Environmental Impact of current construction practices

Me

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- Technology & Sustainability work in the US & India
- Sustainability Management - Presidio School of Business, San Francisco
- USGBC LEED-GA certified
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500eco

Forest First SAMITHI

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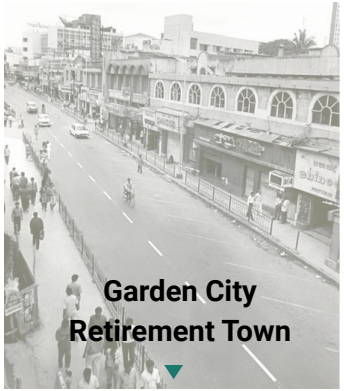
in the past 50 yrs



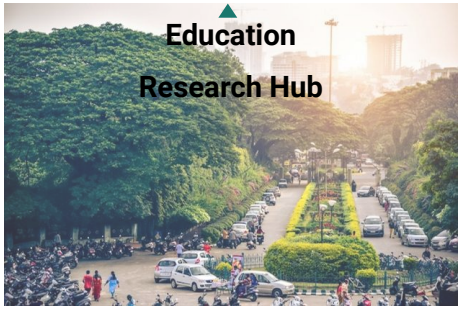
Pre 1970

Density of Population	< 400
Population	1.2 Million

Last 15 yrs

Density of Population	14000
Population	20.3 Million

80's & 90's



Now

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density put in a different way

Built up Area Increase	584 %

BENGALURU

Bengaluru fails to make it to top 50 in Ease of Living Index

SPECIAL CORRESPONDENT

BENGALURU , AUGUST 14, 2018 00:33 IST
UPDATED: AUGUST 14, 2018 00:33 IST

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Not just the top 10, the IT capital of India does not even figure in top 50 in the first 'Ease of Living Index–2018' report, released by the Ministry of Housing and Urban of the Union government on Monday.

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and what has it led to?

ENERGY

Bangalore Mean Temp

↑ 64% over 15 years

4% Increase in HVAC opex per degree

WATER

Bangalore Borewell Depth

↑ 32% annually

30% Increase in annual Water costs

WASTE

Bangalore Daily Waste

↑ 100% over 10 years

7% Increase in annual Waste mngt costs

however

If designed and built Sustainably

71.42 Billion $

Economical

Top 10 cities in India

321 Million CO2 Tons

Environmental

Savings over 10 yrs

* min. projections based on other projects

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Global Impact of Buildings

33%

of global green house gas **EMISSIONS**

40%

of global **ENERGY** use is due to buildings

25%

of global **WATER** is consumed by buildings

40%

of global **MATERIAL** usage goes into construction of buildings

@Source: UNEP SBCI

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Urbanization in Bengaluru

While the strain of rampant urbanization affects several aspects of life, the following are pertinent to built spaces

6X	Population increased
79%	Water bodies decreased
88%	Vegetation decreased
1004%	Paved surfaces increased

- Substandard Housing
- Poor quality of Potable Water
- Extremely bad Air Quality
- Inadequate Waste Management
- Lack of Open Spaces

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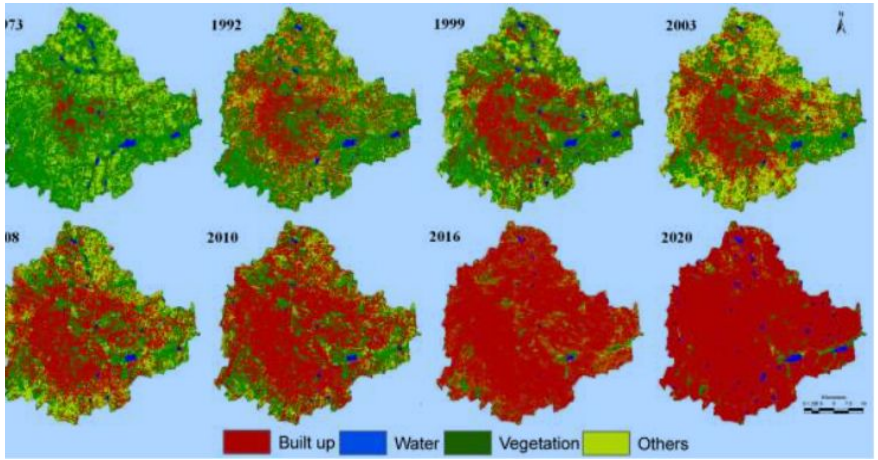
Impact on Green Cover and Open Spaces



