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Review of the implementation of the 2030 Agenda for Sustainable Development in Asia and the Pacific and issues pertinent to the subsidiary structure of the Economic and Social Commission for Asia and the Pacific: energy

Promoting just energy transitions to support sustainable urban development

Note by the secretariat

Summary

Continuing urbanization is one reason why Asia and the Pacific consumes more energy than any other region. Promoting just energy transitions is therefore crucial for achieving sustainable urban development, which represents an ongoing, complex and multisectoral challenge for members and associate members of the Economic and Social Commission for Asia and the Pacific. Implementing such transitions involves rapidly transforming technologies and systems used to supply energy, deploying smart grids and changing behaviours. As urban areas are expected to contribute significantly to the growth in the demand for energy, choices regarding urban infrastructure, building regulations, transport planning, and water and waste management must be aligned with national sustainable energy goals, the targets under Sustainable Development Goal 7 (Affordable and clean energy) and the Paris Agreement.

In implementing just energy transitions, Governments need to develop policies and strategies that balance the needs of communities, including vulnerable groups, with the need to maintain a healthy environment and a strong economy. The secretariat has supported members and associate members in addressing the urban energy challenge, including in respect of city-level Goal 7 road maps, national cooling action plans and passive cooling strategies. Additional efforts and greater regional cooperation are needed to support members and associate members in confronting the challenges before them.

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I. Introduction

1. The Asia-Pacific region is currently undergoing a period of unprecedented urbanization, a transformation that has significant implications for energy consumption, environmental sustainability and socioeconomic development. This is a profound and unprecedented shift in the pattern of human habitation. The process of urbanization and the choices made regarding infrastructure, spatial planning and technologies will lock in energy consumption and greenhouse gas emissions for decades and shape the speed and direction of the energy transition, which will have an impact on the region's sustainable development and the well-being of the population.

2. Globally, urban areas account for 56 per cent of the world's population (4.4 billion urban population in 2023)[1] but account for 60 to 80 per cent of energy consumption and 75 per cent of greenhouse gas emissions.[2] The concentration of human activities into smaller areas through urbanization is not, by its nature, inconsistent with sustainable and low-carbon development. Higher-density urban settlements such as apartments can have greater energy efficiency. Public transport and integrated land-use planning can have great scope to reduce transport emissions in urban areas. Greater urban densities can enable the economies of scale needed for the shared use of resources such as vehicles or office space. Hence, sustainable urbanization policies and frameworks present many opportunities to build lower-carbon societies through well-planned cities with efficient building, transport and waste management infrastructure.

3. In parallel with the urbanization trend, the region faces growing climate risks. City dwellers find themselves exposed to these impacts. Rising global temperatures, increasing sea levels and the intensification of extreme weather events are already having marked impacts.

4. Addressing these interconnected challenges requires a multifaceted approach that prioritizes reducing urban energy demand and the decarbonization of energy systems, while ensuring equitable outcomes for all segments of society. A just energy transition – one that integrates social, economic and environmental considerations – is essential to achieving this balance. Such a transition involves not only improved energy efficiency and a shift away from fossil fuels. It is also necessary to ensure that changes to energy technologies and systems promote inclusivity, resilience and innovation within urban landscapes.

5. Equity and inclusivity are central to the concept of a just energy transition. Marginalized groups, including low-income households, women and Indigenous communities, often bear the brunt of the environmental and socioeconomic challenges associated with urbanization. It is necessary to ensure that vulnerable populations, often the most affected by socioeconomic disruptions and climate impacts, are protected and empowered throughout the transition process.

[1] World Bank Group, "Urban development", 3 April 2023.

[2] United Nations, "Goal 11: Make cities inclusive, safe, resilient and sustainable". Available at www.un.org/sustainabledevelopment/cities/ (accessed on 4 February 2025).

6. Given the outsized role that cities play in the consumption of energy rather than its generation, many urban clean energy solutions are to be found in the more efficient use, distribution and storage of energy.

