

Applying Urban Nexus Approach for Achievement of Sustainable Development Goals (SDGs)

Key messages

- ✓ *Cities are home to over half of the world's population and are centers of growing resource demand. In many cities, the immense demand for resources is driven by the conventional silo approach to resource management, inefficient production systems, and resource-intensive lifestyles. Efforts to improve efficiency in urban systems by improving sectoral coordination can significantly reduce resource demand and contribute to the Sustainable Development Goals (SDGs).*
- ✓ *Understanding interlinkages among different sectors is critical to optimizing urban system planning, improving resource efficiency, reducing environmental pollution and consequently achieving the related SDG targets.*
- ✓ *The urban nexus approach identifies interlinkages among urban sectors and guides actions toward capturing synergies and reducing trade-offs across the sectors, which contributes to sustainable and cost-effective resource use and urban development. The urban nexus approach contributes to multiple SDGs including SDG-2 (zero hunger), SDG-6 (clean water and sanitation), SDG-7 (affordable and clean energy), SDG-11 (sustainable cities), SDG-12 (responsible consumption and production) and SDG-13 (climate action).*
- ✓ *Operationalization of nexus between urban sectors is challenged by weak inter-institutional coordination, conventional sectoral budget lines and lack of coordination between local government strategies and national budgets, lack of science-based evidence and data collection capacities to support decision making, and inadequate knowledge and information dissemination on urban nexus solutions.*
- ✓ *To operationalize urban nexus for achieving SDGs, incorporating an integrated approach in SDGs strategies and planning is crucial, and an SDGs coordination unit under a Prime Minister's or President's Office or ministry such as Ministry of Finance or Ministry of Planning can lead the process of integration. Furthermore, an incentive mechanism to promote institutional collaboration can be introduced. It is also important to formulate incentive mechanisms including favourable budget allocation strategies, tax exemptions policies, and soft loan schemes for upscaling urban nexus from pilots to significant actions.*
- ✓ *To take forward the urban nexus approach in support of the SDGs, local communities, private sector, youth, and civil society should be educated and sensitized on the concept. Bringing urban nexus concepts (and more broadly principles of circular economies) to classrooms through integration within curricula will provide future leaders with better understanding and awareness of the benefits of integrated solutions.*

1. Introduction

Currently (2018), more than half of the world's population lives in cities. The Asia-Pacific region alone is home to 54 per cent of the world's urban population and projections suggest an increase of its urban

population by 1.4 billion by 2050 (UNESCAP, 2019)¹. By 2050, 68 per cent of people in the region will live in urban areas (ibid.).

cities have emerged as centers of growing resource demand, and meeting this demand will become increasingly difficult given that the world will face a 40 per cent shortfall of water (WWAP 2015)², a 50 per cent increase in food demand (UN 2014)³, and a 40 per cent increase in electricity consumption (IEA 2017) by 2040⁴. The growing demand on resources for cities is driven by rapid population growth, resource-intensive lifestyles associated with increasing income level, uncontrolled conversion of land from rural to urban, and social and cultural factors. The increased demand of cities on resources has led to their continuous overexploitation and environmental harm.

In many countries, resource use and development by urban areas is still managed by sectoral departments (water, energy, agriculture, food) in an uncoordinated manner. Interactions between urban sectors are not properly recognized and managed, resulting in inefficiencies, failure to optimize cost savings and lost opportunities to capture and utilise potential synergies across sectors. Minimizing trade-offs and maximizing synergies across these sectors would contribute significantly to addressing priorities for communities, as well as local, regional and global resource challenges.

Cities will play a vital role in most of the underlying policies and investments for resource-efficient growth and sustainable development. Therefore, proper engagement and actions by cities are crucial for achieving sustainable development in both urban and rural areas. It has been estimated that per cent of SDG targets will be at risk without proper engagement of and coordination with local (including city) and regional governments⁵.

The urban nexus approach examines interlinkages among urban sectors including water, energy, food, and waste management and involves identifying, understanding and acting on interrelationships to capture synergies and minimize trade-offs⁶. It also guides stakeholders as to how to integrate management to increase resource efficiency, as well as how to turn waste and wastewater into resources that can contribute to solving the challenges of urban waste management. When the urban nexus approach is applied from the early planning stage onwards, it holds great potential for making urban systems resource efficient, cost effective, and environmentally friendly and also

¹ UNESCAP. 2019. The Urban Nexus: Integrating resources for sustainable cities. www.unescap.org

² WWAP (United Nations World Water Assessment Programme). 2015. The United Nations World Water Development Report 2015: Water for a Sustainable World. Paris, UNESCO.