Changes in land use pattern from 1973 to 2020

Per capita green open space in Bangalore	Per capita Prescribed standard for cities
2.01 sq m	**9 sq m**

Trees per person in Bengaluru	Prescribed number per person
3.4	**7**

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Design Strategies

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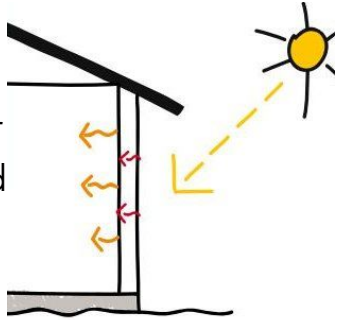
Facades - Glass vs. Brick

If facade is not protected with shading, radiation plays a huge role in bringing extra heat into the building.

Rapid heat gain or loss depending on the weather conditions leading to increased active heating and cooling systems (HVAC).



The embodied carbon emissions for glass are 100 times more than concrete per ton basis.

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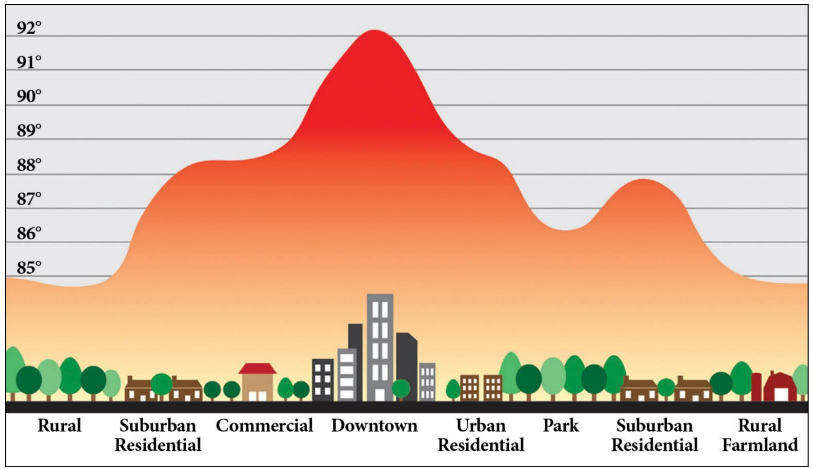
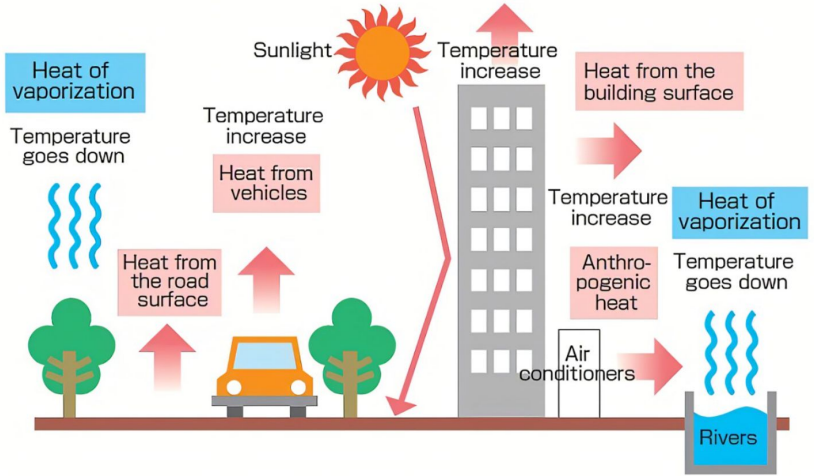
Urban Heat Island Effect

Urban Heat Island is a concept where the urban area experiences warmer conditions than its surrounding regions.



Reason

- Hardscape like the roofs, streets, and sidewalks
- Buildings built in a patterns that reduces wind flow



Higher temperatures force air conditioners to work harder, and also accelerate the formation of smog, contributing to worse air quality.

