

Energy Efficient Building Design

CREEBC Webinar – 30 September 2020

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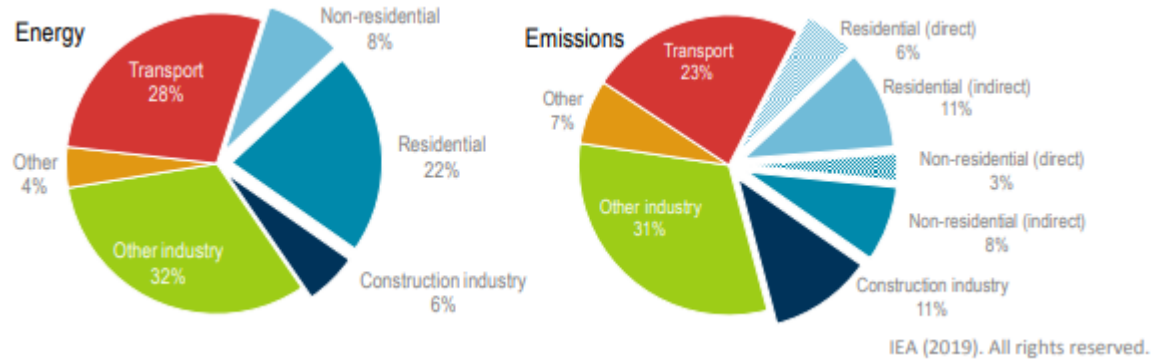
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Why does it matter?

Global perspective (IEA, 2019 Global Status Report for Buildings & Construction):



- Energy demand for space cooling +33% during 2010-2018
- Sector not on track with necessary climate action
- Building stock predicted to double by 2050

Houses built with passive and locally adapted building designs, nature-based solutions and effective urban planning can reduce cooling demand by 90% (International Passive House Association)



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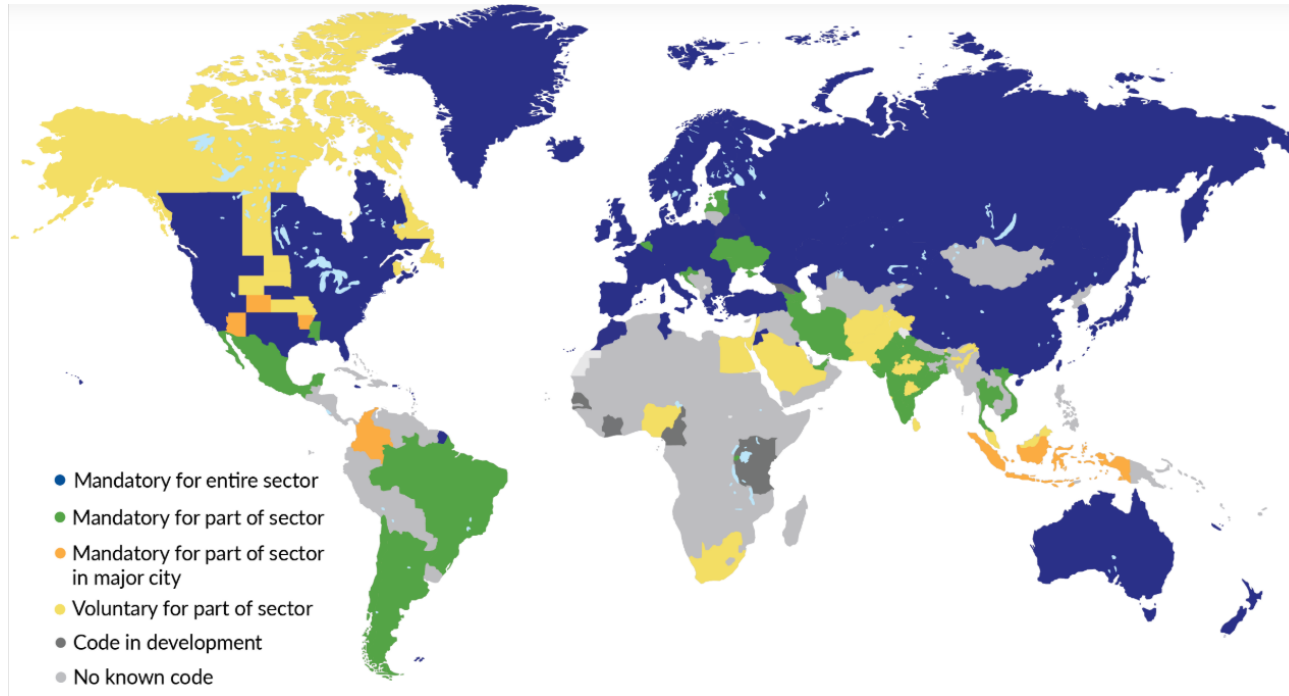
Why does it matter