7. The alignment of urban development strategies with global frameworks such as the Paris Agreement and the 2030 Agenda for Sustainable Development is critical to ensuring the success of the Asia-Pacific urban transformation. With regard to the Paris Agreement, the goal of limiting global warming to below 2°C above pre-industrial levels necessitates a rapid and far-reaching transition in energy systems. Urban areas, as hubs of economic activity and innovation, are uniquely positioned to lead this transformation. By adopting policies and practices that prioritize renewable energy, energy efficiency and sustainable urban planning, cities can serve as models of climate action and sustainable development.

8. In the 2030 Agenda, the importance of integrating social, economic and environmental objectives into urban planning is further underscored. Sustainable Development Goals 7 (Affordable and clean energy), 11 (Sustainable cities and communities) and 13 (Climate action) provide a framework and targets for addressing the complex challenges of urbanization in the Asia-Pacific region. By fostering partnerships between Governments, businesses and civil society, these Goals can be translated into actionable strategies that drive progress towards sustainable and inclusive urban futures.

9. The role of technology and innovation in driving a just energy transition cannot be overstated. Advances in renewable energy technologies, energy storage systems and smart grid solutions are revolutionizing the way energy is produced, distributed and consumed. Similarly, the use of artificial intelligence and data analytics to optimize energy use and predict maintenance needs can enhance the efficiency and reliability of urban energy systems.

10. Strong governance frameworks and institutional capacities are equally important. Policy coherence and coordination must be prioritized at all levels of government to ensure that energy, urban and climate policies are aligned. This includes: setting ambitious renewable energy and energy-efficiency targets; establishing performance standards and carbon-pricing mechanisms; and providing incentives for sustainable practices. International cooperation and knowledge-sharing can also play a pivotal role in accelerating the transition to sustainable urban development.

11. Financing is another critical component of a just energy transition. The scale of investment required to transform urban energy systems and infrastructure is substantial, necessitating the mobilization of both public and private resources. Innovative financing mechanisms, such as thematic bonds, public-private partnerships and climate funds, can help bridge the funding gap and drive investment in clean energy and sustainable urban projects. In addition, international financial institutions and multilateral development banks can provide technical assistance and capacity-building support to ensure that investments are effectively utilized.

12. The potential benefits of a just energy transition integrated with sustainable urban development are enormous. This approach can enhance climate adaptation, introduce economic opportunities, improve public health and foster social inclusion. By transforming urban areas into hubs of innovation, resilience and inclusivity through a combination of urban development and sustainable energy, the Asia-Pacific region can pave the way for a more sustainable and equitable future.

II. Regional trends in urban development, energy transition and climate change

13. Urban development, energy transition and climate change are deeply interconnected. The global emphasis on sustainable urbanization is encapsulated in frameworks such as the New Urban Agenda, adopted at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) in 2016, which promotes inclusive and sustainable cities.[3] This Agenda is closely aligned with the Sustainable Development Goals. Urban centres play a pivotal role in advancing the Goals, in particular with regard to poverty alleviation (Goal 1), access to modern and clean energy (Goal 7) and climate action (Goal 13). These Goals are central for addressing the challenges posed by energy transition in rapidly urbanizing areas, as cities are at the forefront of population growth, resource consumption and environmental impact.

A. Urbanization and energy transition

14. Urban areas are hubs of economic activity, innovation and cultural exchange, but they also account for over half of global greenhouse gas emissions. Rapid urbanization has intensified the demand for energy, transport and housing. This growth, while an essential input to economic development, also poses significant challenges in terms of sustainability and equity.

15. One of the pressing issues is energy poverty in informal settlements of urban areas. These settlements often operate outside regulated urban planning frameworks, exacerbating energy inequities such as access to electricity, cooling and clean cooking. Addressing energy poverty requires an integrated approach that combines renewable energy deployment with urban planning initiatives. For example, clean cooking technologies, microgrids, rooftop solar panels, passive cooling designs and energy-efficient housing can significantly enhance energy access in underserved urban areas.

16. Transport is another area where urban energy dynamics are important. Energy intensity in transport varies significantly across regions. Many fast-growing cities in the region face severe traffic congestion.[4] This not only results in economic losses but also contributes to excessive fuel consumption and greenhouse gas emissions. Transitioning to low-carbon transport systems, including electric vehicles, public mass transit solutions, active mobility and non-motorized transport infrastructure, is essential for reducing urban energy intensity.

