

SUSTAINABLE HOUSING ADDRESSING SCP IN THE HOUSING SECTOR

SCOPING STUDY - EXECUTIVE SUMMARY



SUSTAINABLE HOUSING

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ABBREVIATIONS

ASEAN	Association of Southeast As
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BEE	Bureau of Energy Efficiency
BIM	Building Information Modelli
C&D	Construction and Demolitior
CCAC	Climate and Clean Air Coali
EE	Energy Efficiency
EU	European Union
GDP	Gross Domestic Product
GHG	Greenhouse Gas Emissions
IBS	Industrialised Building Syste
IEA	International Energy Agency
KyrSEFF+	Kyrgyzstan Sustainable Ene
MEPS	Minimum Energy Performan
NDCs	Nationally Determined Cont
NUA	New Urban Agenda
RE	Renewable Energy
SCP	Sustainable Consumption a
SCPF	SWITCH-Asia Sustainable (
SDGs	Sustainable Development G
UK	The United Kingdom
UNDP	United Nations Developmen
UNEP	United Nations Environment
UN-Habitat	United Nations Human Settl
UNIDO	United Nations Industrial De
UN WSSD	World Summit on Sustainab

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EXECUTIVE SUMMARY

CONTEXT

Over the last decades, Asia has been through a process of robust economic growth, driven especially by countries such as China, India, Japan and South Korea. In 2017, the Asia and Pacific region accounted for 42.6% of the global gross domestic product (GDP), compared to a share of 30.1% in 2000 (Asian Development Bank 2018). This development has been accompanied by rapid and large scale urbanisation. Between the periods of 1950-1975 and 1975-2000, Asia's urban population more than doubled, and the trend is projected to continue in the next years, as the current quarter century (2000-2025) will lead to an estimated addition of 1.1 billion people to Asia's urban areas (UN-Habitat, UN ESCAP 2015). This remarkable rate of urbanisation along with rapid economic growth is one of the major driving forces influencing consumption and production patterns in the region. Conservation of resources becomes a key topic, as lifestyles change and consumption patterns become more unsustainable and environmentallydamaging. Material consumption in Asia has increased strongly in the last four decades, accounting for more than half of the global consumption in 2015 (UNEP 2016).

Despite the many and varied reasons for rapid urban growth, most Asian cities face similar challenges to quickly adapt to the rising urban population and to develop adequate solutions for housing, transportation and basic services. According to UN-Habitat, the construction of affordable housing has not matched the urban growth in Asian cities, with the exception of Singapore and Hong Kong (UN-Habitat 2011). What is more, an average of 28% of the urban population resides in informal settlements (UN-Habitat 2015). Although the proportion of urban population living in slums has fallen in most regions in Asia in the past decades, informal housing is still prevalent and many challenges remain for the provision of adequate housing. As further economic expansion, population growth, and corresponding changes in living standards and lifestyles are expected to occur over the upcoming decades, it is crucial to consider the environmental, social, cultural and economic component of housing to ensure sustainable development.

Housing and housing policy play a fundamental role as they shape cities worldwide and, in many cases, produce fragmentation, inequalities and environmental impacts. The future of urbanisation will therefore depend on how countries and cities position housing as a priority in the public debate around sustainable development (Kacyira 2016). Different facets come into play, when discussing "sustainable housing":

"Housing as an essential component of the built environment, a constituent of social development, an important economic sector and an entity that uses natural resources (including labour power) and produces energy and waste, its development certainly affects the ecological, economic, social and cultural sustainability of a place." (Chiu 2003, p. 224)

To address key challenges related to urbanisation, climate change, affordable housing, energy efficiency, clean energy and poverty reduction, sustainable housing shall combine all four sustainability dimensions (i.e. environmental, social, cultural and economic) and thus, pursue a more holistic approach:

"Along with the solutions for the built environment (resource and energy efficiency, environmental, ecological and health safety, resilience to natural disasters), sustainable housing policies should deal with the affordability, social justice, cultural and economic impacts of housing, and contribute to making healthy residential neighbourhoods and sustainable cities." (UN-Habitat 2012, p. 1)

The importance of the housing sector for sustainable development as well as climate change mitigation and adaptation efforts is also recognised by the key policies that compound the international agenda, such as the UN Sustainable Development Goals (SDGs), the Paris Agreement and the New Urban Agenda (NUA). Within the interconnected framework of the SDGs, the most relevant goals for the building sector and more specifically sustainable housing are Goal 11 "Sustainable cities and communities" and Goal 12 "Sustainable Consumption and Production". Besides, the building sector plays a key role in the joint international climate effort established by the Paris Agreement, being explicitly mentioned in 136 out of 194 Nationally Determined Contributions (NDCs) that have been submitted by signatory countries. Nevertheless, concrete policy actions, targets and measures to reach these ambitions are lacking in most submissions. Several key areas including space cooling, building design, and vertical integration are particularly under-addressed (UNEP 2018; UNEP and IEA 2018).