- **Regional perspective** (CARICOM BEEP, 2017):
 - Residential, commercial and industrial buildings combined account for nearly 80% of total electricity consumption
 - Building energy consumption grows faster than GDP
 - Buildings need to become more resilient to climate change and extreme weather events

How buildings matter to SDG achievement

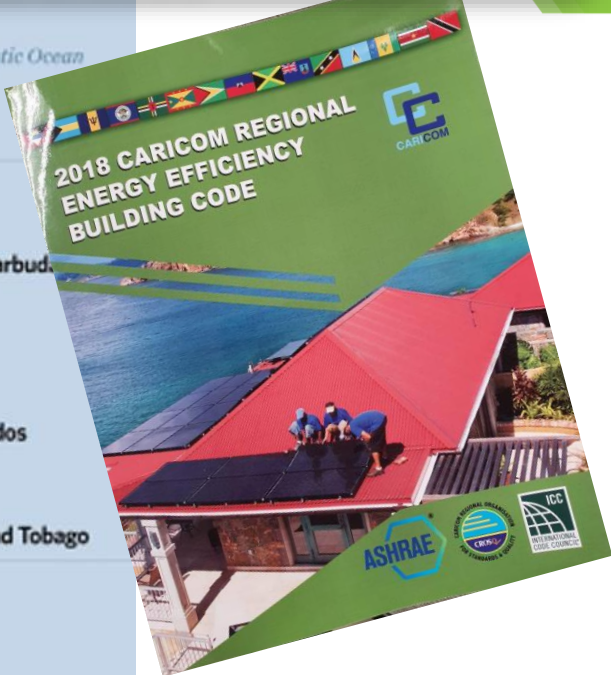


Building energy codes worldwide



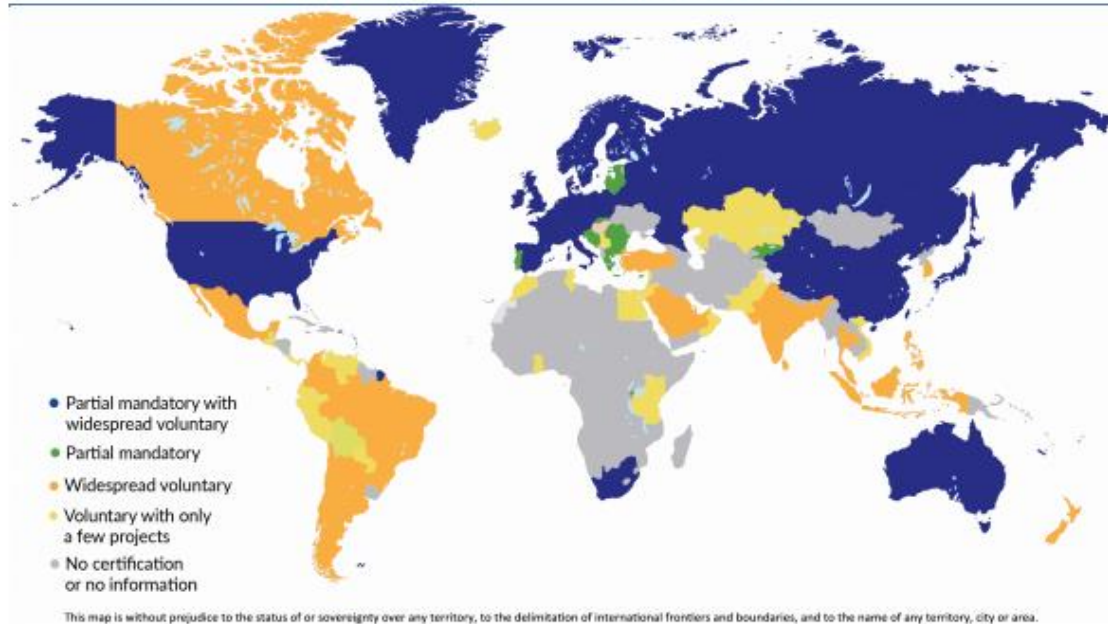
© GlobalABC, with reference to IEA 2019 (Energy efficiency policies: Buildings)

