Global Cement and Concrete Association



Cement Industry Net Zero Progress Report

An update of global action and progress of the GCCA and its member companies, two years on following the launch of its Concrete Future 2050 Roadmap for net zero concrete. www.gccassociation.org





What is Low Carbon and Near Zero? Latest on standards, definitions and targets for green procurement of cement and concrete

> 23rd January 2024 12:30 – 13:30 (GMT)

Dr Andrew Minson DPhil (Oxon) CEng FIStructE FICE Concrete and Sustainable Construction Director Global Cement and Concrete Association (GCCA) January 2024

OUR MEMBER COMPANIES AND AFFILIATES OPERATE IN ALMOST EVERY COUNTRY OF THE WORLD

Our Members

- Asia Cement Corporation
- Breedon Group
- Buzzi Unicem
- Cimenterie Nationale
- Cementir Holding
- Cementos Argos
- Cementos Moctezuma
- Cementos Molins
- Cementos Pacasmayo
- Cementos Progreso
- CEMEX
- Çimsa Cement
- CNBM
- CRH
- Dalmia Cement
- Dangote
- Fletcher Building
- GCC
- Heidelberg Materials
- Holcim
- Huaxin Cement
- JK CementJK Lakshmi Cement

- JSW Cement
- Medcem
- Misr Cement Group
- Nesher Israel Cement
 Enterprises
- Norm Cement
- Orient Cement
- PT Solusi Bangun Indonesia
- SCHWENK Zement
- Secil
 - Siam Cement Group
 - Siam City Cement
 - Taiheiyo Cement
 - Taiwan Cement Corporation
 - TITAN Cement Group
 - UltraTech Cement
 - UNACEM
 - Vassiliko Cement
- Votorantim Cimentos
- YTL Cement

Partner national and regional industry associations

- Asociación de Fabricantes de Cemento Portland – Argentina
- Asociación de Productores de Cemento – Peru
- Associação Brasileira de Cimento Portland – Brazil
- Association of German Cement Manufacturers (VDZ) – Germany
- Association Professionnelle des Cimentiers – Morocco
- Betonhuis Netherlands
- BIBM Europe
- CANACEM Mexico
- Canadian Precast Prestressed
 Concrete Institute
- Cement Association of Canada
- Cement Concrete & Aggregates
 Australia
- Cement Industry Federation Australia
- Cement Manufacturers Association India
- Cement Manufacturers Ireland
- Concrete NZ New Zealand

- European Cement Association
 (CEMBUREAU)
- European Federation Concrete Admixtures
- European Ready Mixed Concrete Organisation
- Federación Iberoamericana del Hormigón Premezclado – LatAm
- Federación Interamericana del Cemento (FICEM) – LatAm
- Japan Cement Association
- Korea Cement Association
- Mineral Products Association
 United Kingdom
- National Ready Mixed Concrete Association – USA
- Portland Cement Association USA
- Thai Cement Manufacturers
 Association
- The Spanish Cement Association (Oficemen)
- Turkish Cement Manufacturers Association (TürkÇimento)

"

<u>Concrete is essential to our</u> <u>lives</u>

... but we have to reduce its emissions."

Concrete & cement are not just <u>fundamental</u> to constructing roads, bridges and buildings.



You are fundamental to building a better wo

António Guterres Secretary-General of the United Nation

John Kerry United States special presidential envoy for climate.



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Cement Industry Net Zero Progress Report

