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Item 4 of the provisional agenda*

**Consideration of the outcomes of expert group and
intersessional meetings, including draft recommendations,
and of global events**

Background paper on housing sustainability and resilience**

Note by the secretariat

1. Work on housing sustainability under the Open-ended Intergovernmental Expert Working Group on Adequate Housing for All began in July 2025. An Expert Group Meeting on housing environmental sustainability was convened on 20 August 2025, with the participation of 50 experts, to identify the principal challenges and trends and to formulate draft recommendations. An intersessional meeting was subsequently held in two sessions on 16 September 2025 and brought together 133 participants, including national focal points, nominated experts and subject matter experts, who reviewed the background documentation and provided substantive inputs. Between October 2025 and February 2026, the paper was revised on the basis of those inputs. As the Co-Chairs of the Working Group prioritized housing resilience as a component of housing sustainability, its climate resilience dimensions were expanded. A further intersessional meeting on housing environmental sustainability and resilience was held on 19 May 2026, in person at the venue of the thirteenth session of the World Urban Forum in Baku and online, with interpretation in the six official languages of the United Nations. It brought together over 100 participants, who considered the framing of the paper and the proposed recommendations. The contents of the present paper were developed through that consultative process, comprising expert group meetings, intersessional meetings and written contributions, through which experts nominated by Member States and accredited organizations provided substantial contributions and technical inputs.

I. Background

2. This analysis addresses the relationship between housing systems and the natural environment, with the aim of providing an evidence base for policy recommendations toward adequate housing for all that is environmentally sustainable and resilient, which is particularly crucial for residents of informal settlements.

3. Achieving environmentally sustainable and resilient housing requires rethinking the entire life cycle of buildings, from material extraction and production to construction, use, and end-of-life management, addressing not only building-level performance, but also wider urban and territorial

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** The present document has not been formally edited.

systems, including land, infrastructure, mobility, energy, water, waste management, and local governance. This entails transitioning from housing systems that degrade natural environments, exacerbate inequalities, and undermine biological and cultural diversity toward systems that benefit communities and ecosystems, enhancing equity, inclusivity, and shared prosperity. The analysis provided outlines all these interrelated dimensions of housing sustainability and resilience.

4. *Section A* establishes the conceptual foundations, clarifying the key criteria of adequate housing and their relationship to environmental sustainability and resilience, and situating the analysis within two interconnected global challenges: the scale and urgency of unmet housing needs worldwide, and the triple planetary crisis. *Section B* examines the impacts of housing systems on the natural environment, including both their negative effects on ecosystems, climate, and biodiversity, and the potential of sustainable housing practices to generate positive environmental outcomes. *Section C* explores the reverse relationship, analyzing how environmental degradation undermines the enjoyment of the right to adequate housing, while also recognizing the benefits that a healthy and balanced natural environment can provide to the well-being and resilience of residents. *Section D* provides regional insights, highlighting how the priorities and constraints of environmentally sustainable and resilient housing differ across the world's major regions. *Section E* analyzes the key obstacles that continue to impede the transition to environmentally sustainable and resilient housing, spanning governance, finance, knowledge, and equity dimensions. *Section F* reviews emerging efforts globally toward more sustainable and resilient housing systems, acknowledging both the progress achieved and the significant gaps that remain.

A. Conceptual framework

1. Adequate housing and environmental sustainability

5. *Adequate housing* is recognized as a component of the right to an adequate standard of living in the *Universal Declaration of Human Rights* of 1948. It is further elaborated in the *International Covenant on Economic, Social and Cultural Rights* of 1966, which affirms the right to adequate housing as a legally binding obligation for States parties. Adequate housing must be understood as more than the mere provision of “four walls and a roof”. It must, at a minimum, meet the following seven key criteria, which are just as fundamental as the basic supply and availability of housing units: security of tenure; availability of services, materials, facilities, and infrastructure; affordability; habitability; accessibility; location; and cultural adequacy.¹ Housing provides individuals and families with a safe, secure and dignified place to live, and serves as a foundation for broader outcomes, including health, well-being, educational attainment, productivity, and social cohesion. The absence of adequate housing reinforces spatial and social inequalities and perpetuates intergenerational cycles of poverty and exclusion.

6. *Environmental sustainability* is associated with the human right to a clean, healthy, and sustainable environment, recognized by the United Nations General Assembly in resolution 76/300 of 2022, which affirms its close interdependence with the enjoyment of other human rights and calls for strengthened action to address environmental degradation.² Environmental sustainability is a dimension of the broader concept of *sustainability*, which encompasses long-term environmental, social, cultural, and economic balance. *Resilience* is an intrinsic condition of sustainability, and it can be defined as the ability of societies and ecosystems to withstand, adapt to, and recover from environmental, social, cultural, and economic shocks.³

7. Environmental sustainability may be understood as an essential complement to the seven key criteria of adequate housing, and at the same time as a cross-cutting dimension that is deeply interrelated with each of them. Environmentally sustainable and resilient housing:

- (a) Enhances the availability and efficiency of *basic services and infrastructure* by integrating renewable energy generation, water harvesting and reuse systems, and circular waste management.
- (b) Improves *affordability* by lowering whole life cycle costs through energy- and water-efficient design, circular approaches that extend building lifespan, and reliance on locally sourced materials less exposed to volatile global markets.

¹ United Nations Committee on Economic, Social and Cultural Rights (CESCR), *General Comment No. 4: The Right to Adequate Housing (Art. 11 (1) of the Covenant)*, E/1992/23 (United Nations publication, 1991).

² A/RES/76/300.

³ HSP/HA.2/Res.9.

- (c) Strengthens *habitability* by improving health and comfort through bioclimatic design and green infrastructure, and by ensuring structural safety under increasingly severe climate conditions.
 - (d) Supports *tenure security* by reducing exposure to climate-related hazards, fostering long-term stewardship of buildings and neighbourhoods that discourages speculative redevelopment, and enabling incremental and in-situ upgrading of existing housing stock, including informal settlements.
 - (e) Improves *location* outcomes by prioritizing compact urban development in areas with low environmental risk,
 - (f) Enhances *accessibility* through flexible and adaptable design, and
 - (g) Reinforces *cultural adequacy* by fostering community-led housing approaches and recognizing the value of traditional, vernacular, and Indigenous building techniques.
8. Environmental sustainability and resilience must be advanced across the entire *global housing continuum*, from emergency shelter, through transitional and incremental self-built housing, to social housing and market housing.⁴

2. The housing challenge

9. Access to adequate housing remains a persistent global challenge. UN-Habitat estimates that more than 3 billion people live in inadequate housing, including 1.16 billion in informal settlements and more than 300 million experiencing homelessness. These figures are set to worsen without decisive action, as the scale and urgency of the housing challenge are amplified by:
- (h) *Demographic growth*. The world's population, currently at 8.2 billion, is projected to reach approximately 10.3 billion by the mid-2080s, mostly concentrating in Sub-Saharan Africa and South-East Asia.⁵
 - (i) *Rapid urbanization*. Two-thirds of global population growth between 2025 and 2050 is expected to occur in cities and towns, adding approximately 1.4 billion urban residents and placing mounting pressure on housing systems that are already strained.⁶
 - (j) *Rising levels of displacement*. Conflicts, environmental degradation, and intensifying climate hazards are forcing growing numbers of people from their homes. The number of internally displaced people has more than doubled over the past decade, reaching a record 83.4 million in 2024, with climate-related disasters accounting for the majority of new displacements.⁷
 - (k) *Housing destruction due to conflicts and natural disasters*. Conflicts and natural disasters destroy and damage millions of homes each year, erasing years of housing progress and generating acute reconstruction needs that compound the existing housing deficit.
10. These factors are deeply interrelated: demographic growth and displacement drive urbanization, and uncontrolled and unplanned urbanization increases exposure to climate hazards and generates avoidable emissions due to low-density expansion and dependence on motorised transport, which in turn create the conditions for further displacement and housing destruction. Urban areas bear a disproportionate share of this exposure: by 2040, more than 2,000 cities, with a total of 1.4 billion inhabitants, will be exposed to heightened risks from sea level rise and flooding, and over 2 billion urban residents could face additional temperature increases of at least 0.5°C.⁸
11. Overall, the global housing deficit has two distinct dimensions: a *quantitative* deficit (a shortage of housing units) and a *qualitative* deficit (the condition of people living in inadequate homes that already exist). While the latter typically receives less policy attention, it is equally, if not more, urgent. Addressing global housing needs therefore requires simultaneous responses on both fronts. On one hand, the construction of large amounts of new housing will be required, especially in the regions where population growth will be concentrated, with global residential floor area projected to increase

⁴ Habitat for Humanity International, *The Global Housing Continuum: A global tool for local action* (Atlanta, 2026)

⁵ *World Population Prospects 2024*, UN DESA/POP/2024/TR/NO. 9 (United Nations publication, 2024).

⁶ *World Urbanization Prospects 2025*, UN DESA/POP/2025/TR/NO. 12 (United Nations publication, 2025).

⁷ Internal Displacement Monitoring Centre (IDMC), *GRID 2025: Global Report on Internal Displacement* (Geneva 2025).

⁸ United Nations Human Settlements Programme (UN-Habitat), *World Cities Report 2024: Cities and Climate Action* (Nairobi, 2024).

by nearly 80 per cent between 2020 and 2050.⁹ On the other hand, large-scale upgrading and retrofitting of existing stock will be needed across all regions: in high-income countries where populations are stabilizing or declining and buildings are ageing, and in lower-income contexts where billions of people live in structurally unsafe, thermally inadequate, and climate-vulnerable homes – many of which were built incrementally and informally. If these housing needs are addressed through current models, they risk amplifying environmental degradation and deepening socio-economic inequalities, potentially raising the number of people living in informal settlements to nearly 3 billion by 2050. Yet the scale and pace of this challenge, if met with the right approaches, also present a historic opportunity to steer housing systems toward more sustainable, resilient, and inclusive development pathways.

3. The environmental challenges

12. The housing challenge does not unfold in isolation: it is deeply entangled with a worsening environmental crisis that both drives and is driven by inadequate housing systems. This environmental crisis is framed by the United Nations through the concept of the *triple planetary crisis*, which refers to three interconnected global challenges:

- (a) *Climate change*. Driven by excessive greenhouse gas emissions, the global surface temperature has already risen by 1.1°C above pre-industrial levels. Without decisive action, warming could reach 3.2°C by 2100.¹⁰ Climate change is causing sea level rise, desertification, and an increase in the frequency and intensity of extreme weather events.
- (b) *Pollution*. Air, water, and soil contamination is widespread across the globe. Currently, 99 per cent of the world's population lives in areas that exceed WHO air quality limits,¹¹ while dangerous and toxic substances continue to be released into water bodies and onto land.
- (c) *Biodiversity loss*. The global extent and condition of ecosystems have declined by about 47 per cent from their natural baselines, and around one million plant and animal species are currently threatened with extinction, out of an estimated total of eight million.¹²

13. The main driver of the triple planetary crisis is the unsustainable management of the Earth's resources. Global material extraction has surged from 30 billion tonnes per year in 1970 to over 105 billion tonnes in 2024, more than tripling within five decades. Most of these resources are either non-renewable or are extracted at a faster pace than their natural renewability rate. At the same time, human activities generate about 30 billion tonnes of solid and liquid waste each year, of which less than one third is recycled. Unsustainable resource consumption continues to grow, outpacing improvements in well-being and widening regional disparities, with high-income countries consuming six times more materials than low-income countries.¹³

14. The triple planetary crisis threatens not only natural ecosystems, but also human well-being. It affects food and water security, air quality, health, and livelihoods, as well as social, cultural, and spiritual life. It also fuels political unrest and conflicts, due to competition for scarce resources, livelihood insecurity, or displacement. Climate-related disasters, in particular, are causing widespread losses and damages: between 2000 and 2019, they affected 3.9 billion people and caused over 500,000 deaths.¹⁴ These impacts are expected to escalate further, if global temperatures continue to rise, pollutants accumulate in the environment, and biodiversity decline accelerates. By 2050, ecological disasters could displace almost one billion people worldwide.¹⁵

15. The complex, two-way relationship between housing systems and the natural environment, encompassing both negative impacts and positive contributions, is examined in *Sections B and C* below.

⁹ International Energy Agency (IEA), *Net Zero by 2050: A Roadmap for the Global Energy Sector* (Paris, 2021).

¹⁰ Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2023: Synthesis Report* (Geneva, 2023).

¹¹ Health Effects Institute (HEI), *State of Global Air 2024: Special Report* (Boston, 2024).

¹² Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), *The global assessment report on Biodiversity and Ecosystem Services* (Bonn, 2019).

¹³ United Nations Environment Programme (UNEP), *Global Resources Outlook 2024: Bend the Trend – Pathways to a liveable planet as resource use spikes* (Nairobi, 2024).

¹⁴ Centre for Research on the Epidemiology of Disasters (CRED) and United Nations Office for Disaster Risk Reduction (UNDRR), *Human cost of disasters: An overview of the last 20 years* (Geneva, 2020).

¹⁵ Institute for Economics & Peace (IEP), *Ecological Threat Register* (London, 2020).

B. The impacts of housing systems on the natural environment

16. Housing contributes significantly to the triple planetary crisis. Its impacts are distributed along the entire value chain, from material extraction to end of life, including housing-related planning practices. The built environment is one of the primary drivers of global resource demand, accounting for nearly 50 per cent of global material extraction.¹⁶ Urban expansion, currently advancing at approximately 1.5 per cent annually,¹⁷ leads to increased land consumption, soil sealing, ecosystem fragmentation, and the loss of natural habitats. The buildings and construction sector is responsible for 15 per cent of global freshwater use¹⁸ and 28 per cent of global energy demand,¹⁹ 70 per cent of which is consumed by residential buildings.²⁰ The sector also generates 21 per cent of global greenhouse gas emissions²¹ and 37 per cent of global CO₂ emissions.²² Housing-related activities further affect air and water quality: household air pollution (i.e. indoor air contamination caused primarily by the burning of solid fuels for cooking, heating, and lighting in poorly ventilated homes) contributes nearly 20 per cent of global ambient PM_{2.5} concentrations,²³ and around 40 per cent of domestic wastewater is discharged without safe treatment.²⁴ Additionally, construction and demolition activities produce approximately 2 billion tonnes of waste every year.²⁵ These impacts are particularly acute in urban areas, where density, infrastructure interdependence, and the concentration of housing, economic activity, and population amplify environmental pressures.

17. Yet, sustainable housing practices, grounded in local socio-economic, cultural, and ecological contexts, hold significant potential to benefit the environment and contribute to ecosystems regeneration. At present, an estimated 22 per cent of construction and demolition waste is recycled; however, this share could increase to as much as 91 per cent through the widespread adoption of circular construction principles.²⁶ Bioclimatic and passive house design, combined with energy-efficiency measures, can substantially reduce energy demand (including cooling-related demand) and associated greenhouse gas emissions. Housing can also serve as a decentralized source of clean and renewable energy: an estimated 25 million households worldwide already rely on solar photovoltaic systems.²⁷ Through on-site wastewater treatment, water reuse systems, and blue infrastructure such as planted swale and bioretention, housing can help reduce water pollution and decrease pressure on freshwater resources. The use of bio-based building materials, such as sustainably sourced timber and bamboo, can contribute to carbon storage, while nature-based solutions, including green roofs, green walls, and green and blue infrastructure, can ameliorate air quality, moderate urban temperatures, enhance carbon sequestration, and support biodiversity.

¹⁶ United Nations Environment Programme (UNEP), *Global Status Report for Buildings and Construction 2025–2026: Building Fast. Falling Short. As climate risks rise and cities grow, we must rethink how we build to create better lives for all* (Paris, 2026).

¹⁷ United Nations Human Settlements Programme (UN-Habitat), *Rescuing SDG 11 for a Resilient Urban Planet: SDG 11 Synthesis Report High Level Political Forum 2023* (Nairobi, 2023).

