



2022 GLOBAL STATUS REPORT FOR BUILDINGS AND CONSTRUCTION

Towards a zero-emissions, efficient and resilient buildings
and construction sector



Global Alliance
for Buildings and
Construction

WHAT IS THE 2022 BUILDINGS-GSR?

A global reference document:

Seventh edition of this annual snapshot on the progress of the buildings and construction sector globally towards achieving the Paris Agreement goals:

- An update on the drivers of **CO₂ emissions and energy** demand globally and
- Status of **policies, finance, technologies, and solutions** that support a zero-emission, efficient, and resilient buildings and construction sector

A collaborative effort, building a global community.

This year's Buildings-GSR features contributions from:



Yale



Input from over 70 GlobalABC members and experts.

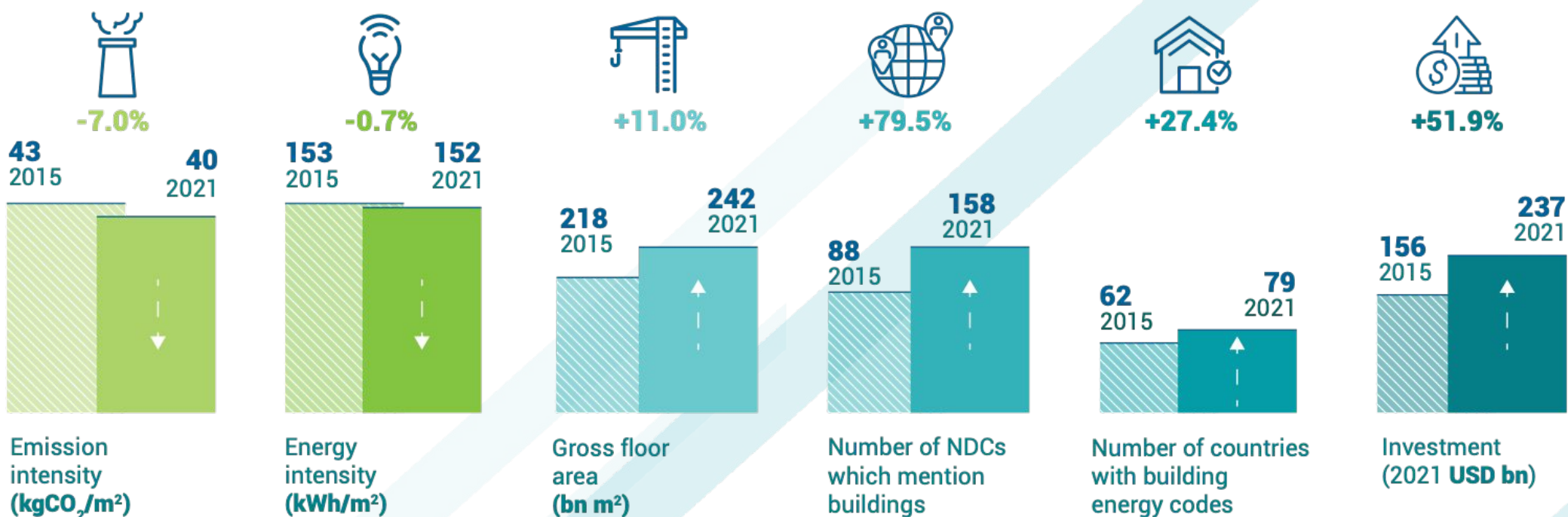
WHAT IS NEW THIS YEAR?

- **Buildings and construction: disruptions and challenges facing the buildings sector in 2022**
- **Global Buildings Climate Tracker:** Are we on track towards the Paris Agreement Goals?
- Updates on **building codes** and building decarbonisation in **Nationally Determined Contributions (NDCs)**
- Status of **investment in building energy efficiency**
- Deep dive on:
 - **Sustainable buildings and construction in Africa**
 - **Building materials embodied carbon and sustainability**

KEY MESSAGE: Rebound in global buildings and construction emissions highlights the need for structural change

- In 2021, construction activities rebounded back to pre-pandemic levels in most major economies. As a result, buildings energy demand increased by around 4 % from 2020 – the largest increase in the last 10 years.
- Despite some progress at the policy level, the lack of structural change highlights the growing gap between the actual climate performance of the sector and the necessary decarbonization pathway.

CHANGE IN GLOBAL DRIVERS OF TRENDS IN BUILDINGS SINCE PARIS AGREEMENT IN 2015



¹ Values included for the baselines have been updated from previous versions of the Buildings-GSR due to both historic input data updates for emissions and floorspace, and also deflation factors for USD. The proportional changes between previous years remains similar.