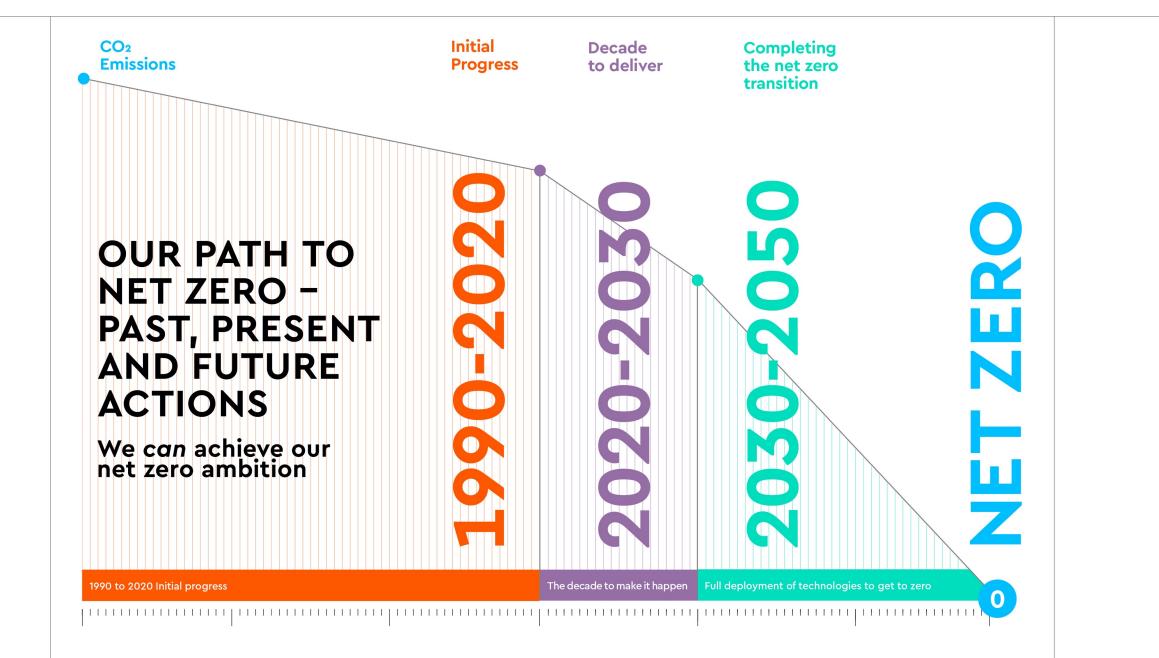
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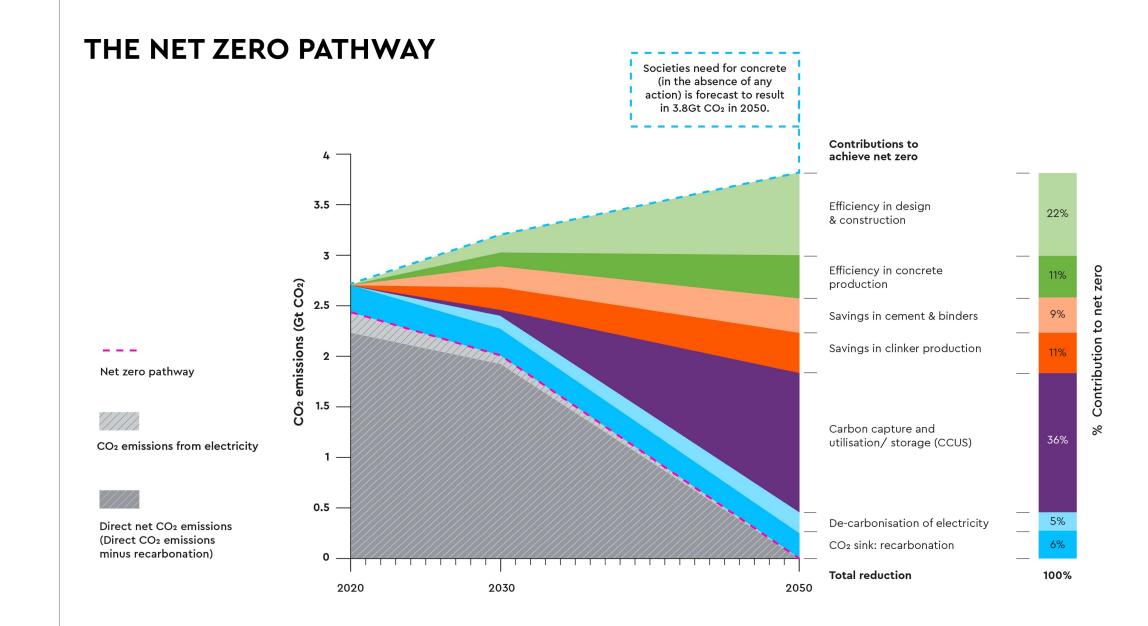
Speaker: Dr Andrew Minson



Andrew Minson, DPhil(Oxon) CEng FIStructE FICE GCCA Director, Concrete and Sustainable Construction











Low Carbon Procurement of Cement and Concrete

Low carbon procurement: GCCA position

- "Create market demand for carbon neutral construction and decarbonised value chains"
- "stimulate demand for low-carbon concrete products.... through changes to standards and

public procurement policy"



GCCA 2050 Roadmap asks for Green Public Procurement Policy

GCCA Policy on Sustainable Procurement

- Assessed at scale of whole project building or infrastructure asset over whole life
- Based on **robust data** and account for performance, economic and technical issues

To define **product baselines**:

- Concrete varies geographically use country and sub country regions
- Concrete is more than one product use sub-categories of concrete strength and product type (precast).
- Consistent baseline methodology for each sub-category of concrete, calculate reference using OPC/CEM1 (2020) mix
- To calculate baselines use country/local Cement and Concrete Industry Associations

Target progressive reduction in carbon footprint of purchased concrete in alignment with global (or national) roadmap

Low carbon procurement initiatives

The following slides provide an overview of the following low carbon procurement initiatives:

- First Movers Coalition (FMC) (cement and concrete)
- Concrete Zero (concrete)





CLIMATE GROUP

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First Movers Coalition (FMC)

A global coalition of companies leveraging their purchasing power to decarbonize the world's heavy-emitting sectors (Aviation, Shipping, Trucking, CDR, Aluminium,



First Movers Coalition (FMC): Commitment for cement and concrete

FMC members in cement and concrete commit to procure

by 2030 10% of cement or concrete as near-zero.

