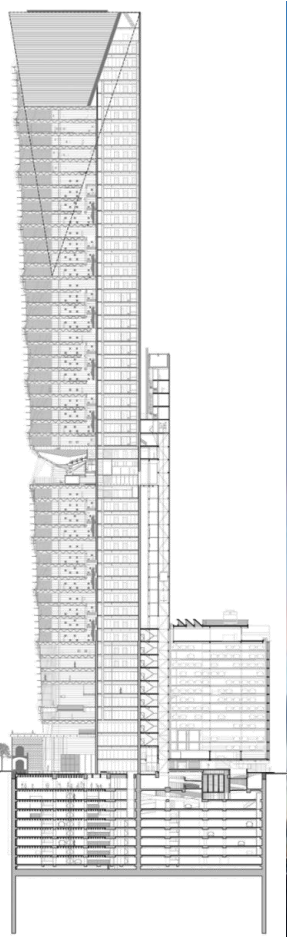
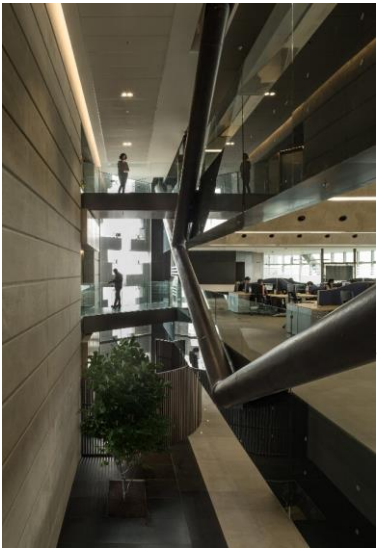
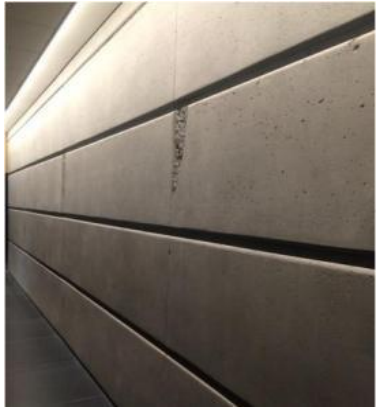


Social Housing, La Paz, Baja California

- Housing with hollow block walls 12 cm thick (masonry).
- Housing with lightweight concrete walls 1800 kg/m³ 10 cm thick
- Dry-semi-warm climate with a minimum temperature of 13.6° C, a maximum temperature of 40° C and an average annual temperature of 22° C.
- Lightweight Concrete decreasing approx. 5° C the temperature



Architectural & Lightweight Concretes



Torre Reforma, Ciudad de México

- Construction completed: 2016
- 246 meters high 57 levels
- Total area: 80,000 m²
- Typical floors from 875 m²
- Length of facade walls: 40 m.
- Lightweight concrete 1,800 kg/m³,
- Strength f_c 250 kg/cm²
- Concrete to reduce dead load in mezzanine slabs and improve energy efficiency.
- Apparent concrete indoors.
- 39,360 m² facade area.
- **111,783 kgCO₂** reduced by exposed concrete

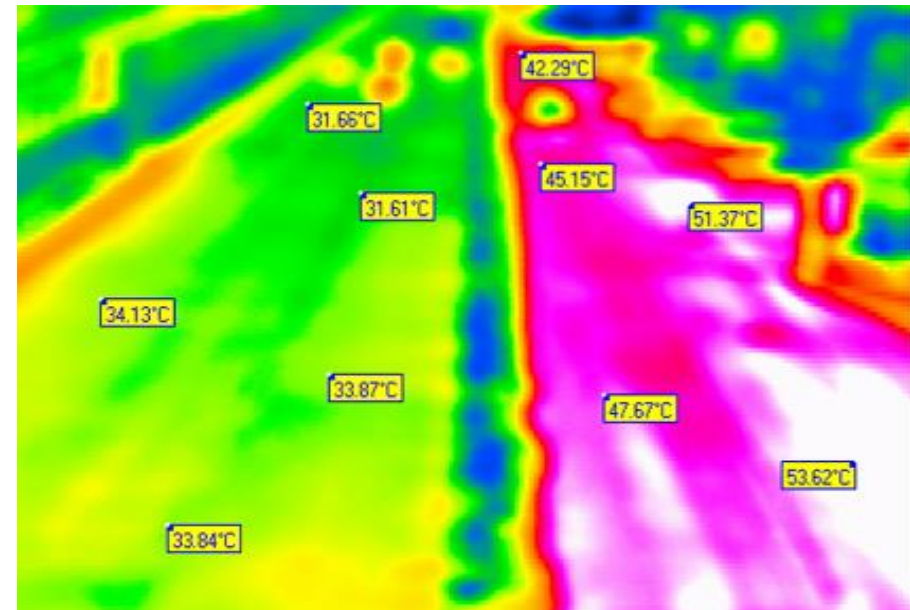
1m² paint = 3 kgCO₂
1m² colored concrete = 0.16 kgCO₂
-2.84 kgCO₂

Repavimentación Circuito Interior, CDMX

- Substitution of conventional concrete MR by special product MR45
- Speed in construction
- Durability
- Area: 2,095,000 m²
- The concrete guarantees a minimum durability of 25 years
- A volume of 420,000 m³ of concrete is placed
- Reduce heat islands
- **115,225 tonCO₂ reduced**

Pavements. 30% fewer luminaires, same lighting.

1 m² concrete pavement = 290 kgCO₂
1 m² asphalt pavement = 345 kgCO₂
-55 kgCO₂



▶ Closing remarks

- Sustainable Development is the main challenge today
- The construction industry is key.
- Concrete is the 2nd most used material and there are no substitutes for its attributes
- It is necessary to exercise leadership and commitment to achieve the required changes
- Innovation is key to achieving our goals
- We must embrace the challenge as consumers and in our daily lives
- The collaboration of companies in the sector, designers, architects, engineers, other industries, academia, and NGOs is essential for the future.
- We have a clear path to follow to achieve the 2030 and 2050 goals.