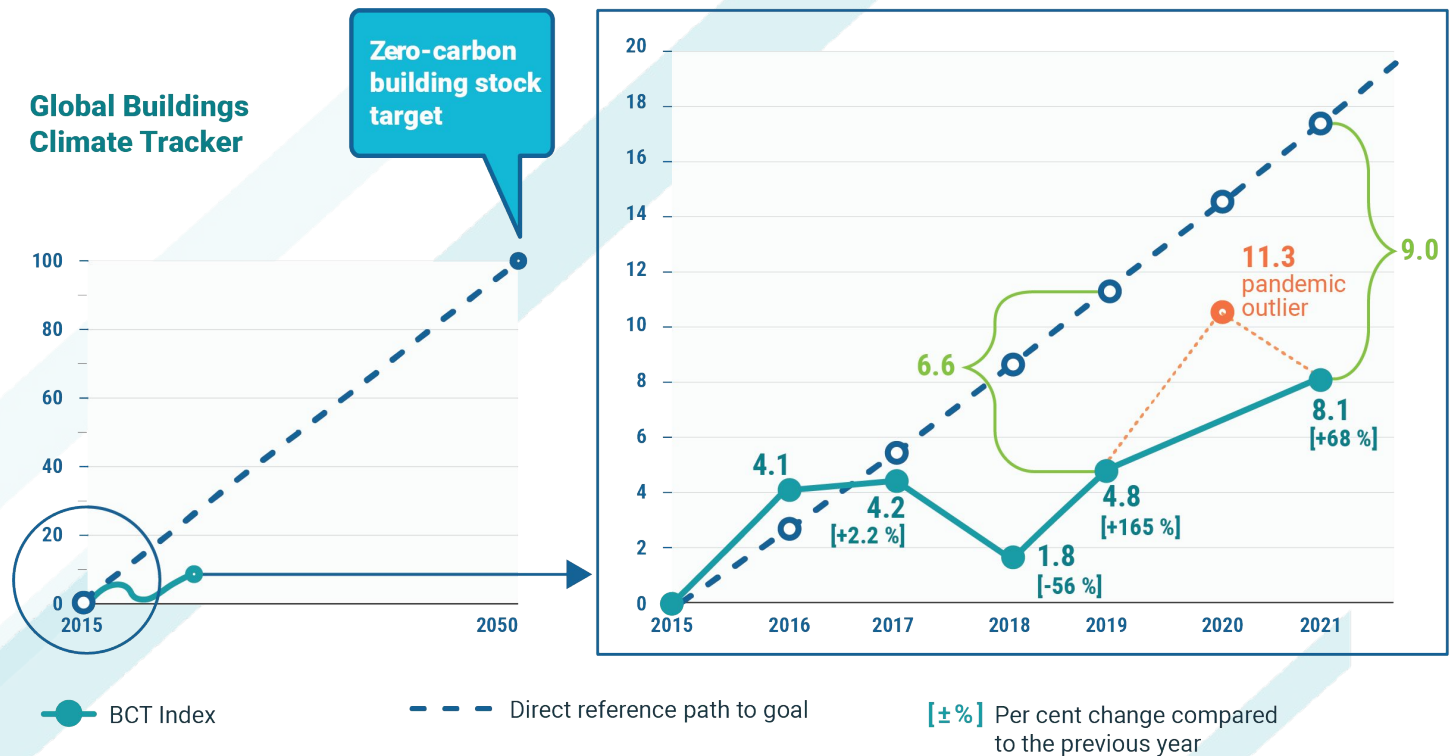
KEY MESSAGE:

The Global Buildings Climate Tracker indicates that the buildings and construction sector remains off track to achieve decarbonization by 2050.

Buildings Climate Tracker (BCT):
Decarbonisation index trend for buildings
and construction

The BCT shows a negative rebound since
2020 in the decarbonization of the
buildings sector, with increased energy
intensity and higher emissions.

No structural, systemic improvement was
achieved in the buildings sector, leaving it
vulnerable to external factors.



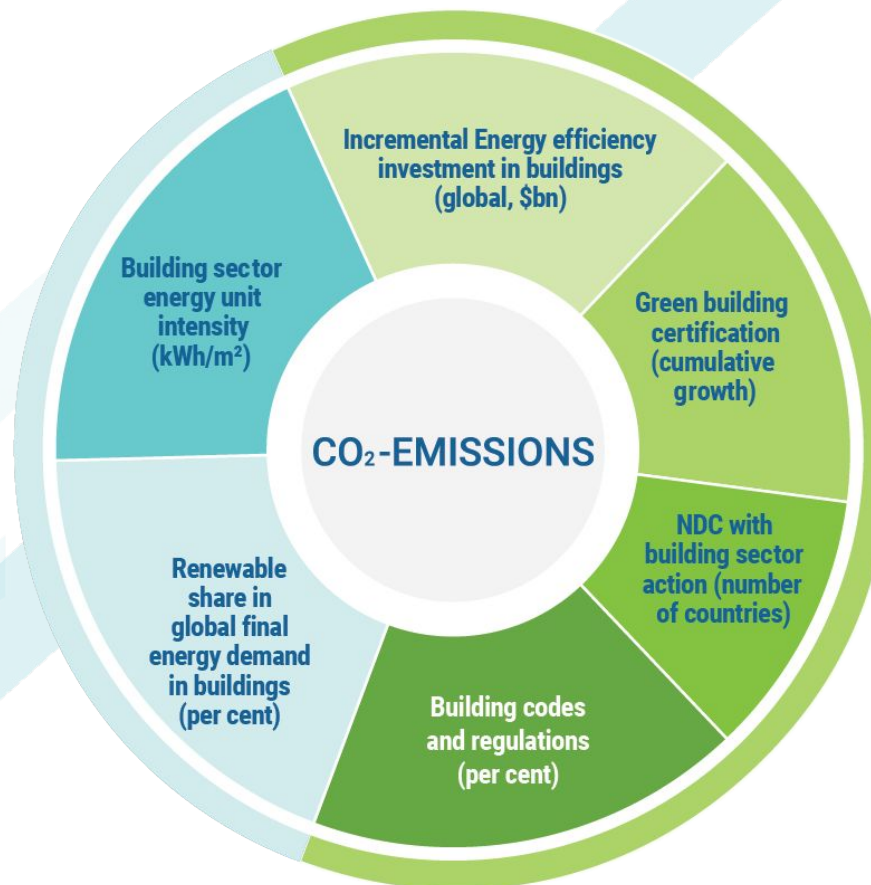
Source: Adapted by the Buildings Performance Institute Europe.