FMC's definition of near-zero is:

Cement with embodied carbon below 184 kg
 CO₂e/tonne of cement

2. Concrete that is below a set of embodied carbon limits based on specified compressive strength

Specified compressive strength (f'c in psi)	Embodied carbon (kg CO ₂ e/m³)		
0 - 2500 psi	70		
2501 - 3000 psi	78		
3001 - 4000 psi	96		
4001 - 5000 psi	117		
5001 - 6000 psi	124		
6001 - 8000 psi	144		

(Source : FMC, 2023)

ConcreteZero

ConcreteZero is a **procurement initiative** that brings together leading businesses and decision makers to speed up transformation towards zero emissions concrete.

Concrete Zero is focused on **unifying market demand**, accelerating innovation and deployment of sustainable solutions.



ConcreteZero commitments

2025

30% of concrete consumption has carbon intensity no greater than the ConcreteZero Embodied Carbon Threshold.

2030

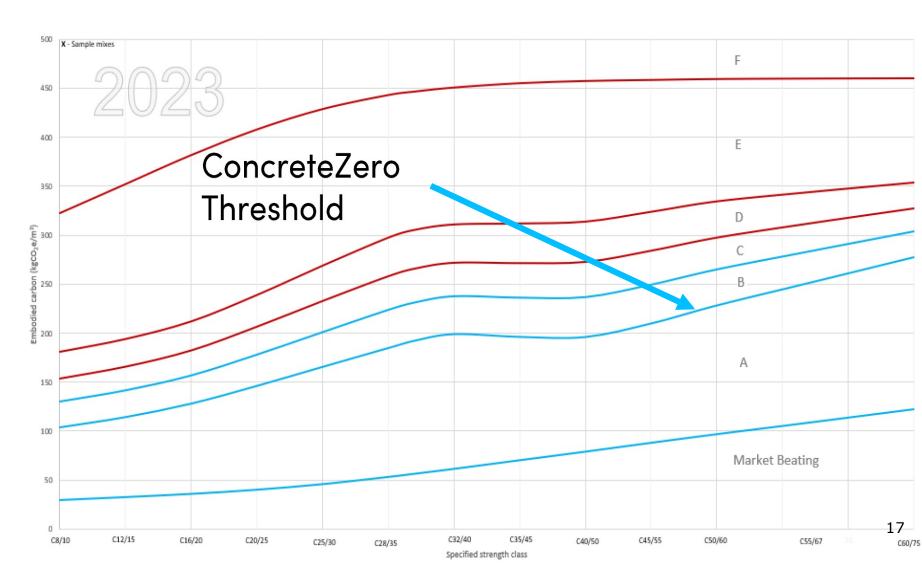
50% of concrete consumption has carbon intensity no greater than the ConcreteZero Embodied Carbon Threshold.

2050

100% of total concrete consumption is meeting the definition of net zero concrete.

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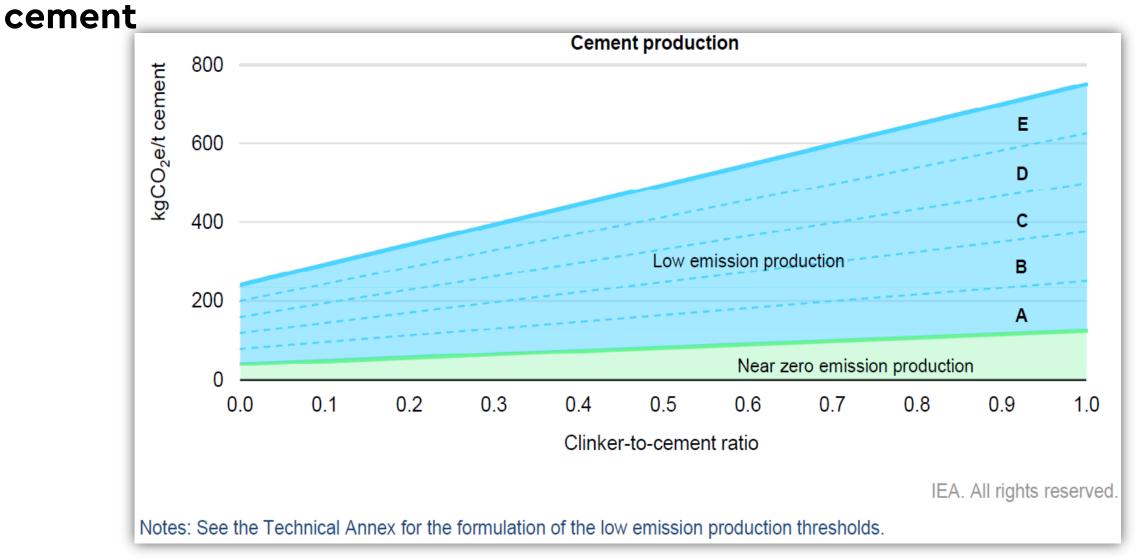
LCCG Market Benchmark for embodied carbon, normal weight concrete, LCA stages A1 to A3 (Readymix: cradle to batching plant gate, Precast: cradle to mould)



Industrial Deep Decarbonisation Initiative (IDDI)