In addition to the potential of the housing sector to encourage sustainable development, the importance of sustainable consumption and production (SCP)

was first recognised internationally at the 1992 topics of affordable housing, district development, United Nations Conference of Environment and and the countries' building and sustainable housing Development in Rio de Janeiro (UN 1992). Later, at objectives within the NDCs to the Paris Agreement the World Summit on Sustainable Development (UN and the UN SDGs underpinned the analysis. This in-WSSD 2003), the Johannesburg Declaration identified depth assessment has been performed for ten focal SCP as one of the three overarching objectives of countries, i.e. China, India, Kazakhstan, Kyrgyzstan, sustainable development, together with poverty Malaysia, Mongolia, Nepal, Pakistan, Sri Lanka and eradication and the management of natural resources Thailand, which have been selected by the SCPF due to advance social and economic development. to their sector focus and priorities. In addition, further Research conducted on consumption patterns and research on the current state of SCP in other SWITCHlife cycle analysis has identified housing, along with Asia countries has been performed which confirmed food and transport, as a key area where consumption the overall view captured in the focal country analysis. has the highest impact on the environment (UNEP In order to identify and compare the SCP progress 2015). In these sectors, the consumption of water and energy, the generation of waste and the greenhouse across the focal countries, a set of indicators has gas (GHG) emissions affect and are affected by been defined. The indicators took into consideration almost every lifestyle domain. Within the context of the different stages of the building value chain as well SCP, housing thus plays a critical role as part of a as the overarching topics. Based on their relevance production system that represents considerable use for the context of sustainable housing, both qualitative of resources and major environmental consequences. and quantitative indicators have been selected and How people live, where they live and how their living applied to the focal countries. Each indicator has been spaces are built all have social and environmental ranked on a scale from 1 to 3, with 1 representing low effects, beginning at mining, with the extraction of raw SCP potential and 3 high SCP potential. As SCP has not received much attention in the field of housing, materials for the production of building materials, and ending with the demolition of the building at the end of this evaluation offers crucial insights regarding the its life cycle and the disposal of the waste. Given the differences and similarities of SCP approaches magnitude of the urbanisation process of Asian cities pursued in the Asian context. and the changes of society's consumption patterns caused by the economic growth of the region in recent decades, it is fundamental to look at the Asian SUSTAINABLE HOUSING ALONG THE housing sector, as it has the potential to drive green **BUILDING VALUE CHAIN** and resource efficient practices in the construction industry and promote sustainable development in the Within the building lifecycle, different processes are region.

OBJECTIVES AND METHODOLOGY OF THE ASSESSMENT

By recognising the relevance of housing in the context of sustainable urban development and SCP patterns in Asia, the SWITCH-Asia Sustainable Consumption and Production Facility (SCPF) has commissioned a study with the aim to provide a comprehensive overview of the current state, trends and gaps of SCP in sustainable housing in Asia and to identify critical issues with the need for further action. In order to determine topic areas which reflect the most pressing issues, the study has examined housing along the different stages of the building value chain, i.e. material production, design and manufacturing, construction, usage and recycling with a particular focus on the policy environment, technology & architecture, standards, guidelines & rating systems and access to finance. Besides the lifecycle stages, the overarching

responsible for consuming a variety of resources, such as raw materials, energy, land and water, for emitting GHGs and other pollutants into the air, water or soil; as well as for generating waste and land coverage alterations. Therefore, it is crucial to consider the impacts of the housing sector across the different stages of the building value chain, as each of them uses specific resources causing different kinds of emissions and consequences to the environment. The following priority issues and emerging topics of sustainable housing in the context of SCP have been identified for the respective stage of the building value chain in the assessed Asian countries.