The GlobalABC Buildings Climate Tracker (BCT): A Decarbonisation index trend for buildings and construction

The Buildings Climate Tracker (BCT) comprises seven indicators:

1. Incremental energy efficiency investment in buildings
2. Building Energy Codes
3. Green Building Certifications
4. NDCs with building sector action
5. Renewable energy share in final energy in buildings
6. Building Sector Energy unit Intensity
7. CO₂ emissions

37%
IMPACT



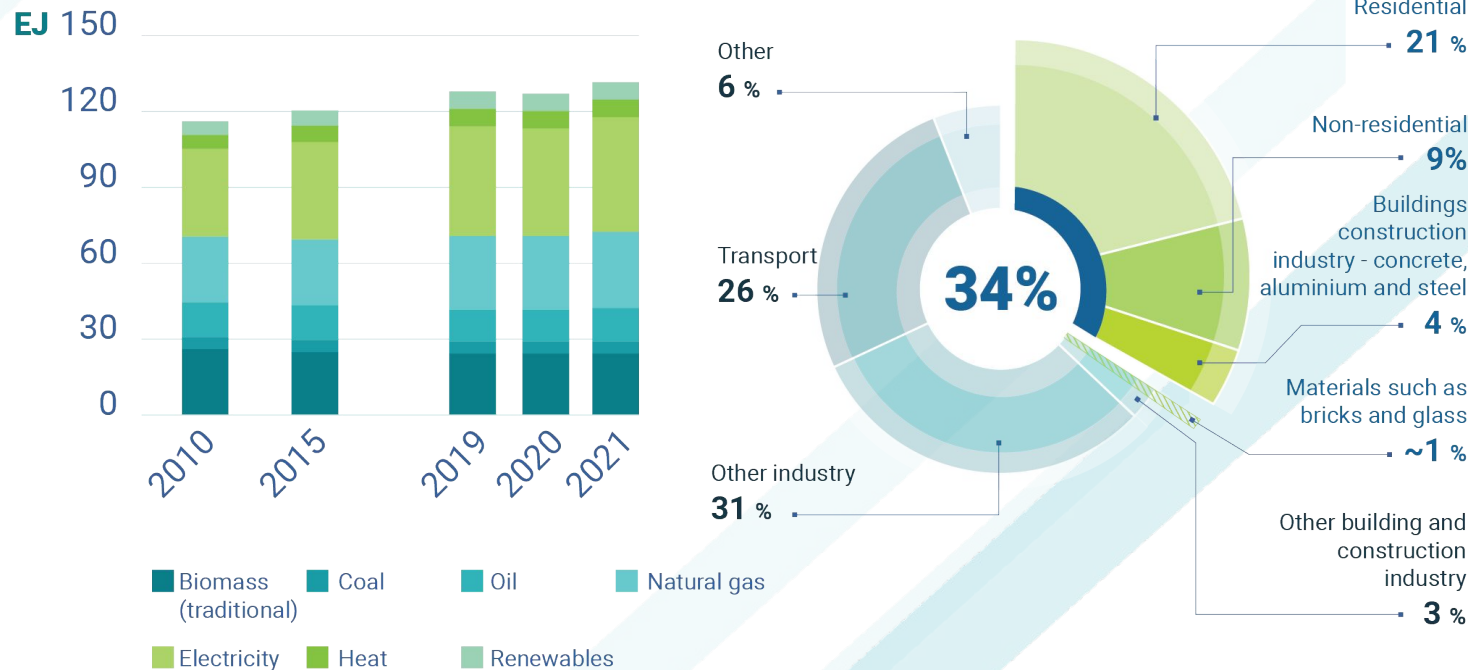
63%
ACTION

Source: Adapted by the Buildings Performance Institute Europe (BPIE) 2022.

KEY MESSAGE:

Compared to 2020, energy used in buildings increased by around 4% in 2021

Global share of buildings and construction final energy demand, 2021



Operational energy demand in buildings (for space heating and cooling, water heating, lighting, cooking and other uses) accounts for around 30% of final demand and has grown to 135 EJ,

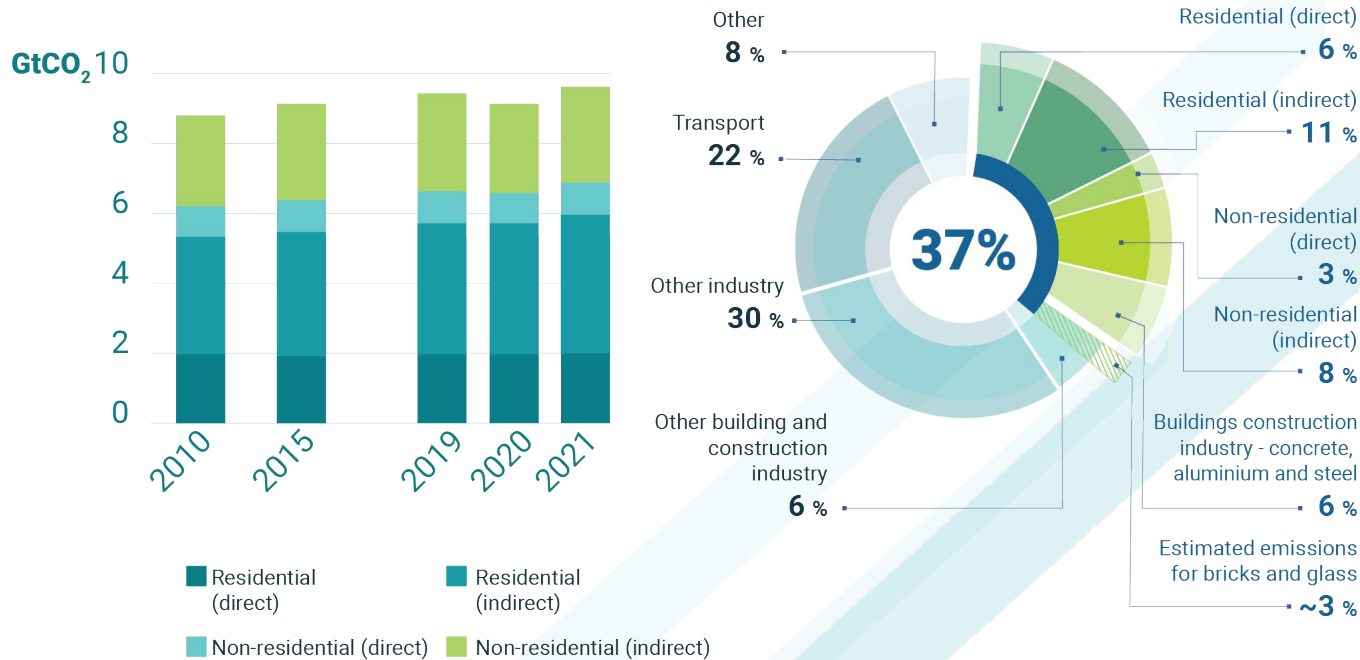
Energy demand in 2021 increased by around 4% from 2020 and exceeds the previous peak in 2019 by 3%.