- Current members of IDDI are Canada, Germany, India, Saudi Arabia, Sweden, United Arab Emirates, United States, United Kingdom and Brazil
- The IDDI has a green public procurement pledge for adoption by governments (national or subnational)
- The IDDI pledge includes commitments to procure low or near-zero emissions steel, cement and concrete for public construction projects
- For cement and crude steel, IDDI has used the IEA methodology as a robust starting point for setting bands and defining low emission product
- For concrete, a methodology by GCCA is proposed and will be presented in this webinar. This has not been endorsed, adopted or used by IDDI

IEA methodology and values for low and near zero emission



IEA Report: "Achieving Net Zero Heavy Industry Sectors G7 Members", May 19th 2022

IEA methodology for cement level

Top of Near Zero

- For clinker/cement = 1.0, IEA estimates a value of 125 kg CO_2e/t for near zero emission production.
- For clinker/cement = 0.0, IEA assumes calcined clay as the most emissions-intensive, scalable alternative cement constituent in use today. A threshold value of 40 kgCO₂e/t, which is of comparable ambition to the value established for pure clinker is proposed.

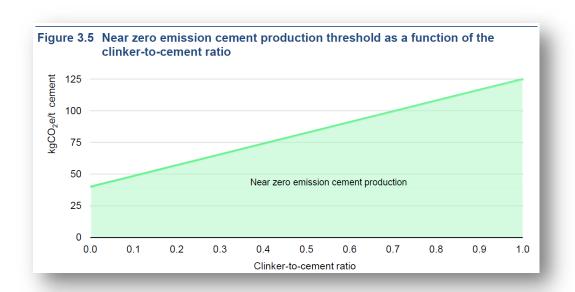


 Table 3.3
 Thresholds for near zero emission cement production using 100% clinker shown relative to conventional process technology

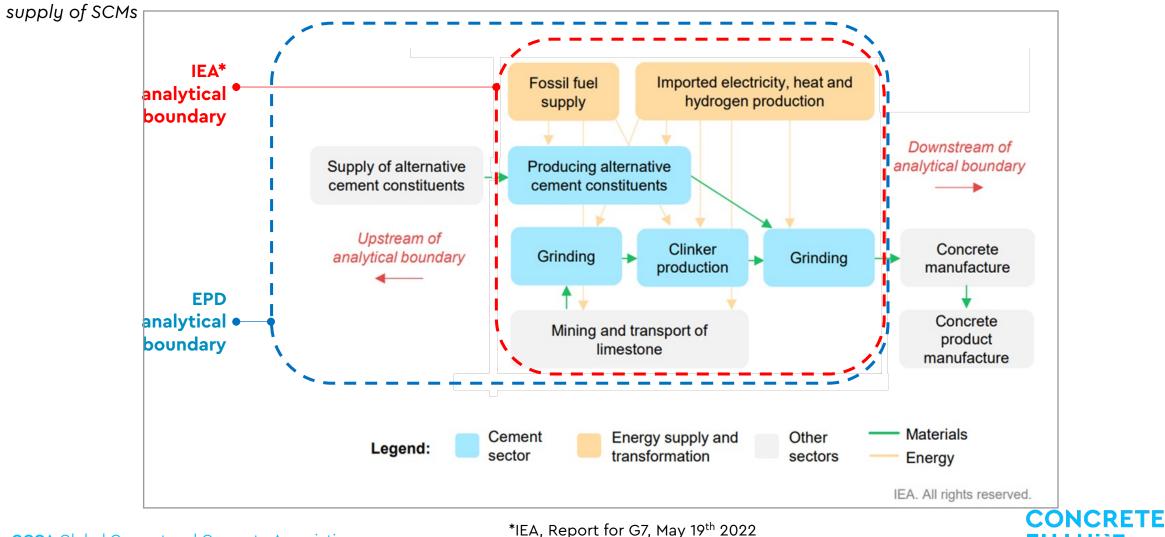
Emissions source	IEA reference values (kgCO₂e/t cement)	Near zero emission production thresholds (kgCO₂e/t cement			
	Dry kiln	Direct	Direct + indirect		
Fossil fuel use in clinker production	250				
Fossil fuel use in alternative cement constituent production	0	125			
Calcination	520		125		
mported electricity, heat and hydrogen	30	N/A			
Fossil fuel supply	35	N/A			
Raw material supply	15	N/A			
Total	850	125	125		
Notes: All values rounded to the nearest 5 kgCO ₂ e/t. See Box 3.3 for a description of the IEA reference values used in this document.					

IEA Report: "Achieving Net Zero Heavy Industry Sectors G7 Members", May 19th 2022

IEA methodology for cement level: sliding scale

- The IEA method has at its core a clinker/cement ratio sliding scale for setting bands and defining low emission cement and near zero cement
- In large part this removes the incentive to use more SCMs to reduce clinker cement ratio and hence carbon emissions
- IDDI have an *Explanatory Note* added to the pledge, providing the option for member countries to choose between a sliding scale for the clinker ratio OR a static clinker-to-cement ratio

IEA Scope vs EPD scope



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We note: The IEA values for production need to be modified per EPD methodology and include for example emission from the

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Global Initiatives - Summary