³ United Nations. 2014. https://www.un.org/waterforlifedecade/food_security.shtml

⁴ IEA (International Energy Agency). 2017. World Energy Outlook 2017.

⁵ UN Sustainable Development Solution Network (2016) Getting Started with the SDGs in Cities. A Guide for Stakeholders <http://unsdsn.org/wp-content/uploads/2016/07/9.1.8.-Cities-SDG-Guide.pdf>

⁶ For more information about the urban nexus approach please visit: <https://www.unescap.org/urban-nexus>

Box 1: Urban Nexus

“The Urban Nexus approach examines the interdependencies between water, energy and food/land and the synergies and competing uses of these resources, requiring a shift from a sectoral to a cross sectoral, integrated approach. It challenges existing structures, sector policies and procedures to promote the protection and use of water, energy and food/land in a balanced manner, countering traditional silo thinking and divided responsibilities that often result in poorly coordinated investments, increased costs and underutilized infrastructure and facilities.

The Urban Nexus approach is an action-oriented guiding principle within the vision of a circular economy, where waste is viewed as a resource. Multi-sectoral and multilevel approaches which integrate resources contribute to improved resource efficiency. With many project cities identifying wastewater and solid waste management as their most pressing problems, the Urban Nexus approach emphasizes how wastewater and waste can be converted into sources of energy and useful by-products, such as fertilizer”.

Source: UNESCAP, 2019¹

generates various social benefits such as new jobs and improvement of health. Promoting nexus between urban sectors would greatly contribute to achievement of SDG-2, SDG-6, SDG-7, SDG-11, SDG-12 SDG-13 and target SDG-9.4 on promoting resource efficient and environmentally sound technologies.

This policy brief aims to provide suggestions and actionable measures for policy makers to address key challenges to operationalizing urban nexus for achieving the SDGs.

2. Regional progress on resource-related SDGs

Since the adoption of the Sustainable Development Goals by the United Nations General Assembly in 2015, the Asia-Pacific region has made some, but not sufficient progress in achieving the resource related SDGs, including SDG-2, SDG-6, SDG-7, SDG-11 and SDG-12 (Table 1). As none of these SDGs have been realised, greater efforts are thus called for.

Table 1: Regional and sub-regional progress of SDG-2, SDG-6, SDG-7, SDG-11 and SDG-12 in the Asia-Pacific region

	AP	E-NEA	SEA	S-SWA	N-CA	Pacific
SDG-2						
2.1 Improvement of access to food	●	●	●	●	●	●
2.2 End malnutrition	●	●	●	●	●	●
2.3 Improving agricultural productivity	●	●	●	●	●	●
2.4 Ensure sustainable food production	●	●	●	●	●	●
2.5 Maintain the genetic diversity in food production	●	●	●	●	●	●
SDG-6						
6.1 Access to safe drinking water	●	●	●	●	●	●
6.2 Access to adequate sanitation	●	●	●	●	●	●
6.3 Improve water quality	●	●	●	●	●	●
6.4 Increase water use efficiency	●	●	●	●	●	●
6.5 Implement integrated water resources management	●	●	●	●	●	●
6.6 Protect water related ecosystems	●	●	●	●	●	●
SDG-7						
7.1 Access to modern energy	●	●	●	●	●	●
7.2 Increase share of renewable energy	●	●	●	●	●	●
7.3 Improve energy use efficiency	●	●	●	●	●	●
SDG-11						
11.1 Access to adequate housing and basic services	●	●	●	●	●	●
11.2 Access to safe and sustainable transport system	●	●	●	●	●	●
11.3 Enhance inclusive and sustainable urbanization	●	●	●	●	●	●
11.4 Protect cultural and natural heritage	●	●	●	●	●	●
11.5 Improve resilience to natural disaster	●	●	●	●	●	●
11.6 Improve air quality and waste management	●	●	●	●	●	●
11.7 Improve access to green and public spaces	●	●	●	●	●	●
SDG 12						
12.1 Implement sustainable consumption and production framework	●	●	●	●	●	●
12.2 Sustainable use of natural resources	●	●	●	●	●	●
12.3 Reduce food waste and losses	●	●	●	●	●	●
12.4 Environmentally sound management of chemicals and waste	●	●	●	●	●	●
12.5 Reducing waste generation	●	●	●	●	●	●
12.6 Sustainability information reporting	●	●	●	●	●	●
12.7 Sustainable public procurement policies	●	●	●	●	●	●

(Source: Synthesis from UNESCAP, 2019⁷)

Note: ● Need to maintain progress; ● Need to accelerate progress; ● Reversed trend; ● Insufficient data

⁷ UNESCAP. 2019. Asia and the Pacific SDG Progress Report 2019.