Source: IEA 2022. All rights reserved. Tracking Buildings 2022.

KEY MESSAGE:

Compared to 2020, operational energy-related CO₂ emissions have increased by around 5% compared to 2020, a rebound that now exceeds the 2019 peak

Global share of buildings and construction operational and process CO₂ emissions, 2021



Operational energy-related CO₂ emissions from buildings grew by around 5% in 2021 compared to 2020 to around 10 GtCO₂, exceeding the previous 2019 peak of 9.6 GtCO₂ by 2%.

Emissions from producing buildings materials are around 3.6 GtCO₂ (concrete, steel, aluminium, glass, and bricks).

Together buildings represented around 37% of global emissions in 2021.

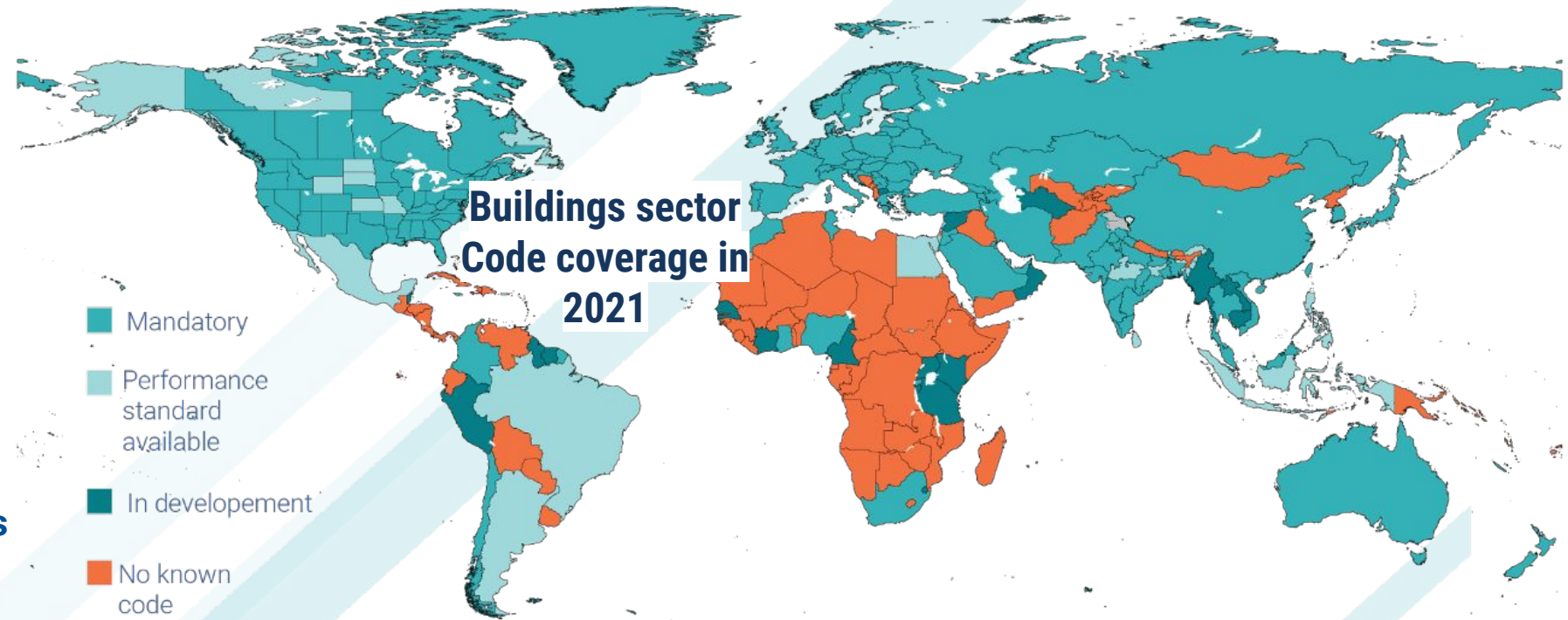
Source: International Energy Agency (2022). Tracking Clean Energy Progress. Paris.

KEY MESSAGE:

More progress is required on global adoption of mandatory building energy codes and for existing codes to align to zero emissions

Since 2020, there has been little progress on national building energy codes in countries which are yet to adopt them.

Several countries, France and Denmark, now include embodied carbon emissions as part of their codes.