Initiative	By Whom	Public/ Private	Description – current status		
First Movers Coalition	US Secretary of State & World Economic Forum	Public/ Private	 Cement and Concrete Definitions for "near zero" Targets are 85% reduction on 2020 by 2030, for 10% of purchased volume Concrete by strength Based on US data for benchmarks 		
ConcreteZero	Climate Group in partnership with World Green Building Council	Private	 Concrete Definitions for an "embodied carbon threshold" Targets apply to 30% then 50% of specified/purchased volume (2025/2030), though LCCG data is dynamic Concrete by strength UK data 		
Industrial Deep Decarbonisatio n Initiative	UNIDO Concrete Association	Public	 Cement definitions in IEA May 2022 report a robust starting point Cement definitions for "low emission" and "near zero emissions" Targets to be applied by countries Concrete: GCCA developing proposal. Global data 		



Global Initiatives - Comparison

Initiative	Global Data	Static Definitions	Multiple Bands	Separate Definitions and Targets	Market penetration / Ambition
First Movers Coalition	×	\checkmark	×	×	Small/Very High
ConcreteZero	×	×	\checkmark	\checkmark	Wide/High
IEA					Flexible - Depends on Target Setting against Bands

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GCCA developing proposal for concrete banding for IDDI

Be congruent with IEA definitions* for Cement, in terms of:

- Same static bands for all countries
- Five low carbon emission bands "A to E", with equal spacing/range
- "Near zero" band defined by destination at 2050
- Upper bound of band "E" defined, recognising current good practice
- Separation of definitions and targets

*(as this is robust starting point for IDDI)

In addition

- "F" and "G" bands introduced to allow wider engagement
- Based on GWP from EPDs
- Clinker/cement sliding scale NOT applied

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IDDI essential requirement is consistent global reporting by countries

The developing proposal for concrete

Concrete divided into categories because it is not one product

- Categories based on strength classes, because that performance characteristic impacts more concretes than any other*
- Special readymixed concrete which is defined by other performance characteristics may need to be excluded at start of process
- Application to readymixed (approach to precast for discussion)

*note that even this is a simplification because concrete's specified for a particular strength but different exposures may require different mixes and hence different ECO_2

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Near Zero Concrete

Assumptions of what near zero practice looks like in 2050:

Materials

<u>Cement</u>

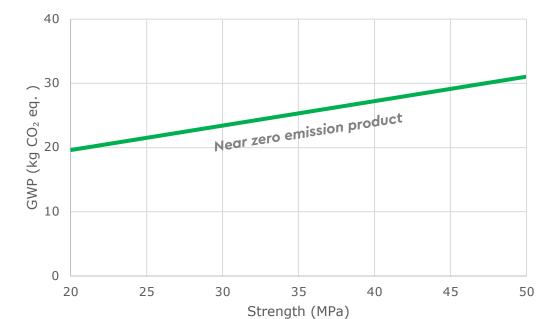
- Adopt IEA near zero cement values
- Clinker/Binder = 0.52
- Estimate cement content reduction due to admix evolution, shift to 56-day compressive strength and performance testing (14%)

Other materials

• Reduce emissions of raw materials production and delivery (100%)

Manufacturing

• Reduction emissions of concrete production (100%)



Near Zero Concrete Band

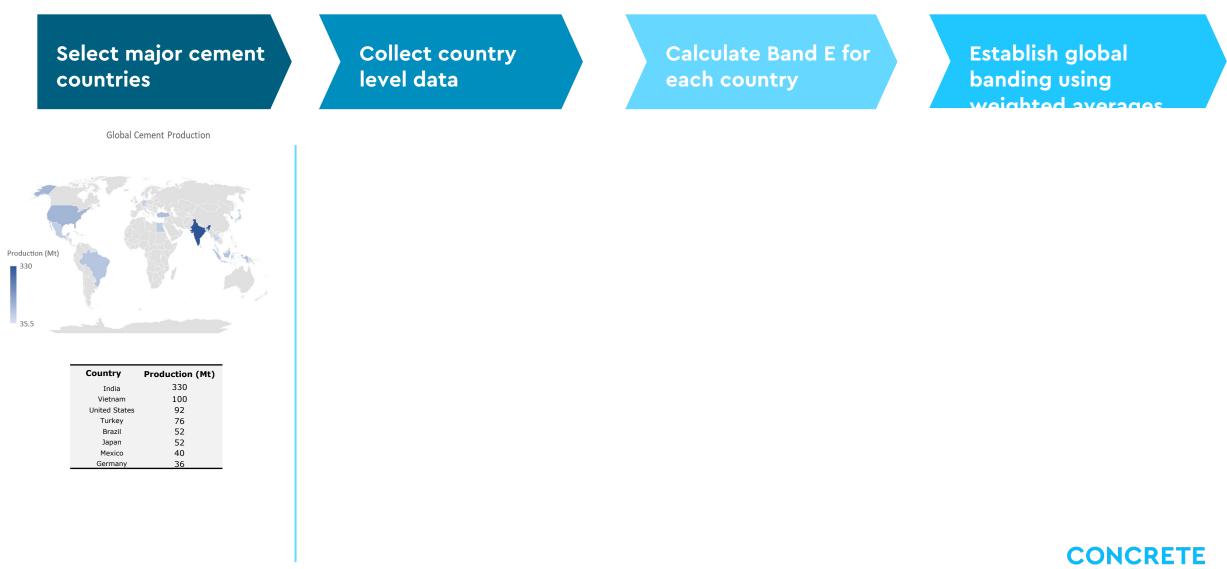


Select major cement countries

Collect country level data

Calculate Band E for each country Establish global banding using weighted averages