¹⁸ World Green Building Council (WorldGBC), *Building a water-resilient future for everyone, everywhere: Examining the role of the built environment in mitigating the global water crisis* (London, 2023).

¹⁹ UNEP, *Global Status Report for Buildings and Construction 2025–2026*.

²⁰ Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, United Kingdom, and New York City, Cambridge University Press, 2022).

²¹ United Nations Environment Programme (UNEP), *Global Status Report for Buildings and Construction: Beyond foundations – Mainstreaming sustainable solutions to cut emissions from the buildings sector* (Nairobi, 2024).

²² UNEP, *Global Status Report for Buildings and Construction 2025–2026*.

²³ HEI, *State of Global Air 2024*.

²⁴ *The Sustainable Development Goals Extended Report 2024* (United Nations publication, 2024).

²⁵ United Nations Environment Programme (UNEP), *Global Status Report for Buildings and Construction 2024/2025: Not just another brick in the wall - The solutions exist. Scaling them will build on progress and cut emissions fast* (Paris, 2025).

²⁶ R.K. Sakthibala and others, “A critical review on recycling and reuse of construction and demolition waste materials”, *Cleaner Waste Systems*, vol. 12 (December 2025). Available at <https://doi.org/10.1016/j.clwas.2025.100375>.

²⁷ International Energy Agency (IEA), *Technology and Innovation Pathways for Zero-carbon-ready Buildings by 2030: A strategic vision from the IEA Technology Collaboration Programmes* (Paris, 2022).

1. Spatial and urban planning

18. Housing demand is a major driver of land use change and is responsible for the conversion of farmland, forests, wetlands, and open spaces into built environments. Between 2000 and 2020, suburban and urban areas expanded from 3.4 to 4.1 per cent of the world's total land surface, and continued growth could lead to the loss of more than 110,000 km² of natural habitat by 2050.²⁸ Housing is the dominant component of this expansion: in 2024, it represented more than two thirds of the floor area increase of the global building stock.²⁹ Urban expansion increasingly extends beyond administrative boundaries, forming large metropolitan agglomerations that fragment ecosystems and intensify environmental pressures. A significant share of this growth is unplanned and lacks adequate infrastructure and services.

19. Uncontrolled urban expansion threatens biodiversity, degrades land and soils, and reduces vegetation cover, thereby weakening the Earth's capacity to regulate greenhouse gas concentrations. The spread of impervious surfaces (roads, rooftops, driveways) limits groundwater recharge and increases the vulnerability to climate-related hazard. It amplifies stormwater runoff, heightening flood risks and weakening ecosystem services such as climate regulation and water purification. It also exacerbates the urban heat island effect, raising temperatures in densely built-up areas. In hilly and mountainous areas, housing development on steep slopes and unstable terrain further increases exposure to landslides and other geophysical hazards. Furthermore, when housing development converts carbon-rich ecosystems such as peatlands, wetlands, and forests, it releases stored carbon and reduces long-term sequestration capacity.

20. Fragmented, isolated, and low-density housing developments increase land consumption alongside dependence on carbon-intensive mobility and patterns of social exclusion. In several high-income cities, urban sprawl reaches extreme levels, with residential built-up areas exceeding 450 m² per inhabitant.³⁰ The prevalence of vacant or underutilized housing constitutes an additional structural inefficiency. Across 324 cities worldwide, the median housing vacancy rate is approximately 8 per cent, with even higher rates in some developing contexts.³¹ Such vacancy represents wasted materials and land consumption, while simultaneously increasing pressure for new construction that carries further environmental and economic costs.

21. On the other hand, sustainable land use and planning practices can deliver substantial environmental benefits. Integrated territorial planning that promotes polycentric urban development can reduce both environmental and housing pressures. Compact, mixed-use, transit-oriented urban settlements, with adequate density levels, appropriate housing typologies, and well-connected neighbourhoods, can maximize resource efficiency, protect peri-urban ecosystems, foster social cohesion, and significantly reduce the environmental and financial costs of transport, services, and infrastructure provision. Prioritizing brownfield and greyfield regeneration over greenfield development contributes to limiting land consumption and revitalizing existing urban areas. Green and blue infrastructure enhances biodiversity, strengthens climate resilience, and improves microclimates. Overall, it is estimated that improved spatial and urban planning could reduce global greenhouse gas emissions by up to 25 per cent.³²

2. Materials extraction and production

22. The extraction and production of building materials carry wide-ranging environmental implications across the housing value chain. Material production is frequently energy- and carbon-intensive: steel is responsible for roughly 8 per cent of global greenhouse gas emissions; cement

²⁸ Qiang Ren and others, "Impacts of global urban expansion on natural habitats undermine the 2050 vision for biodiversity", *Resources, Conservation and Recycling*, vol. 190 (March 2023). Available at <https://doi.org/10.1016/j.resconrec.2022.106834>.

²⁹ UNEP, *Global Status Report for Buildings and Construction 2025–2026*.

³⁰ Organisation for Economic Co-operation and Development (OECD), *OECD Regions and Cities at a Glance 2022* (Paris, 2022).

³¹ Yang Wang, Yunyun Li and Xiaoli Yue, "Differences in Housing Vacancy Rates across Major Cities Worldwide", *Journal of Civil Engineering and Urban Planning*, vol. 7, no. 3 (2025). Available at <https://doi.org/10.23977/jceup.2025.070304>.

³² IPCC, *Climate Change 2022: Mitigation of Climate Change*.

accounts for 6 per cent;³³ and fired clay bricks for 1 per cent.³⁴ Transporting materials through global supply chains further increases energy consumption and emissions, making locally sourced materials generally more environmentally sustainable than imported alternatives. Overall, embodied carbon emissions – related to materials and construction processes – represent about 25 per cent of total emissions from the buildings and construction sector.³⁵ Beyond greenhouse gases, materials extraction and production generate additional impacts. Water use in material manufacturing contributes to growing water scarcity. Extraction and processing often contaminate water sources, degrade air quality, alter landscapes, and lead to land degradation and biodiversity loss. Hazardous wastes associated with industrial production can harm human and ecological health.

23. Bio-based construction materials offer substantial environmental benefits. Derived from renewable resources, they can not only reduce emissions but even act as carbon sinks. Research shows that replacing conventional construction materials with mass timber could reduce global carbon emissions by 14–31 per cent, provided that responsible forestry practices are implemented.³⁶ Bamboo has even higher carbon sequestration potential and can be highly sustainable, when processed with bio-based substances instead of chemical treatments. Other promising bio-based materials include straw, cork, hempcrete, mycelium, and agricultural residues.

24. Sustainability in construction materials can be advanced through low- and high-technology, as well as hybrid approaches. Low-technology construction – adopting techniques such as rammed earth, compressed stabilized earth blocks, adobe bricks, and bamboo structures – relies on locally available resources, reduces energy use, and minimizes waste. At the same time, it generates easily accessible employment and strengthens culturally rooted practices. High-technology innovations can improve conventional materials (for instance, through carbon-cured concrete or recycled steel) or create entirely new substances, such as biomimetic materials and nanocomposites, which offer enhanced efficiency and considerable environmental benefits. Hybrid approaches that combine traditional knowledge with modern engineering techniques can deliver environmental and cultural benefits as well as structural performance and durability.

3. Housing construction

25. The construction phase of housing also generates significant environmental impacts. The transportation of materials to building sites contributes to energy use and emissions. Excavation works disturb soils, alter natural drainage patterns, and produce substantial amounts of waste. Construction activities can also contaminate soil and water; additional pressures include noise pollution, dust and particulate emissions, and the generation of waste from offcuts and packaging materials. Yet, sustainable construction practices can considerably reduce these impacts. Prefabrication, modular construction, and 3D printing minimize onsite disturbance and improve material efficiency. In low-income contexts, labour-intensive approaches and community-based construction methods reduce energy use and support local livelihoods.

4. Housing use

26. The use phase of housing is the longest in the building life cycle and generates the largest share of environmental impacts.

27. Energy demand in homes – arising from heating, ventilation, and air-conditioning (HVAC), as well as from cooking, lighting, and appliances – is still predominantly met by fossil fuels. As a result, the operational emissions generated by housing account for 44 per cent of total carbon emissions from the buildings and construction sector.³⁷ Between 1990 and 2019, electricity demand in buildings increased by 161 per cent,³⁸ driven by rising living standards, the construction of larger homes, higher expectations of thermal comfort, and the growing electrification of heating through heat pumps. However, a significant share of this electricity is wasted due to inefficient appliances, outdated HVAC

³³ World Economic Forum (WEF), *High-Emitting Sectors: Challenges and Opportunities for Low-Carbon Suppliers* (Geneva, 2024).

³⁴ Josephine A. Olsson and others, “Greenhouse Gas Emissions and Decarbonization Potential of Global Fired Clay Brick Production”, *Environmental Science & Technology*, vol. 4, no. 59 (February 2025). Available at <https://doi.org/10.1021/acs.est.4c08994>.

³⁵ United Nations Environment Programme (UNEP), *Building Materials and the Climate: Constructing a New Future* (Nairobi, 2023).

³⁶ Ibid.

³⁷ Ibid.

³⁸ IPCC, *Climate Change 2022: Mitigation of Climate Change*.

systems, and poorly insulated building envelopes. Electricity demand in buildings is expected to further rise as a consequence of climate change: as temperatures rise, the global stock of cooling appliances, currently at 4 billion units, may reach 14 billion by 2050.³⁹ This trend positions cooling as a central driver of future energy demand in housing, particularly in rapidly urbanizing and warming regions. As long as much of the electricity that powers housing continues to be generated from fossil fuels, rising demand will lead to substantial increases in greenhouse gas emissions.

28. Water consumption also has significant environmental implications. Between 1960 and 2014, domestic water demand increased by more than 600 per cent.⁴⁰ Ageing plumbing and sewage systems, together with inefficient fixtures, contribute to high consumption levels. As cities expand, over-extraction of aquifers and rivers intensifies, degrading ecosystems and reducing water availability.

29. In many low-income settings and informal settlements, households rely on solid fuels – such as coal, wood, charcoal, dung, and agricultural residues – for cooking, heating, and other domestic tasks. This practice emits harmful pollutants, including PM_{2.5}. It is estimated that 47 per cent of the world’s population is exposed to household air pollution, with this share exceeding 95 per cent in some least developed countries.⁴¹

30. Despite these challenges, the use phase also offers some of the most effective opportunities for maximizing the environmental benefits of housing. Bioclimatic design, which optimizes natural ventilation, daylighting, shading, and thermal mass, can significantly cut energy demand while maintaining thermal comfort. Energy efficiency measures, including well-insulated building envelopes, efficient appliances and HVAC systems, and digital tools such as building energy management systems (BEMS), further decrease consumption. A home that combines bioclimatic strategies with energy-efficient technologies can reduce its energy demand by up to 90 per cent, compared with a conventional building.⁴² Renewable energy systems, such as photovoltaic panels or solar-thermal technologies, can even transform housing into a net producer of clean energy.

31. Similarly, water-saving fixtures, greywater reuse systems, and rainwater harvesting can substantially reduce freshwater consumption and wastewater discharge. Vegetation incorporated into terraces, roofs, and gardens provides passive cooling, improves air quality, and enhances urban biodiversity. Regular maintenance extends the lifespan of housing and reduces the need for new construction, thereby avoiding associated material, energy, and carbon costs.

5. Housing end-of-life

32. At the end of their service life, housing units are frequently demolished rather than renovated or repurposed. The drivers vary by context: inadequate maintenance, poor construction quality, development pressure, speculation, and changing market demands all contribute, in different combinations, to demolition rates that are higher than necessary. In many cases, buildings are demolished while still structurally sound, representing a substantial loss of embodied materials, energy, and capital. A similar loss takes place when informal settlements are cleared, or residents are evicted without adequate consideration of in-situ upgrading or material recovery. Finally, housing built with low-quality materials and fragile structures is easily destroyed by extreme weather events.

33. Demolition has significant environmental impacts. It requires heavy machinery, prolonged on-site operations, and the transport of large volumes of waste materials – processes that consume fuel, generate dust and noise pollution, and contribute to greenhouse gas emissions. Construction and demolition waste is one of the largest waste streams globally, yet only a small fraction is reused or recycled. Most of it is deposited in landfills or illegal dumpsites, contributing to land degradation, soil and water contamination, and air pollution.

34. The need for demolition can be reduced right from the design phase, by adopting circular construction practices. Durable materials, structural resilience, high-quality construction, and flexible layouts can significantly extend the lifespan of buildings. Design approaches such as reversible construction and dry assembly enable buildings to be taken apart selectively without damaging their components, allowing structures to be repurposed or refurbished more easily at the end of their life

³⁹ Ibid.

⁴⁰ Betsy Otto and Leah Schleifer, “Domestic Water Use Grew 600% Over the Past 50 Years”, World Resources Institute, 10 February 2020. Available at www.wri.org/insights/domestic-water-use-grew-600-over-past-50-years.

⁴¹ HEI, *State of Global Air 2024*.

⁴² Sophia Welch, Esther Obonyo and Ali M. Memari, “A review of the previous and current challenges of passive house retrofits”, *Building and Environment*, vol. 245 (November 2023). Available at <https://doi.org/10.1016/j.buildenv.2023.110938>.

cycle. Where demolition is unavoidable, these strategies facilitate the reuse or recycling of materials and components. The effectiveness of these strategies depends on complementary solid waste management systems capable of handling, sorting, and processing construction and demolition waste at scale.

C. The impacts of the natural environment on housing systems

35. The impacts of the triple planetary crisis directly undermine the enjoyment of the human right to adequate housing. Climate-related hazards, in particular, threaten the safety and tenure security of millions of households worldwide. An estimated 3.3 to 3.6 billion people currently live in areas highly vulnerable to climate-related hazards, the majority of whom lack the capacity to adapt or recover effectively.⁴³ Approximately 10 per cent of the world's built-up surface lies in areas exposed to flood hazards, 24 per cent to tropical cyclone winds, and 3 per cent to storm surges.⁴⁴ Additional risks stem from landslides, wildfires, and slow onset events such as desertification and sea level rise. In urban settings, these risks are compounded by the interconnection of systems such as drainage, energy, and transport, where a single hazard event can trigger cascading failures across multiple services simultaneously. Informal settlements are at the epicentre of this exposure, as they concentrate the populations least able to absorb climate shocks in the areas most likely to experience them.

36. Climate-related disasters inflict severe physical damage on housing, including structural damage, destruction of roofs and building envelopes, material degradation, and contamination of interiors. When damage is repeated, repair and rebuilding costs frequently exceed original construction costs. Beyond the dwellings themselves, disasters disrupt the roads, utilities, water systems, and social infrastructure that make housing functional, often for extended periods. In some cases, climate-related disasters force people to leave their dwellings entirely, often seeking refuge in makeshift shelters or overcrowded public buildings that expose them to further risks. Between 2015 and 2024, weather-related disasters triggered 248 million internal displacements – far more than those caused by conflicts.⁴⁵ Forced displacement often results in severe social damage: it disrupts community networks, cultural ties, and local support systems; interrupts children's education with long-term consequences for human development; and erodes the social cohesion that underpins community resilience.

37. Slow onset events constitute an additional and escalating challenge. Rising sea levels represent a particularly acute threat for approximately 900 million people living in low-lying coastal areas,⁴⁶ with small island developing States facing the most critical threats to their housing and territorial integrity. Desertification and land degradation, affecting over 3.2 billion people,⁴⁷ are already driving migration from rural areas due to loss of livelihoods and freshwater, further compounding housing pressures in receiving areas.