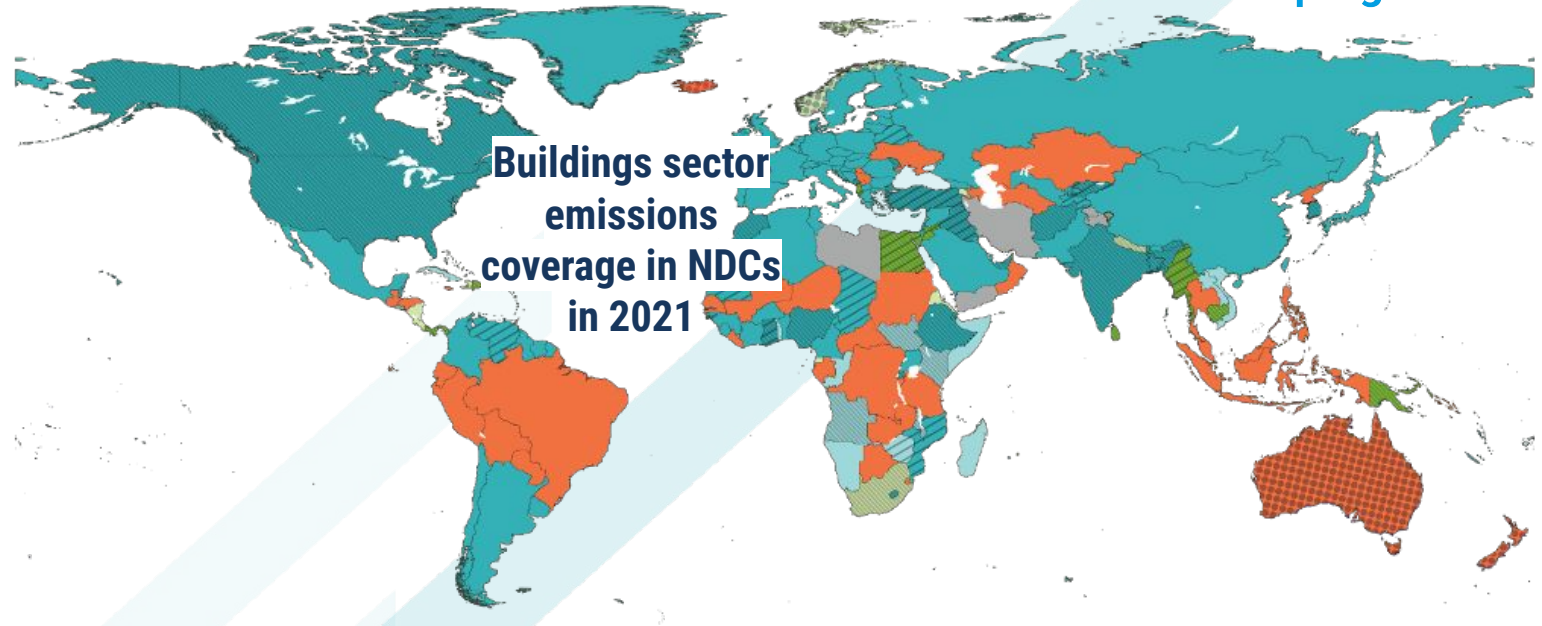
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KEY MESSAGE:

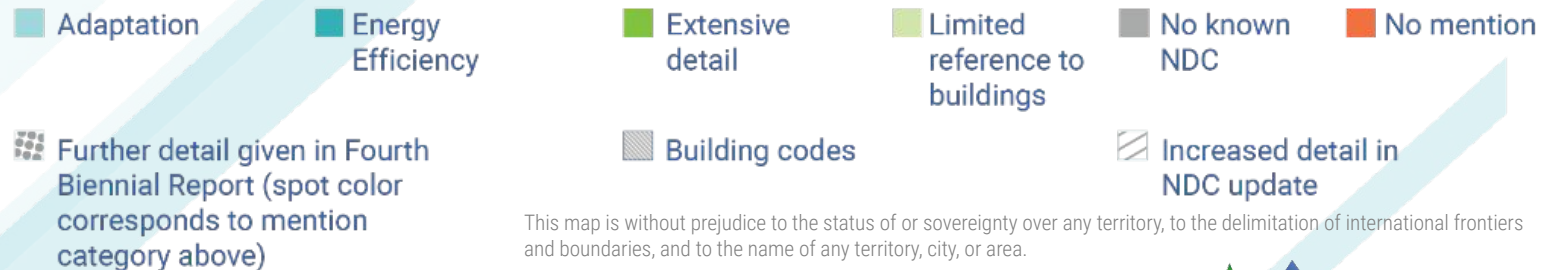
Ambition to act on buildings' emissions has increased, but must be matched by action in policy, regulation and continued investment

In 2021, 158 countries mentioned buildings in their NDCs, of which 118 refer to energy efficiency as a part of their emissions reduction strategy.

However, the ambition of NDCs must be matched by increased adoption of building energy codes.



NDC mentions of buildings



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KEY MESSAGE:

Governments have increased the level of energy efficiency investment in line with levels needed to support the Paris Agreement

- *Global investment in the energy efficiency of buildings increased **by around 16 % from 2020**, dominated by investments from EU countries, the USA, Canada and Japan.*
- *Global investment in energy efficiency in 2021 was **\$237 billion, up from \$184 billion in 2020**. **The annual growth in energy efficiency investment once again exceeded 3 %** – a rate needed to achieve the Paris Agreement and SDG7.*
- *The global buildings construction sector value increased by 5 % to more than \$6.3 trillion in 2021.*
- *Global increases in the cost of living will put pressure on borrowing costs, but energy efficiency presents a means of moderating energy cost volatility as well as reducing emissions.*

SPOTLIGHT: Africa buildings and construction

KEY MESSAGE:

Africa's building stock has low resilience to climate change, posing unique challenges in the coming decades

