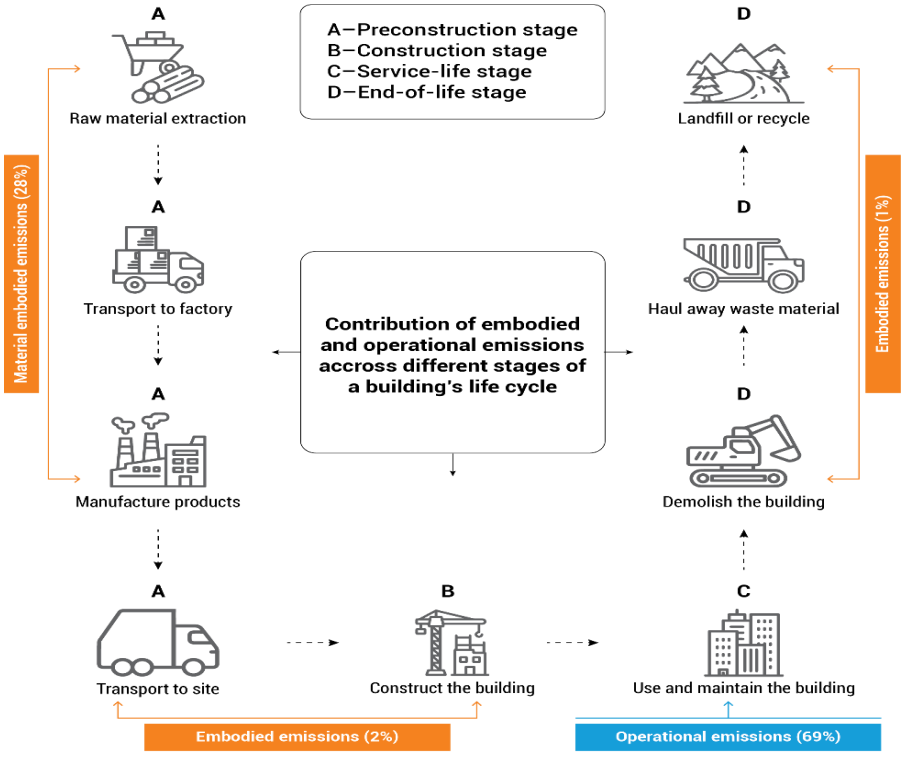
India’s Building Code Has a Blind Spot for a Whole Category of Emissions

-By Sarah Khan and Sweta Bhushan

Building codes are not new to India, and the first iteration of the National Building Code (NBC) dates back to 1970. While the NBC had general building guidelines in place, there were none pertaining to regulating emissions from the building sector. In 2002, the Bureau of Energy Efficiency (BEE) was established under the Energy Conservation Act to spearhead energy and emission-related regulations. This led to the formation of India’s energy efficiency codes – the Energy Conservation Building Code (ECBC) in 2007 for commercial buildings and the Eco Niwas Samhita (ENS) in 2018 for residential buildings.

Embodied emissions are released during the material sourcing, construction, and demolition stages of the building life cycle.

However, these codes consider only the operational emissions of a building, which account for approximately 69% of the total emissions. The remaining 31% is embodied emissions, which is unaccounted for in the existing versions of the codes (see image for details). Embodied emissions are released during the material sourcing, construction, and demolition stages of the building life cycle. Considering that the share of embodied emissions is significant, regulating these emissions would be crucial for decarbonising the building sector and contributing to India’s net-zero target. This highlights the need for a code for assessing, monitoring, and managing embodied emissions.



Source:https://www.wsp.com/en-ca/insights/ca-growing-up

Photo: Author provided

Opportunities for embodied emissions management ripe in India

The share of operational emissions can potentially decrease during the service-life stage of a building owing to regulations, efficient technologies, and sustainable building systems. Conversely, the potential to decrease embodied emissions can only be explored during the preconstruction stage. Most of the building stock of 2050 is yet to be built in India according to a report by the Rocky Mountain Institute, and embodied emissions will substantially rise over time because of rapid construction. This provides India with a unique opportunity to control emissions associated with the increased embodied energy in buildings as their construction has not commenced yet.

What aspects be crucial in formulating a national-level code on embodied emissions?

Setting limits for embodied emissions

Several countries have adopted embodied carbon policies for setting upper limits following different approaches. For example, France and Finland have adopted a building-scale approach in which a carbon limit for a new construction is determined based on a standard building's emissions.

The United States and the Netherlands follow the material-scale approach, which is a performance-based compliance method requiring an Environmental Product Declaration to verify that the embodied emissions of a material are within the specific permissible limit. Alternatively, Denmark has taken a step further from the building-scale approach by setting an embodied carbon budget of 12 kg CO_2 equivalent (CO2-eq) per square metre per year for new buildings above 1000 square metres.

This emissions-cap approach is more beneficial to India because it accounts for total embodied emissions across the life cycle of a building. It allows for flexibility in managing the available embodied carbon budget of the building through determinants such as design aspects, material choice, construction methods, and end-of-life use.

For instance, if conventional material replacement is non-negotiable, then high embodied emissions can be compensated by low energy-intensive design, lowering the material consumption of the building to stay under the limit. Moreover, a range of emissions caps could be incorporated in the code, specific to the building type, climate, and built-up area, considering the diverse environment of the country.

A standard measuring tool

Beyond specifying the emissions limit, the code has to also specify methods to calculate the emissions. Currently, there are several tools to calculate life cycle emissions. Since the code will be used nationwide, all stakeholders should follow a standard tool to ensure consistency of measurement.

The ENS tool standardises and enables calculations specified in the ENS code for energy efficiency. Similarly, a tool to conduct life cycle assessment with reliable and extensive databases should be designed and adopted to measure embodied emissions and supplement the code. Doing so will increase the transparency, thereby improving the accountability of all stakeholders.

Balancing trade-offs between embodied and operational emissions

The code should also account for the trade-offs between operational carbon and embodied carbon as existing codes can facilitate a reduction in operational emissions while increasing embodied

emissions. Electricity is a major contributor to operational emissions; therefore, integrating renewable energy sources, such as rooftop solar photovoltaic, could help reduce operational emissions drastically.

However, this implies that solar panels, which utilise energy-intensive materials such as silicon and aluminium, would ultimately increase embodied emissions of a building, reflecting the possibility that technologies adopted to decrease operational emissions might cause high embodied emissions. Addressing this issue in the code will offer insights into embodied emissions of many energy efficiency solutions and prompt actions to counter them.

Way forward

The building sector presents a complex environment involving multiple stakeholders and decision-makers such as architects, developers, builders, contractors, and suppliers, playing a vital role in different stages of a building's design and construction. Therefore, a participatory process involving multiple stakeholders is vital to inform the formulation of the code holistically.

While BEE has notionally planned to incorporate guidelines on embodied emissions in the future, early implementation is desirable. Given that the implementation rates of energy efficiency codes in the building sector are picking up and building stocks are ascending, the opportunity for change is ripe. By coupling energy efficiency codes with codes for embodied emissions of the building sector, we can unlock the potential for achieving truly net-zero building designs.

Sarah Khan and Sweta Bhushan are senior analysts who work in the Climate, Environment and Sustainability sector at the Center for Study of Science, Technology and Policy, a research-based think tank.