Minimum EE Requirements established in the 2018 CREEBC



Building energy certification systems

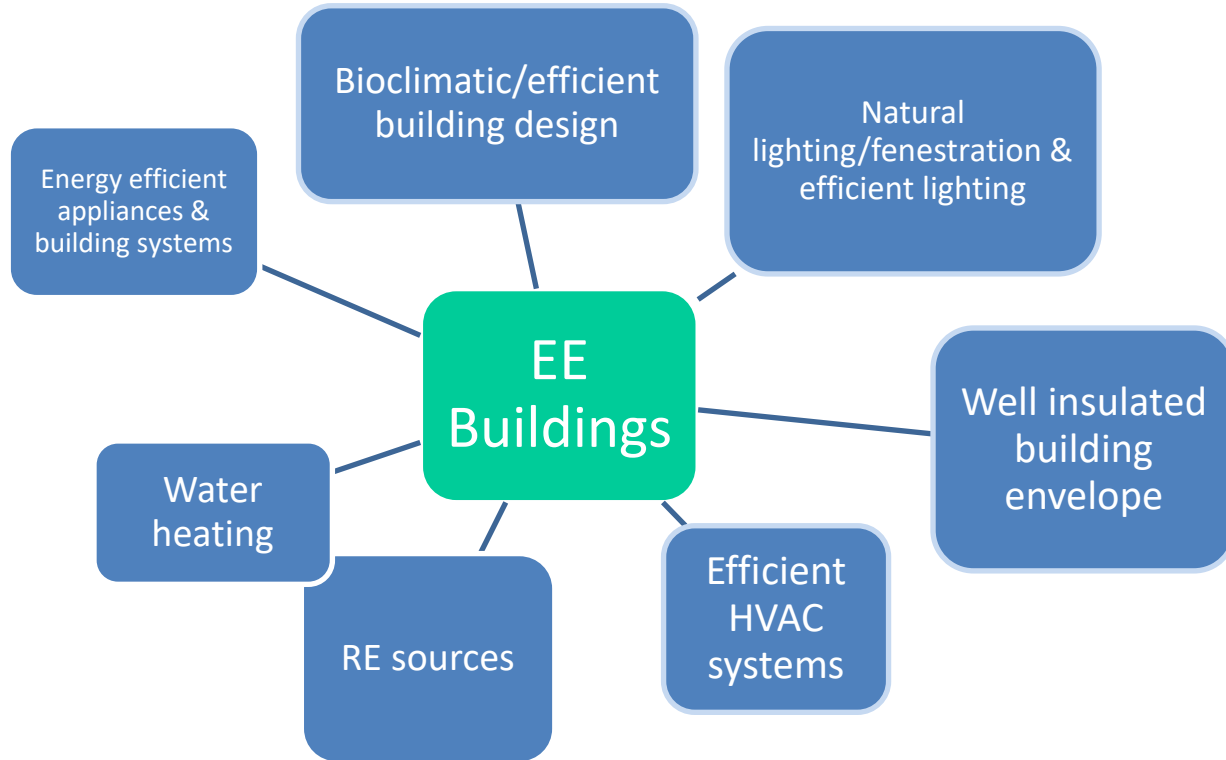
Map 3 • Building energy certification programmes by jurisdiction, 2017-18



IEA (2019). All rights reserved.