Table 1 also shows that progress towards SDG-2, SDG-7, SDG-11 and SDG-12 varies significantly between sub-regions. For instance, the Pacific sub-region has made good progress on environmentally sound management of chemicals and wastes target of SDG-12, whereas East and North-East Asia (E-NEA), South-East Asia (SEA) and South and Southwest Asia (S-SWA) sub-regions exhibited a reverse trend on the same target. For the target of ensuring sustainable food production, SDG-2, the East and North-East sub-region has made good progress and could achieve the target by 2030 if they maintain this progress. In contrast, all other sub-regions have regressed and need to make greater efforts on this target. Moreover, lack of appropriate data for measuring the progress of many targets is the biggest challenge for the Asia-Pacific region (Table 1). For example, in the East and North-East Asia sub-region, of the six targets of SDG-6, data is only available for the target on protecting water related ecosystems.

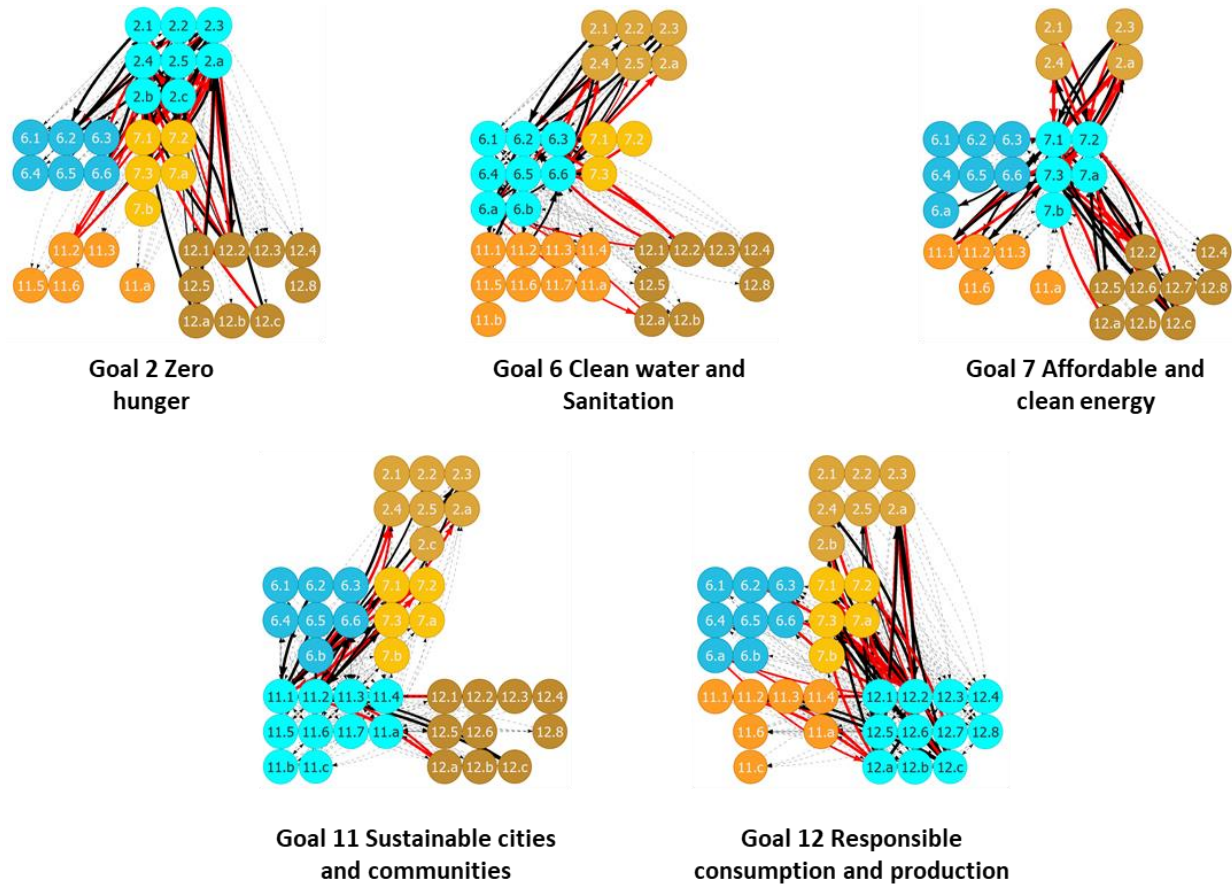
Results in Table 1 imply that the Asia-Pacific region needs substantially greater efforts and resources to scale-up the implementation of actions to achieve the SDGs. However, managing additional resources is a major challenge for most developing countries in the region. An urban nexus approach can provide resource-efficient solutions that contribute to multiple SDGs by capturing synergies and minimizing trade-offs. Implementation of the urban nexus approach begins with identifying and understanding the types and nature of interactions among the urban sectors. In this section, interlinkages of five SDGs (2, 6, 7, 11 and 12) have been analysed. As these goals contain specific associated targets, the analysis takes into account the interlinkages among these targets within and across the goals.

