

Paving the way for a better future

Decarbonization of cement is crucial to address climate change and reach global net-zero GHG emissions

After water, concrete is the most consumed material on the planet

Cement, the key ingredient in concrete, is responsible for

7% of global carbon emissions

Emerging markets consume up to **30%-40%*** of cement today

and their use of cement is projected to grow **rapidly** as they increasingly invest in buildings and infrastructure

*(excluding China)

Bridging the gap and setting the foundation

To successfully decarbonize the cement and concrete industry in emerging markets, it is helpful to understand...

01 How cement is used and by whom

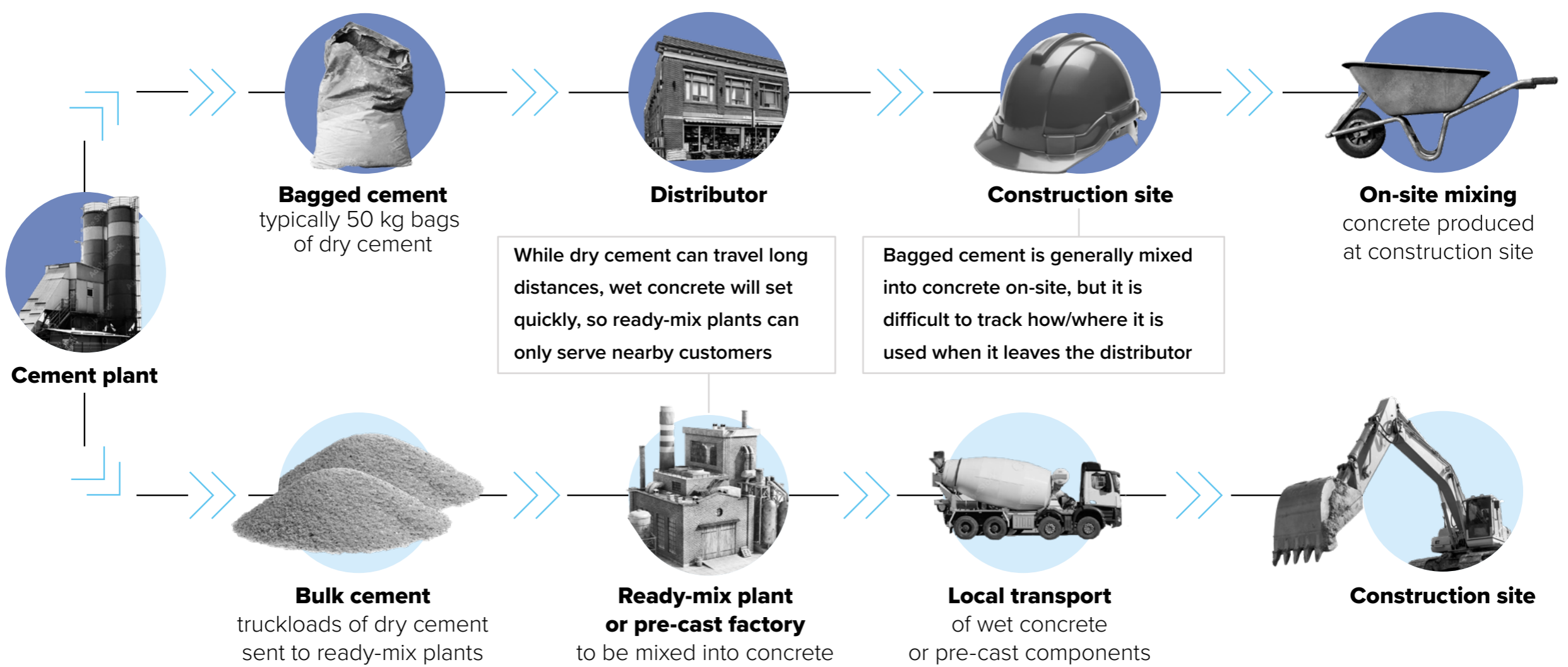
02 How cement is distributed and mixed

03 How demand will evolve as a market develops

Context: When cement leaves the plant, there are two ways it can be packaged and distributed