MATERIAL PRODUCTION

Within this stage, one of the most pressing topics emerging in Asia regards the rising extraction of sand for cement production, as well as the cement industry itself, which is responsible for major emissions and environmental problems in the region. Progress has been made by local governments in recent years with the implementation of more rigorous policies and regulations for raw materials extraction and building materials production (The Third Pole 2017). Particularly China, which has become the world leader in cement production and consumption (Hasanbeigi et al. 2017), has placed significant efforts in defining energy efficiency goals for the cement industry and shifting production methods to more advanced and sustainable practices. Besides, technological advancements in the mining and heavy industry contribute to decrease the environmental and social impacts of these sectors, for instance through the production of manufactured sand for cement production (Eco-business 2018), the implementation of environmentally friendly limestone production processes (ASEAN 2017) and the development of cleaner and cost effective brick kiln technologies (CCAC 2018). In Kazakhstan, progress has been made in the field of intelligent mining in the past decade: live data through cutting edge technology is used to monitor mines and equipment and consequently, increase efficiency (Financial Times 2016). In the near future, it is expected that policies will arise to further promote a broad implementation of digitalisation in the mining sector.

DESIGN / MANUFACTURING

A common issue for developing countries in Asia is the dependence on foreign materials, layouts, methods and business models for building design and construction which are often energy inefficient and inadequate for local climatic conditions and social needs. Traditional vernacular architectural practices can provide valuable contributions to present approaches of sustainable construction, allowing to apply design elements that are adequate to the local conditions and available resources. Sustainability of vernacular design solutions is determined by the consideration of the environmental context, the use of resources available on site, traditional local technologies and the involvement of the community (Oliver 2006). The traditional Malay house, for instance, is built with the floor raised above the ground to avoid dampness and flush flood as well as with many openings that allow for ventilation to cool the inner areas. Moreover, within this lifecycle stage, energy building codes and green building rating systems play a key role in encouraging green building practices. Developments in this regard take place at different pace in Asian countries, with some countries such as China having established a mandatory code for all building types whereas others such as Mongolia do not have any standards in place. In addition, different financial schemes have been initiated in recent years such as Thailand's Energy Efficiency Revolving Fund to stimulate the market for sustainable housing or the Kyrgyzstan Sustainable Energy Efficiency Financing Facility (KyrSEFF+) to provide funding and technical support for importing sustainable technologies and enhancing residential energy efficiency (Frankfurt School - UNEP 2012; KyrSEFF 2017).

CONSTRUCTION

Within the construction stage, the utilisation of local abundant resources presents an opportunity for Asia's construction industry to go beyond conventional materials like brick and cement, and reduce the environmental impacts associated with their production. Bamboo, for example, has been historically used as a building material in South- and South-East Asia, and offers a wide range of advantages for prevalent construction practices (Rashid and Rahat Ara 2015). Moreover, alternative and innovative applications gained space in Asia's construction industry, such as Industrialised Building Systems (IBS) which result in reduced construction time, costs and waste generation. To foster the specification of green building materials and the application of more sustainable construction programmes and corresponding guides/directories. Moreover, programmes have been initiated to promote and inform about innovative, cost-effective and environmentally-friendly building materials. In Kyrgyzstan, for instance, technical manuals have been developed and disseminated as part of an United Nations Industrial Development Organization (UNIDO) programme to raise awareness about sustainable construction materials and job creation in this field (UNIDO 2014).

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The lifecycle stage of usage is usually the longest phase along the value chain and many major urban environmental challenges are related to it, as for instance, the lowering of the groundwater table as well as the pollution of the soil and water bodies. Despite the regulatory and technological advancements made in the last decades, many cities in Asia still struggle to provide basic services and face challenges in dealing with water management and increasing volumes of municipal solid waste. Nevertheless, cases of successful implementation of water policies, as in Beijing, China, demonstrate the importance of regulatory efforts to avoid the overexploitation of groundwater resources and foster more conscious water consumption patterns (Global Water Partnership 2015). Besides, initiatives and programmes on waste collection try to raise awareness and change behavioural patterns. For instance, through the installation of Smart Collection Points in the municipality of Ulaanbaatar in Mongolia, the population of Ger areas is able to access basic services of waste disposal (Archdaily 2016). Turning the attention also to the consumption of electricity, Minimum energy performance standards (MEPS) and energy performance labelling for appliances and equipment are the two most widely utilised programmes to allow for informed consumption decisions and to stimulate market transformation towards more efficient products. Subsidies are also being used to encourage citizens to replace their older, inefficient household appliances with new, efficient technologies. For instance, a 10% discount on new refrigerators has been granted by the United Nations Development Programme (UNDP), government and appliance companies in Kazakhstan to incentivise the replacement. Thousands of flyers were distributed through a 2018 campaign, resulting in increased sales of A++ refrigerators and 279 large-scale appliances being properly recycled over the course of only two months (UNDP 2019).