Figure 1 below, generated with the IGES SDG Interlinkages Analysis & Visualisation Tool V2.0,⁸ demonstrates the interlinkages at the target level for each of the urban-nexus related goals for Indonesia, as an example. The figure on Goal 2 (zero hunger) shows the eight targets under this goal have several links with targets under the other four goals. The links among the targets are shown by arrowed lines, indicating the flow of influence. Some of these links are positive (black line), while some are negative (red line).⁹ The analysis shows there is a lot of difference in the number of links between goals. For example, compared with Goal 2 (zero hunger), Goal 11 (sustainable cities) has more links with targets under Goal 6 (clean water and sanitation) and Goal 12 (responsible consumption and production). Among the four goals other than the city related Goal 11, Goal 12 (responsible consumption and production) seems to have the highest number of links with targets in other goals, indicating the relative importance of consumption and production practices in the urban nexus for sustainability.

⁸ The IGES SDG Interlinkages Analysis & Visualisation Tool enables users to visualise the interlinkages between SDG targets, which can help identify potential synergies and trade-offs between SDGs. The SDG Interlinkages Tool can be accessed for free at <https://sdginterlinkages.iges.jp/>. For more information on the tool and its methodology, please refer to Zhou, X. and Moinuddin, M. 2017. Sustainable Development Goals Interlinkages and Network Analysis: A Practical tool for SDG integration and policy coherence. Hayama: Institute for Global Environmental Strategies.

⁹ The strength of the causal links, measured by correlation coefficients of the associated targets, are also shown in the IGES SDG Interlinkages Tool. For instance, in Figure 1, for Goal 2, Target 2.3 on agricultural productivity appears to have a strong positive influence on Target 6.4 on increasing water efficiency in Indonesia. On the other hand, under Goal 7, Target 7.1 on access to energy shows a conflicting relationship with Target 12.2 on sustainable resource use in Indonesia.

Figure 1: Interlinkages of relevant SDGs of urban nexus: Example of Indonesia



Source: Figure generated using [IGES SDG Interlinkages Analysis & Visualisation Tool V2.0](#)

Notes:

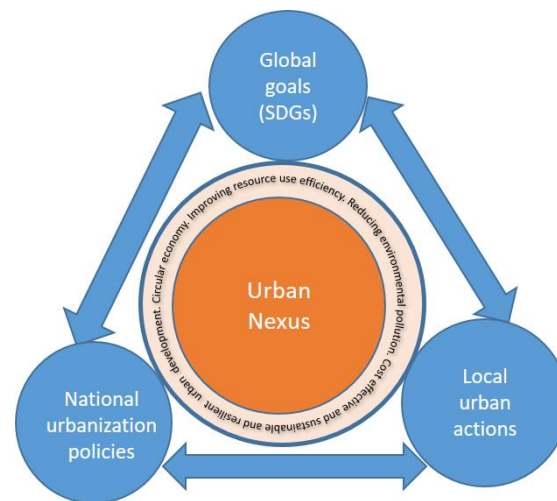
- Each node represents one SDG target. The nodes in fluorescent blue indicate the selected targets. In the figures above, all the targets under each of the five urban nexus-related goals are selected and their interlinkages with the other four goals are displayed.
- Each line with an arrow linking two nodes represents a directional/causal relation between two targets.
- Black and red lines indicate positive and negative relations respectively. Dotted lines indicate data unavailability.