Source: Adapted from IEA (2019c), "Energy efficiency policies: Buildings", www.iea.org/topics/energyefficiency/policies/buildings.

What makes buildings energy efficient?



Bioclimatic building design

- Climate responsive architecture where buildings are specifically designed to achieve thermal comfort in tropical climates
- Key design principles:
 - Optimal building orientation & location
 - Solar control
 - Air circulation
 - Consideration of thermal effects of materials

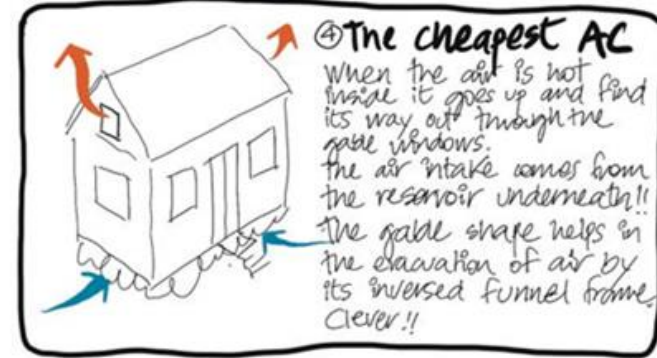
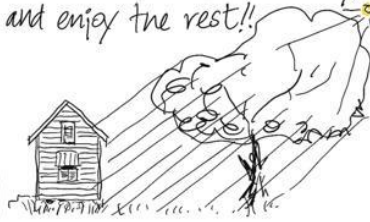
The Chattel House

thermodynamics & passive architecture



① Shadows. Go green!

Any vegetation around the building provides shade and freshness. If you are lucky and you have a mango tree, share some with the monkeys and enjoy the rest!!



② More shadow !!

The Chattel Houses are separated 3-4 ft. from the ground. This means that a reservoir of cool air (shadow under the house) is always at our disposal.



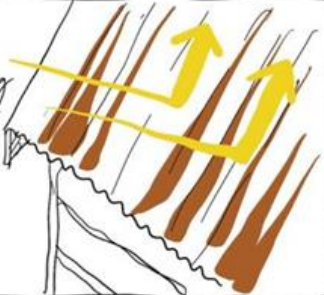
③ And more !!

The beautiful bell pelmet window had is not only a nice feature (sometimes even decorated), but it's the solution to ventilate the house even when raining!! Their shapes are always unique, but all those come from the old windows lowered where the upper part opened flapping upwards!



⑤ Colours!

The lightest colors, the cooler. Reflecting sunlight, or catching it when darkened by rust, the so-called "galvanized" have to be maintained.



Sun shading strategies



Reduce the amount of radiation & improve light distribution inside the building

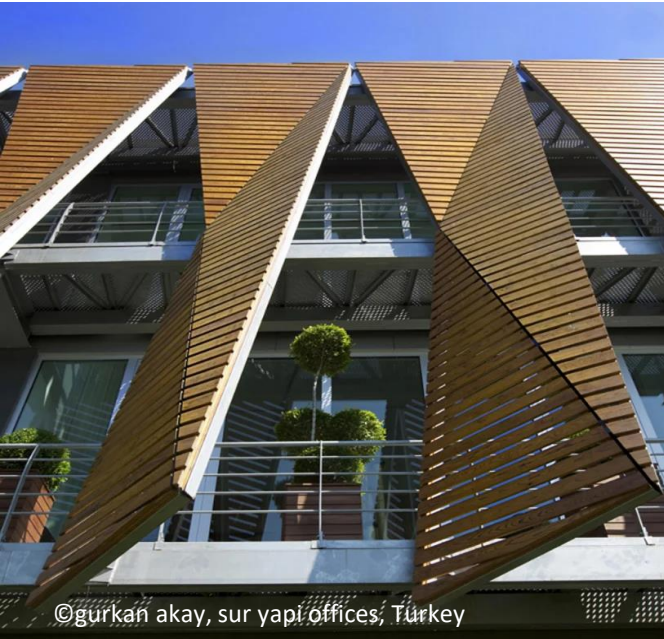
Types of shading:

- Retractable devices (shutters, roller blinds, louvers)
- Fixed redistribution devices (overhangs, fins, reveals, light shelves)
- Natural shading: trees

Sun shading strategies



Reduce the amount of radiation & improve light distribution inside the building



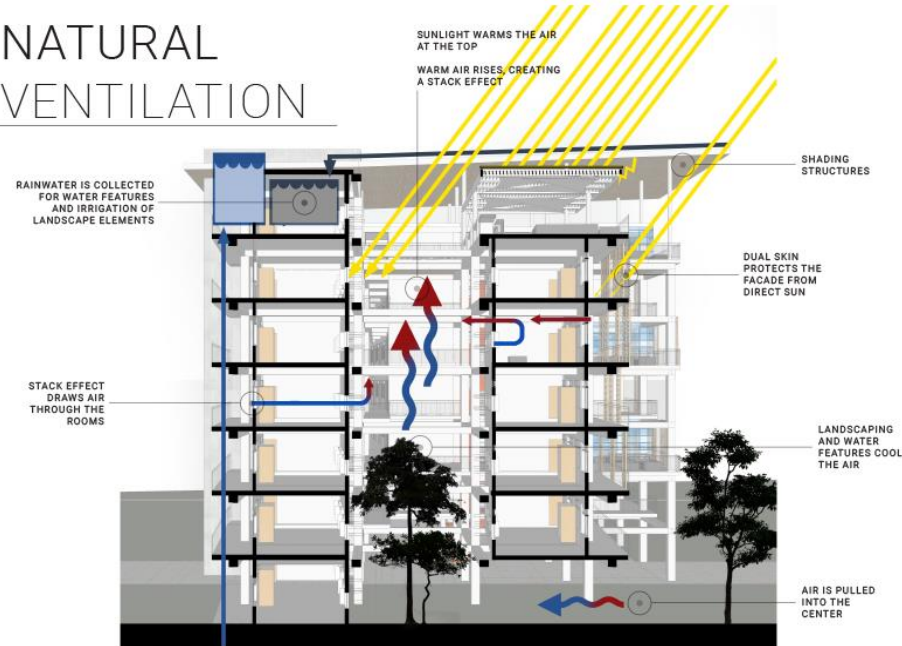
Maximum ventilation



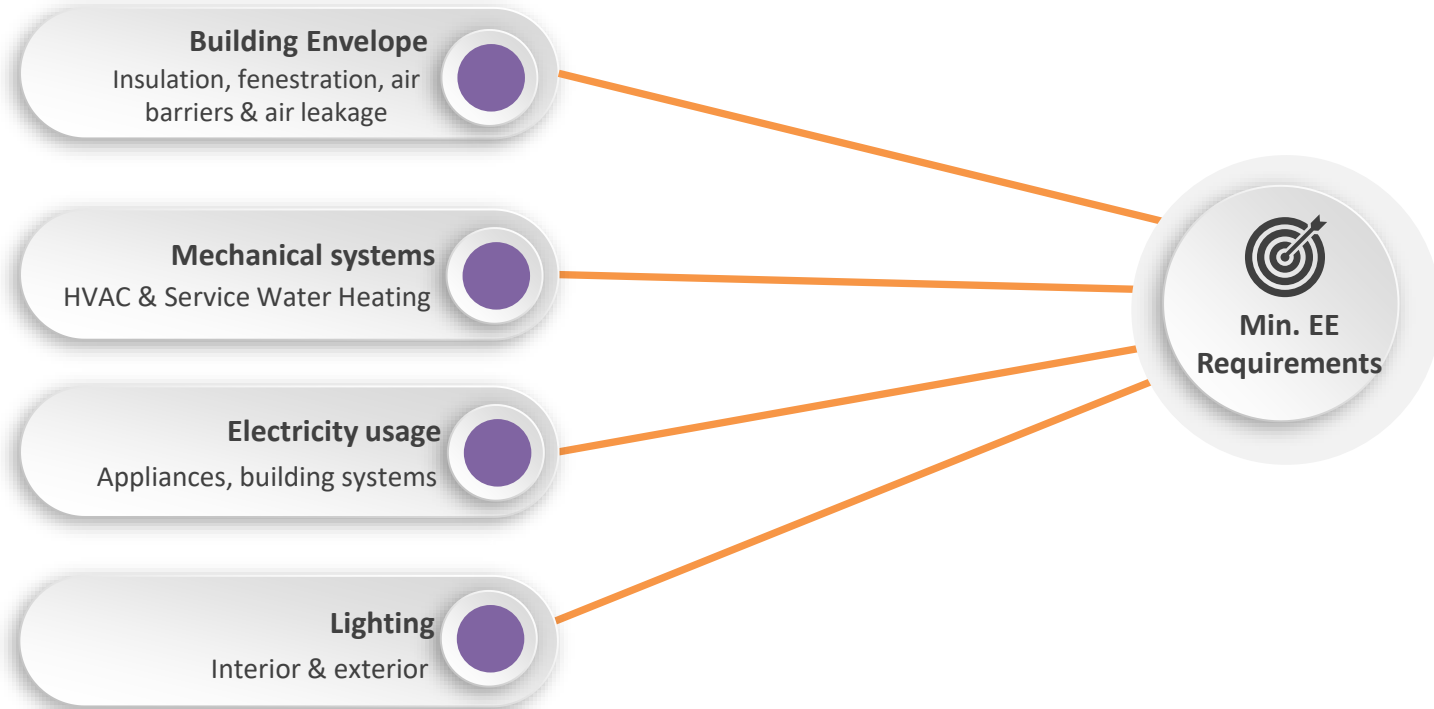
Improve indoor air quality & thermal comfort

- Types: natural or mechanical
- Principles:
 - Cross ventilation
 - Stack ventilation
- Examples:
 - High ceilings
 - Roof vents
 - Windows on opposing sites
 - Minimize internal partitions
 - Using stilts for elevation

NATURAL VENTILATION



2018 CREEBC: Minimum EE Requirements