RECYCLING

Recycling refers to the final stage of a building's lifecycle, when its structure is dismantled or demolished to give place to new construction. The intense urbanisation during the last decades has posed many challenges in Asia regarding the management of construction and demolition (C&D) waste, which accounts for approximately 25%-35% of the Municipal Solid Waste in the region (UN Environment 2017). Still, the sector has not received much attention in Asian countries and the policy environment for C&D management is still very incipient. Nevertheless, efforts have been made to regulate the collection and correct disposal of C&D waste and to foster technological developments for its recycling and reutilisation. Solid waste transfer stations where not only municipal solid waste but also C&D waste can be collected and recycled are increasingly established. Moreover, Recycled Aggregate Concrete is, for instance, a promising opportunity for C&D waste management that still lacks more organised efforts to be widely applied in Asia.



SOCIAL AND ENVIRONMENTAL ASPECTS OF SUSTAINABLE HOUSING

Apart from the building lifecycle, additional overarching themes are fundamental when assessing sustainable housing in the context of SCP. They should complement the lifecycle assessment and allow for a broader reflection on the subject matter, going beyond SCP and covering further social and environmental facets.

As the region is one of the most vulnerable to climate change, adaptation efforts are highlighted in most of the NDCs as a priority for sustainable development. China and India are among the highest emitters in the region, thus having established ambitious targets for emissions reduction with a particular focus on energy efficiency measures in the building sector. Similar to the NDCs, the level of detail of the building or sustainable housing goals in the country strategy's to achieve the UN SDGs, vary broadly across countries. While Malaysia, for instance, aims to improve the access to affordable housing, Mongolia does not address housing or SCP programmes as part of its priority actions.

By taking a closer look at affordable housing developments, a variety of successful programmes and policies to address the growing demand for housing, especially for low income groups have been initiated. Some countries have focused on the direct provision of housing by the government, as in the case of Mongolia where the real estate market experienced a late boom in the early 2000s. In Kyrgyzstan, a strategy to provide affordable housing under the "Development Program of the Kyrgyz Republic for the period 2018-2022" was set up to support dwelling purchase through low-rate mortgages, incorporating modern energy services (Kyrgyz Republic 2018). However, the programme has been criticised by parliament deputies and experts for being unaffordable and poorly implemented (The Times of Central Asia 2019). Despite its downfalls, it can serve as an example and jumping-off point for more comprehensive and well planned affordable housing programmes. Other countries have supported the private sector to build adequate housing structures. In China, for instance, the housing sector has shifted towards a market-oriented approach over the last 30 years by developing and regulating the real estate market and increasing commodity housing supply. However, housing affordability remains a challenge in urbanised Asia, with the high prices for housing affecting also the middle-income groups and the limited options for housing finance posing a barrier to bear the high initial costs. Besides programmes that focused on adding to the formal housing stock, many governments in Asia have invested in slum upgrading programmes, as in the case of Thailand, where the Baan Mankong Programme has achieved improvements for social, economic and environmental conditions in informal settlements (CODI 2019).

As environmental considerations also gain space in more integrated and holistic urban planning approaches, the concept of eco-cities has grown in Asian countries as a way for the region to develop urban areas that are gentler to the natural environment and provide their inhabitants with better health and life quality. Different approaches to eco-cities/district development have been developed in Asia in the last decade, especially in China, where a strong eco-city development agenda has been put in place with the selection of 100 new urban areas for the development of eco-city projects. The implementation of this agenda has experienced many hurdles, especially with regards to the lack of indicators and parameters to define what should be achieved by these new urban areas in terms of sustainability. Other initiatives across the region have focused on an ecological approach to urban planning and on encouraging energy efficiency, water resource efficiency, and waste management, such as in the example of the Putrajaya Green City plan in Malaysia (Putrajaya Corporation 2013) or the One Bangkok district project in Thailand (One Bangkok 2019). Kazakhstan is boosting green districts in cities such as Almaty, Nur-Sultan and Aqkol which has become the first smart city of the country. The development of macro-regions is outlined in a complex scheme of urban planning strategies. These districts - once fully completed - will integrate features such as dense residential quarters, waste to energy plants, certified green buildings, energy efficient street lighting, rainwater storage and green corridors, to name only a few (UNEP 2019).