38. Environmental degradation contributes further to unsafe and unhealthy living conditions. Extreme heat, whose frequency and intensity are increasing due to climate change, poses a severe and growing threat that affects approximately 4 billion people⁴⁸ and causes an estimated 153,000 deaths per year.⁴⁹ In poorly designed or inadequately insulated dwellings, such as those in informal settlements, indoor heat often surpasses outdoor temperatures, further compounding health risks. Household air pollution causes another 3.2 million deaths each year.⁵⁰ Hazardous materials within homes, including asbestos, lead-based paints, volatile organic compounds (VOCs), and formaldehyde,

⁴³ Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, United Kingdom, and New York City, Cambridge University Press, 2022).

⁴⁴ European Union (EU), *Atlas of the Human Planet 2017. Global Exposure to Natural Hazards* (Luxembourg, 2017).

⁴⁵ IDMC, *GRID 2025*.

⁴⁶ IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability*.

⁴⁷ United Nations Convention to Combat Desertification (UNCCD), *Investing in land's future: Financial needs assessment for UNCCD* (Bonn, 2024).

⁴⁸ Camille Giguere and others, *Climate Change and the Escalation of Global Extreme Heat: Assessing and Addressing the Risks* (Climate Central, Red Cross Red Crescent Climate Centre, World Weather Attribution, 2025).

⁴⁹ Qi Zhao and others, "Global, regional, and national burden of heatwave-related mortality from 1990 to 2019: A three-stage modelling study", *PLOS Medicine*, vol. 21, no. 5 (May 2024). Available at <https://doi.org/10.1371/journal.pmed.1004364>.

⁵⁰ World Health Organization (WHO), *Household air pollution and related health impacts: Technical brief* (Geneva, 2025).

also pose serious health concerns. Water pollution undermines access to safe drinking water and domestic hygiene, and increases the incidence of waterborne diseases.

39. A range of adaptation and resilience measures can mitigate these impacts. Flood-resistant construction, elevated or cyclone-proof structures, slope stabilisation, and drainage systems reduce hazard exposure. Durable and climate-resistant materials, nature-based solutions, and redundant systems for energy and water provision further strengthen resilience. Secure land tenure is a foundational enabler that allows households to invest in protective improvements, while geospatial tools and community-based data collection support the identification of at-risk housing and the targeting of interventions. At the urban and territorial scales, integrating climate risk into land use planning and zoning regulations can prevent new housing development in hazard-prone areas, while strategic investment in green and blue infrastructure enhances citywide flood management and heat mitigation. Together, these approaches lower the likelihood of injuries, fatalities, and economic losses, provide long-term financial benefits, and enhance psychosocial well-being by increasing residents' sense of security and control. Furthermore, passive cooling strategies reduce indoor temperatures during extreme heat, while clean cooking technologies and improved ventilation reduce exposure to indoor air pollution. Phasing out hazardous materials in favour of non-toxic alternatives improves the safety and habitability of homes.

40. When the natural environment is healthy and balanced, it can actively enhance the enjoyment of the human right to adequate housing. The surroundings of a home benefit the health and well-being of its occupants not only through the absence of pollution but also through the presence of vegetation and biodiversity. Research shows that living in environments rich in plant and animal life improves physical and mental health.^{51, 52} Green spaces in urban areas also function as essential public spaces, fostering social interaction and community cohesion. Additionally, natural resources can directly support household resilience: rainwater harvesting improves water security, while solar energy generation enhances energy security and reduces energy poverty. More broadly, re-establishing the connections between the built and natural environments reinforces residents' sense of place, cultural identity, spiritual well-being, and community ties.

D. Regional insights

41. Regional patterns of housing sustainability differ widely across the world, reflecting variations in climate, income levels, urbanization dynamics, and industrial capacity. In high-growth, low-income regions, where housing demand is expanding rapidly and informality is widespread, the priorities are ensuring that new construction meets sustainable and resilient standards from the outset, upgrading existing informal settlements, and activating vacant buildings. In slower-growth, higher-income regions, the priority shifts toward large-scale retrofitting of existing stock and more efficient use of land and urban assets – though new construction must also meet high sustainability standards. Across all regions, both climate change mitigation and adaptation are necessary and mutually reinforcing. However, their relative emphasis differs: low-income regions, despite contributing least to global greenhouse gas emissions, face the most severe climate hazards and have the least capacity to recover from their impacts, making adaptation a particular priority. Higher-income regions, as the largest historical contributors to emissions, bear a greater responsibility for mitigation, while also needing to strengthen resilience as climate risks escalate.

42. In *Latin America and the Caribbean*, residential energy demand is rising, although the region benefits from a relatively low-carbon electricity mix. Urban sprawl drives inefficient land use, and a large share of the housing stock is highly vulnerable to climate hazards, especially in informal settlements. Energy efficiency measures, bioclimatic design, and sustainable materials are growing but not yet mainstream; circular construction remains modest. The building sector in this region generates approximately 400 MtCO₂-eq per year (3.4 per cent of global building-related emissions; 0.3 tCO₂-eq per capita).⁵³

43. In *North America*, housing sustainability benefits from strong technical capacity but faces structural challenges: high per capita energy use driven by large, heating- and cooling-intensive homes, extensive suburban sprawl, and energy injustice. Climate resilience is relatively high but

⁵¹ Peter James and others, "A Review of the Health Benefits of Greenness", *Current Epidemiology Reports*, vol. 2, no. 2 (April 2015). Available at <https://doi.org/10.1007/s40471-015-0043-7>.

⁵² Joel Methorst and others, "The importance of species diversity for human well-being in Europe", *Ecological Economics*, vol. 181 (March 2021). Available at <https://doi.org/10.1016/j.ecolecon.2020.106917>.

⁵³ Data on greenhouse gas emissions generated by the building sector for this region and the following ones is derived from: IPCC, *Climate Change 2022: Mitigation of Climate Change*.

unevenly distributed, with low-income and minority communities facing heightened exposure to climate risks and pollution. Energy efficiency retrofits, sustainable materials, and circular construction practices are expanding. The building sector in this region accounts for approximately 2000 MtCO₂-eq per year (17.2 per cent of global building-related emissions; 1.0 tCO₂-eq per capita).

44. *Africa* faces rapid urbanization, limited infrastructure, and widespread incremental construction, often informal. Per capita energy use is low but increasing, driven by rising incomes and cooling demand. Household air pollution is widespread. Much of the housing stock is highly vulnerable to climate hazards, particularly in informal settlements. Bioclimatic design and sustainable materials are emerging but remain small in scale; circular construction is mostly informal. The building sector in this region contributes approximately 500 MtCO₂-eq per year (4.3 per cent of global building-related emissions; 0.2 tCO₂-eq per capita).

45. *Western Europe* is gradually decarbonizing a mature, carbon-intensive housing stock through stricter performance standards and large-scale renovation efforts. Climate resilience is relatively high. The use of sustainable materials is expanding; circular construction is relatively advanced, but is complicated by an ageing building stock that was not designed for disassembly.

46. In *Eastern Europe and Central Asia*, ageing and poorly insulated buildings drive high heating energy intensity. Renovation rates remain insufficient, and resilience is weakened by deteriorating infrastructure and governance challenges linked to the 1990s mass privatisation of housing. In many multi-apartment buildings, unclear responsibilities for common areas have hampered maintenance, collective decision-making and investments in renovations. The use of sustainable materials and circular construction practices is limited. Further, Roma settlements are particularly exposed to climate risks, facing poor-quality housing, inadequate infrastructure, insecure tenure and limited access to public support. This pattern is also visible in some Western European countries.

47. Together, the building sectors in Western Europe, Eastern Europe, and Central Asia are responsible for approximately 2400 MtCO₂-eq per year (20.7 per cent of global building-related emissions; 1.4 tCO₂-eq per capita).

48. In the *Middle East*, housing sustainability is constrained by extreme heat and high cooling energy intensity. Low-density expansion increases land consumption, while housing resilience remains uneven, particularly for low-income, informal, and conflict-affected communities. Efforts to improve energy efficiency and expand renewable energy are under way, while sustainable materials and circular construction practices remain limited. The building sector in this region generates approximately 800 MtCO₂-eq per year (6.9 per cent of global building-related emissions; 1.5 tCO₂-eq per capita).

49. *Southern and South-East Asia* face rapid population growth, extensive informality, and rising energy demand, especially for cooling, though per capita energy use remains low. Household air pollution is widespread. Housing resilience is critically low, particularly in informal settlements, in a region that faces some of the world's most severe climate impacts. Sustainable materials are emerging but not yet mainstream; circular construction remains modest. The building sector in these regions accounts for approximately 1800 MtCO₂-eq per year (15.5 per cent of global building-related emissions; 0.3 tCO₂-eq per capita).

50. In *Eastern Asia*, rapid urbanization and massive construction volumes have produced one of the world's largest and most energy- and carbon-intensive building stocks, which is now ageing and facing intensifying heat and flood risks. Despite efforts to improve energy efficiency and resilience, electricity demand continues to rise, and urban expansion into floodplains and coastal zones further increases exposure to climate risks. Sustainable materials are expanding, while circular construction progresses unevenly. The building sector in this region (excluding Japan) generates approximately 2900 MtCO₂-eq per year (25 per cent of global building-related emissions; 1.1 tCO₂-eq per capita).

51. *Australia and New Zealand* face sprawling urban development, high per capita energy use, and escalating climate risks. Cooling needs are increasing with more frequent heatwaves. Resilience is increasingly strained by extreme weather events. Rooftop solar panels are widespread, while energy efficiency retrofits are expanding slowly. Sustainable materials and circular construction are growing. The building sector in these countries (combined with that of Japan) accounts for approximately 800 MtCO₂-eq per year (6.9 per cent of global building-related emissions; 1.5 tCO₂-eq per capita).

52. *Small island developing States (SIDS)* face acute challenges due to scarce land, geographic isolation, and extreme climate exposure. Cyclones, storm surges, and flooding frequently damage housing stocks, while financial and technical capacity for resilience remains limited. Dependence on imported fossil fuels results in low energy security, while dependence on imported building materials increases construction costs and carbon footprints. The depletion of local materials due to excessive

resource extraction and deforestation reduces the available alternatives. Renewable energy and bioclimatic approaches are expanding, while circular construction remains limited.

53. Across regional contexts, *least developed countries (LDCs)* represent a particularly acute challenge, as they combine housing pressures driven by rapid urbanization, extensive informality, and rising climate exposure with the most severe constraints in institutional capacity, domestic finance, and technical expertise, and the least capacity to absorb and recover from climate-related housing losses.

E. Key challenges

54. The transition to environmentally sustainable and resilient housing faces a range of interconnected challenges that operate at multiple scales, from individual behaviour and building-level governance to national policy frameworks and global finance. These challenges are not evenly distributed: they fall most heavily on low-income households, marginalized communities, informal settlement residents, and countries with the least institutional and financial capacity to respond. Addressing them requires recognizing that environmental sustainability and the right to adequate housing are not competing objectives, but mutually reinforcing ones, and that policies which neglect either dimension risk undermining both.

55. A further structural limitation is that the dominant frameworks, tools, and solutions for sustainable housing – building codes, certification systems, green finance instruments, and performance standards – have been designed primarily for formal housing markets and complete-unit delivery models, leaving large parts of the housing continuum, and in particular its informal and incremental segments, effectively outside their reach.

56. The challenges discussed in this section cover eight interrelated dimensions: the disproportionate impacts of climate change on marginalized groups and persons; the vulnerability of incremental housing and informal settlements; the sustainability-affordability gap; financial barriers; policy and governance failures; awareness, knowledge, and capacity constraints; systemic disincentives to retrofitting; the environmental sustainability challenges of post-disaster and post-conflict reconstruction; and the risks that poorly designed environmental policies can pose to the right to adequate housing. This list is not exhaustive: it reflects the most significant and cross-cutting barriers identified in the current evidence base, while acknowledging that context-specific challenges may require additional, tailored analysis.

1. Disproportionate impacts of climate change on marginalized groups and persons

57. Climate change disproportionately affects low-income households and marginalized communities, compounding existing inequalities in access to adequate housing. Poor households are more likely to live in at-risk areas that lack adequate protective infrastructure such as dykes, drainage systems, or slope stabilization measures. They are also nearly twice as likely as the average person to reside in fragile or substandard dwellings.⁵⁴ When disasters damage or destroy these homes, families lose not only shelter, but also most of their assets, deepening pre-existing inequalities and pushing them further into poverty. In some contexts, disasters have also been shown to trigger evictions and cause long-term disruption for low-income tenants.⁵⁵ Substandard dwellings also concentrate exposure to extreme heat, disproportionately affecting homebound persons, including women in caregiving roles, infants, older persons, and persons with disabilities.

58. Other factors that may increase exposure to climate-related housing risks include gender, age, disability, migration status, religion, and racial or ethnic background. Women and girls often experience insecure tenure and are at heightened risk of violence and harassment during displacement and in emergency shelters. Older persons and persons with disabilities have limited capacity to evacuate and face additional obstacles in reaching safe spaces. Migrants, refugees, internally displaced persons, and racial or ethnic minorities are frequently confined to climate-vulnerable areas with inadequate housing and infrastructure. Indigenous Peoples and rural communities often depend on ecosystems heavily exposed to climate risks and, in some cases, face threats of displacement linked to environmental conservation programmes. These groups are too often excluded from adaptation strategies and are less likely to benefit from relief or reconstruction efforts.

2. Vulnerability of incremental housing and informal settlements

59. Incremental, self-built housing is the predominant mode of residential development in many cities across the world, and informal settlements account for a substantial share of the urban population in rapidly urbanizing countries. Far from being a marginal phenomenon, this form of housing production is how most low-income urban residents obtain shelter. Yet it is also where climate vulnerability is most concentrated: informal settlements are disproportionately located in hazard-prone areas, built with materials and techniques that offer limited structural resistance, and surrounded by inadequate or absent protective infrastructure. The countries with the highest concentration of informal settlements are, at the same time, among those most severely affected by climate change, compounding socio-ecological pressures on communities that have contributed least to the triple planetary crisis. Despite being on the frontline of climate vulnerability, these communities remain largely invisible to the finance systems designed to address these risks.

60. An analysis of 22 major climate funds shows that, between 2003 and 2023, only 3.5 per cent of global climate finance, across just 2.1 per cent of projects, supported informal settlements or the urban poor.⁵⁶ This represents an alarming imbalance, given that more than one billion people live in informal settlements and face acute risks from floods, heatwaves, landslides, and disease. Investments in upgrading, basic services, and climate-resilient infrastructure in these areas are essential, as they deliver significant co-benefits by improving housing quality, public health, and livelihoods.

61. This funding gap reflects a deeper pattern of systemic exclusion that extends well beyond climate finance. Informal settlements are frequently deemed ineligible for funding due to insecure tenure, unclear administrative authority, or insufficient data, and community-led plans are often overlooked when they fall outside formal planning frameworks. Further, where residents face the threat of eviction, they are reluctant to invest in durable, safer, or more climate-resilient materials. Instead, households may prioritize materials that are cheaper, lighter, easier to transport, easier to assemble incrementally, or less costly to lose in the event of demolition or displacement. As a result, chronic underinvestment deepens vulnerability and undermines climate justice, human rights, and global commitments such as the SDGs and the *New Urban Agenda*.

3. Sustainability-affordability gap

62. Environmental sustainability and housing affordability are too often treated as competing objectives. The criteria by which affordable housing programmes are usually designed and evaluated – minimizing upfront cost and maximizing delivery speed – are systematically misaligned with the long-term, whole life cycle perspectives that environmental sustainability and resilience require. This tension is particularly acute in rapidly urbanizing low- and middle-income countries, where the scale and urgency of the quantitative housing deficit generate strong political and institutional pressure to deliver units as quickly and cheaply as possible. Affordable housing projects are often relegated to peripheral areas, which fuels urban sprawl, increases dependence on motorized transport, and consequently drives greenhouse gas emissions. High-density affordable housing developments suffer from intensified urban heat island effects due to a lack of sufficient green spaces. Construction relies on conventional, carbon-intensive materials and techniques. The result is a self-reinforcing dynamic: housing delivered under affordability constraints embeds environmental vulnerabilities that raise long-term costs – through higher energy expenditure, greater exposure to climate hazards, and accelerated physical deterioration – which in turn deepen the financial pressures on low-income residents that affordability programmes were designed to address. This dynamic is not an inherent feature of affordable housing, but a consequence of policy frameworks that treat upfront cost as the primary measure of affordability, while externalizing the long-term environmental and financial costs onto residents and communities.