Climate-resilient buildings are key

- Vulnerability to impacts of climate change
- Increased frequency and severity of extreme weather events

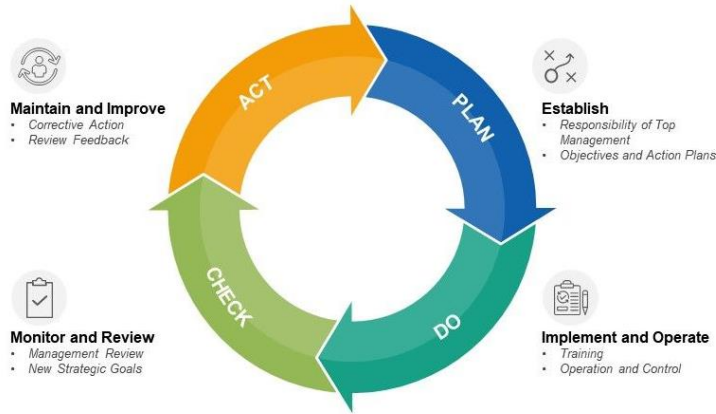
Identify most prevalent risks

Define mitigation strategies through building design

- Exemplary strategies:
 - Off-grid RE (back-up) power supply
 - Upsizing roof drains
 - Protection of glazing; increasing the ballistics level of the building envelope; designing safe spaces for building occupants
 - Passive ventilation & tree shading to prevent overheating
 - Expanded water storage

Continuously enhancing building efficiency

- Building energy management systems



- Aided by smart technologies

The CCREEE: Connecting the dots