3. Operationalization of urban nexus for the SDGs

The Asia-Pacific region is experiencing increasing demand for urban spaces, increasing costs of urban resource use and urban lifestyles, and increasing risk and vulnerabilities as a result of unplanned

urbanization. These issues are caused by inadequate, inefficient and underdeveloped planning and infrastructure. Unplanned and rapid urbanization is exerting increased stress on basic services including water and energy supply and sanitation, and for people living and working in informal settlements such stressors are associated with unhygienic living conditions due to the inability to access quality services, lack of decent work conditions and high cost of living. As emphasized in the outcome of Rio+20 and in the 2030 Agenda for Sustainable Development (UN 2016),¹⁰ integrated approaches are needed to overcome some of the problems created by the conventional silo approach to urban management, which cannot address complex issues leading to resource degradation and environmental harm.

Figure 2: Urban nexus approach to address global, national and local goals and targets



The urban nexus approach to designing urban solutions arose as a result of observations of the trade-offs arising from conventional sectoral approaches to urban management. It guides stakeholders towards identifying and capturing synergies between sectors, jurisdictions and technical domains, resulting in improved institutional performance (GIZ and ICLEI 2014)¹¹. The goal of the approach is to accelerate access to promote intersectorial coordination, revise respective monosectoral framework conditions, services, and to increase service quality and quality of life within planetary boundaries.

To translate the urban nexus concept into action, GIZ and ESCAP jointly support urban nexus projects in 12 cities in 7 countries of the Asia-Pacific region, namely Chiang Mai and Korat in Thailand, Danang in Viet Nam, Naga and Santa Rosa in Philippines, Nagpur and Rajkot in India, Pekanbaru and Tanjungpinang in Indonesia, Rizhao and Binhai in China, and Ulaanbaatar in Mongolia. As shown in Figure 1, strong interlinkages between SDG-2, SDG-6 and SDG-7, SDG 11 and SDG 12 in the urban domain can be tapped to realize a circular economy, improve resource-use efficiency, and reduce environmental pollution, in line with local, national and global development objectives.

¹⁰ UN.2016. Sustainable development goals and new urban Agenda: Key commitments.

¹¹ GIZ and ICLEI. 2014. Operationalizing the Urban NEXUS: Towards resource-efficient and integrated cities and metropolitan regions.

4. Illustrative cases of how an integrated resource approach contributes to the SDGs

An integrated approach is required to achieve the SDGs, and adopting the urban nexus approach is an entry point to break the barriers between actors and sectors, identify trade-offs and capture synergies across resource management. While implementation of SDGs in developing countries faces challenges including lack of resources, the urban nexus approach can take up the challenges by introducing resource efficient, cost effective innovations and contributing to multiple SDGs.

4.1. Urban NEXUS approach to optimize water, energy, and land resources in Ulaanbaatar, Mongolia

Challenge: More than 60 per cent of Ulaanbaatar’s 1.4 million residents live in disorganized ger-based settlements (ger: a portable, round tent covered with skins or felt) on the city’s periphery, and as urban migration continues to rise, these settlements are expanding in an uncontrolled manner. As the trend progresses, major environmental and social problems such as air pollution as well as soil and ground water contamination are further exacerbated. Utilizing a Nexus approach to examining the city’s energy master plan and improving the management of solid waste, the city of Ulaanbaatar was able to launch a community-driven, land readjustment effort to create an “Eco village” in Khoroo No. 19 in the Bayanzurkh district, next to the “Tsaiz” wood market.

Nexus solutions: While Ulaanbaatar residents of ger districts generally have legal titles to their plots, a majority desire to live in detached homes with basic infrastructure connections. With the exception of electricity supply, these settlements often lack basic services. In total, 90.5 per cent of 180 households living in the project area expressed an interest in improving their current housing conditions and increasing infrastructure connectivity. Working with limited capacity and budgetary shortages, the city initiated a community-driven land readjustment of about 180 participating households on 12 hectares of land. Through this redevelopment, the city incorporated energy-efficient, ecological development principles and decentralized heating and wastewater management, with the objective of improving land use, raising the land value, and strengthening energy and waste management infrastructure. Based on projection studies, the redevelopment and housing innovations will reduce heat energy consumption and CO₂ emissions by 50 per cent. Utilizing the Nexus framework, the Eco village has made strides in mobilizing partners and the community.