Bagged cement

Dry bags typically distributed through retail



Bulk cement

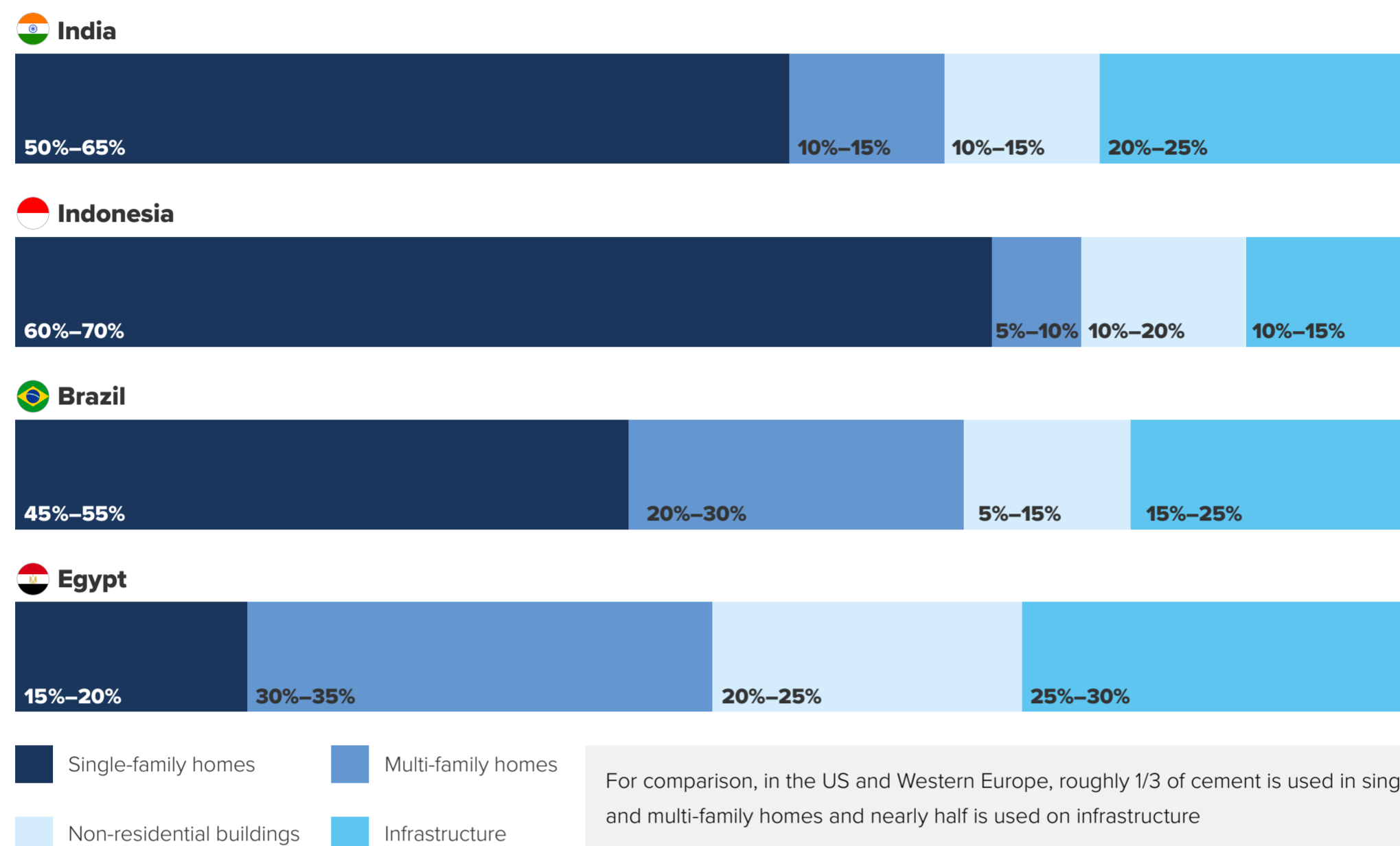
Delivered to construction sites as concrete or pre-cast structures

Scroll to view insights on cement and concrete decarbonization in emerging markets, based on analysis of **four significant cement-producing emerging markets globally**



01 The majority of cement is consumed in small-scale projects, run by individuals with limited materials and engineering expertise, which creates a need for education

Small residential buildings make up a large share of cement applications in emerging markets, where material specifiers are typically **local masons and contractors** who may not be formally trained to optimize the strengths and volumes of concrete used in projects



Emerging markets should invest in and **educate local masons and contractors**, who may be unaware of the environmental implications of cement use and how to optimize materials use and reduce their projects' carbon footprint

Cement is primarily bagged and often hand-mixed on-site, which increases the risk of inefficient use of cement

02

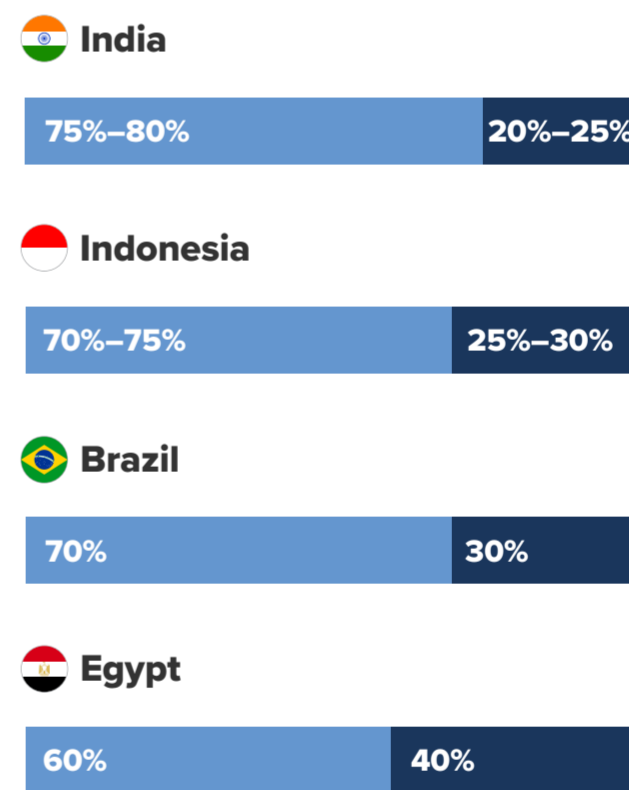


Emerging markets primarily consume **bagged cement** because:

- Projects tend to be small and may not have access to bulk cement (ready-mix plants)
- Some government policies, particularly in Brazil, do not encourage cement industrialization¹

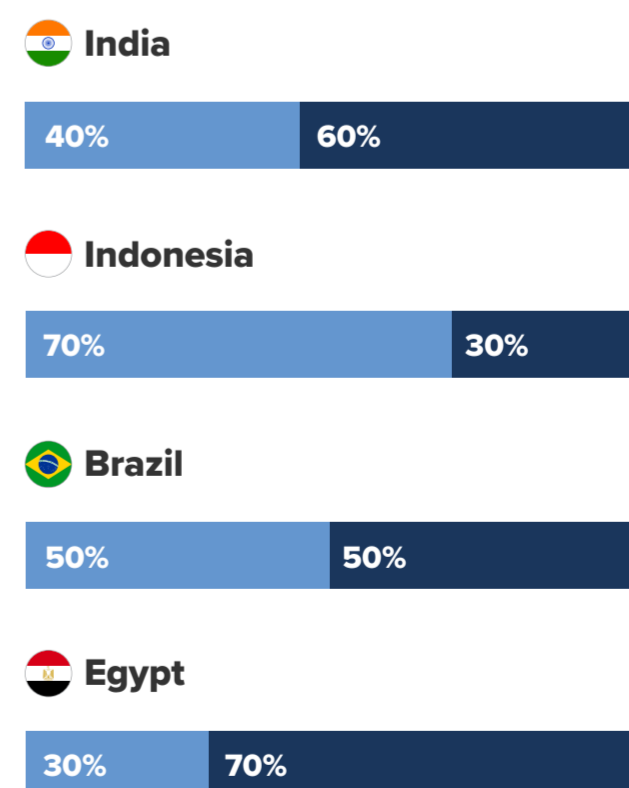
■ Bagged cement ■ Bulk cement

For comparison, in the US, less than 5% of cement is sold in bags



Cement is frequently mixed by hand without formal recipes or quality control measures in place, creating a high potential for its overuse²

■ Hand-mixing ■ Mechanized mixing



Emerging markets should **support the transition to bulk cement** and ready-mix concrete and, in parallel, expand use of quality control mechanisms (e.g., mixing equipment, standardized measurement) for bagged cement

Photo credit: Hakan Çöplü, GCCA Concrete in Life 2021 Photography Competition



03 The transition to bulk cement and large capital projects will create **new decarbonization challenges and opportunities**

Emerging markets are shifting to larger projects as they **urbanize and invest** in more infrastructure:



Challenges

Larger projects typically require higher strength (more carbon-intensive) concrete



Opportunities

Bulk cement has the potential for more SCMs³ and greater quality control (standardized mixing)



Photo credit: Mario Pereda, GCCA Concrete in Life 2021 Photography Competition



Photo credit: Agung Lawerissa, GCCA Concrete in Life 2021 Photography Competition

Increasingly, share is shifting from bagged to bulk cement

Historical bulk cement consumption vs. today as a % of total consumption

India

0% 20 years ago > **20%–25%** Today

Indonesia

20% 10 years ago > **25%–30%** Today

Brazil

20% 20 years ago > **30%** Today

Egypt

10% 10 years ago > **40%** Today

Governments, the industry, and standards organizations should seek to identify and **reform restrictive construction codes** that hinder decarbonization in large capital projects

Emerging markets should ensure that, as they transition to bulk cement, they are utilizing SCMs to reduce the carbon intensity of cement



Photo credit: Ammar Ahmed, GCCA Concrete in Life 2021 Photography Competition

Emerging markets must ensure their cement and concrete decarbonization plans reflect the way their countries use cement today and will use it in the future

The GCCA 2050 Net-Zero Roadmap Accelerator Program is using these insights to help national cement industries accelerate local implementation of the GCCA 2050 Cement and Concrete Industry Roadmap for Net Zero Concrete

Worth noting: Many other critical levers exist for delivering net-zero cement which don't directly relate to the products and applications for which cement is used. Examples include use of renewable energy, alternatives fuels, and carbon capture technology in the production process. The cement industry and governments must also prioritize and support these levers to achieve net zero.

1. For example, in the Brazilian tax structure, concrete mixing at the construction site is considered a service that is taxed less (2% to 5%) than industrialized products (15% to 23%)
 2. Because of the liability associated with buildings, builders tend to err on the side of caution and use liberal amounts of cement

3. Supplementary cementitious materials (e.g., fly ash and blast furnace slag) displace cement in concrete mixtures and reduce the overall carbon intensity