B. Urban heat island effect

17. Across many cities of the Asia-Pacific region, the urban heat island effect is accentuated by the increased frequency and severity of heatwaves. This results in a greater reliance on air conditioning powered by electricity, which in turn increases energy demand and greenhouse gas emissions.

18. Consequently, urban resilience has become a cornerstone of climate adaptation strategies. Resilient urban infrastructure must incorporate climate-smart technologies and practices. For example, green roofs, permeable pavements and urban forests can mitigate urban heat islands, reduce building

[3] See https://unhabitat.org/habitat-iii.

[4] *Review of Developments in Transport in Asia and the Pacific 2024: Transition towards Sustainable Transport Solutions* (United Nations publication, 2024).

energy demand and enhance water management. Simultaneously, transitioning to low-carbon energy systems, such as efficient buildings, solar and bioenergy, can reduce urban emissions while supporting energy security. However, the implementation of these solutions requires robust governance frameworks, financial investment and community participation.

C. Regional disparities in energy access and climate vulnerability

19. Regional disparities in energy access, consumption and pricing highlight the unequal burden of energy transition. For example, in India, energy poverty[5] rates are higher than income poverty rates. In urban areas, 28 per cent of households experience energy poverty while 20 per cent experience income poverty.[6] This financial strain is even more pronounced among low-income households, further deepening urban inequalities. In contrast, urban areas in countries such as Bhutan and Sri Lanka have achieved near-universal energy access, demonstrating the potential of targeted policies and investments.

20. Urban population density and per capita energy use also vary widely across regions. High-density cities can exhibit lower per capita energy consumption compared with many sprawling urban centres in comparable countries. Compact urban development, supported by efficient public transport and mixed-use zoning, can reduce energy demands and enhance sustainability. However, achieving this requires overcoming challenges such as land-use conflicts, the presence of informal settlements and inadequate infrastructure.

D. Social dimensions of urban energy transition

21. Energy transition in urban areas must prioritize social equity to ensure that no one is left behind. Vulnerable populations, including low-income households, migrants and informal workers, often miss out on many of the benefits offered by the energy transition. Policies must address gender disparities, affordability, accessibility and inclusivity to create a just energy transition.

22. Community engagement is critical for the success of urban energy initiatives. Participatory planning processes can empower residents to shape their urban environments and ensure that their needs are met, while fostering social cohesion and economic opportunities.

III. Policy, technology and finance solutions for a just energy transition in the urban context

A. Policy innovations for a just energy transition

23. Effective policy frameworks are crucial for aligning urban development with energy transition and climate goals to foster sustainable urban development. Integrated urban planning, which combines land use, transport and energy strategies, can promote sustainable development.

[5] Energy poverty is defined as a lack of adequate, reliable and affordable energy for lighting, cooking, heating and other daily activities necessary for welfare and economic development (Brian Min and others, “Beyond access: 1.18 billion in energy poverty despite rising electricity access”, World Bank blogs, 12 June 2024).

[6] Luke Ravetto, “Addressing energy poverty in India”, blog, The Borgen Project, 10 September 2024.

24. The integration of renewable energy and energy efficiency into urban systems is an important policy priority. Cities can adopt policies that require new buildings to be low-energy, mandate solar panels on new buildings, incentivize energy-efficient appliances and support decentralized energy systems. While most large-scale renewable energy projects may be physically located outside urban areas for the most part, there is a role for technologies such as waste-to-energy, floating solar and rooftop solar to contribute to providing supply for urban energy demand. Measures to reduce energy demand and increase efficiency can play a crucial role in the transition to sustainable urban development. In order to achieve equitable outcomes, it is essential to ensure that all segments of the population have access to clean energy and essential energy services and are actively involved in decision-making processes. Retrofitting buildings to be more energy efficient – including for low-income households, public buildings and schools – can reduce energy demand and costs while also providing more thermally comfortable indoor environments. This can lead to improved health, productivity and learning outcomes. Such initiatives not only address energy poverty but also foster social cohesion and resilience.