4. Financial barriers

63. Financial barriers are among the most significant factors limiting the uptake of environmentally sustainable and resilient housing, and many of them are rooted in a deeper structural dynamic that excludes most households from access to suitable and flexible financing options. In many contexts, housing has increasingly been treated as a financial asset, with greater emphasis on this role than on its function as social infrastructure, a social good, and an essential human right. Speculative investment practices, the unchecked entry of institutional financial actors into housing markets, and the decoupling of housing systems from their public purpose have generated powerful incentives that

⁵⁶ Cities Alliance, *Climate Finance for the Urban Poor: A Review of Global Climate Funds* (Brussels, 2024).

work against environmental sustainability and resilience, favouring speed and low upfront costs over quality, long-term affordability, and life cycle performance.

64. Within this broader context, environmentally sustainable construction, upgrading, and retrofitting face additional financial obstacles that compound these structural disincentives. Access to affordable finance is limited, especially in developing countries, while public subsidies, credit guarantees, and concessional financing remain insufficient to close the gap. For many households, developers, and small-scale landlords, liquidity constraints and limited access to credit prevent investments in sustainable and resilient upgrades, even when these would reduce operating costs over time. In rental markets, the landlord-tenant dilemma – where landlords bear the costs while tenants benefit from lower utility bills – further discourages investment in sustainable renovation. In multi-apartment buildings, financing instruments, even when available, are difficult to deploy in the absence of capable intermediary entities able to administer loans and coordinate works on behalf of multiple households. Financial institutions themselves often lack the tools and capacity to assess the value of sustainable housing or to design financial products that reflect life cycle savings.

65. Disaster risk finance and insurance also pose major challenges. Insurance coverage for disaster losses remains highly uneven: in 2020, less than half of global disaster losses were insured, with coverage in most developing and emerging economies below 10 per cent.⁵⁷ Climate change is accelerating an insurability crisis, with rising premiums and, in some cases, insurers withdrawing coverage entirely from high-risk areas. Government support for post-disaster recovery is frequently inadequate to fill this gap. More broadly, properties in climate-exposed areas face declining market values as perceived risks and ongoing costs rise, generating cascading fiscal and financial effects: reduced property tax revenues weaken local governments' capacity to fund services and infrastructure, while homeowners facing uninsured losses or falling property values are at greater risk of mortgage default, with potential knock-on consequences for financial institutions and local housing markets.

5. Policy and governance challenges

66. Policy and governance challenges further constrain the uptake of environmentally sustainable and resilient housing. Fragmented institutional landscapes – characterized by outdated regulations, weak enforcement mechanisms, and frequent policy discontinuity – hinder the development of long-term strategies and discourage private sector engagement. Poor intersectoral coordination hampers integrated decision-making across housing, planning, energy, environment, finance, and social affairs, making it difficult to align policies and budgets. At the local level, administrations often lack the institutional and technical capacity to plan, monitor, and enforce sustainable housing initiatives. In multi-unit residential buildings, the governance structures needed to manage effective maintenance and administer retrofit programmes – including capable intermediary entities able to coordinate residents and manage financing on behalf of multiple households – are frequently underdeveloped or entirely absent. Where housing stock is dominated by individually owned single-family homes, investment decisions are fragmented, there is no body to aggregate demand or coordinate works, and professional knowledge and financial capacity at the household level are often limited. Informal settlements face additional challenges as they are placed outside the reach of regulatory frameworks, with unclear administrative jurisdiction, insecure tenure, and the absence of formal planning mechanisms.

67. A deeper governance challenge concerns the assumptions embedded in prevailing housing policy frameworks. In many contexts experiencing demographic stabilization or population decline, housing strategies continue to treat large-scale new construction as the primary response to housing need, despite growing evidence that this approach is difficult to reconcile with global climate mitigation targets.⁵⁸ Governance systems have been slow to respond to this evidence, in part because housing policy is deeply embedded in broader economic frameworks that link welfare, employment, and financial stability to rising construction rates and property values. The result is that retrofitting, upgrading, and the mobilization of vacant and underutilized buildings remain marginal in policy and investment frameworks, even where demographic and environmental conditions would make them the more rational priority. This governance gap, however, is also relevant in rapidly urbanizing economies, where high vacancy rates frequently coexist with acute housing shortages, pointing to a systemic failure to leverage existing stock as a resource for meeting housing need sustainably.

⁵⁷ United Nations Office for Disaster Risk Reduction (UNDRR), *Global Assessment Report on Disaster Risk Reduction – Our World at Risk: Transforming Governance for a Resilient Future* (Geneva, 2022).

⁵⁸ Sophus O.S.E. zu Ermgassen and others, “A home for all within planetary boundaries: Pathways for meeting England's housing needs without transgressing national climate and biodiversity goals”, *Ecological Economics*, vol. 201 (November 2022). Available at <https://doi.org/10.1016/j.ecolecon.2022.107562>.

6. Awareness, knowledge, and capacity constraints

68. Limited awareness among households and significant knowledge and capacity gaps across the housing ecosystem continue to hinder the uptake of environmentally sustainable and resilient housing. Public understanding of sustainable construction is increasing, but remains superficial: in a global survey, only 38 per cent of respondents reported having some knowledge of the topic, and this was mostly focused on energy efficiency and ecological materials, with far less attention to health, well-being, and social dimensions.⁵⁹ In other words, residents tend to recognize the benefits of sustainable housing for the environment more readily than the benefits for themselves. This gap is reinforced by limited awareness of life cycle cost advantages, as well as behavioural biases favouring short-term savings over long-term economic gains. A similar dynamic affects investment in resilient construction: households and developers systematically underestimate disaster and climate risks, leading to chronic underinvestment in protective measures even where the long-term financial and safety case is compelling. Furthermore, in many contexts, cultural preferences associate high-carbon materials such as concrete and steel with status and upward social mobility, while viewing bio-based, earth-based, and traditional low-carbon alternatives as signs of poverty. The same pressures influence housing typologies, with single detached houses often favoured over more sustainable multi-unit configurations. Public perceptions of sustainable housing are further distorted by a general scepticism towards new technologies and pervasive “greenwashing”.

69. On the supply side, technical knowledge on sustainable and resilient materials and construction methods remains uneven. Research and data collection continue to focus predominantly on energy efficiency and operational carbon emissions. This narrow emphasis limits the development of tools capable of providing a holistic analysis of sustainable housing that accounts for the full range of environmental impacts, as well as social, cultural, and economic co-benefits. It also overshadows the practical conditions that determine whether sustainable materials can actually be procured and used, particularly in informal and incremental housing contexts. Value-chain analysis of informal settlements show that residents’ material choices are shaped by cost, availability, transportability, proximity, regulatory barriers, tenure insecurity and the ability to buy materials incrementally or collectively.

70. Monitoring and evaluation systems are also weak: there is limited tracking of the performance of sustainable housing, insufficient data on long-term durability and maintenance needs, and little understanding of how financial incentives and policy frameworks shape the availability and distribution of sustainable materials and technologies. Moreover, the global discussion on sustainable construction is largely shaped by the experiences of high-income countries with temperate climates, resulting in an emphasis on over-engineered and costly solutions that often overshadow more affordable, community-based approaches. This imbalance contributes to the proliferation of certifications, performance benchmarks, and sustainability targets that are not suitable or realistic for many developing contexts, including incremental housing, informal settlements, and crisis-affected communities.

71. Capacity constraints further impede progress. In many countries, the infrastructure needed for producing sustainable materials, deploying renewable energy systems, or supporting material reuse and recycling is inadequate or entirely absent. Gaps in logistics, certification, and quality control systems limit the reliability and scalability of sustainable construction supply chains. Shortages of skilled labour, particularly in low-income and rural areas, also affect the quality, safety, and consistent application of sustainable construction practices.

7. Systemic disincentives to retrofitting existing buildings

72. Retrofitting existing housing remains the exception rather than the norm, even when it is the more sustainable option. Retrofits do involve upfront costs that can be significant, particularly in low- and middle-income settings, and technical complexity is a genuine constraint in some contexts. However, these challenges are frequently overstated, and the main barriers stem from policy, regulatory, and awareness issues. In many countries, subsidies and regulatory frameworks make redevelopment easier and more profitable than upgrading existing stock, a tendency reinforced by land speculation dynamics. When retrofitting is discouraged by policy and market incentives, demolition and redevelopment become the default, often justified through narratives of “urban renewal”. In many cases, however, such redevelopment results in larger environmental footprints, the loss of culturally significant buildings, and the displacement of residents, particularly those in informal settlements and low-income neighbourhoods. In these cases, displacement may occur through direct eviction, or

⁵⁹ The Sustainable Construction Observatory, *Sustainable Construction Barometer 2025 – 3rd edition* (Paris: Saint-Gobain, 2025).

indirectly, when new, larger homes raise property prices and rents, rendering housing unaffordable for existing communities.

8. Post-disaster and post-conflict reconstruction

73. Post-disaster and post-conflict reconstruction presents distinct environmental sustainability challenges that differ from those of routine housing delivery. In these contexts, urgency, institutional disruption, and constrained supply chains often create strong incentives to prioritize speed and low upfront costs over long-term performance. This can result in environmentally harmful practices, including large-scale demolition of partially damaged structures, uncontrolled dumping of debris, increased reliance on carbon-intensive imported materials, and the reconstruction of housing in hazard-prone or environmentally sensitive areas without adequate risk assessment.

74. The management of rubble and debris constitutes a critical challenge. Large volumes of construction and demolition waste are frequently treated as liabilities rather than resources, despite their significant potential for reuse and recycling. At the same time, debris may be contaminated by hazardous substances, including asbestos, or pose safety risks due to unexploded ordnance, requiring careful handling and specialized technical capacity. In many contexts, the absence of regulatory frameworks, quality standards, and testing facilities for recycled materials further limits their uptake, even where circular approaches would reduce environmental impacts and reconstruction costs. The surge in demand for construction materials during reconstruction also creates conditions for illegal harvesting and extraction of natural resources that cause lasting environmental damage.

75. These challenges are compounded by governance and administrative constraints. Circular rubble management is rarely integrated into disaster preparedness plans and the humanitarian timelines driving reconstruction are frequently misaligned with the slower processes needed for participatory, environmentally sound rebuilding. The destruction of land records and property markers compounds these difficulties, generating housing, land, and property disputes that delay debris management and increase pressure on land and natural resources.

76. Finally, a central challenge in post-disaster and post-conflict reconstruction is that environmental sustainability and the right to adequate housing are frequently treated as competing priorities rather than mutually reinforcing ones. Shelter responses in crisis contexts often focus narrowly on the physical structure, neglecting security of tenure, habitability, cultural suitability, and access to services and infrastructure. Residents of informal settlements are particularly at risk of being overlooked entirely, as insecure tenure and unclear administrative jurisdiction frequently disqualify them from reconstruction assistance, regardless of the severity of their losses. Reconstruction is typically treated as a one-time emergency intervention rather than an opportunity to reduce long-term climate vulnerability, with the result that pre-existing risks are often restored rather than addressed.

9. Adverse impacts of environmental sustainability policies on the right to housing

77. Poorly designed or inadequately regulated environmental sustainability measures can create new risks that undermine the right to adequate housing and disproportionately affect informal settlement residents, low-income households, and marginalized groups. For example, retrofit campaigns and energy efficiency programmes may unintentionally exclude those most in need, especially when subsidies primarily benefit wealthier households or when mandatory upgrades raise rents and reduce affordability. Decarbonization policies such as carbon pricing, fossil fuel phase-outs, and minimum energy performance requirements can similarly increase household energy costs in the short term, deepening energy insecurity among low-income households that already spend a disproportionate share of their resources on energy. In several contexts, environmental regulations and redevelopment framed as “urban renewal” have been linked to evictions, displacement, and maladaptation that increases rather than reduces vulnerability.

78. Environmental sustainability policies can also generate financial risks for both the private sector and households. As regulations tighten and expectations shift toward higher environmental performance, buildings that fail to meet new standards risk becoming stranded assets, losing value, becoming uninsurable, or falling outside financing eligibility. This affects not only developers and investors but also low- and middle-income households who may find themselves trapped in inefficient or at-risk homes without the possibility to upgrade them. Without adequate safeguards, a “second-tier” housing market of non-compliant, depreciating properties may emerge, deepening inequalities in housing quality, safety, and location.

79. In some cases, climate risks leave no alternative than relocating the affected communities. However, if not managed properly, with a rights-based approach, this can lead to severe social disruption. Climate mitigation measures – including large renewable energy projects, conservation

initiatives, and land acquisitions linked to carbon offsets – can also result in displacement or land appropriation, threatening Indigenous Peoples, rural communities, and others whose customary tenure is not formally recognized.

F. Emerging efforts toward environmentally sustainable and resilient housing

80. The importance of environmentally sustainable and resilient housing is increasingly reflected in international commitments and frameworks. In 2015, at COP21, the *Paris Agreement* was adopted by 195 parties under the United Nations Framework Convention on Climate Change, establishing the goal of limiting global warming to well below 2°C above pre-industrial levels, with efforts to limit warming to 1.5°C. Its primary implementation mechanism, the *Nationally Determined Contributions* (NDCs) consist of national climate plans through which each country sets out its commitments to climate change mitigation and adaptation, updated every five years. The *Global Alliance for Buildings and Construction* (GlobalABC), hosted by the United Nations Environment Programme (UNEP), was also established at COP21, with the purpose of advocating for, tracking progress toward, and supporting the decarbonization and resilience of the buildings and construction sector globally. In 2022, the *Buildings Breakthrough* initiative was launched at COP27, committing participating countries to making near-zero emission and resilient buildings the new normal by 2030 through coordinated action on policies, finance, and standards. In 2024, at the first *Buildings and Climate Global Forum* held in Paris, 70 countries endorsed the *Déclaration de Chaillot*, recognizing that progress toward a sustainable built environment remained insufficient and committing to accelerate decarbonization and strengthen climate resilience across the buildings and construction sector through integrated urban planning, sustainable construction and retrofitting, and whole life cycle approaches. The *Déclaration* also established the *Intergovernmental Council for Buildings and Climate* (ICBC) as a new governance body to drive implementation and accountability across the sector. In 2025, at COP30 in Belém, the ICBC held its first ministerial meeting and launched the *Belém Call for Action for Sustainable and Affordable Housing* – the first multistate housing commitment adopted at a COP. It calls on governments to integrate housing into national climate strategies, prioritize housing that meets standards for resource and energy efficiency, emissions, and resilience, and close the investment gap in sustainable housing through coordinated international finance. It also proposes establishing a dedicated *Affordable and Sustainable Housing Finance Alliance* with international financial institutions and multilateral development banks, and sets time-bound targets for aligning national housing policies with the *Paris Agreement* by 2035. At the same Conference in Belém, housing and the transformation of informal settlements were explicitly addressed at COP ministerial level for the first time, reaffirming that achieving the goals of the *Paris Agreement* requires stronger alignment between climate governance and urban development, and recognizing the critical role of cities and local governments in implementing climate solutions.

81. The governance of environmentally sustainable and resilient housing is also shaped by a broader set of urban governance frameworks. The *New Urban Agenda*, adopted at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) in Quito in 2016, provides the primary global framework for sustainable urbanization, explicitly linking housing, land management, spatial planning, and environmental sustainability as interdependent dimensions of urban development. *National Urban Policies*, which have been adopted or are under development in a growing number of countries, offer a critical instrument for translating these commitments into coherent national strategies. Together, these frameworks have helped shift the discourse toward integrated approaches to sustainable housing that go beyond building-level performance to encompass urban form, land governance, and the spatial dimensions of environmental sustainability and resilience.