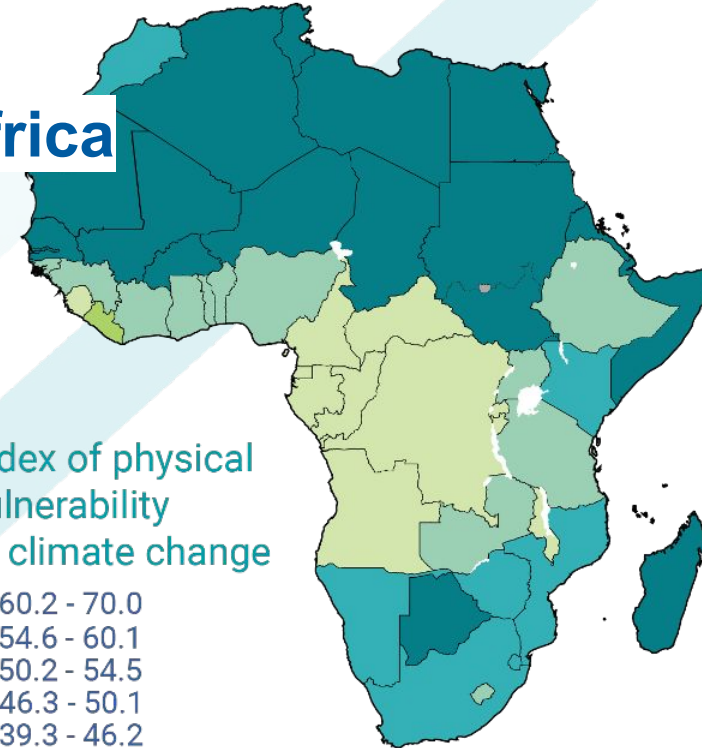
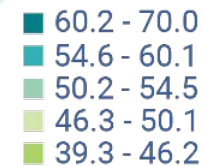


Regional focus: Africa

The current resilience of buildings against the growing impacts of climate change is low, in particular as more than half of African citizens are living in informal housing.

80% of those living in rural sub-Saharan Africa lack access to electricity.

Index of physical vulnerability to climate change



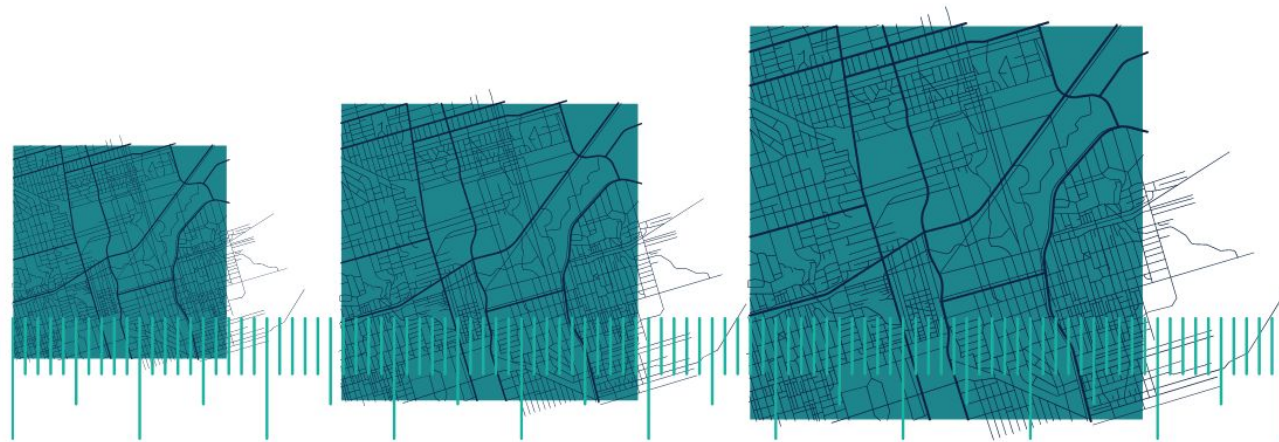
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SPOTLIGHT: Africa buildings and construction

KEY MESSAGE:

70% of the African building stock in 2040 still has to be built, with much of this growth happening in cities.



Source: Insaf Ben Othmane H. 2022

An estimated 70% of the African building stock in 2040 still has to be built.



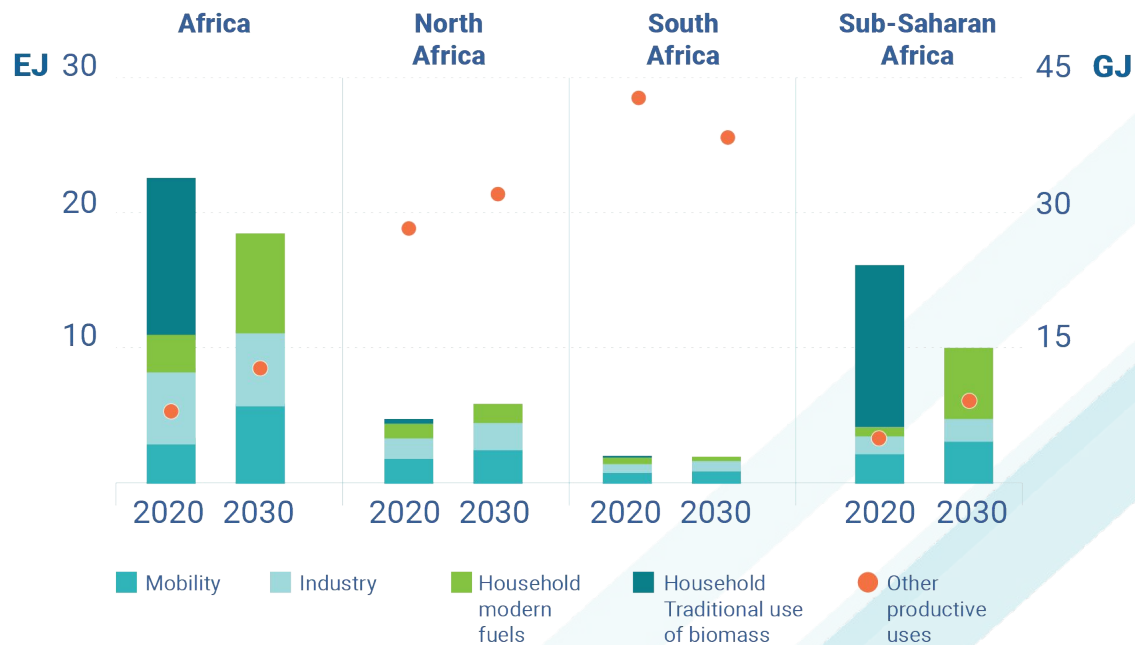
SPOTLIGHT: Africa buildings and construction



