



# Embodied carbon management for global infrastructure



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# Executive summary

The coming three decades will witness the global construction industry surpassing USD30 trillion annually from the current spending of around USD11 trillion<sup>1</sup>. Research suggests that every billion dollars spent on infrastructure development generates one million tons of embodied carbon, due to the prevailing practices of designing, procuring, and constructing capital projects. This emission factor is amplified three times during the asset operations and maintenance phase in the form of operational carbon emission.

Substantial emphasis has been given to the reduction of operational carbon through energy efficiency measures, government policies, corporate initiatives, and carbon offset strategies. However, the inherent problem associated with embodied carbon remains to be tackled in a structured manner. This need becomes not only more important but urgent at a global scale, as the share of embodied carbon from construction projects and infrastructure assets in the next two to three decades will be equivalent to their operational carbon emissions. As embodied carbon remains throughout the asset life, the infrastructure projects have to be executed 'right the first time with carbon consciousness, having a limited path to return'.

Despite this, few countries with highest construction spend and growth rate are yet to act in firming up policies and centralised measures for curbing embodied carbon.

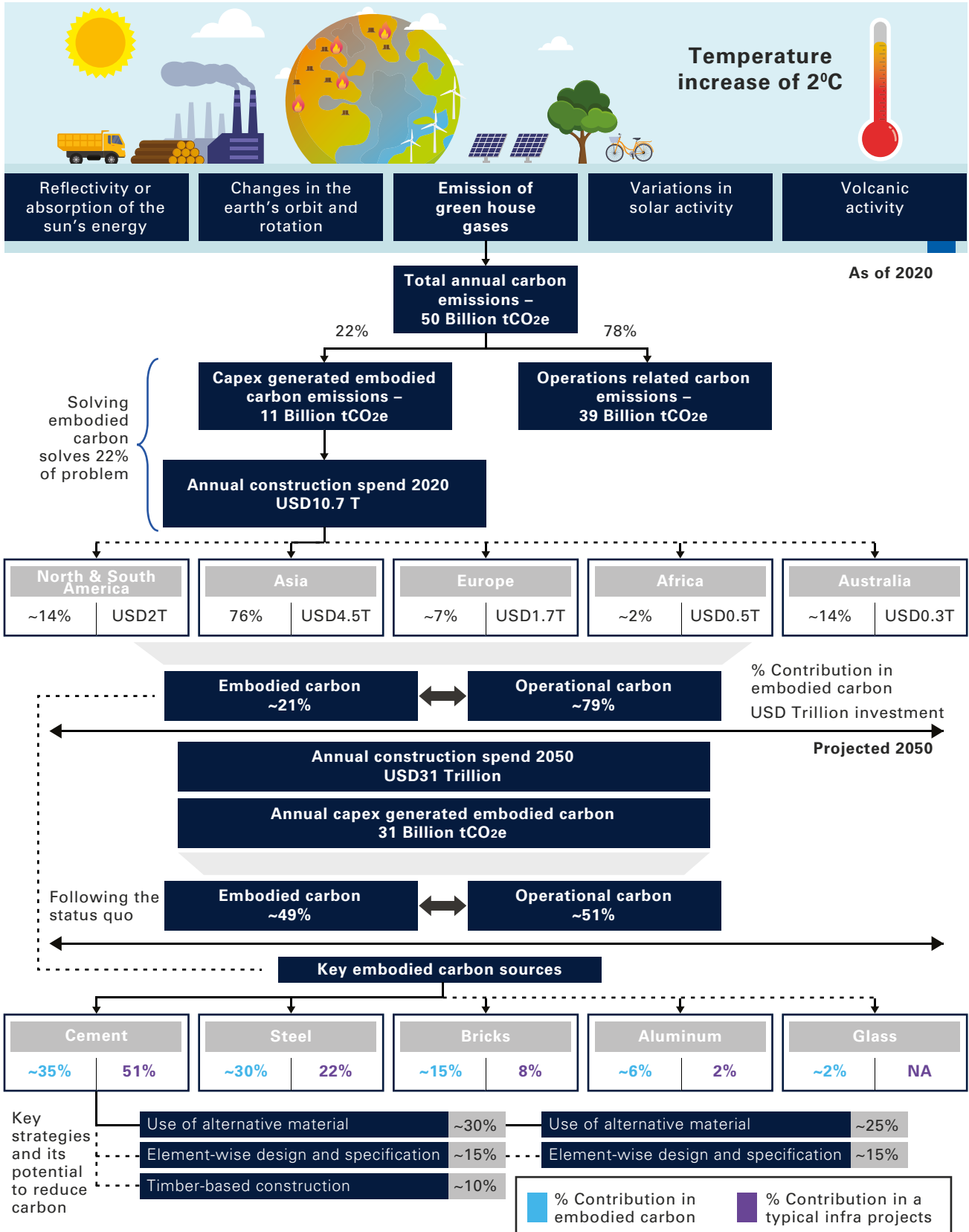
The construction industry is amongst the slowest to adapt and evolve, be it technological advancements, productivity improvements, or manpower skilling. With the rapid pace of urbanisation and ageing infrastructure replacement, projects are needed to be built at a much faster rate, which makes the problem at hand more challenging for reducing the carbon footprint this sector will generate.