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Mitigating Urban Heat Island Effect

Green roofs and facade

Including water bodies

Installing Solar PV

Appropriate window and shade design

Increase in green cover

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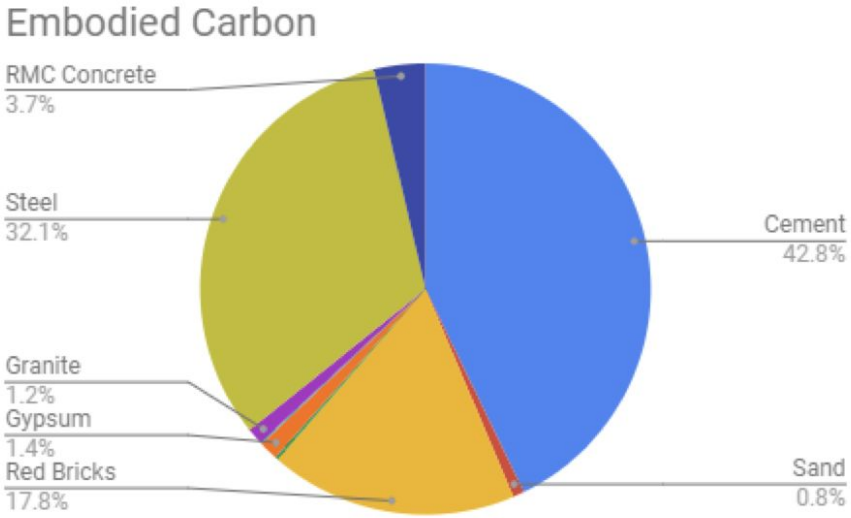
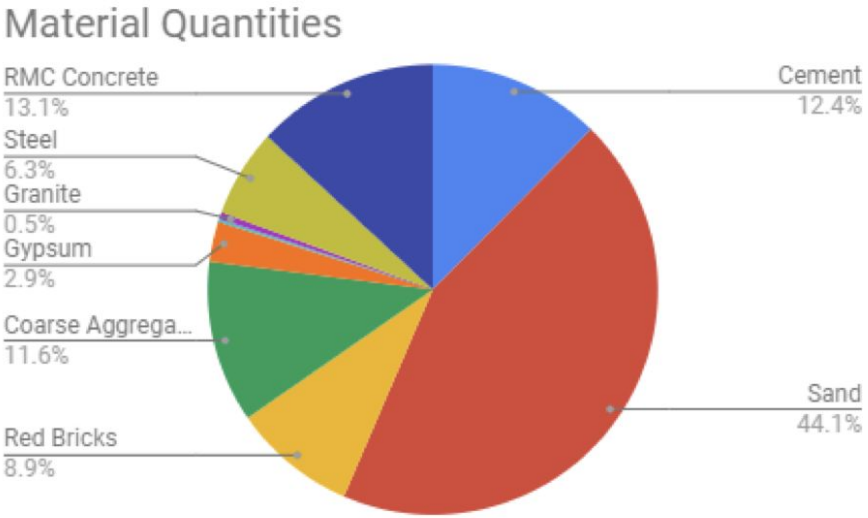
Material vs. Carbon





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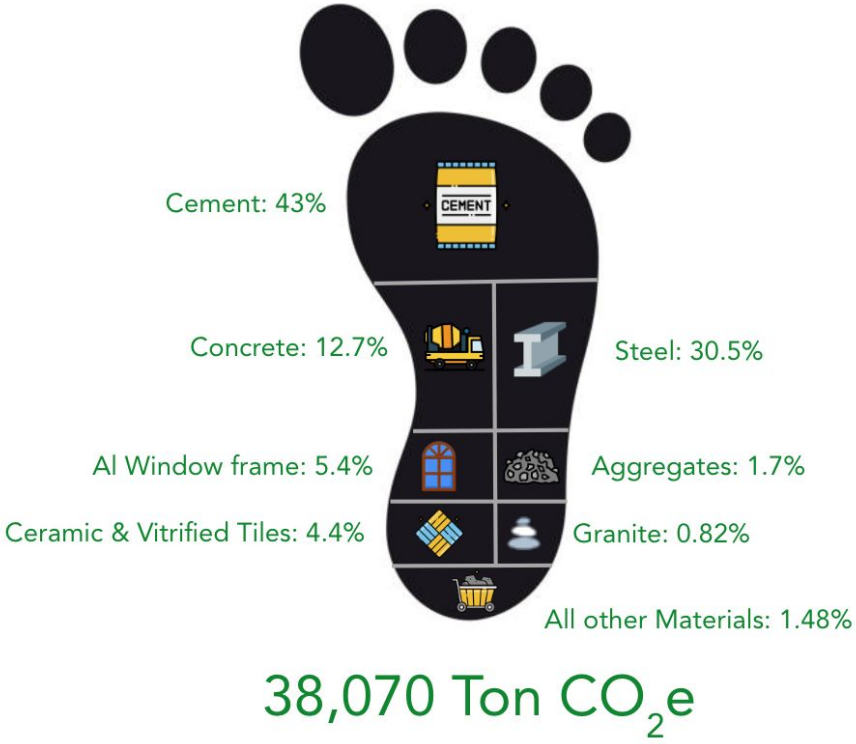
Carbon Footprint & Impact



