UNFCCC Climate Technology Centre & Network

Low carbon action for the building sector in developing countries

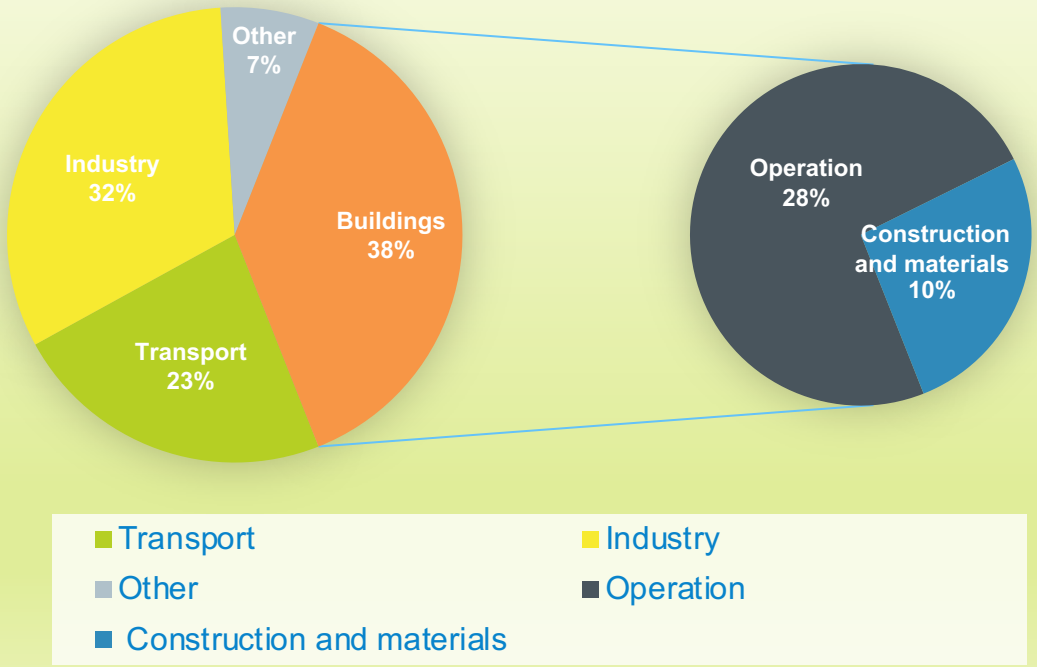
Dr. Rose Mwebaza

Director- Climate Technology Centre and Network

The magnitude of the problem - Embodied carbon emission in Building

- **Carbon emissions from the building sector are the highest ever recorded.**
- Building accounts for 38% of global carbon emissions;
  - **Out of which, 10% is Embodied carbon emission in building and construction value chain.**
- Building material represents **50% of the demand for cement and 30% of steel** which have carbon intensive productions.
- **Embodied carbon emissions in upstream are irreversible,** if not managed at construction stage:
  - **With the energy efficient operations of building, the share of embodied carbon emission will increase.**
- Building construction and demolition waste leads to material losses, worsening the carbon intensity in the value chain.