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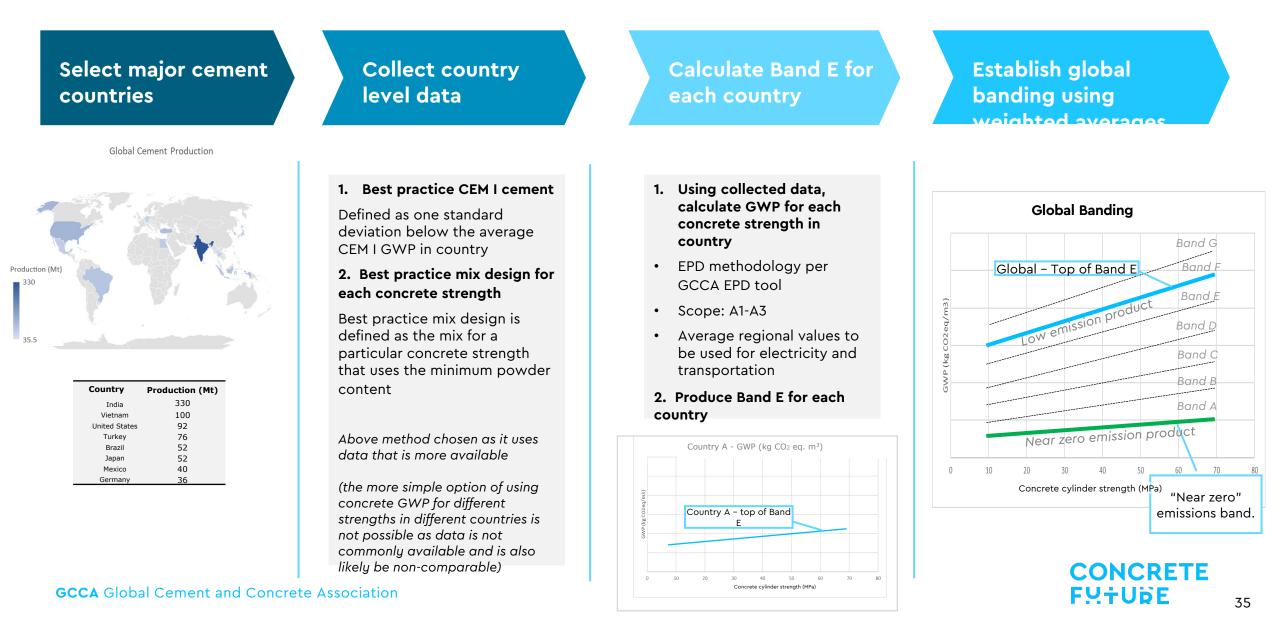
strengths in different countries is not possible as data is not commonly available and is also likely be non-comparable)

Select major cement **Calculate Band E for Collect country Establish global** level data countries each country banding using weighted averages Global Cement Production 1. Best practice CEM I cement Defined as one standard deviation below the average CEM I GWP in country Production (Mt 2. Best practice mix design for each concrete strength Best practice mix design is defined as the mix for a particular concrete strength that uses the minimum powder content Country Production (Mt) 330 India 100 Vietnam United States 92 Turkey 76 Above method chosen as it uses Brazil 52 data that is more available 52 Japan Mexico 40 36 Germany (the more simple option of using concrete GWP for different