25. The territorial just transition plans, part of the Just Transition Mechanism of the European Union, serve as an exemplary model in this regard. With a budget of 17.5 billion euros the initiative is focused on supporting regions heavily reliant on fossil fuels as they transition to a greener economy.[7] It is characterized by its emphasis on local engagement, green job creation and fairness. By incorporating input from communities and stakeholders, the initiative is aimed at ensuring that policies address the unique needs of each region while minimizing adverse socioeconomic impacts. Such a comprehensive and inclusive approach offers valuable lessons for countries in the Asia-Pacific region, where diverse energy landscapes demand tailored solutions. The creation of green jobs in urban settings – through initiatives such as installing rooftop solar power systems and retrofitting buildings for energy efficiency – can create almost five times as many direct jobs per unit investment compared with equivalent fossil fuel investments such as coal-fired power.[8]

26. In Asia and the Pacific, the need for a just energy transition is increasingly urgent as nations strive to balance rapid economic growth with climate commitments. Countries such as Indonesia and the Philippines have taken proactive steps to develop localized energy transition plans. In Indonesia, the Just Energy Transition Partnership stands out as a pioneering initiative. Backed by $20 billion in international funding, it is aimed at accelerating the phaseout of coal, the country's primary energy source, while simultaneously supporting workers and communities dependent on the coal industry. This dual focus on environmental sustainability and socioeconomic equity underscores the importance of aligning global climate goals with urban developmental priorities.

27. Similarly, the Government of the Philippines has embarked on efforts to integrate just transition principles into its energy policies. By adopting a localized approach, these initiatives demonstrate the potential for adapting

[7] For more information, see https://ec.europa.eu/regional_policy/en/information/publications/communications/2021/the-territorial-just-transition-plans.

[8] Heidi Garrett-Peltier, "Green versus brown: comparing the employment impacts of energy efficiency, renewable energy, and fossil fuels using an input-output model", *Economic Modelling*, vol. 61 (February 2017), pp. 439–447.

global best practices to regional contexts. They emphasize the importance of inclusive planning, capacity-building and innovative financing mechanisms to ensure that the transition to renewable energy sources benefits all segments of society.

28. The Economic and Social Commission for Asia and the Pacific (ESCAP) has also been instrumental in promoting sustainable energy transition across the region. ESCAP has supported several cities and provinces in developing energy transition road maps, which outline the technological options and policy measures required for a future with sustainable energy. These road maps are designed to ensure that urban development remains sustainable while addressing the challenges posed by the energy transition. By identifying specific technological pathways, such as the integration of renewable energy systems and energy-efficient technologies, and aligning them with policy interventions, ESCAP helps cities and urban centres in the region to navigate the complexities of transitioning to a low-carbon economy.

29. By fostering partnerships, leveraging international support and prioritizing local needs, countries can create sustainable development pathways that leave no one behind. These efforts underscore the critical role of policy innovations in shaping a just and resilient energy future for all.

B. Technological innovations to foster sustainable urban development

30. Technological advancements are at the forefront of driving sustainable urban development, offering innovative solutions to some of the most pressing challenges faced by cities today. These innovations are pivotal in shaping the urban energy transition, enhancing resilience and promoting equity in access to resources. Smart grids, energy storage solutions and digital platforms enable more efficient energy management and distribution.

31. One significant technology area is urban mobility, in particular the adoption of electric vehicles and smart/digital transport systems. Electric vehicles are rapidly transforming the transport landscape, contributing to a reduction in greenhouse gas emissions and improving air quality in urban areas. For example, the life-cycle greenhouse gas emissions of an internal combustion engine vehicle are 41.9 tons of carbon dioxide equivalent, compared with between 19.7 and 21.1 tons for an electric vehicle.[9] Public transport systems in urban areas are particularly well suited to electrification. However, scaling up electric vehicle infrastructure, such as charging stations and grid upgrades, remains a challenge, in particular in developing countries, owing to the lack of enabling policy frameworks and the absence of private sector investment in the development of the necessary infrastructure.