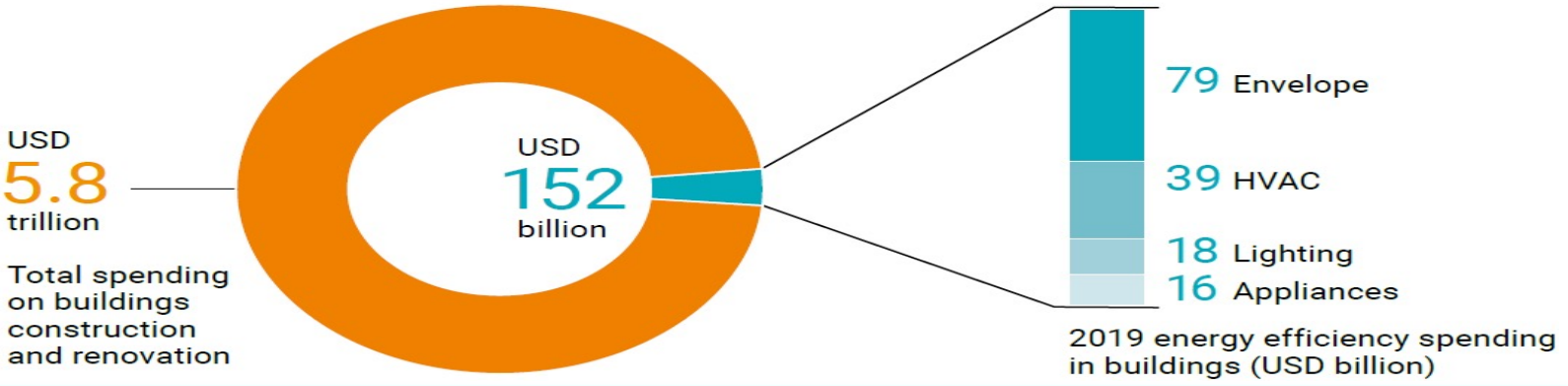
Share of Buildings (Operation and Construction) in Global emission



What's trending on low carbon building?

- **NDCs are prioritizing actions** to decarbonize the building stock:
  - 136 countries mention buildings, 53 countries mention building energy efficiency, and 38 specifically call out building energy codes;
- **73 countries** had Building Energy Codes; Clear value chain approach on building is still lacking
- **Investment on energy efficient buildings** has increased representing 150 Billion USD
  - *still remains outpaced by investment in conventional buildings and construction.*
  - for every $1 spent on Energy Efficiency, $37 is spent on conventional construction approaches.
- **Building certifications and sustainable procurement of building materials** are among other initiatives on low carbon building.

Building construction and energy efficiency investment and breakdown



A case study from Thailand Building Sector - CTCN on low carbon and resilient buildings

CTCN
CLIMATE TECHNOLOGY CENTRE & NETWORK

Objective: To implement a GCF readiness proposal on enabling Thailand in achieving national targets for energy efficiency in the building sector as defined in Energy Efficiency Plan of 2015, in NAMAs, and in Thailand's NDC.

Key Deliverables:

- Detailed technology assessment in line with the current Building Energy Code (BEC) standard and future goals
- Technology performance evaluation across key building typologies most suited for Thailand for 5 building types.
- Identification of threshold level of energy efficiency to create investment baseline
- Capacity building on green building design and evaluation, construction, technology implementation, retrofits, operation and maintenance

A case study from Thailand Building Sector - CTCN on low carbon and resilient buildings

CTCN
CLIMATE TECHNOLOGY CENTRE & NETWORK

Key findings on Technology performance evaluation across key buildings:

- Many buildings (under five building types) fail to comply with the individual performance requirements on **building envelope**, lighting, air conditioning, and hot water generation system under Building Energy Code of Thailand -2009 criteria.
- Non-compliances are largely on **BUILDING ENVELOPE's** Wall (OTTV-Overall Thermal Transfer Value) for walls and windows and Roof (RTTV-Roof Thermal Transfer Value) for roof criteria under BEC 2009 criteria.
- **The report made relevant recommendations on building materials and on building design technologies to comply with BEC from Thailand's context.**
- **Please find the report at** UNIDO (ctc-n.org)

Stakeholders consultation on EE in Thailand Building Sectors

UN environment programme
UNIDO

A case study from Smart City in Sri Lanka - CTCN supporting Green Building in Sri Lanka

CTCN
CLIMATE TECHNOLOGY CENTRE & NETWORK

Objective: To establish a pathway for the transition of Kurunegala City through the capacity enhancement of city planners and policymakers into a low emission municipality.