Benefits: The Eco village in Khoroo No. 19 contributes to SDG-6 (Water), SDG-7 (Energy), SDG-11 (Cities) and SDG-13 (Climate Action) as well as other SDGs by generating the following multiple benefits:

Performance parameters	Results	Relevant SDGs
Energy efficiency improvement	Heat energy consumption reduced by 50 percent	SDG-7, SDG-11, SDG12, SDG-13
Wastewater management	Improved	SDG-6
Awareness raising on urban nexus solutions	Increased	SDG-6, SDG-7, SDG-12
Partnerships between public-private actors to finance buildings	Improved	SDG-11, SDG-17

Value of land plots and economic development opportunities	Increased	SDG-8, SDG-11
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4.2. Improving water security through introducing high efficiency water pumps in Da Nang City, Viet Nam

Challenge: Over the last decade Da Nang has turned itself into a rapidly growing hub for transportation, services and tourism, which has added stress to the city’s aging water supply infrastructure. Water demand is rapidly increasing from both local residents and tourists. It is anticipated that by 2030 the city’s total water demand on the present water utility will have doubled. Demand for energy for water supply will also significantly increase over the next decade; it is estimated to rise from 18 to 21 GWh over 2015 to 2017 (Ninh 2019)¹².

Nexus Solutions: With awareness of the interlinkages between water and energy as well as potential barriers to address the challenges the city is now facing, the Da Nang Water Supply Company (DAWACO) decided to replace low efficiency conventional pumps with higher efficiency pumps at the Cau Do water treatment plant. Three existing conventional raw water pumps (50% efficiency) and six existing clean water pumps (64% efficiency) were replaced with higher energy efficient pumps (83% for intake pumps and 90.6% for clean water distribution pumps), which have been customized to the specific conditions and requirements of the recipient plants.

Benefits: This measure contributes to SDG-6 (Clean Water and Sanitation), SDG-7 (Affordable and Clean Energy), SDG-11 (Sustainable Cities and Communities) and SDG-13 (Climate Action):

Performance parameters	Results	Relevant SDGs
Increased efficiency of pumps	Efficiency of intake pump improved from 50 per cent to 83 per cent and for water distribution pump from 64 per cent to 90. per cent	SDG-6 and SDG-11
Improvement of supply capacity	Increased capacity from 18 million m ³ /year to 20 million m ³ /year for intake pumps; and from 84 million m ³ /year to 101 million m ³ /year for distribution pumps	SDG-6 and SDG-11
Electricity saving	Electricity consumption for water production was reduced by 3,400 MWh/year	SDG-7, SDG-11, SDG-12

¹² Ninh. 2019. The Joint Crediting Mechanism (JCM) within Framework of JCM Model Project in Da Nang & Recommendations of JCM Application for An Trach Pumping Station. Proceedings of the Workshop on Promoting Private Sector Participation Towards Low-carbon Project Development in Vietnam, held in Hanoi on 11st January 2019.

CO2 mitigation amount	Contributes to annual reduction in emissions of approx. 1,145 tCO ₂ /year	SDG-13 and SDG-11
Reduction of operation cost	Total electricity costs of operating pumps in 2018 reduced by about 5.77 billion VND/year. Estimated payback period only 3 years	SDG-11

4.3. Using municipal wastewater in power plants to mitigate water crisis in Delhi, India

Challenge: Delhi is located in the Yamuna River basin. It is anticipated that rapid population growth and economic development will increase water demand further in this already water-stressed river basin. Competition over water among the major water users can also be expected to increase. Concurrently, demand for power is increasing. In Delhi, India’s capital, power supply capacity has not kept pace with population growth and the expansion of economic activities. While the installed capacity for power generation in Delhi has increased fourfold in the last two decades to 2,590 MW (megawatts), by 2021–22 the required installed capacity could reach 11,731 MW. The Central Electricity Authority (CEA) guideline sets the water use intensity maximum for power generation at 3.6 cubic meters/MWh. Based on this guideline, 2,100 MCM of water will be required for power generation in 2021–22.