Evidently, direct solutions for embodied carbon management are limited but existing digital penetration can play a pivotal role in this area by leveraging tools and platforms currently in use such as Building Information Modeling (BIM), digital twin, and Common Data Environment (CDE) amongst others.

A collective approach towards whole lifecycle carbon management of capital projects will need to be the way forward for global infrastructure. It is imperative for the global construction industry to collaborate and address this challenge of embodied carbon reduction.

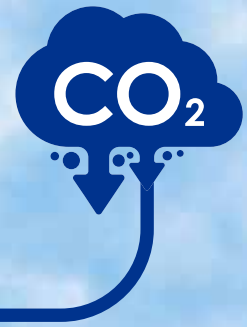
1. Future of Construction- A global forecast for construction to 2030 by Marsh & GuyCarpenter, September 2021

# Deconstructing the problem of embodied carbon<sup>2,3,4,5</sup>



2. Climate and earth's energy budget, article by Rebecca Lindsey, January 2019  
 3. UNDERSTAND THE CARBON MARKET IN ONE NUMBER, by Climate Impact Partners, April 2022

4. Future of Construction- A global forecast for construction to 2030 by Marsh & Guy Carpenter, September 2022.  
 5. Based on KPMG in India analysis



# Foreword

The COP27 has been a grim reminder for all nations' concerted efforts in the current decade for reducing the carbon emissions and keeping the global temperature increase below 1.5 degree Celsius. With climate change becoming a pervasive issue, infrastructure development also has its fair share to resolve when it comes to carbon emissions from capital projects.

With the burgeoning global infrastructure spending, focused and impending actions are warranted from the construction industry. In this quest to build rapid infrastructure for global growth, we cannot not miss the carbon implications it brings, in the form of embodied and operational carbon emissions.

Today, the global construction industry accounts for a greater share of embodied carbon as compared to the overall transportation sector. In the coming few years, construction sector growth is also expected to surpass that of manufacturing sector by contributing to almost one-third of global GDP.

At such a scale, addressing embodied carbon becomes existential for the infrastructure sector and its stakeholders including the feeding industries such as steel, cement, aluminum, and others. Project developers and asset owners embarking on their decarbonisation and/or net zero journeys should consider emissions generated from embodied carbon while finalising design and procurement decisions.



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# Table of Contents



## CHAPTER 01

Increasing temperature due to embodied carbon - an imminent problem to solve

## CHAPTER 02

Construction industry - major contributor to global warming



## CHAPTER 03

Solutions to manage carbon

## CHAPTER 04

Collective call for action from the construction industry