32. In China, the world's largest electric vehicle market, this transition is exemplified, with 8.1 million electric vehicles registered in 2023.[10] This progress is underpinned by the establishment of extensive charging infrastructure, which ensures the feasibility and convenience of electric vehicle use. By focusing on the electrification of public transport fleets, the potential to reduce emissions and save energy can be maximized. One such example is the city of Shenzhen, where the electrification of public buses has led to an

[9] International Energy Agency, "Comparative life-cycle greenhouse gas emissions of a mid-size BEV and ICE Vehicle", 5 May 2021.

[10] International Energy Agency, "Trends in electric cars", *Global EV Outlook 2024: Moving towards Increased Affordability* (2024).

annual reduction of 1.35 million tons of carbon dioxide emissions.[11] Such initiatives not only reduce environmental impacts but also provide a model for other cities to follow in their quest for sustainable mobility solutions.

33. In Singapore, the Smart Nation initiative uses artificial intelligence-powered traffic management systems and predictive analytics to offer improved air quality, an efficient transportation system and reduced traffic congestion. The same mechanism is also used in public buildings and infrastructure to provide optimum cooling, heating and lighting conditions based on energy consumption patterns, building occupancy and environmental conditions.

34. In addition to advancements in transport, decentralized energy systems are playing a transformative role in urban energy management. Smart grid technologies further enhance the sustainability and resilience of urban areas. These technologies involve the integration of digital communication and advanced monitoring systems into traditional power grids, enabling more efficient energy distribution and consumption. In Tokyo, for example, the implementation of smart meters and energy storage systems has made dynamic energy management possible, resulting in a reduction in energy wastage. Such advancements not only optimize energy use and reduce peak demand. They also enhance the grid's ability to respond to disruptions, ensuring a more reliable supply of electricity during emergencies.

35. Energy-efficient buildings are another critical component of sustainable urban development. By incorporating passive design, advanced materials, smart systems and renewable energy sources in these buildings, energy consumption and greenhouse gas emissions are reduced. Cities worldwide are adopting policies and incentives to encourage the construction of green buildings, recognizing their long-term benefits for both the environment and urban economies. Urban green infrastructure, including nature-based solutions and well-structured urban forms, can significantly reduce energy demand by reducing the need for heating and cooling. Studies have demonstrated that the energy consumption of buildings can be reduced by 10 to 30 per cent through urban form management,[12] while nature-based solutions integrated into buildings and landscapes can reduce heating and cooling loads by even greater shares.[13]

36. The establishment and enforcement of strong building energy codes that include passive design measures can significantly reduce energy demand. Green building certification schemes, such as the Leadership in Energy and Environmental Design standard and the Building Research Establishment Environmental Assessment Method, promote advanced energy-efficient construction practices and can be leveraged to increase real estate values and introduce market incentives to stimulate uptake. Retrofitting existing buildings with energy-saving technologies and approaches, including passive cooling, can also yield substantial benefits, reducing urban energy consumption and emissions. ESCAP has advanced research and capacity-building on passive

[11] Institute for Transportation and Development Policy, "China tackles climate change with electric buses", blog, 11 September 2018.

[12] Yiman Zhao and others, "Impact of urban form on building energy consumption in different climate zones of China", *Energy and Buildings*, vol. 320 (1 October 2024).

[13] Qingchang He, Francisca Tapia and András Reith, "Quantifying the influence of nature-based solutions on building cooling and heating energy demand: a climate specific review", *Renewable and Sustainable Energy Reviews*, vol. 186 (October 2023).

cooling strategies such as high-performance building envelopes, reflective roofing, natural ventilation systems and urban greenery.

37. The integration of renewable energy into urban planning is also gaining momentum across various subregions. In India, an ambitious rooftop solar programme is aimed at achieving installed capacity of 40 gigawatts by 2030,[14] with a focus on urban households and small businesses. The initiative not only promotes the use of clean energy but also empowers individuals and communities to become active participants in the energy transition. Similarly, in Viet Nam, renewable energy zones are being developed as part of the country's urban planning strategies, ensuring that cities are equipped to meet growing energy demands sustainably.

38. These diverse efforts underscore the potential of technology to drive a just energy transition in urban areas. By leveraging innovative solutions, cities can enhance their resilience to environmental challenges, reduce inequalities in resource access and foster sustainable economic growth. However, realizing these benefits requires collaboration between Governments, private sector players and local communities to ensure that technological advancements are implemented effectively and equitably. Technological innovations are therefore central to achieving sustainable urban development.