82. This growing body of international commitment is complemented by an increasing recognition that housing outcomes are largely delivered at the local level. As of 2025, multilevel governance is the most frequently cited enabler of urban climate action in the NDCs, with 77 per cent of them highlighting this dimension.

83. Despite these commitments and the momentum they have generated, progress on the ground remains uneven and, in many areas, insufficient. This section reviews emerging efforts toward environmentally sustainable and resilient housing, while also acknowledging the remaining gaps, across eight dimensions: holistic frameworks for assessing housing sustainability; the decarbonization of the buildings and construction sector; energy efficiency retrofit; climate adaptation and resilient housing; circular construction; affordable housing; incremental and self-built housing; climate-responsive upgrading of informal settlements; community-led approaches; the recognition of traditional, vernacular, and Indigenous architecture; and green housing finance. These themes reflect

the areas where the most significant progress is being made, but they do not constitute an exhaustive account of all relevant developments, many of which are context-specific or at too early a stage to assess systematically.

1. Holistic frameworks for housing sustainability

84. There is growing consensus that housing sustainability cannot be achieved through fragmented or sector-specific approaches. Holistic frameworks are needed, integrating all dimensions of environmental sustainability and resilience together with the social, cultural, and economic aspects of adequate housing. Understanding the interdependence among these dimensions is essential to ensure that measures reinforce one another rather than creating unintended trade-offs. Only in this way can adequate housing be fully addressed in all its key elements and aligned with the SDGs and the *New Urban Agenda*.

85. Green building certification systems remain among the most widely used tools for assessing sustainability in the built environment. This market has expanded significantly in recent years: between 2015 and 2024 the total number of green building certifications has almost tripled worldwide.⁶⁰ These tools play a valuable role in advancing greener building practices, yet they have important limitations. They often fail to adopt a genuinely holistic perspective, giving disproportionate weight to certain dimensions – typically energy performance – while paying insufficient attention to resilience, affordability, socio-cultural considerations, and inclusivity overall. Their methodologies are also primarily designed for formal, higher-income housing markets. In response to these weaknesses, new efforts are emerging to adapt certification systems to the realities of low- and middle-income countries, including informal settlements. For these tools to be meaningful, they must recognize and value incremental, resource-efficient practices that are already present in these communities.

86. Beyond certification systems, a range of assessment methodologies can support a more comprehensive evaluation of sustainability in housing. *Life cycle assessment* (LCA) measures a building's environmental impacts across its entire life cycle. Newer approaches such as *absolute environmental sustainability assessment* (AESA) aim to determine not only whether a building is more sustainable than a baseline, but whether its impacts remain within planetary boundaries. *Life cycle benefit assessment* (LCBA) expands the scope to include the positive environmental contributions of buildings, while *social life cycle assessment* (S-LCA) focuses on social impacts and *whole life costing* (WLC) takes a financial lens, assessing the total cost of a building across its entire life cycle. Despite these advances, assessment methodologies remain fragmented and rarely integrate environmental, social, cultural, and economic dimensions into a single coherent framework. Their implementation is also hindered by limited data availability, particularly in low- and middle-income countries.

2. Decarbonization of the buildings and construction sector

87. Reducing carbon emissions in the buildings and construction sector is essential for achieving global climate goals. The IPCC proposes a three-part strategy based on Sufficiency, Efficiency, and Renewables (SER): reducing demand for floor space and energy through compact and shared living models; improving the performance of both new and existing buildings; and integrating renewable energy generation. Over the past decades, notable progress has been made in these respects: global building energy intensity has reduced by 8.5 per cent since 2015, and renewable energy systems are expanding across residential sectors worldwide.⁶¹

88. This progress is supported by the growing uptake of policies promoting building decarbonization. As of 2025, 51 per cent of NDCs addressed climate change mitigation in the built environment. However, only 15 per cent included specific means of implementation such as finance and capacity building,⁶² and most lacked a holistic life cycle perspective that integrates embodied carbon or circularity.⁶³ Explicit housing commitments remain limited, with only 13 per cent of NDCs addressing the decarbonization of housing and informal settlements.⁶⁴

89. Building energy codes are among the most powerful tools for reducing operational carbon emissions. Globally, 85 countries have adopted codes for residential buildings, 80 per cent of which

⁶⁰ UNEP, *Global Status Report for Buildings and Construction 2025–2026*.

⁶¹ Ibid.

⁶² United Nations Human Settlements Programme (UN-Habitat), *Urban Content in NDC 3.0: A Snapshot of 128 NDCs*, HS/010/25E (Nairobi, 2026).

⁶³ UNEP, *Global Status Report for Buildings and Construction 2024/2025*.

⁶⁴ UN-Habitat, *Urban Content in NDC 3.0*.

are mandatory. Yet, more than half of the world's new construction is still not covered.⁶⁵ Evidence shows that combinations of policy instruments, including bans, building codes, energy efficiency mandates, and subsidies, achieve greater impact than single measures. Recent policies from Germany and Rwanda demonstrate the effectiveness of integrated approaches that combine mandatory performance standards with financial incentives. Growing attention to embodied carbon is also emerging, as countries like Denmark and Australia have introduced regulatory limits and mandatory LCA requirements.

90. Despite these advances, the buildings and construction sector remains off track: since 2015, its CO₂ emissions have increased by 5 per cent, falling far short of the 28 per cent reduction required by 2030 to align with the *Paris Agreement*.⁶⁶

3. Energy efficiency retrofit

91. As most of the global housing stock will remain in use for decades, improving the energy performance of existing buildings is essential for meeting climate goals. Energy efficiency retrofits can significantly reduce household energy demand and operational emissions, and a growing number of countries are demonstrating how such programmes can be scaled effectively and equitably. In Canada, the *Mortgage Loan Insurance (MLI) Select* programme incentivizes deep energy upgrades, alongside affordability and accessibility, for both new and existing buildings. Complementary municipal level mechanisms, such as *Community Efficiency Financing* (CEF), enable municipalities to expand innovative home energy retrofit financing programmes, illustrating how coordinated national and local action can accelerate equitable and low carbon housing transitions. In the Netherlands, the *Energiesprong* initiative has transformed more than 5,000 social housing units into net zero energy homes, using prefabricated façades and integrated energy systems to substantially reduce energy bills for low-income tenants.

92. Despite these promising examples, global progress remains slow: annual energy retrofit rates in buildings are below 1 per cent in most major markets, far short of the 2.5 per cent required by 2030 under the International Energy Agency's (IEA) decarbonization scenarios.⁶⁷

4. Climate adaptation and resilient housing

93. As climate impacts intensify, adapting the housing stock to changing environmental conditions has become crucial. Resilience retrofits increase the safety and well-being of residents and deliver clear financial benefits: strengthening homes before disasters strike is far more cost-effective than reconstructing them after they have been damaged.

94. The importance of housing adaptation is increasingly reflected in national policy frameworks. As of 2024, adaptation measures related to buildings appeared in 53 per cent of NDCs.⁶⁸ Furthermore, 76 countries have adopted *National Adaptation Plans* (NAPs). However, although nearly all of them mention housing, references are often superficial and rarely grounded in a comprehensive understanding of the right to adequate housing. Only 42 NAPs address land rights, and very few consider housing loss and damage, climate-induced displacement, or the specific vulnerabilities of informal settlements.⁶⁹

95. Key policy tools for effective housing adaptation include hazard mapping, risk-sensitive land use and zoning regulations, climate-resilient building codes, early warning systems, secure land tenure measures, anti-eviction safeguards, community-based awareness programmes, and subsidies for resilient retrofitting. Several national and local initiatives illustrate how these measures work in practice. In Indonesia, the *Green Affordable Housing Program* aims to provide one million affordable, environmentally sustainable, and disaster-resilient homes for low-income communities by 2030. In Colombia, the *Casa Digna, Vida Digna* programme delivers resilience upgrades for low-income households, simplifying permitting procedures and expanding access to subsidies.

96. Adaptation progress is difficult to assess, as there is no global system for tracking housing resilience indicators and most NAPs lack measurable housing-related targets. Nonetheless, available

⁶⁵ UNEP, *Global Status Report for Buildings and Construction 2024/2025*.

⁶⁶ Ibid.

⁶⁷ International Energy Agency (IEA), *Sustainable Recovery: World Energy Outlook Special Report* (Paris, 2020).

⁶⁸ UNEP, *Global Status Report for Buildings and Construction 2024/2025*.

⁶⁹ Danish Institute for Human Rights, *Human rights in climate change adaptation: emerging trends in National Adaptation Plans* (Copenhagen, 2025).

evidence indicates that while policy frameworks are expanding and efforts are increasing, current actions fall far short of what is required to address the global housing adaptation gap.

5. Circular construction

97. The shift from a linear “take-make-use-dispose” model to circular construction can reduce resource extraction, extend building lifespans, and maximize reuse, recycling, and material recovery. Circular construction is gaining traction worldwide. In Europe, recycled materials now account for an estimated 18 per cent of total construction inputs, supported by policy frameworks such as the European Union’s *Construction Products Regulation*.⁷⁰ Globally, 75 countries have adopted circular economy calls to action, roadmaps, or operational strategies, with the built environment being the most frequently targeted sector, representing 16 per cent of sector-specific measures. However, many of these roadmaps remain fragmented and lack integrated approaches, quantified targets, or dedicated funding.⁷¹

98. A key policy tool that can drive the transition to circularity is extended producer responsibility (EPR), which shifts waste management costs from public authorities to producers, creating incentives to prevent waste and design more durable, recyclable products. France has already introduced a comprehensive EPR scheme for construction and demolition waste, and India is developing a similar framework. Other enabling policies include circular building codes, standards for recycled materials, pre-demolition audits, material passports, building logbooks, digital twins, and circular public procurement.

99. Despite these advances, circular construction remains at an early stage. Most countries still rely on linear construction models characterized by high levels of material extraction, low recycling rates, and limited reuse of existing buildings.

6. Affordable housing

100. Affordable housing constitutes a significant share of new construction and urban expansion, shaping emissions, energy costs, and climate risk exposure for decades. Therefore, the early integration of environmental sustainability and resilience criteria into affordable housing programmes is critical, along with gender and social equity principles, to ensure that these initiatives reach those most in need. Recognizing these priorities, a growing number of governments have implemented environmental performance requirements across both the supply and demand sides of the affordable housing market, targeting energy efficiency, water conservation, emissions reduction, and climate resilience.

101. An illustrative model is the *EcoCasa* programme in Mexico, which incentivizes the construction of affordable and sustainable housing by offering financing and preferential rates to developers who achieve a minimum of 20 per cent of reduction in CO₂ emissions in their projects. Through a multidimensional assessment of energy efficiency, water consumption, and the urban environment, the programme seeks to balance environmental impact reduction with improved habitability for residents.

102. Despite these advances, programmes of this kind remain limited in scale and geographic coverage. They tend to concentrate in middle-income countries with sufficient institutional capacity to design and administer complex incentive structures, leaving the lowest-income countries – where affordable housing pressures are most acute and climate vulnerability is highest – largely underserved.

7. Incremental and self-built housing

103. Recognizing and supporting incremental and self-built housing, rather than seeking to replace it, has emerged as one of the most significant and underused opportunities to advance environmentally sustainable and resilient housing at scale. The economic and environmental case is compelling: improving an existing self-built home, rather than demolishing it and building anew, costs on average less than a quarter of the price of new construction and avoids roughly two-thirds of the associated embodied carbon.⁷² Applied across the hundreds of millions of vulnerable homes worldwide, this represents one of the largest untapped sources of emissions reductions in the housing sector, while simultaneously improving safety and living conditions.

⁷⁰ UNEP, *Global Status Report for Buildings and Construction 2024/2025*.

⁷¹ United Nations Industrial Development Organization (UNIDO), *National Circular Economy Roadmaps: A Global Stocktake for 2024* (Vienna, 2024).

⁷² Build Change, *Saving Embodied Carbon Through Strengthening Existing Housing* (Denver, 2023).

104. A growing body of practice demonstrates how sustainability and resilience can be embedded directly into incremental building processes. Evidence increasingly shows that the decisive factor is not finance alone but the pairing of finance with technical assistance: programmes that sequence advisory support together with small-scale, flexible lending achieve stronger outcomes in both construction quality and household safety, while building the confidence of lenders historically reluctant to serve self-builders. Housing microfinance calibrated to the pace of self-construction, combined with locally adapted technical guidance, enables households to integrate structural strengthening, bioclimatic design, and resource-efficient materials progressively, as resources allow. Secure tenure consistently underpins these gains, giving households both the confidence to invest and access to credit. In Iquique, Chile, the *Quinta Monroy* project replaced an informal settlement in situ with structurally sound “half houses” designed for incremental expansion: tenure security enabled 35 per cent of households to access loans for home extensions, with property values rising from approximately USD 8,500 to USD 20,000 over time. Solar panels were integrated, producing up to 70 per cent of household energy consumption, materials from the cleared settlement were recycled and reused in new construction, and residents reported improved thermal comfort, ventilation, and daylight conditions.⁷³

105. Despite this potential, incremental housing remains largely invisible to the policy, finance, and certification frameworks that govern the housing sector, which continue to be designed around formally delivered, fully completed units.

8. Climate-responsive upgrading of informal settlements

106. Informal settlements have long been the focus of upgrading initiatives aimed at improving basic services, tenure security, and housing conditions. Yet they are far more than sites of vulnerability: their residents exercise meaningful autonomy in housing choices, organize collectively, and demonstrate locally driven resilience that formal housing systems rarely replicate. An emerging body of practice is now building on this foundation, integrating climate action into upgrading efforts and treating informal settlement upgrading not only as a housing and poverty reduction intervention but as a critical entry point for urban climate adaptation and resilience.

107. Several initiatives illustrate this convergence. In Kibera, Nairobi, a community-managed green-blue-grey drainage system was implemented in public spaces. Similarly, the Yervada project in Pune, launched under India’s *Basic Services for the Urban Poor* (BSUP) scheme, implemented strategic construction measures to mitigate environmental risks such as elevating homes against floods. In São Paulo, the *Special Zones of Interest* (ZEIS) facilitated, on the one hand, comprehensive *favela* upgrading, including land regularization and environmental recovery, and on the other the development of new social housing projects. Emerging approaches are also broadening the scope of climate-responsive upgrading beyond physical infrastructure. Care-centric upgrading frameworks – which reconceptualize the neighbourhood as a system of support for daily care work, including childcare, elder care, and domestic tasks – integrate gender-sensitive services, accessible public spaces, and environmental regeneration into a single intervention logic. The *Transformative and Organizational Hubs for Social Inclusion and Harmony* (UTOPIAS) programme, in Iztapalapa, Mexico, illustrates this approach in practice.

108. While climate change, pollution, and biodiversity loss present acute pressures for informal settlements, these communities have simultaneously generated a wave of innovation, intertwining upgrading interventions with climate action and demonstrating that locally driven, community-led approaches can deliver substantial environmental, social, and cultural outcomes.

9. Community-led approaches

109. Community-led approaches are essential for ensuring the social legitimacy, cultural relevance, and long-term effectiveness of environmental sustainability measures. Empowering residents to co-design and implement housing solutions strengthens local ownership, builds capacity, and ensures that interventions reflect local priorities across different levels of interventions, from information and awareness through incremental construction, upgrading and retrofitting, to urban and territorial governance. This is particularly important in informal settlements and low-income areas, where top-down tools such as codes, benchmarks, and standards often fail to align with everyday realities.

⁷³ José Rafael Núñez Collado and Han-Hsiang Wang, “Slum upgrading and climate change adaptation and mitigation: Lessons from Latin America”, *Cities*, vol. 104 (2020). Available at <https://doi.org/10.1016/j.cities.2020.102791>.