Management of wastewater is also a big challenge for Delhi. The city’s rapid expansion and increase in domestic water supply has raised the volume of wastewater to 1,650 million cubic meters (MCM) per year, far exceeding the wastewater treatment capacity of about 850 MCM per year. Further, sewage treatment capacity has also not kept pace with this rise in wastewater generation. Over the last four decades, while the treatment capacity increased sevenfold, the volume of wastewater increased twelvefold. The discharge of untreated wastewater is the main source of pollution in surface water bodies in the basin, including the Yamuna River.

Nexus solutions: While water availability is an issue, reuse of wastewater could mitigate the water crisis as well as reduce the pollution of natural water bodies. If Delhi’s wastewater could be properly collected, treated and reused in power plants, freshwater demand of the power sector could be cut by up to 75 per cent.

Indraprastha Power Generation Co Ltd (IPGCL), the state owned electricity provider of Delhi, is moving towards cleaner and water-smart power generation by using treated municipal wastewater instead of freshwater in the operation of its Pragati Combined Cycle Gas Turbine (CCGT) power plant. This represents a win-win solution for water crisis mitigation and wastewater management. A salient feature of the power plant is that the raw water requirement for operation of the power plant is met by a Delhi municipal sewage water treatment plant. As per an agreement between IPGCL and the Delhi Municipal Sewage Water Treatment Authority, in exchange for 20 million liters per day (mld) of treated wastewater from the sewage treatment plant without charge, IPGCL covers the operation and maintenance costs of the sewage treatment plant.

Benefits: This initiative contributes to SDG-6 (Clean Water and Sanitation), SDG-7 (Affordable and Clean Energy), SDG-11 (Sustainable Cities) and SDG-13 (Climate Action):

Performance parameters	Results	Relevant SDGs
Amount of wastewater treated and reused	Treatment of 20 mld of wastewater.	SDG-6 and SDG-11
Amount of cooling treated wastewater supply for power generation	Intake of 20 mld of treated wastewater for cooling of power plant.	SDG-7, SDG-11 and SDG-13
Cross institutional collaboration	Annual cost of operation and maintenance of Sewage Treatment Plant (INR 4.00 Crores, or 594,964 USD) is borne by the power company.	SDG-6, SDG-7 and SDG-11

5. Challenges to operationalize the urban nexus approach in the Asia-Pacific region

The following challenges are faced in operationalization of an urban nexus approach:

i. Weak inter-sectoral coordination

While coordination of interrelated sectoral policies, plans and actions is a universal challenge, it is especially so for the urban nexus approach. Siloed interests and planning dominate urban development; consequently, interlinkages are not identified and understood, and opportunities to capture synergies and minimize potential trade-offs are missed. Lack of incentive mechanisms to motivate sectoral bodies to collaborate is one of the key factors for weak inter-sectoral or institutional coordination.

ii. Lack of specific budgeting for the urban nexus

In the context of developing countries, local governments largely rely on national budget allocations for implementation of urban development. Conventionally, budget allocation overlooked sectoral interlinkages, meaning opportunities to reduce costs were lost. In addition, mismatches between national budget allocation and strategies and development plans of local governments often occurred. Therefore, even if local governments adopt strategies and action plans to operationalize the urban nexus, they may not be financed by national budgets. Local governments lack the ability to generate local revenue and only have limited authority to directly access different sources of financing. Specific budgeting for targeted integrated resources projects and initiatives is also lacking.

iii. Lack of data collection and management capacity to support the urban nexus

Conventional decision-making processes are often not evidence-based and may not respond to new scientific evidence supporting a nexus approach. Lack of appropriate data recording, collection, processing and management systems at local levels also presents challenges to operationalizing the urban nexus. Under current institutional frameworks, local governments in many developing countries lack capacities for baseline data collection and management on the status of resources, consumption patterns, management practices and opportunities for improvement in the urban nexus. As a result, local governments often fail to identify priorities for

urban nexus projects where this approach can maximise synergies and mitigate trade-offs. Proxy indicators being developed in some countries are one way to overcome the lack of data that can help measure nexus-related progress.

iv. Lack of information/knowledge on nexus solutions/technologies

As the case studies portray in section 4 and other urban nexus projects implemented by GIZ and ICLEI¹¹ demonstrate, technologies and systems are now available that can provide urban nexus solutions to capture multiple benefits. However, lack of information and knowledge of these local solutions may hinder their uptake and further development, consequently making it difficult to launch potential nexus projects. The benefits of urban nexus can be shared; however, the channels for disseminating and promoting the concept, good practices and technical solutions are limited and not widely available.