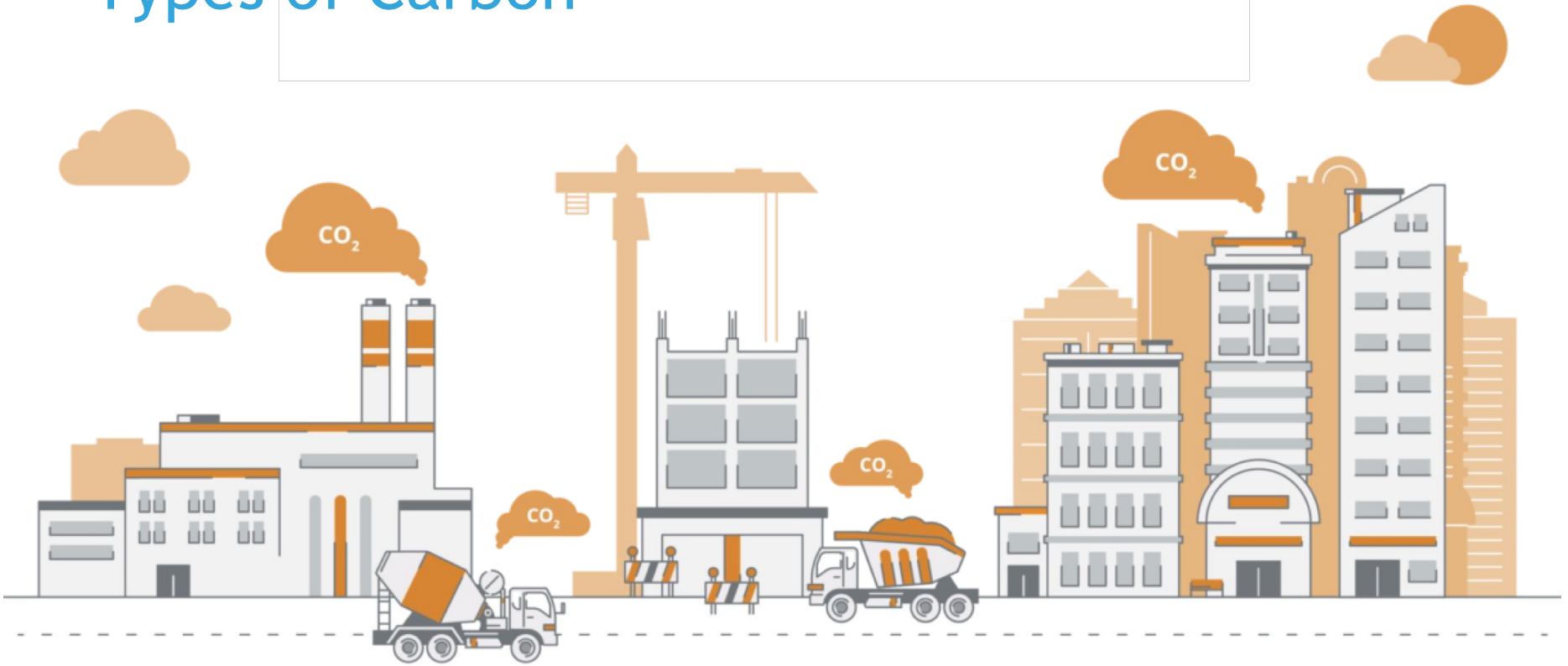
38,070 Ton CO_2e

Carbon emitted by 16,996 average Indian homes each year [1]

Equivalent to a petrol car travelling 3443 times around the earth [2]

Total of 1,90,350 Trees need to be planted to offset 38,070 Ton of CO_2e

Types of Carbon



Embodied Carbon
The emissions from manufacturing, transportation, and installation of building materials.

Operational Carbon
The emissions from a building's energy consumption.