110. A growing body of evidence shows that community-led housing can achieve equal or higher levels of environmental performance and resilience compared with conventional construction, while also improving living conditions and reducing costs. These initiatives frequently rely on locally sourced, low-impact materials and traditional or Indigenous construction methods that are well adapted to climatic and cultural contexts. They often involve de-commodified tenure regimes, such as community land trusts or housing cooperatives, which support life cycle thinking and maintenance, and prevent speculation and displacement. Such practices deserve the same policy recognition and support typically reserved for formal development. Several examples illustrate this potential. In Montevideo, Uruguay, more than 200 housing cooperatives (in which residents collectively own, manage, and maintain their homes) have earned the *Sello Verde* environmental certification, which grants access to sustainability funds and training. In Namibia, community savings groups are enabled by government grants and secure land titles to undertake the incremental construction of affordable, climate-responsive homes, often using recycled materials. In Europe, the European Commission's Citizen-led Renovation initiative supports energy communities (citizen- or resident-led groups that collectively manage energy generation, savings, and renovation decisions) to drive building renovation, while emerging social energy service models can help aggregate demand, coordinate technical support, and ensure that energy savings benefit residents.

111. Community-led approaches are also critical in post-disaster and post-conflict reconstruction, where externally driven processes frequently produce housing solutions that are poorly adapted to local climatic conditions, cultural practices, and livelihoods, and that may restore or entrench pre-existing vulnerabilities rather than addressing them. UN-Habitat's work in Haiti, Mozambique, and Nepal has demonstrated that sustainable housing reconstruction requires integrating tenure security, community participation, and locally appropriate materials and techniques from the outset. When these conditions are met, reconstruction can simultaneously address immediate recovery needs, reduce long-term climate vulnerability, and generate local economic opportunities.

112. One area requiring particular caution is the relocation of communities threatened by climate hazards. When relocation is unavoidable, it must be grounded in human rights principles and ensure the full, meaningful participation of both affected and receiving communities. Fiji's *Planned Relocation Guidelines* offer a promising example of a structured, community-centred framework that seeks to minimize social disruption and safeguard livelihoods.

10. Recognition of the environmental value of traditional, vernacular, and Indigenous architecture

113. Across the world, there is growing recognition that traditional, vernacular, and Indigenous architecture provides important environmental insights for sustainable housing. Over time, many communities have developed construction practices finely attuned to local climates, ecosystems, and resource availability, relying on passive cooling and heating strategies, nature-based solutions, and locally sourced bio-based or earth-based materials. These approaches embodied principles of bioclimatic design and circularity well before such concepts were formalized in contemporary policy frameworks. They also frequently embodied disaster resilience, having been refined over generations in response to local hazard conditions, often outperforming imported construction typologies in terms of both safety and recovery. More broadly, traditional housing systems reflect holistic relationships between people and their environments that extend beyond the physical form of buildings, often involving practices such as incremental self-construction, community-managed land, and collective stewardship of natural resources. By recognizing and valuing Indigenous, local, and traditional knowledge, and adapting it to contemporary needs, housing policies and practices can advance both environmental and cultural sustainability, strengthening community cohesion and sense of place. To capitalise on the potential offered by traditional, vernacular and indigenous construction practices, it is necessary that such techniques are recognized, regulated and included in the official building codes and standards, allowing their full inclusion in the formal housing construction sector.

11. Green housing finance

114. Green housing finance is essential for scaling environmentally sustainable homes by reducing upfront costs, supporting low-income and vulnerable households, accelerating innovation in sustainable materials and techniques, and advancing the shift from a linear to a circular construction model.

115. Global investment in energy-efficient buildings expanded significantly over the past decade but began to contract in 2023. After reaching a peak of USD 290 billion in 2022, it declined to USD 270 billion in 2023, largely due to rising borrowing costs and the phase-out of post-pandemic public

support programmes.⁷⁴ In response, several countries have introduced new policy instruments to sustain investment. China's *Incentive Fund for Green Building Development* provides subsidies for energy-efficient retrofits and high-performance green buildings. Australia has channelled significant resources through the *Clean Energy Finance Corporation*, including dedicated funding for social housing upgrades. South Africa's renewable energy tax incentives and Botswana's *Roofstop Solar Initiative* support energy efficiency and renewable energy uptake.

116. Private finance is also playing a growing role. As of 2023, 43 banks worldwide had adopted net zero targets for their real estate lending portfolios.⁷⁵ A broad range of financial instruments now supports green construction and retrofit markets, including green bonds, sustainability-linked bonds, green mortgages, energy performance contracts, green REITs, and blended finance structures backed by development banks. Cities are also expanding the use of municipal green bonds, pooled finance facilities, and on-bill repayment schemes to support energy upgrades in housing. However, deployment of these tools remains uneven: for example, emerging markets accounted for only 10 per cent of global green bond issuance in 2021.⁷⁶ Inclusive financing mechanisms, including microcredit schemes and pay-as-you-save models, remain critical to expanding access in emerging and developing economies.

117. Despite growing awareness of environmental issues, only 4 per cent of total global investment in buildings and construction currently goes to energy-efficient projects. This falls far short of the USD 1.3–2.1 trillion per year required until 2035 to align the sector with global climate goals. Projections suggest that investment levels may continue to decline if financing barriers and high interest rates persist.⁷⁷

118. With respect to climate adaptation and resilience, no global dataset exists for housing-specific finance. Available estimates indicate that developing countries will require USD 310–365 billion annually by 2035 for adaptation across all sectors, which is 12 to 14 times current levels of international public adaptation finance. In 2023, international adaptation finance only reached USD 26 billion. Although the share received by LDCs and SIDS is increasing, overall flows remain far below identified needs, and the global adaptation finance gap continues to widen.⁷⁸

119. Regarding circular construction, financing is emerging and gradually gaining momentum. It is estimated that currently only 2 per cent of global investment flows are directed to circular business models, equivalent to USD 27 billion per year.⁷⁹ To help scale up investments and demonstrate bankable circular construction projects, the European Union has launched the *Circular Construction Finance* initiative, mobilizing over EUR 80 million in investment.

II. Proposed draft recommendations

A. Enablers for environmentally sustainable and resilient housing systems

1. **Advance the housing and climate agenda together. Integrate a rights-based approach into environmental and housing policies to ensure that the right to adequate housing and the right to a clean, healthy, and sustainable environment are advanced in a coherent and mutually reinforcing manner. Strengthen housing governance to foster long-term, cross-sectoral policy implementation across the entire housing continuum.**

120. Human rights should be embedded across the full spectrum of environmental and housing legislation – from NDCs, NAPs, and national housing strategies down to local building codes and planning instruments – and across the entire housing continuum, from emergency shelter to incremental, social, and market housing. This requires a particular focus on low-income and marginalized groups, including residents of informal settlements, as their housing conditions and tenure status render them disproportionately vulnerable to environmental risks. Regulations must be designed and implemented with explicit attention to all elements of adequate housing. Safeguards must be systematically integrated to prevent displacement, community disruption, and the

⁷⁴ UNEP, *Global Status Report for Buildings and Construction 2024/2025*.

⁷⁵ Ibid.

⁷⁶ Ibid.

⁷⁷ Ibid.

⁷⁸ United Nations Environment Programme (UNEP), *Adaptation Gap Report 2025: Running on empty. The world is gearing up for climate resilience — without the money to get there* (Nairobi, 2025).

⁷⁹ Circle Economy Foundation, *The Circularity Gap Report Finance* (Amsterdam, 2025).

concentration of environmental burdens in disadvantaged areas. This includes implementing essential measures to curb land and real estate speculation linked to climate policies, as well as protective mechanisms – such as social tariffs or energy allowances – to ensure that the pursuit of climate goals does not exacerbate energy poverty. A rights-based approach requires targeted financial support for vulnerable households, robust anti-eviction protections, accessible grievance mechanisms, disaggregated monitoring of distributional impacts, and meaningful community participation in planning, retrofitting, and relocation processes.

121. Governments bear primary responsibility for steering housing systems toward equitable and sustainable outcomes, and must take leadership in establishing the long-term strategic frameworks, institutional architectures, and enabling conditions within which all other actors, including private sector, civil society, and communities, can contribute effectively. Governments should invest in institutional capacity-building so that planning departments, housing authorities, and environmental agencies can effectively implement integrated policies, enforce compliance, and adapt to evolving climate and market conditions. Clear horizontal and vertical cooperation mechanisms are essential to harmonize housing, planning, environmental, energy, finance, and social policies, align mandates across national, regional, and local levels, and empower local authorities to act as leaders and exemplars of sustainable housing practices.

122. Participatory governance must be embedded through multi-stakeholder platforms, community planning committees, and structured engagement in informal settlements, ensuring that policies reflect local realities and socio-cultural needs. Clear and measurable sustainability targets must be integrated into NDCs, NAPs, and national housing strategies to provide direction and accountability. Strong enforcement systems are necessary to ensure compliance. Comprehensive monitoring and evaluation systems are needed to assess the impacts of sustainable housing policies, programmes, and financial instruments. Transparency and accountability mechanisms, including open data, public reporting, and independent oversight, further strengthen trust. International cooperation platforms, including the ICBC and the GlobalABC, have an important role to play in supporting governments to align national housing and climate policies, exchange effective practices, and advance coherent, rights-based approaches across countries. Together, these measures strengthen public trust, advance social justice, and ensure that environmental policy reinforces – rather than undermines – the right to adequate housing.

2. Mobilize and ensure complementarity of diverse financing sources to scale sustainable, resilient, and equitable housing systems. Prioritize affordability and long-term financial viability, and ensure that residents of informal settlement, low-income households, marginalized groups, and community-based organizations can access public, private, and international finance.

123. Expanding and diversifying finance for sustainable, resilient, and equitable housing requires the creation of a comprehensive financing ecosystem that aligns public, private, and international capital with both environmental and affordability objectives, and that is calibrated to the maturity of local markets and the financial capacity of households, investors, and public authorities.

124. Public actors play a central role in shaping this ecosystem. Governments should establish enabling regulatory and fiscal environments – through tax incentives, blended finance structures, guarantees, concessional lending, and targeted subsidies – that lower upfront costs for sustainable and resilient construction and retrofits. Financial mechanisms must be explicitly designed to reach low-income households, informal settlement residents, small-scale developers, community-based organizations, and grassroots groups, using tools such as microfinance for incremental improvements, flexible collateral arrangements adapted to the continuum of land tenure, pay-as-you-save models, and community-level revolving funds. Investing in the provision of serviced land with clear tenure documentation can further act as an enabling mechanism, reducing the vulnerability of informal settlements. Affordable insurance schemes that protect low-income and vulnerable households from climate-related hazards should be made available. Particular attention should be given to pre-financing mechanisms that allow households to undertake improvements before they have the necessary capital in hand, addressing a critical entry barrier for low- and middle-income owner-occupiers. Beyond financial mechanisms, governments should promote and scale institutional delivery models of environmentally sustainable and resilient housing, including public rental housing schemes, public or governmental developers, and regulated housing companies operating with social objectives, as these are essential complements to market-based approaches and help ensure sustained access to adequate housing for informal settlement residents, low-income households, and marginalized groups.

125. Mobilizing private finance requires close coordination with central banks and financial regulators to integrate climate and environmental risk into lending criteria while avoiding compliance

burdens that could result in the exclusion of low-income and marginalized groups. Strengthening the capacity of financial institutions will enable them to assess creditworthiness based on building life cycle savings and reduced climate risks. Dedicated investment windows for circular construction and bio-based materials can help stimulate emerging markets. Green bonds and catastrophe bonds offer additional instruments for mobilizing capital toward sustainable and resilient housing.

126. At the international level, countries should work to increase finance flows for climate mitigation and adaptation and ensure that resources reach those most in need – including informal settlements residents and grassroots organizations – through direct access modalities that bypass unnecessary intermediaries and through co-financing instruments adapted to the capacities of community-based organizations. Multilateral development banks and international financial institutions have a critical role to play, given that the volume of climate finance currently reaching the housing sector, and informal settlements in particular, remains negligible relative to the scale of need. In this context, the *Belém Call for Action for Sustainable and Affordable Housing*, including its proposal to establish a dedicated *Affordable and Sustainable Housing Finance Alliance*, signals growing momentum toward dedicated institutional mechanisms for channelling finance to sustainable and affordable housing. A diversified, inclusive financing ecosystem supports a more equitable housing transition and accelerates progress toward environmentally sustainable and resilient housing for all.

3. Strengthen knowledge and societal awareness for sustainable housing. Improve data generation, disaggregation and analysis, and promote behavioural change by increasing the understanding of the benefits of environmental sustainability and resilience through education, professional practice, technical frameworks, and public discourse.

127. Strengthening the knowledge base for sustainable housing requires a systemic effort, particularly in developing countries where data scarcity and limited technical capacity impede effective policymaking. Comprehensive data systems should capture the environmental, social, cultural, and economic dimensions of housing across both formal and informal markets. This includes information on building performance, construction practices, material supply chains, life cycle impacts – encompassing both embodied and operational impacts – affordability, and exposure to environmental hazards. Research must also address informal and community-led housing practices, incremental construction, and traditional, vernacular, and Indigenous building methods. Robust networks are essential: partnerships among universities, research institutions, national and local governments, and communities can strengthen knowledge sharing and generate reliable, context-specific evidence.

128. Building on this foundation, certification systems and evaluation tools for sustainable housing should be tailored to local climatic, cultural, and socio-economic conditions, avoiding dependence on imported benchmarks that may be costly or unfeasible. These frameworks should incorporate life cycle assessment as well as indicators on resilience, affordability, cultural adequacy, and social inclusion. They should also include tiered pathways that accommodate informal and incremental construction. Piloting these tools in social housing, informal settlement upgrading, and community-led projects will help refine methodologies and ensure inclusivity.

129. Alongside a stronger evidence base, advancing societal awareness and behavioural change is essential to shift public perceptions and everyday practices. Strategic communication and education programmes should challenge common misconceptions, such as the belief that sustainable buildings are inherently more expensive, or that high-carbon industrial materials are superior to bio-based or earth-based alternatives. Targeted campaigns should highlight the co-benefits of environmentally sustainable housing for its residents, including improved indoor air quality, enhanced thermal comfort, better aesthetics, reduced energy and water bills, and greater resilience to climate hazards. Strengthening public understanding of the holistic nature of sustainable housing – encompassing environmental, social, cultural, and economic dimensions – is equally important. Behavioural tools, including nudges, real-time feedback on energy and water use, and tenant-landlord engagement programmes, can encourage more efficient consumption patterns. Awareness must be complemented by accessible public advisory services that guide households through financing, technical requirements, and decision-making, and by the integration of environmental sustainability and resilience principles into school curricula, vocational training centres, and architecture and engineering programmes. Together, a stronger evidence base and a more informed, engaged society enable better-targeted policies and finance, broaden acceptance of sustainable materials and housing typologies, and foster the shared ownership of housing and environmental goals across communities, governments, the private sector, and civil society.

4. **Build resilient and inclusive local value chains for environmentally sustainable technologies and materials. Support solutions that are adapted to local climates, cultures, and economic realities by developing skills, investing in infrastructure, innovation, quality assurance, context-responsive green labelling and certification schemes, performance standards, fiscal and financial incentives, and strategic public procurement.**

130. Coordinated action is essential to build reliable, affordable, and context-appropriate production systems for sustainable materials and technologies. Governments should begin by identifying gaps in local manufacturing capacity of low-carbon, bio-based, or recycled materials, and develop targeted investment plans to close these gaps. Building a skilled workforce is equally essential: dedicated training programmes for artisans, builders, engineers, and architects can accelerate the diffusion of both traditional low-tech methods and advanced high-tech innovations adapted to local climatic, cultural, and socio-economic conditions. Parallel investments in enabling infrastructure – such as laboratories for material testing, regional fabrication hubs, certification bodies, logistics networks, and recycling facilities – ensure that sustainable building products meet quality, safety, and performance standards. Robust research and innovation ecosystems, including universities, incubators, and industry partnerships, can drive advances in sustainable materials and support the development of new products. Strengthened local supply chains reduce dependence on imported, carbon-intensive materials, lower construction costs, expand economic opportunities, and reinforce connections between housing, local industry, and cultural identity.