INTERNATIONAL BEST PRACTICES

In the last decades, there have been considerable developments in the fields of green and resource efficient housing and sustainable urban planning around the globe. The following selected examples provide additional inputs on general SCP trends with replication potential in the SWITCH-Asia countries. While some of these practices require higher political commitment and investments in technological development (such as standards), others can be more simply undertaken by industry stakeholders (such as online platforms for second hand materials).

Table 1: Overview of international best practices replication potential in SWITCH-Asia countries

Best Practice Example	
Cement production in the EU Material Production	Co-processing u and replacing ra 2018).
The German Energy-Efficiency Housing Standard Design/Manufacturing	Funding scheme incentivise that r requested by the 2018).
Singapore BCA Green Mark	The Building and rating system co incentives in its
UK's Green Guide to Specification Construction	Guidance and in environmental p Life Cycle Asses
Capacity building for safer construction in Nepal Construction	Capacity buildin construction as Code (Guragain
U.S. Energy Star and Energy Guide Usage	Strong legal bas evaluation and r U.S. (Zhou & Kh
Superuse and the Harvest Map in the Netherlands Recycling	Design approact platform and ma and components (Mezzi 2018).
Star Apartments, Los Angeles, U.S. Affordable Housing	Model of suppor provision, but or support, permar formerly homele
Hammarby Sjöstad Project, Stockholm, Sweden District Development	Re-development comprising hous ambitious sustai



Table 1: Overview of international best practices in the field of SCP sustainable housing with

Description

uses municipal solid waste for both generating energy aw materials in cement production (CEMBUREAU

he by the state-owned development bank KfW to new housing is built more energy efficient than he legislative minimal standards (KfW Development Bank

nd Construction Authority (BCA) Green Mark building ombines ambitious green building targets and financial comprehensive framework (Solidiance 2016).

nformation for architects and developers on the performance and impacts of building materials through essment (BRE Centre for Sustainable Products 2015).

ng and awareness raising on earthquake resilient part of the implementation of the National Building n et al. 2018).

sis, flexible and quick revision processes and consistent monitoring of the energy labelling programmes in the hanna 2017).

ch to promote circular economy as well as online arket place for redundant and second hand materials ts available in the area adjacent to the project site

rtive-housing which focuses not only on housing n creating architectural structures that offer safety, nence, independence and a sense of community to ess individuals (Kilston 2014).

nt of a declining industrial district into a mixed-use area sing, commercial areas and recreational spaces with anability goals (Modarres-Sadegui & Konstari 2015).

SCP PROGRESS IN SUSTAINABLE HOUSING IN SELECTED ASIAN COUNTRIES

With the help of a set of indicators, the SCP progress of the focal countries (i.e. China, India, Kazakhstan, Kyrgyzstan, Malaysia, Mongolia, Nepal, Pakistan, Sri Lanka and Thailand) has been identified. Both the overall country results as well as the scores achieved per SCP category are visualised in Figure 1. Sri Lanka achieves both the highest overall rating and highest category ratings for both construction and usage, while Thailand and India follow closely behind on the overall ranking. Sri Lanka ranks highly on the grounds of a number of progressive instruments: for example, a National Construction Policy which puts the strengthening of sustainable development and the reduction of negative environmental impacts at the forefront, a Presidential task force specifically designed to encourage visibility of energy efficiency in the residential building sector as well as the promotion of water conservation through television and radio advertisements, school programmes and print media. Similar to Sri Lanka, India's highest score is reached in the category of usage with the help of extensive information programmes on the conservation of energy and water, a corresponding national SCP policy under development and an existing labelling scheme for appliances from the Bureau of Energy Efficiency (BEE). In turn, Thailand ranks first in the general category, where overarching policies such as the National Sufficiency Economy Policy towards the SDGs, and National Economic and Social Plans with specific measures to strengthen building codes and support GHG mitigation have been introduced.