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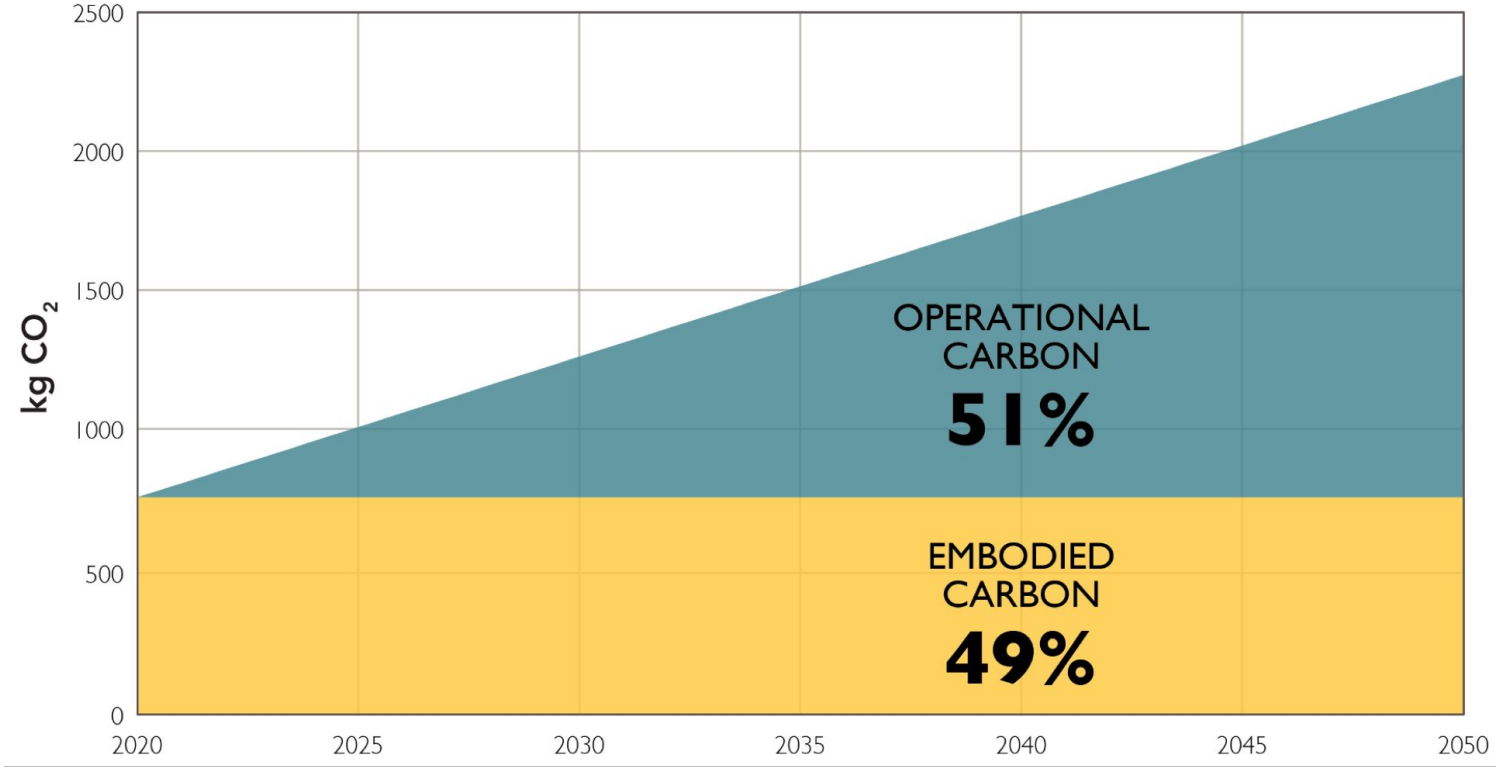
Breakup