Key Findings on building related component under Kurunegala Smart City:

- Green building comprising roof and wall design enabling efficient use of energy and eco-friendly construction materials were identified as a priority technology towards becoming a climate smart city.
- A roadmap was developed with proposed action plans on Green Building:
  - *City level expansion of policies with targets on greening public and private buildings*
  - *Mandatory regulations green building ratings and certifications*
  - *Identification of energy intensive buildings through baselining; Auditing and reporting of energy intensive buildings*
  - *Capacity building of municipal authority and policy makers*

Stakeholder consultation on Kurunegala Smart City components

UN environment programme

A case study from Antigua and Barbuda on climate resilient public building - CTCN support on resilient buildings

CTCN
CLIMATE TECHNOLOGY CENTRE & NETWORK

Objective: To enable the Government of Antigua and Barbuda to build climate resilient buildings to withstand a Category 5 hurricane, extreme flooding, and extended drought.

Key Deliverables and findings:

- Conduct technical assessments of key government buildings, including hospitals, police offices, fire stations and schools, as well as their service inputs (food, water, electricity)
- Identify the detailed interventions required to make the buildings resilient to the impacts of climate change and variability
- Comprehensive costing of the adaptation interventions
- Recommendations for policy and standards e.g. the Building Code; and other recommendations for the project to best achieve its climate resilience goals
- As the outcome of the feasibility study, the upgradation of the buildings were suggested instead of new built which is less carbon intensive and produce less construction and demolition waste

UN environment programme
UNIDO

Building Energy Codes for public buildings in the Kyrgyz Republic - CTCN support on low carbon and resilient buildings

CTCN
CLIMATE TECHNOLOGY CENTRE & NETWORK

Objective: Support in enhancing the building energy codes to institutionalize and standardize the energy performance of building

Key deliverables:

- Benchmarking international practices on Building energy performances with similar landscape as Kyrgyz Republic.
- Gap analysis of selected three building codes- Boiler installation, HVAC and **Building Envelope.**
- Create a database of relevant clean energy technologies and building materials for public and residential buildings.
- Develop the building energy codes
- Develop approach to implement the building energy codes

Technology development and innovation have potential roles to play towards low *embodied* carbon building

- Designing **innovative circular materials and products** that can be recovered in closed-loop processes, can reduce the demand for the construction materials
    - Smart selection of materials for components and structures with minimised life cycle impact using material libraries;
    - Rightsizing and light weighting of components and structures;
    - Consideration of thermal properties of construction materials in relation to regional needs;
    - Structures with extended lifespans, suitable for deconstruction and reuse of materials and components.
- **Material processing and fit-for-purpose cements** based on local feedstocks produce with less energy, emissions, and impacts; closed-loop production cycles.
- Manufacturing and construction **use of digital systems to track materials**, and prevent their excessive use
- Adopting **off-site (modular) construction** for disassembly and enhancing additive manufacturing with closed-loop materials for waste avoidance will further result in material efficiencies.
- Use of remote sensing and geophysics for characterisation of materials to enable recovery and reuse in existing value chain.

CTCN

CLIMATE TECHNOLOGY CENTRE & NETWORK

CTCN Secretariat
UN City, Marmorvej 51
DK-2100 Copenhagen, Denmark
www.ctc-n.org
ctcn@un.org

UNFCCC_CTCN

UNFCCC.CTCN

Supported by

EUROPEAN UNION

環境省
Ministry of the Environment

METI
Ministry of Economy, Trade and Industry

外務省
Ministry of Foreign Affairs of Japan

Norwegian Ministry of Foreign Affairs

UDENRIGSMINISTERIET
DANIDA

Canada

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs, Education and Research EAER
State Secretariat for Economic Affairs SECO

gef

GREEN CLIMATE FUND

Ministry of Science and ICT

Federal Ministry for Economic Affairs and Energy

MINISTERO DELL'AMBIENTE
DELLA TUTELA DEL TERRITORIO E DEL MARE

Government Offices of Sweden
Ministry of the Environment and Energy

Spanish Cooperation

FORMIN.FINLAND.FI
MINISTRY FOR FOREIGN AFFAIRS OF FINLAND

Comhshaol, Pobal agus Rialtas Áitiúil
Environment, Community and Local Government