Figure 1: Total ranking of focal countries by SCP category



Many valuable lessons can also be learned from the experience of countries like Kazakhstan, Malaysia and Pakistan, which fall in the middle of the ranking. Malaysia, for instance, performs the highest in the category of design and manufacturing, due its well-developed Green Building Council and Index, an online government-supported portal for BIM guidelines and green material product directories. In turn, Pakistan excels in the category of material production with a National Mineral Policy that outlines the importance of environmental, social and economic sustainability and comparatively low levels of raw materials use, mineral depletion and fossil fuel depletion. Kazakhstan performs well in most categories as many of its policies are generally guided by a plethora of constantly-updated policy frameworks and strategies which incorporate SCP as an underlying theme; often providing specific objectives for the housing sector. Some examples of such frameworks and guidelines include the Strategy on Sustainable Development for 2007–2024, Energy Efficiency 2020 Programme, Strategy "Kazakhstan

2050," Concept on "Transition to Green Economy," among other overarching policies. Sharing the score for third-lowest raking of the focal countries analysed in the assessement are Nepal and China. Although performing well, especially regarding the legislative environment, China ranks the lowest in the category of material production due its high consumption of raw materials, fossil fuels and minerals and the lack of effective policies in the mining sector. With a 20 points difference, Mongolia ranks behind Nepal and China due to generally low sustainable standards for buildings which is reflected in the low performance within the design and manufacturing category. Finally, Kyrgyzstan brings up the rear: it achieves the lowest ranking in almost all categories, except for material production and design & manufacturing. Without a Green Building Council, green building rating system, national policies related to SCP for the construction sector or energy use in buildings - all while attempting to restructure their policies after a power shift - there is much room for further progress.

CONCLUSION AND RECOMMENDATIONS

Overall, the study shows that considerable efforts in the field of SCP in sustainable housing have already been made in most focal countries, ranging from affordable housing programmes, government level approaches to eco-city development and incentives for urban building energy efficiency or energy efficient appliances to awareness raising campaigns for energy and water conservation. However, challenges remain, especially in the areas of material production and recycling, i.e. at the beginning and at the end of the building lifecycle. This is due to a lack of policies for energy intensive industries such as cement, low uptake of smart mining practices as well as a lack of reuse of C&D waste. Moreover, existing standards are often not enforced or complied with and financing options are rare, especially for lower-income groups.

Through the comprehensive analysis performed, priority topics in the current SCP debate related to sustainable housing have been identified which have not received much attention so far but are critical to foster sustainable development along the whole building value chain. Thus, the following topics areas are recommendations on the basis of the assessment with the need for further action. Overarching topics related to affordable housing, district development as well as connecting housing with SDGs and NDCs shall be addressed across all topic areas. Joint efforts are required to collectively discuss and promote (holistic) approaches and strategies that respond to these critical issues and trigger the scale-up of sustainable housing across Asia.

Table 2: Recommended priority topics relating to SCP in sustainable housing

Focal areas	Identified critical issues
Policy environment	 Policies for energy-intensive industries such as cement, including specific objectives, particularly for the extraction of sand and gravel. Policies promoting sustainable practices in the design and construction stage, such as application of BIM, mandatory requirements for building components; Policies on water efficiency and conservation & waste generation and management, such as requirements for storm water collection and regulations on C&D waste.
Technology & architecture	 Environmentally friendly materials and technologies for material production and construction, such as fly ash, manufactured sand and semi open cut mining method for limestone production; Vernacular architecture: use of local resources (such as bamboo, sheep wool and straw bale) and traditional ways of construction (such as Malay house, Yurt and Ger areas); New design/construction approaches, such as intelligent mining, modular design, BIM and industrialised building systems; Waste and recycling concepts, such as digital platforms to reuse waste materials of all kinds, smart collection points/recycling stations for construction and household waste, waste-to-energy approaches.
Standards, guidelines & rating systems	 Energy building codes, green building rating systems and green building materials certification to upscale sustainability practices in the housing sector; particularly addressing effective measures for implementation, compliance and enforcement; MEPS and labelling for appliances; Guides/directories for architects and developers to compare products using lifecycle assessment, environmental criteria, etc.
Access to finance	 Concessional finance mechanisms, such as soft loans, grants, revolving funds, energy performance contracting for green construction; combination of financial incentives with building standards; Community-based savings and loans schemes, such as funds for settlement upgrading; Regulatory and fiscal incentives, such as subsidies for green construction and retrofits, upgrading to EE appliances; RE off-grid applications; tax/import duty reduction/exemption for green building materials.

Affordable Housing	District Development	
Slum upgrading programmes Housing programmes targeting minorities Bottom-up approaches led by the communities Financing schemes	 Integrated urban planning approaches: solutions for energy, waste, water, sewage, mobility, health, etc. Community-centred approaches 	

Connecting housing with SDGs and NDCs

Country objectives and actions on housing in the scope of the global agenda setting process.

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