Global Average for business as usual. Courtesy - EIA Energy Outlook 2017

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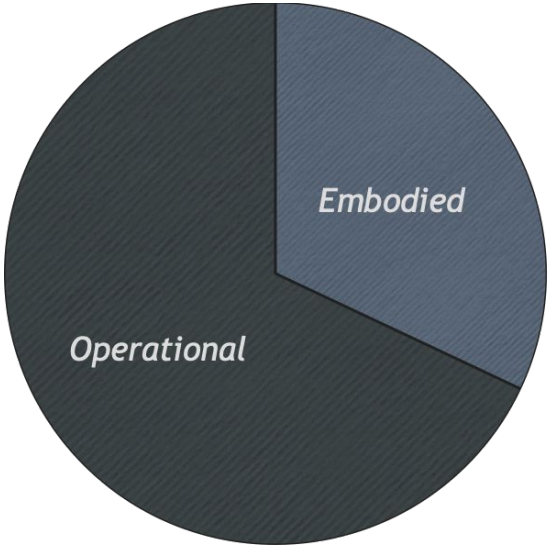
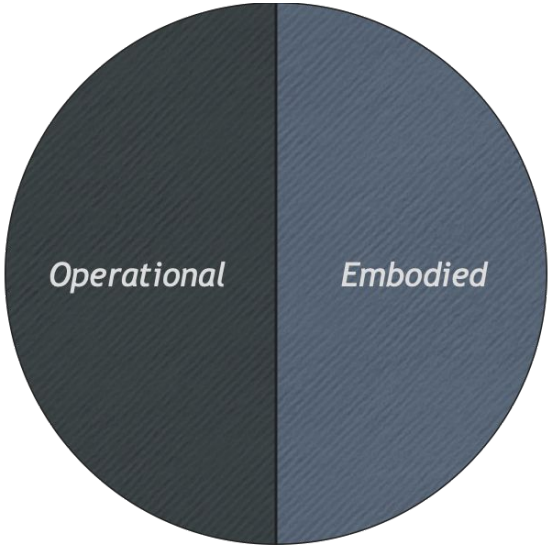
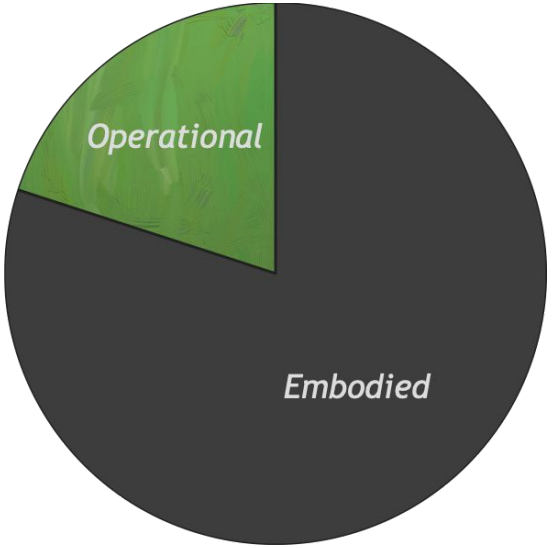
Future Predictions



2018

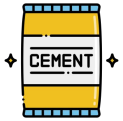


2035

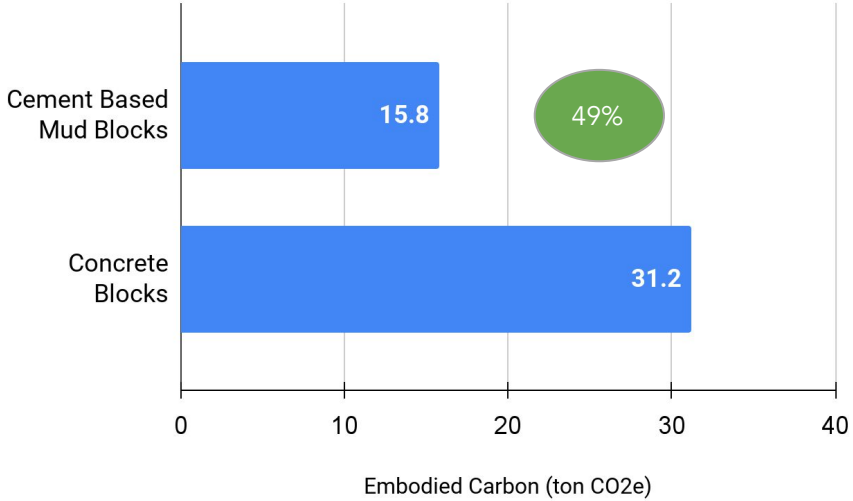


2050

Embodied Operational



Use of cement, steel and concrete make upto 85% of carbon emissions of all materials impact in building construction. [1]



Cement based mud blocks instead of concrete blocks. Mud blocks further regulates the cooling and heating requirements further reducing operational energy need.

The use of recycled, upcycled materials and materials made from waste can lead to a reduction of upto 60% of carbon footprint.

To Conclude

- Set Sustainability Goals at the concept stage
- Integrate sustainability as a core business value
- Focus on material and Embodied Carbon
- Focus on Passive and native technologies
- Measure - Manage - Mitigate

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Let us not have inaction define us! Thank you!