131. Building this productive capacity must be matched by enabling regulatory and market frameworks that normalize the use of low-carbon, bio-based, and recycled products. Green labelling and certification systems, supported by transparent methodologies, can help consumers, developers, and lenders identify credible products and avoid greenwashing. These frameworks should also incorporate human rights considerations and ethical sourcing requirements, including safeguards against forced labour in material supply chains. In the case of bio-based materials, particular attention should be given to sourcing governance, including certification of sustainable forestry and agricultural practices and safeguards against deforestation and land-use competition. Clear, science-based, and context-appropriate testing protocols, performance benchmarks, and safety standards should be adopted.

132. Fiscal and financial incentives, such as tax credits, reduced import duties, and concessional loans for manufacturing facilities, can accelerate adoption across value chains. Governments should further encourage innovation through competitive funding, demonstration projects, and partnerships that showcase the performance and aesthetics of sustainable materials in real world applications. Public procurement at both national and local levels should be leveraged as a powerful market-shaping tool by mandating or strongly incentivising the use of certified sustainable materials in social housing, public buildings, and infrastructure projects. Complementary awareness campaigns targeting builders, engineers, and households can increase familiarity and confidence in new materials. Over time, these enabling frameworks will support rapid market expansion, reduce embodied carbon, improve circularity, and help deliver high-quality, sustainable housing at scale.

133. Finally, governments should support the access system through which residents of informal settlements and incremental housing, source, transport, store, reuse and assemble materials over time.

B. Spatial and urban planning

5. **Deliver environmentally sustainable and resilient housing through inclusive and participatory urban planning that aligns housing and environmental objectives, promotes compact, mixed-use, and transit-oriented development, incorporates risk-informed and ecosystem-based approaches, and scales up nature-based solutions.**

134. Planning systems should shift towards inclusive and participatory practices that treat housing, environmental stewardship, risk reduction, and spatial development as interdependent dimensions of the same policy agenda. Governments should strengthen urban planning frameworks to explicitly incorporate compact, mixed-use, and transit-oriented development principles. They should also leverage public land management policies to prioritize spatial justice and the delivery of sustainable housing through transparent allocation criteria and long-term affordability safeguards. These approaches help fulfil the right to adequate housing by ensuring well-located, service-connected neighbourhoods accessible to all, while simultaneously advancing environmental sustainability through resource efficiency, reduced land consumption, and lower dependence on carbon-intensive mobility. Early assessment and planning for future urban growth represents a particularly critical opportunity in the fastest-growing smaller cities and towns, especially in Africa and Asia, where planning capacity and resources for sustainable land-use management remain constrained.

135. Housing resilience and disaster risk reduction require the alignment of land use planning, infrastructure investment, and territorial governance into a coherent, multi-scale approach that addresses vulnerability where it originates: in the spatial patterns, planning decisions, and infrastructure gaps that determine who is exposed to risk and who is not. Risk-informed planning, grounded in hazard mapping, climate projections, and ecosystem assessments, should guide where housing can safely expand and where development must be avoided. Inclusive and participatory planning processes are essential to ensure that low-income and marginalized groups, including residents of informal settlements, are not pushed into high-risk or environmentally sensitive areas. Community involvement is also important for shaping shared decisions related to land allocation, housing provision, and infrastructure development.

136. Protecting ecosystems and biodiversity must be central to planning practice. This includes minimizing soil sealing, safeguarding natural habitats, scaling up green and blue infrastructure – such as urban forests, restored wetlands, riparian buffers, and permeable surfaces – and integrating green spaces, urban agriculture, and biodiversity corridors. When accompanied by affordability and equity safeguards, this approach leads to safer, healthier, and more resilient urban environments; strengthened social cohesion and equity; and urban growth patterns that protect ecosystems while meeting housing needs sustainably.

6. Reduce environmental and housing pressures stemming from rapid and uncoordinated urban expansion through compact urban development and integrated, sustainable territorial planning. This includes promoting polycentric growth, strengthening urban-rural linkages, optimizing the use of existing urban assets, regenerating brownfield and greyfield sites, reusing vacant and underutilized buildings, and discouraging unnecessary demolitions.

137. Land must be understood and governed as a social and ecological resource – not solely as a commodity – and public policy should reflect this by prioritizing its use for equitable, inclusive, and environmentally sustainable housing systems. Adopting integrated, balanced, and sustainable territorial development strategies is crucial to reduce the environmental and housing pressures generated by rapid, unplanned urbanization in major metropolitan areas, to prevent the proliferation of informal settlements without adequate services and infrastructure, and to promote more equitable, resource-efficient patterns of growth. Governments should strengthen national and regional planning frameworks that support polycentric development, encouraging the emergence of multiple economic and service hubs rather than concentrating investment exclusively in large cities. This shift demands coordinated investments in secondary cities, intermediary towns, and rural service centres, including improved transport connectivity, digital infrastructure, essential public services, and diversified housing supply. Strengthening urban-rural linkages is equally important. Enhanced mobility systems, integrated food and resource networks, and shared ecosystem management can reduce migration pressures on primary agglomerations, improve rural and peri-urban livelihoods, and decrease spatial disparities. Territorial strategies should also incorporate robust climate risk assessments to ensure that emerging growth nodes are environmentally viable and resilient. Integrated territorial development can reduce congestion and pollution in major cities, lower pressures on land and ecosystems, enable more predictable and inclusive urban expansion, and improve regional equity. Over time, this approach can alleviate housing shortages in metropolitan areas by distributing opportunities more evenly across regions.

138. Within existing urban areas, development must be reoriented away from land- and carbon-intensive expansion and toward the smarter, more resource-efficient use of existing urban assets. Governments should prioritize brownfield and greyfield regeneration by adopting regulatory frameworks and fiscal incentives that make it easier and more attractive for public and private actors to redevelop underused industrial sites, ageing commercial areas, and obsolete infrastructure corridors. This approach demands coordinated planning, environmental remediation support, and integrated infrastructure upgrades that can transform these areas into viable mixed-use neighbourhoods. Addressing vacant and underutilized buildings is equally critical. Governments should establish transparent vacancy monitoring systems, apply vacancy taxes and progressive taxation on excessive per capita floor area, and create programmes that facilitate the conversion of empty units into affordable housing – including through rental – or community facilities.

139. Policies should also discourage the demolition of structurally sound buildings by reforming building codes, offering tax incentives for renovation, and requiring pre-demolition audits to identify opportunities for material recovery and adaptive reuse. They should also give explicit attention to the preservation of cultural heritage, including vernacular architecture, whose disappearance represents an irreversible loss. These strategies reduce demand for materials, energy, land, and floor area, while

revitalizing existing neighbourhoods and fostering more compact, resilient, socially inclusive, and culturally vital urban development.

C. Housing construction and retrofitting

7. **Embed environmental sustainability and resilience standards across housing construction and retrofit. This requires advancing context-responsive building codes that adopt a whole life cycle approach, integrating climate change mitigation and adaptation, circular construction principles, and healthy indoor environments, and coupling regulatory frameworks with fiscal incentives, capacity development, and enforcement and monitoring systems.**

140. Mainstreaming sustainable housing practices requires the systematic integration of environmental sustainability and resilience standards across the entire housing life cycle, supported by coherent regulatory, financial, and capacity-building measures. Governments should update or develop building codes and guidelines that reflect local climatic conditions, cultural practices, and socio-economic realities, embedding requirements for climate change mitigation and adaptation, circular construction principles, and healthy indoor environmental quality. Adopting a whole life cycle perspective means expanding building regulations beyond design and construction to include housing operation, maintenance, and end-of-life management. Codes and guidelines should incorporate provisions on embodied carbon, operational performance, durability, routine maintenance, and the potential for deconstruction, reuse, or recycling of materials. They should also incorporate provisions for promoting shared housing models such as co-housing, co-living, and intergenerational housing, which have lower environmental footprints while promoting social interaction and community cohesion. Moreover, they should include compliance pathways adapted to heritage-listed and historically protected buildings, enabling energy and resilience improvements such as insulation, glazing, or renewable energy systems to proceed without conflicting with conservation requirements.

141. Regulatory reforms must be accompanied by targeted financial incentives for developers, municipalities, small builders, and households that adopt sustainable solutions, helping to overcome upfront cost barriers and accelerate market uptake. Subsidies, tax rules, and procurement practices should be reviewed to ensure that public incentives consistently reward sustainable performance, while progressively phasing out financing and financial support for buildings that fail to meet minimum environmental standards. Capacity-building programmes for builders, architects, engineers, and public officials are also critical to ensure that local actors have the technical skills needed to deliver sustainable construction at scale. Robust enforcement and monitoring mechanisms are equally important. Strong maintenance frameworks, particularly in public and social housing, can significantly extend building lifespans. Digital permitting systems, performance audits, post-occupancy evaluations, energy audits and tools such as smart meters, intelligent controls, building information modelling (BIM), and building passports can strengthen compliance and improve long-term performance. Together, these measures support the implementation and enforcement of sustainability standards across new construction and retrofitting.

8. **Establish dedicated environmental and resilience frameworks for affordable housing across both the supply and demand sides of the market. This includes setting minimum performance standards adapted to local contexts, prioritizing well-located land, and embedding whole life cycle criteria into procurement and financing.**

142. Affordable housing represents a structurally distinct segment of the housing market that requires dedicated environmental frameworks, rather than the mere extension of general sustainability standards. On the supply side, governments should establish mandatory minimum environmental performance requirements for all publicly funded, subsidized, or regulated affordable housing, covering energy and water efficiency, embodied carbon, climate resilience, circular construction principles, and healthy indoor environments. These standards must be calibrated to local climatic conditions, available materials, and construction capacities, avoiding the transplantation of high-income benchmarks that raise costs without delivering proportionate benefits in lower-income contexts. Site selection criteria for affordable housing programmes should explicitly prohibit the relegation of affordable units to peripheral, poorly connected, or climate-exposed locations, and should instead prioritize well-located land with access to services, public transport, and green infrastructure. Procurement frameworks and developer incentive structures should reward whole life cycle performance rather than upfront cost minimization alone.

143. On the demand side, financial instruments should be designed to make environmentally sustainable affordable housing accessible to low-income households without shifting additional cost

burdens onto them. Subsidies, concessional loans, and voucher schemes should incorporate sustainability criteria while maintaining or strengthening affordability safeguards. Energy and water efficiency measures embedded in affordable housing can substantially reduce households' long-term utility expenditure, and this life cycle savings argument should be systematically integrated into the financial design of affordability programmes. Strong anti-displacement safeguards must accompany any environmental upgrading requirements to prevent sustainability standards from becoming a mechanism for excluding low-income residents from affordable housing markets.

9. Accelerate the large-scale, equitable, and inclusive retrofitting of existing housing stock, including informal settlements. Enhance structural safety, energy and water efficiency, climate and disaster resilience, and healthy indoor environments, while embedding safeguards for affordability, social inclusion, and tenure security.

144. Scaling up equitable and inclusive retrofitting requires comprehensive national and local programmes that systematically improve the structural safety, energy performance, water efficiency, resilience, and health conditions of the existing housing stock. Governments should develop strategies with clear indicators, timelines, and target groups, and establish retrofit standards tailored to local climates, building typologies, and socio-economic contexts. These standards must be paired with mandatory regulations as well as financial instruments – such as grants, low-interest loans, on-bill financing, and targeted subsidies – that reduce upfront costs for low-income households and small landlords. In multi-apartment buildings, governments should support the development of capable aggregator models, such as energy utilities, municipal companies, housing associations, or dedicated retrofit agencies, and enable on-bill repayment schemes that address both financing and building governance barriers simultaneously. Green leases can further support retrofit efforts by aligning the interests of landlords and tenants, and rental housing policies in both private and public markets should be strengthened to safeguard affordability, ensure long-term maintenance quality, and enable energy performance upgrades, explicitly addressing split incentives between landlords and tenants. Governments should streamline administrative procedures and provide technical assistance to support households undertaking retrofits, especially those implementing incremental improvements.

145. Prioritizing retrofitting in informal settlements and low-income neighbourhoods is crucial, as residents often face the highest exposure to climate risks. Social equity should be ensured by embedding strong safeguards in retrofit programmes and regulations, including anti-eviction protections, rent stabilization mechanisms, and requirements that landlords receiving public funds maintain affordability. Integrating community organizations into retrofitting initiatives can also enhance social inclusion and cultural appropriateness. Effective retrofit programmes can reduce energy and water bills, improve indoor air quality, lower exposure to extreme temperatures and climate hazards, and, most importantly, extend building lifespans, thereby reducing embodied carbon emissions and demolition waste, and advancing resilient, inclusive housing transitions.

10. Embed circular economy principles across housing and construction systems. Promote design for longevity, adaptability, and disassembly, scale up reuse and recycling practices, and foster business models that minimize resource extraction, waste generation, and negative environmental externalities across the building life cycle.

146. Advancing circular construction requires reshaping the regulatory and economic incentives of the construction sector so that resource efficiency, durability, and material recovery become standard practice rather than the exception. Governments should adopt design standards that prioritize long-lasting materials, modular and adaptable layouts, and construction techniques that allow components to be easily repaired, repurposed, or disassembled. Mandatory pre-demolition audits, material passports, and digital building logbooks can track material flows and enable reuse at scale. Novel ownership models – such as leasing façade elements or structural components, take-back schemes, and EPR arrangements – can reinforce circularity by making producers responsible for maintenance and end-of-life recovery across decades and by positioning buildings as material banks with traceable flows.

147. To support circular supply chains, governments should expand recycling infrastructure, certify secondary materials, and create physical or digital marketplaces for reclaimed components. Fiscal incentives, including reduced taxes on reused materials and grants for innovation, can further accelerate private sector adoption. Capacity-building programmes for architects, engineers, builders, and public officials are essential to ensure that circular principles are widely understood and applied throughout the sector. Circular construction can lower life cycle costs, stimulate green industries, extend building lifespans, and align the housing sector with environmental sustainability goals.

D. Incremental housing, informal settlements, and collective solutions

11. Support environmentally sustainable and resilient incremental and self-built housing by strengthening tenure security, enabling homeowner- and community-led construction and upgrading through flexible regulation, technical assistance, and finance.

148. Realizing the environmental and resilience potential of incremental housing requires dedicated regulatory, financial, and technical frameworks that enable residents to improve their homes progressively while meeting sustainability standards. These frameworks should be built around homeowner- and community-led execution rather than top-down delivery: when residents and local communities act as the primary decision-makers and managers of their own upgrades, construction quality improves, local capacity and economies are strengthened, and long-term maintenance is secured. Regulatory pathways, including building codes and land use rules, should accommodate incremental approaches through flexible and progressive compliance mechanisms rather than exclusionary requirements that penalize low-income residents or trigger displacement and criminalization. Secure land tenure is a foundational enabler: without it, households lack the security and incentive to invest in long-term improvements, and public programmes cannot effectively target their support.

149. Financial mechanisms should be strengthened to support incremental improvements, including community savings schemes, matching grants, revolving funds, and microcredit accessible to informal-sector workers, calibrated to the pace and scale of self-built construction. Critically, finance and technical assistance should be delivered as an integrated, sequenced model rather than as parallel instruments: advisory support provided before and alongside lending improves construction quality and household safety while building the confidence of lenders historically reluctant to serve self-builders. Technical assistance centres and trained facilitators – including those embedded in community-based organizations – can help residents integrate structural strengthening, sustainable materials, bioclimatic design, and resource-efficient practices into their building processes; such support should attend not only to construction but also to residents' broader well-being and income-generating opportunities. Particular attention should be given to decentralized technologies suited to incremental adoption: solar home systems can provide clean energy access without dependence on grid extension; green roofs can reduce indoor temperatures, manage stormwater, and support biodiversity; rainwater harvesting systems can improve water security and reduce pressure on municipal supply; and waste-to-energy conversion through biogas technology can recover energy from organic household waste while reducing open burning and associated air pollution. Capacity-building programmes should target artisans, local builders, and community facilitators, ensuring that sustainable and resilient construction knowledge is embedded in the communities where incremental housing is most prevalent. These approaches lower long-term maintenance and utility costs, reduce exposure to climate hazards, and generate local economic opportunities, demonstrating that incremental housing, when adequately supported, can be a driver of sustainable urban development rather than a symptom of its absence.