6. Policy recommendations

Single interventions are unable to comprehensively address the multiple challenges facing the urban nexus approach. Each country will need a set of coherent policy interventions to make full use of the urban nexus for the SDGs. The following recommendations are suggested to assist countries in designing sets of interventions to propose the urban nexus approach to better integrate solutions:

Strengthen institutional coordination among relevant sectors

- i. **Incorporate integrated approaches in SDG strategies and planning.** This would involve coordination among sectors and development of strategic plans that would in turn provide guidance for operationalisation of urban nexus. The process can be led by a lead agency such as an SDGs coordination unit under the Prime Minister or President, Ministry of Finance, Ministry of Planning, etc.
- ii. **Introduce incentives for cross-sectoral planning and actions.** Budget allocation strategies need to be strengthened to recognize and emphasize cross-sectoral urban nexus projects or initiative scholarships for capacity building of staff on the urban nexus approach, etc.
- iii. **Integrate urban nexus approach in the process of Voluntary National Review (VNR) of implementation of the 2030 Agenda for Sustainable Development Goals.** As the guiding principles of VNR clearly state the necessity of respecting interlinkages among targets for effective tracking of progress, the urban nexus approach would help to integrate three dimensions of SDGs: economic, social and environmental.

Introduce financial mechanism to support urban nexus

- i. **Introduce well-targeted economic and policy instruments to improve resource efficiency.** Tariffs for water and energy consumption at attractive market price can benefit multiple sectors by improving water and energy use efficiency, and hence generate revenue (in the framework of the circular economy model).
- ii. **Provide incentives to local private companies for adoption of nexus solutions.** Incentives such as tax exemptions and soft loans can be provided to local private companies such as utilities for adopting interventions that provide multiple benefits.

Enhance capacities for data generation, monitoring and reporting, and promote education on urban nexus

- i. **Enhance capacity of local government agencies for data gathering, monitoring and reporting to promote the urban nexus for implementation of SDGs.** Urban nexus-based local actions contribute to national and global goals and targets on sustainable development. Recognition of these contributions will require investments by both national and local governments to build capacities for data generation, monitoring and reporting in a simplified standard format.

Incorporating urban nexus in education programmes

- i. **Bringing urban nexus to classrooms.** The children and youth of today will be tomorrow's leaders and educators. They are from not just public schools and universities, but from academic and technical training institutes. It is important that they understand how concerns of the urban nexus relate to their cities and their daily lives. Effective ways to integrate the urban nexus concept and approach into the education curriculum should be considered¹³.

Conclusions:

As home to more than half of the world's population, cities in the Asia Pacific Region will play a vital role in most of the underlying policies, planning, investments and actions needed to achieve the SDGs. As SDGs are interconnected, under a business-as-usual approach cities will not be able to address the challenges of the SDGs. However, an integrated approach is required to overcome the barriers and challenges, and the urban nexus approach provides an entry point to identifying the roots of barriers and challenges and to adopting innovative solutions toward capturing synergies between sectors, jurisdictions and technical domains, resulting in improved institutional performance. Enabling environments include those that strengthen institutional coordination, introduce incentive mechanisms for urban nexus projects, and provide training and education on urban nexus to all relevant stakeholders in order to apply urban nexus to achieve the SDGs.

The content of this paper was prepared by Bijon Kumer Mitra, Ngoc-Bao Pham, Mustafa Moinuddin and Henry Scheyvens, Institute for Global Environmental Strategies under the supervision of Kyungkoo (Philip) Kang, ESCAP. This paper benefited from comments by Curt Garrigan (ESCAP), Ruth Erlbeck (GIZ), and Omar Siddique and Alexander Vougioukas (ESCAP). **For more information about the Urban Nexus project, visit: <https://www.unescap.org/urban-nexus>**

¹³ Importance of integrating the urban nexus concept and approach into the education curriculum was extensively discussed in the Ninth Regional Workshop on Integrated Resource Management in Asian Cities: the Urban Nexus, Bangkok, Thailand, 22-23 May 2019