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An Approach to Environmental Justice in Design and Construction

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Learning Objectives

- Learn how to calculate embodied carbon for typical and unconventional materials to make smart design decisions.
- Talk about embodied carbon and engage clients, designers, and supply chains.
- Learn how to integrate embodied carbon into your design process
- Learn about the typical hurdles to low-environmental-impact designs and how to address them.

Description

We are in a climate emergency. The built environment is responsible for roughly half of all greenhouse gas emissions, and, with the predicted construction growth in upcoming years, the problem can seem overwhelming and unmanageable. However, as designers we are poised with the opportunity to make the biggest impact by adapting our professional practice. Our lecture will break down a traditional lifecycle analysis, shed light on how to calculate embodied carbon at each design stage, and explain how to draw conclusions from the results. We will also present MASS Design Group's integrated approach to reducing its environmental footprint and dive into the challenges faced in the firm's applications across the United States and various African nations. Addressing the climate crisis will require a rigorous inquiry into traditional design methodology across all disciplines; however, the tools and resources we will share are directly applicable to architects and structural engineers.

Speaker(s)

James Kitchin is an Associate Engineer for MASS Design Group based in the Kigali office since 2017. He joined on a short term Engineering Without Borders UK fellowship with the aim of building capacity and with his addition the team grew to three structural engineers. James has led a number of projects including phases of the Rwanda Institute for Conservation Agriculture and more recently The Ellen DeGeneres Campus of the Dian Fossey Gorilla Fund. James has also led research on potential locally fabricated structural materials and techniques including earth, bamboo, and lightweight concrete. Prior to joining MASS, James was an engineer and project manager at AECOM in Cambridge, UK, working on domestic and international projects from refurbishments of cultural institutions to steel gridshell station canopies.

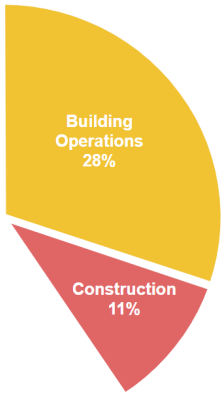
Jean Paul “Nelson” Habintwari joined MASS Design Group in 2017 as an Engineer based in the Rwanda office. He led the office’s complete transition from AutoCAD to Revit and provides workshops on many pieces of software, including Dynamo. The engineering team started using Revit in 2017 and Nelson set up and maintains the discipline’s drawing standards. Since joining MASS Nelson has focused on the structural design and drawing of the Rwanda Institute for Conservation Agriculture and more recently The Ellen DeGeneres Campus of the Dian Fossey Gorilla Fund. His experience in the construction industry over the last decade includes design, construction, and supervision in a number of East African countries.

To meet the IPCC recommendation of halfing our greenhouse gas (GHG) emissions by 2030 and achieving net zero by 2050, we are required to reduce both our operational and embodied carbon in our buildings. We have been reducing our operational carbon in our buildings for decades but have been neglecting the embodied carbon.

Operational vs Embodied

Operational carbon from heating, cooling and electrifying our existing building stock.

Embodied carbon from extracting, manufacturing, installing, and disposing building materials.



Source: UN Environment, Global Status Report 2017

MASS.

MASS believe building should be built on the principles of Good, Clean and Fair. We aim to minimize operational carbon in buildings through the use of natural ventilation, daylighting and thermal mass. We address embodied carbon by using low embodied carbon materials and design lean so the buildings beauty comes from the quality of the materials and construction, rather than additional finishes.

We believe *Architecture is never neutral, it either hurts or it heals.*

We believe *Architecture is never sustainable, it is either climate negative or climate positive.*

Rwanda Institute for Conservation Agriculture (RICA) is a Climate Positive project. This presentation explains how that was achieved and how it was measured.

Good
We believe everyone deserves good design. Good design is beautiful and just. It is essential to delivering human rights, essential services, and the spaces that will build a better world.

Clean
Being climate positive is an imperative. Our projects strive for not only efficient operation, but the design of the entire supply chain to be resilient, restorative and regenerative.

Fair
Looking at the design and construction process holistically—from material extraction to assembly and operation—ensures we have safe and equitable labour practices.