12. Integrate environmental sustainability and resilience into informal settlement upgrading. This includes participatory, multiscale, and multisectoral interventions, nature-based solutions and care-centred approaches.

150. Informal settlement upgrading strategies should be explicitly aligned with national climate mitigation and adaptation frameworks, including NDCs and NAPs, and climate risk assessments should inform the design, sequencing, and targeting of all upgrading interventions. Given the acute climate exposure of informal settlement residents, priority should be accorded to climate adaptation and disaster risk reduction, even as mitigation co-benefits are pursued. Beyond physical infrastructure improvements, interventions should encompass the full range of factors that determine household and community resilience, including exposure reduction, ecosystem restoration, livelihood diversification, and social cohesion.

151. Upgrading strategies must address vulnerability simultaneously at the household, neighbourhood, and city scales. At the household scale, resilience measures should include flood-resistant construction, improved ventilation, and the integration of nature-based solutions such as green roofs and permeable surfaces. At the neighbourhood scale, investments in drainage systems, slope stabilization, green and blue infrastructure, and access routes for emergency response can substantially reduce collective exposure to floods, landslides, and extreme heat. At the city and territorial scale, upgrading programmes must be coordinated with land use planning, risk-informed zoning, and broader infrastructure investment to avoid concentrating new vulnerabilities while addressing existing ones. Mitigation and adaptation strategies should be designed as mutually

reinforcing rather than competing priorities: nature-based solutions, clean cooking technologies, decentralized renewable energy systems, and circular waste management simultaneously reduce greenhouse gas emissions and enhance local resilience.

152. Participatory processes must be structured to actively overcome power imbalances and historical inequities, ensure the meaningful inclusion of women, older persons, persons with disabilities, and other groups disproportionately affected by climate impacts, and generate locally owned solutions with long-term community support. Care-centric approaches, which integrate gender-sensitive design and shared care infrastructure into upgrading, can further ensure that interventions reflect the daily realities of those who carry the greatest care burdens. Crucially, community engagement must be backed by robust institutional frameworks and adequate public resourcing, ensuring that the responsibility for sustainability and resilience is not shifted from governments onto communities themselves. Realizing these investments at scale also depends on addressing the data invisibility that has long constrained finance for informal settlements: granular, georeferenced data – generated through satellite imagery, mobile mapping, and low-cost sensors, in combination with community-collected information – can make settlements and their needs visible to public and private investors. When designed and implemented with this integrated approach, upgrading programmes can reduce poverty, advance climate goals, protect ecosystems, and deliver the full spectrum of adequate housing rights for the communities most at risk.

13. Recognize and support collective housing solutions, including community-led housing and housing cooperatives, as integral components of sustainable housing systems. Acknowledge their contribution to environmental sustainability, resilience, social cohesion, and cultural vitality, and embed them in national policy, financing, and planning frameworks.

153. Collective housing solutions – encompassing community land trusts, housing cooperatives, mutual aid networks, resident-led upgrading initiatives, and the diverse collective, customary, and social tenure regimes recognized within different countries' legal frameworks – deliver environmental, social, and cultural outcomes that market-based and top-down public approaches alone cannot replicate, and must be treated accordingly within national housing systems. By decommmodifying land and housing, these models discourage speculation and displacement, support long-term stewardship of buildings and neighbourhoods, and create the institutional conditions for life cycle thinking, maintenance culture, and incremental improvement. They also encompass traditional and communally managed construction systems, in which the collective organization of building and resource management embodies long-established practices of sustainability, mutual support, and shared stewardship. National housing strategies and urban master plans should explicitly include collective solutions within their delivery models, alongside public and private sector pathways. Regulatory frameworks, including building codes, land use rules, and tenure policies, should be adapted to accommodate community-led approaches, with accessible legal forms for collective ownership, streamlined registration procedures, and compliance pathways that do not impose disproportionate burdens on low-income communities.

154. Dedicated financing instruments – including seed capital grants for cooperative formation, long-term low-interest loans for community-led construction, and blended finance mechanisms that recognize the reduced speculative risk of de-commodified housing – should be designed to reach community-based organizations and grassroots groups that are typically excluded from mainstream financial products. Technical support platforms should assist communities in accessing sustainable materials, integrating bioclimatic design, and meeting evolving environmental performance standards, ensuring that collective housing contributes to national climate goals without imposing unaffordable upgrade costs on residents.

E. Climate-resilient housing and disaster risk reduction

14. Shift from reactive crisis response to proactive climate risk governance. Institutionalize disaster risk reduction across housing systems and urban planning, and establish early warning and preparedness frameworks, with particular attention to the most vulnerable areas and informal settlements.

155. Effective climate resilience in housing requires a fundamental shift in governance orientation, from managing disasters after they occur to systematically reducing risk before they do, spanning the full resilience cycle from early warning and foresight through risk reduction, crisis response, and post-crisis recovery and reconstruction, as called for in United Nations Habitat Assembly resolution 9/2. Governments should institutionalize disaster risk reduction as a cross-cutting objective of housing,

planning, and urban management systems, ensuring that resilience is embedded in policy design, budget allocation, and institutional mandates at all levels rather than treated as an emergency response function. Dedicated national frameworks should explicitly link housing policy to the *Sendai Framework for Disaster Risk Reduction* and ensure that NDCs and National Adaptation Plans incorporate measurable, adequately financed housing-specific resilience targets, including by mobilizing loss and damage finance and international climate adaptation funds to close the investment gap in housing resilience, particularly in the most vulnerable countries and communities.

156. Early warning systems are among the most cost-effective investments in housing resilience. Governments should expand coverage of multi-hazard early warning systems – encompassing floods, storms, heatwaves, fires, and landslides – with particular attention to communities in climate-exposed informal settlements that are frequently underserved by official alert systems. Community-based governance bodies that leverage local knowledge should be integrated with formal systems to improve last-mile communication and response. Community awareness programmes should complement early warning by building understanding of climate risks and safe construction practices through accessible tools such as hazard maps, demonstration projects, and community facilitators that enable genuine two-way information exchange.

157. Disaster preparedness planning must explicitly integrate housing, covering shelter needs assessment, pre-positioned materials and technical capacity, and frameworks for the rapid deployment of temporary shelter that minimizes environmental impacts. Preparedness plans should also anticipate post-disaster material flows, including through protocols for debris management and material recovery. Governments should further ensure that housing resilience extends beyond crisis preparedness to the systematic upgrading of existing housing stock – including through hazard-resistant retrofits, slope stabilization, flood-proofing, and strengthened building envelopes – prioritizing informal settlements and low-income areas where exposure to climate risks is greatest. Regular climate risk assessments, geospatial risk mapping, real-time monitoring of housing vulnerability, and structured community feedback mechanisms should be institutionalized across all scales of urban governance to enable adaptive management. Investing in local housing resilience diagnostics and establishing measurable baselines is essential to ensure that adaptation efforts can be effectively prioritized, targeted, and monitored. National frameworks should also establish explicit legal protections for tenants facing climate-related housing risks, ensuring that residents – particularly in informal and low-income contexts where tenure is most insecure – have access to support and legal recourse when their housing is damaged or rendered uninhabitable by floods, extreme heat, or other climate hazards, and are protected from opportunistic eviction in the aftermath of disasters. Strengthening tenure security incrementally – including through accessible digital and electronic registration systems – can serve as a practical instrument for reducing vulnerability, giving households the security needed to invest in hazard-resistant improvements even where full legal title is not immediately attainable. Proactive risk governance of this kind significantly reduces the human, economic, and environmental costs of disasters, and is far more effective and equitable than reconstruction-focused approaches that restore rather than reduce pre-existing vulnerabilities.

15. Ensure that post-disaster and post-conflict housing reconstruction advances environmental sustainability, climate resilience, and tenure security. Approach the full spectrum of shelter and housing interventions—from emergency shelter to repair and reconstruction—as interconnected components of an inclusive, rights-based recovery process.

158. Post-disaster and post-conflict reconstruction must be treated as an opportunity to advance environmental sustainability and climate resilience rather than restore pre-existing vulnerabilities. Governments and humanitarian actors should integrate environmental standards into all phases of recovery, from emergency shelter deployment through permanent rebuilding, prioritizing repair of partially damaged structures over unnecessary demolition, and locally appropriate, low-carbon materials over imported alternatives. Rubble and debris should be treated as a resource rather than a disposal problem. Governments should operationalize, where feasible, circular rubble management protocols established in preparedness plans, directing construction and demolition waste toward reuse and recycling, and deploying specialized capacity where debris is contaminated or complicated by unexploded ordnance.

159. Tenure security is a precondition for equitable reconstruction. Reconstruction support must not be conditioned exclusively on formal land ownership documentation, as this systematically excludes households with informal or customary tenure from grants and assistance. Fast-track tenure recognition processes and innovative land documentation tools should be deployed rapidly in post-

crisis contexts to identify legitimate beneficiaries and prevent the exclusion of marginalized and Indigenous communities.

160. Reconstruction processes should be community-led and participatory, drawing on locally appropriate materials, construction techniques, and cultural practices to produce more durable, climatically suited, and maintainable outcomes. International actors should align their support with nationally and locally led strategies, ensuring that reconstruction generates local economic opportunities and strengthens community resilience rather than creating dependency.

16. Consider rights-based planned relocation as a last-resort climate adaptation measure. For communities in areas where climate risks cannot be adequately mitigated in situ, ensure that relocation processes are voluntary, participatory, inclusive, and grounded in human rights principles, while safeguarding livelihoods, cultural ties, and tenure security.

161. Planned relocation should be considered only when risk reduction and in-situ adaptation measures have been exhausted or are demonstrably insufficient to protect communities from irreversible climate hazards. Governments should develop dedicated legal and policy frameworks for planned relocation that are clearly distinct from emergency displacement and involuntary eviction, establishing transparent criteria for when relocation is warranted, equitable compensation mechanisms, and robust accountability systems. These frameworks must be grounded in the full spectrum of adequate housing rights – encompassing tenure security, cultural adequacy, access to services, and proximity to livelihoods – and must include strong safeguards against the use of climate risk as a pretext for displacing communities from economically valuable land. These frameworks must also explicitly protect communities from forced eviction driven by insecure housing, land, and property rights, which can leave residents vulnerable to displacement in the name of climate adaptation without adequate legal recourse or compensation.

162. Resettlement areas must be treated as new settlements requiring full spatial and infrastructure planning, not merely as alternative plots. Site selection should be integrated into land-use and territorial planning frameworks, ensuring that receiving areas offer lower hazard exposure, legal tenure, adequate housing, access to livelihoods and social infrastructure, and connectivity to the communities and networks that people depend on. Resettlement housing should be designed with community participation, reflect local climatic conditions and cultural practices, and meet the sustainability and resilience standards applied elsewhere in national housing policy.

163. The full, free, and prior informed consent of affected communities must be the foundation of any relocation process, with sustained engagement from risk assessment through post-relocation monitoring ensuring that both origin and receiving communities participate meaningfully. Relocation processes must actively address power imbalances and historical inequities, and governments must not download responsibility for adaptation onto communities themselves. Social support, including psychological assistance, livelihood restoration programmes, community cohesion measures, and cultural continuity provisions, should accompany physical relocation. Long-term funding mechanisms and governance frameworks that extend beyond typical planning horizons are essential to prevent relocation from generating new forms of poverty and exclusion.

Annex

Key references

The work of the OEWG-H on housing environmental sustainability and resilience was informed by the outcomes of relevant forums, summits, and meetings, including:

The *Buildings and Climate Global Forum*, held in Paris, France, from 7 to 8 March 2024.

The *thirtieth meeting of the Conference of the Parties (COP30) to the UN Framework Convention on Climate Change (UNFCCC)*, held in Belém, Brazil, from 10 to 21 November 2025.

The *Country and Organization-Led Initiative (COLI) Global Summit “Advancing Sustainable Forest-based Bioeconomy Approaches”*, held in Vienna, Austria, from 23 to 25 February 2026.

The *Sustainable Buildings and Construction Summit 2026*, held in Lausanne, Switzerland, from 20 to 22 April 2026.

The *thirteenth session of the World Urban Forum (WUF13)*, held in Baku, Azerbaijan, from 17 to 22 May 2026.

The work of the OEWG-H on housing environmental sustainability and resilience also drew on the following key documents, resources, and publications, among many others:

Buildings and Climate Global Forum: Ministerial Declaration – Declaration de Chaillot (2024). Chaillot, France.

Federal Ministry of Agriculture and Forestry, Climate and Environmental Protection, Regions and Water Management of Austria (2026). *Vienna Call for Action for a sustainable forest-based bioeconomy*. Vienna.

Global Alliance for Buildings and Construction (2024). *10 Whole Life Cycle Recommendations for the Buildings Breakthrough* (27 February). Available at <https://globalabc.org/news/10-whole-life-cycle-recommendations-buildings-breakthrough>.

Global Alliance for Buildings and Construction and One Planet Network (2026). *Scaling Circular Construction to Realize the Right to Adequate Housing for All: Policy Pathways*. Paris.

Intergovernmental Council for Buildings and Climate (2025). *Belém Call for Action for Sustainable and Affordable Housing*. Belém.

Intergovernmental Panel on Climate Change (2022). *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, United Kingdom, and New York: Cambridge University Press.

Intergovernmental Panel on Climate Change (2022). *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, United Kingdom, and New York: Cambridge University Press.

United Nations Environment Programme (2026). *Global Status Report for Buildings and Construction 2025–2026: Building Fast. Falling Short. As climate risks rise and cities grow, we must rethink how we build to create better lives for all*. Paris.

United Nations Environment Programme (2025). *Adaptation Gap Report 2025: Running on empty. The world is gearing up for climate resilience — without the money to get there*. Nairobi.

United Nations Environment Programme (2025). *Global Status Report for Buildings and Construction 2024/2025: Not just another brick in the wall - The solutions exist. Scaling them will build on progress and cut emissions fast*. Paris.

United Nations Environment Programme (2024). *Global Status Report for Buildings and Construction: Beyond foundations – Mainstreaming sustainable solutions to cut emissions from the buildings sector*. Nairobi.

United Nations Environment Programme (2023). *Building Materials and the Climate: Constructing a New Future*. Nairobi.

United Nations, Human Rights Council (2022). *Towards a just transformation: climate crisis and the right to housing – Report of the Special Rapporteur on adequate housing as a component of the*

right to an adequate standard of living, and on the right to non-discrimination in this context, Balakrishnan Rajagopal. 23 December. A/HRC/52/28.

United Nations Human Settlements Programme (2026). *World Cities Report 2026: The Global Housing Crisis*. Nairobi.

United Nations Human Settlements Programme (2024). *World Cities Report 2024: Cities and Climate Action*. Nairobi.

United Nations Human Settlements Programme (2012). *Sustainable Housing for Sustainable Cities: A Policy Framework for Developing Countries*. Nairobi.

United Nations Office for Project Services (2026). *From Rubble to Resource: Guidance for people-centred circular rubble management and reconstruction*. Copenhagen.

United Nations Office for Project Services (2024). *Climate Action Roadmaps for Buildings and Construction: Step-by-step Guidance*. Copenhagen.

United Nations Office for Project Services (2024). *National Circularity Assessment Framework for Buildings*. Copenhagen.