CONCRETF

FU÷UBF

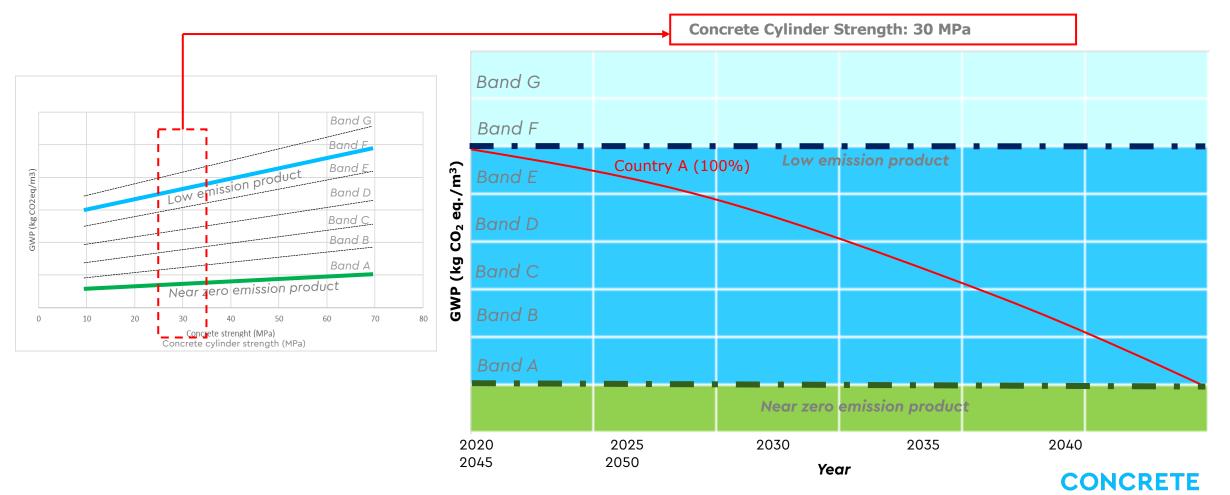
Select major cement **Calculate Band E for Collect country Establish global** banding using level data countries each country weighted averages **Global Cement Production** 1. Best practice CEM I cement 1. Using collected data, calculate GWP for each Defined as one standard concrete strength in deviation below the average country CEM I GWP in country EPD methodology per Production (Mt 2. Best practice mix design for GCCA EPD tool each concrete strength Scope: A1-A3 • Best practice mix design is defined as the mix for a Average regional values to • particular concrete strength be used for electricity and that uses the minimum powder transportation content Country Production (Mt) 2. Produce Band E for each 330 India country 100 Vietnam United States 92 Turkey 76 Above method chosen as it uses Country A - GWP (kg CO₂ eg. m³) Brazil 52 data that is more available 52 Japan Mexico 40 36 Germany (the more simple option of using concrete GWP for different Country A – top of Band strengths in different countries is not possible as data is not commonly available and is also likely be non-comparable) CONCRETF 40 50 60 Concrete cylinder strength (MPa) **GCCA** Global Cement and Concrete Association FU÷UbF



How do we use global banding at country level

Global banding

Countries can define the ambition trajectory to net zero for each concrete strength

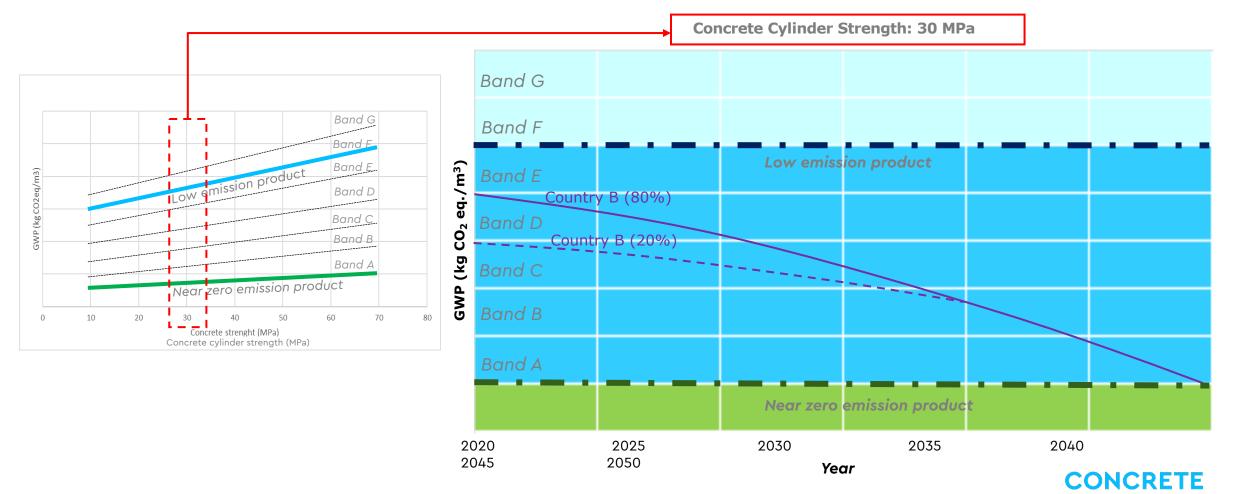


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Global banding

Countries can define the ambition trajectory to net zero for each concrete strength

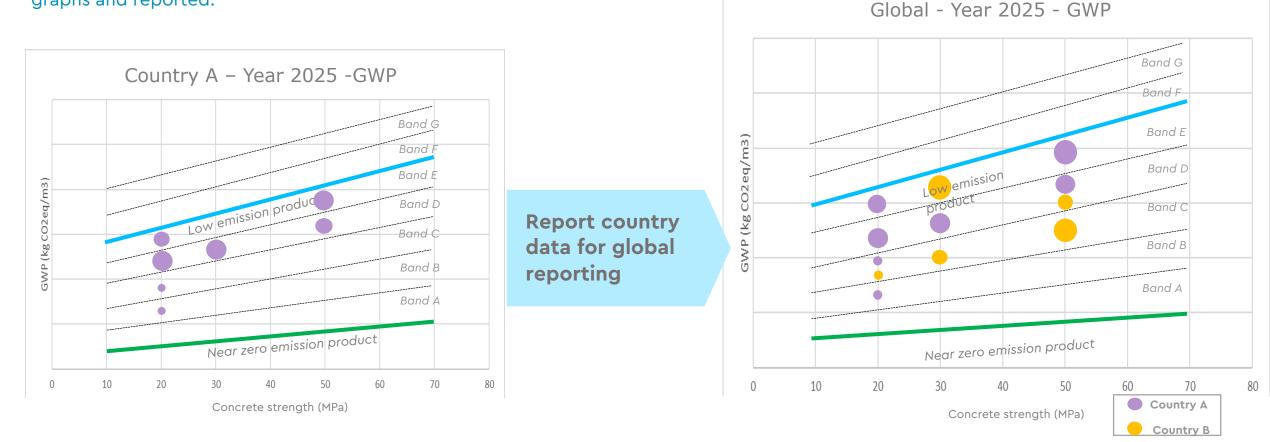


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How do countries report data

Country data reporting

Country data (% in each band) plotted on country graphs and reported.