C. Financing mechanisms

39. Financing remains a critical barrier to scaling up clean energy initiatives in urban areas. Despite the growing recognition of renewable energy and energy efficiency as cornerstones of sustainable urban development, limited access to financial resources hampers progress. To overcome this challenge, innovative financing models, such as thematic bonds and blended finance, are emerging as pivotal solutions. Cities can also leverage international funding sources, such as the Green Climate Fund and the Global Environment Facility, to support climate mitigation and adaptation efforts.

40. In recent years, significant traction has been gained by thematic bonds, which are debt instruments specifically earmarked for environmentally and socially beneficial projects, including renewable energy and sustainable infrastructure. In 2023, the Asia-Pacific region issued $140 billion in green bonds. Cities across the region are leveraging these bonds to finance large-scale solar, wind and energy-efficient building projects. By offering stable returns to investors, thematic bonds effectively channel private capital into public and semi-public initiatives.

41. Blended finance is another innovative approach that combines public and private funding sources. This model minimizes investment risks for private investors by incorporating concessional funding from Governments or international donors. By leveraging the strengths of both sectors, blended finance mechanisms create opportunities to fund projects that would otherwise be deemed too risky or unprofitable. Blended finance has been instrumental in funding urban energy projects in developing regions, where access to

[14] India, Ministry of New and Renewable Energy, "Grid connected rooftop solar programme". Available at https://mnre.gov.in/en/grid-connected-solar-rooftop-programme/ (accessed on 28 January 2025).

affordable financing is often limited. For example, blended finance has supported the deployment of energy savings insurance in Indonesia.[15]

42. Public-private partnerships are also crucial in driving investment in energy-efficient infrastructure. These partnerships bring together Governments, private companies and international organizations, enabling them to pool resources and expertise. Furthermore, these innovative financing mechanisms highlight the necessity of mobilizing diverse funding sources to support urban energy transitions. Reliance on public funding is insufficient to meet the growing financing demand for renewable energy infrastructure. Instead, cities must explore creative avenues to attract investments, such as climate-resilient insurance products, community crowdfunding initiatives and carbon trading systems. Each of these mechanisms can complement existing strategies, ensuring that urban areas have the financial resources needed to meet their sustainability targets.

43. In addition to financial innovations, policy frameworks play a critical role in ensuring the success of these mechanisms. Governments must establish clear regulations and incentives to encourage private sector participation in urban energy projects. Tax incentives, subsidies and streamlined approval processes can significantly enhance the attractiveness of investing in renewable energy initiatives. By creating an enabling environment, policymakers can ensure the long-term viability of financing mechanisms for sustainable urban development.

44. The transition to sustainable urban development depends heavily on innovative financing mechanisms. Thematic bonds, blended finance and public-private partnerships are already demonstrating their potential to drive investments in renewable energy and energy-efficient infrastructure. However, sustained efforts to mobilize diverse funding sources and supportive policy environments are essential to scaling up these solutions and ensuring a greener future for urban areas worldwide.

D. Role of regional cooperation

45. Regional cooperation can enhance the effectiveness of the urban energy transition and climate action. Collaborative approaches can be used to address the transboundary challenges experienced by large urban areas, such as regional grid connectivity and cross-border power trading, which have an impact on urban sustainability. Cities can also learn from each other through networks such as the C40 Cities Climate Leadership Group and the Global Covenant of Mayors for Climate and Energy. These platforms facilitate the exchange of best practices, tools and strategies for sustainable urban development. Regional forums can amplify the voices of cities, ensuring that urban perspectives are integrated into global climate and energy discussions.

IV. Issues for consideration by the Commission

46. The Commission may wish to take note of the present document and provide further guidance to the secretariat on how it can support member States in accelerating the energy transition through the urban development process.

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[15] Organisation for Economic Co-operation and Development, “Blended finance for clean energy”. Available at www.oecd.org/en/about/programmes/clean-energy-finance-and-investment-mobilisation/blended-finance-for-clean-energy.html (accessed on 4 February 2025).