KEY MESSAGE:

Shifting from inefficient and unhealthy biomass for cooking in sub-Saharan Africa would increase household energy efficiency in Africa by 2030.

Africa's final energy consumption by sector 2020-2030



Under their Sustainable Africa Scenario, the IEA projects that, by 2030, African household energy demand for cooling (including refrigeration) will more than double.

The need for cooling is the major future challenge for residential energy demand, with ownership of fans standing at 0.6 units per household and current cooling device ownership standing at only 0.06 units per household.

Source: IEA 2022. All rights reserved. Adapted from "Africa Energy Outlook 2022" (IEA 2022b).



Photo credit: Eva Blue

SPOTLIGHT: Africa buildings and construction

KEY MESSAGE:

Traditional sustainable construction and building practices are a cornerstone of African cultural heritage.

By preserving and further developing the local traditional construction techniques it will be possible to promote more affordable housing that is adaptable to climate conditions.



Source: Insaf Ben Othmane H. 2022



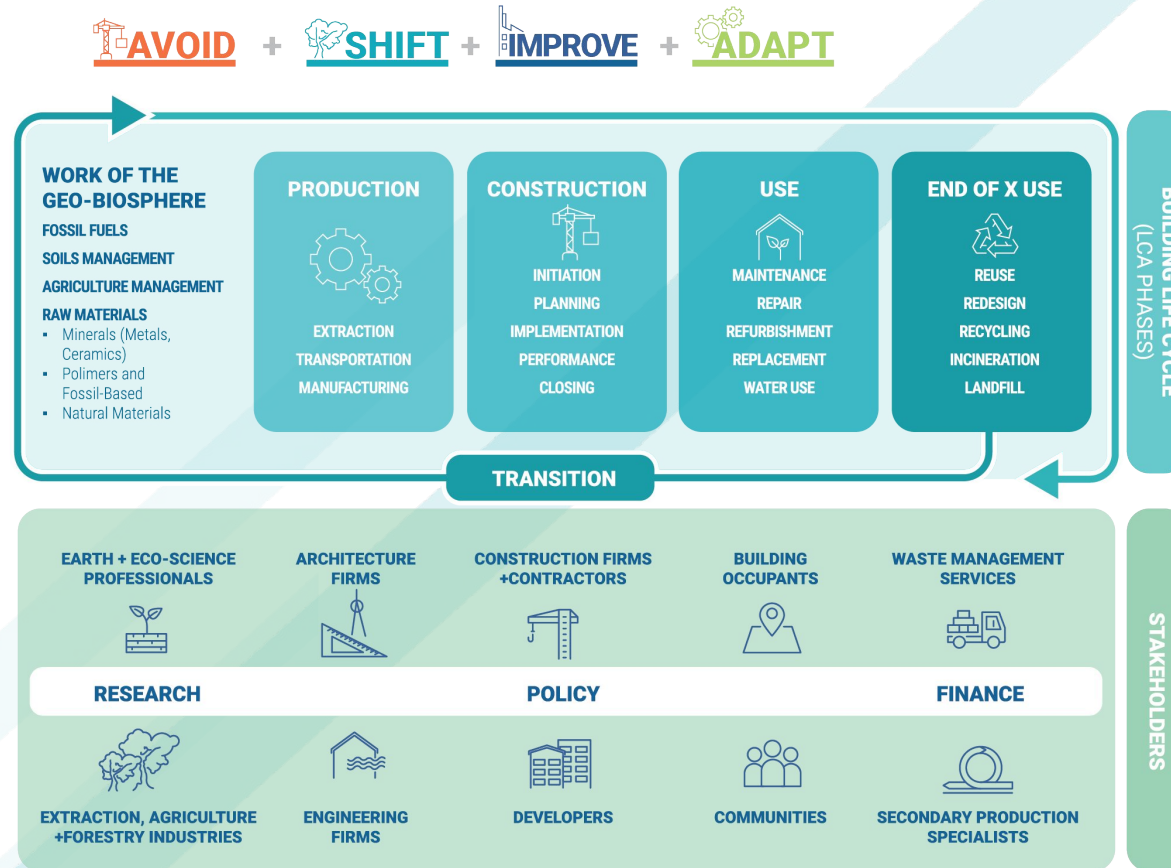
SPOTLIGHT: Materials

KEY MESSAGE:

Embodied carbon in buildings need immediate action to avoid undermining the carbon reductions achieved from energy efficiency.

Globally, approximately 100 billion tonnes of waste is caused by construction, renovation and demolition, with about 35 % sent to landfills.

In fast-growing developing economies, construction materials are set to dominate resource consumption, with associated greenhouse gas emissions expected to double by 2060.