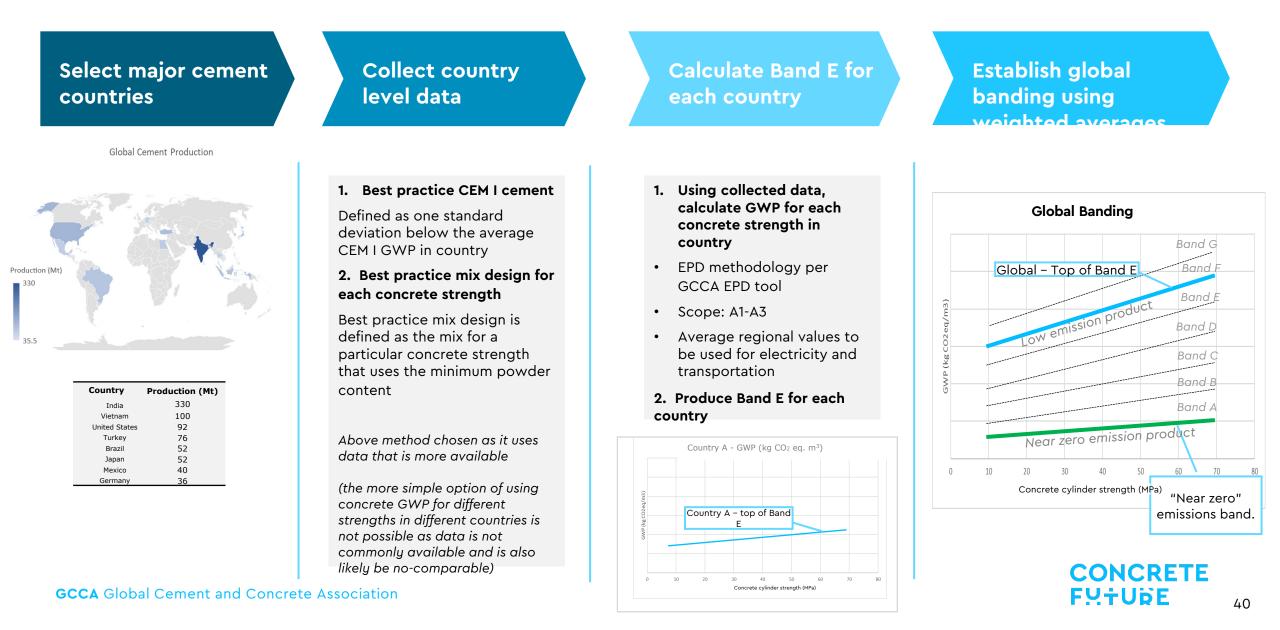
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Aggregated reporting

Global Initiatives - Comparison

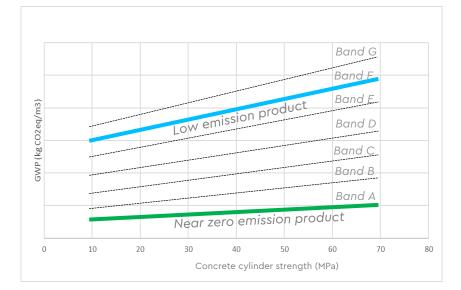
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Proposed GCCA					Flexible - Depends on Target Setting against Bands

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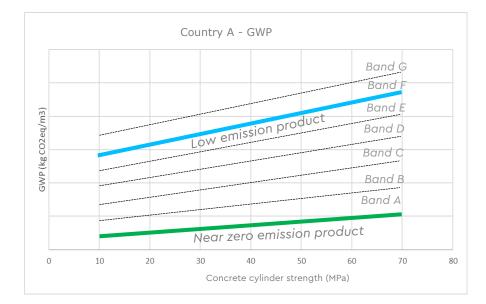
How do we use global banding at country level

Global banding



Normalise to consider differences in EPD standards in country

Country A - normalised global banding





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Normalisation

Normalisation may be required to account for different PCR standards and practises in a country.

Proposed Global Banding is based on:

- Net GWP
- A1-A3 EPD modules
- EN15804 (eg economic allocation for SCMs)
- Ecolnvent database

Any deviation from the above in a country, would need to be accounted for by a specific country normalisation.

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Thank you for joining us.

The webinar recording will be made available our website.

Webinar Series 2024

INNOVANDI PEN CHALLENGE LAUNCH 2024

20th February 12:30-13:30 London Time