Credit: Naomi Keena, Daniel Rondinel, Alejandra Acevedo, Seth Embry, Anna Dyson, 2022



SPOTLIGHT: Materials

KEY MESSAGE:

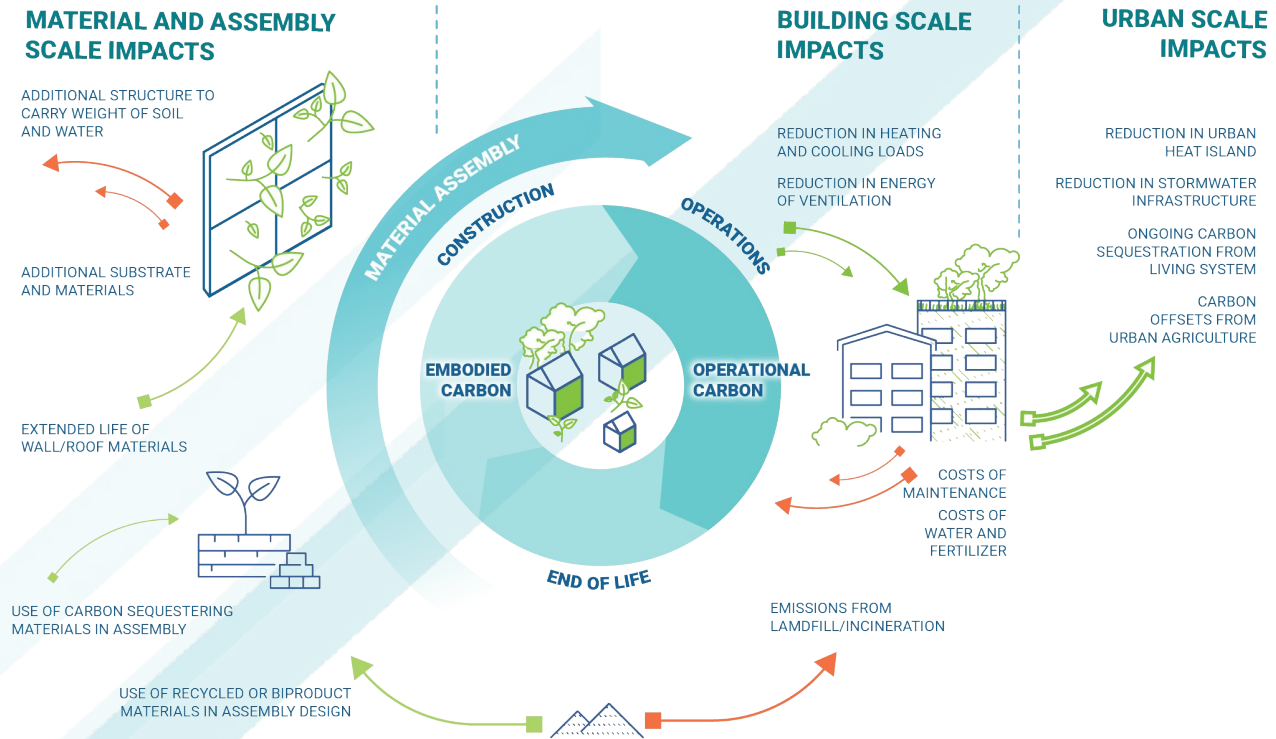
A Whole Building Life Cycle and Systems Approach to decarbonization is essential to maximizing long-term sustainability.



Green infrastructure and biomaterial systems

The upfront embodied carbon associated with adding capacity for green roofs and living facades must be weighed against any benefits of reduced heating and cooling loads.

For most climates and building types, operational carbon savings and ecosystemic benefits outway upfront embodied carbon.



Credit: Christina Ciardullo and Anna Dyson, Yale Center for Ecosystems + Architecture, 2022



KEY MESSAGE:

More than 30 countries have set out pathways for the transition of their buildings and construction sector to zero emissions



A growing number of countries and regions are developing buildings and construction sector roadmaps, highlighting the importance of national governments and regional cooperation and partnerships in efforts to decarbonize the building sector.

Buildings Roadmap Highlights

DENMARK

Maximum limits on building carbon emissions for new buildings to be gradually decreased in 2025: 10.5 kgCO₂/m²/year.

Reducing to 7 kgCO₂/m²/year by 2029.

INDONESIA

By 2050: all new buildings to be constructed to a nearly zero-energy building standard and existing buildings to achieve a nearly zero-energy building operational standard.

COLOMBIA

By 2030: 40% reduction in operational carbon and 30% reduction in embedded carbon

By 2050: 100% of new buildings and major renovations are to be net zero

KEY RECOMMENDATIONS FOR POLICY AND DECISION MAKERS

1. Coalitions of national stakeholders to **set targets and strategy towards a sustainable, zero-carbon and resilient buildings and construction sector.**
2. National and sub-national governments to put in place **mandatory building energy codes** and set out a pathway for **codes to achieve zero carbon across a building's life cycle** as quickly as possible.
3. Governments and non-state actors must increase their investment in energy efficiency.
4. **Construction and real estate industries must develop and implement zero-carbon strategies for new and existing buildings.**
5. Building materials and construction industries must commit to reduce their CO₂ emissions throughout their value chain.
6. Support research partnerships to accelerate the development, demonstration and commercialization of innovations to reduce embodied carbon in building materials.
7. Governments, especially cities, need to implement policies that promote the **shift to circular economies.**
8. **Regulations need to take a whole building life cycle** approach that considers both materials' embodied carbon emissions and operational emissions.
9. **Fast-growing countries and economies need investment to build capacity, resources and supply chains** to promote energy-efficient designs and low-carbon and sustainable construction



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Photo credit: Pawel Czerwinski



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