

GIZ-PROJECT
INTEGRATED RESOURCE MANAGEMENT IN ASIAN CITIES:
THE URBAN NEXUS

URBAN NEXUS DEVELOPMENT STRATEGY
A TEMPLATE FOR PARTNER CITIES

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GIZ-PROJECT: INTEGRATED RESOURCE MANAGEMENT IN ASIAN CITIES: THE URBAN NEXUS

A TEMPLATE FOR AN URBAN NEXUS DEVELOPMENT STRATEGY

A. BACKGROUND

A.1 THE GIZ-PROJECT ‘INTEGRATED RESOURCE MANAGEMENT IN ASIAN CITIES: THE URBAN NEXUS’

Current trends in global demand for natural resources put chances for long term sustainable development at risk. Constraints on the availability of fresh water, on the provision of energy from non-renewable sources, and recurrent regional food shortages led to **attempts to systematically think through linkages and mutual interdependencies – the nexus - between the usage of limited natural resources such as water, energy, and (agricultural) land**. Fundamental aim of this response to resource constraints is to advance a broad increase of efficiency of when using natural resources. As a result, **the nexus approach** as a major way of **addressing the issue of constrained natural resources in an integrative fashion** began emerging five years ago within the international development discourse during the run-up to the UN’s Rio+20 Conference. In November 2011 the German Federal Government organized the Bonn2011 Nexus Conference which provided an important push for the nexus approach.

Inserting nexus based thinking into the urban context supports the implementation of the **New Urban Agenda** expected to originate from **Habitat III** in 2016 and, in particular, the international **Post-2015 Development Agenda**. **Of significant relevance is Sustainable Development Goal (SDG) 11 “Make cities and human settlements inclusive, safe, resilient and sustainable”**. Urban nexus initiatives and urban nexus-inspired projects in the arena of international technical development cooperation further global environmental welfare in a concrete manner.

The GIZ-Project **Integrated Resource Management in Asian Cities: the Urban Nexus** started in mid-2013. The urban nexus project – involving UN-ESCAP as political partner and ICLEI SEA as implementing partner – primarily focuses on urban nexus interrelationships mostly in secondary cities. In doing so, the GIZ-Project assumes a pioneering role. As of June 2015, project partner cities are Baguio (Philippines), Chiang Mai (Thailand), Da Nang (Vietnam), Naga (Philippines), Korat (Thailand), Rizhao (PRChina), Weifang (PRChina), Santa Rosa (Philippines), Pekanbaru (Indonesia), Tanjungpinang (Indonesia), and Ulan Bataar (Mongolia).

Since its inception, the urban nexus project has been closely working with city governments on a continuous basis. In ten partner cities fourteen case studies have been launched successfully. These case studies investigate and test the merits of the urban nexus approach. In addition, cases **foster cooperation** between different departments within city administrations and between city

administrations and stakeholders and **assist in identifying** opportunities for future **cross-sectoral synergies**.

During the last two and a half years, the urban nexus project has reached a level of solid maturity. A landmark is the **Nexus Partnership Declaration** which ten partner cities endorsed as a **guiding policy statement** for the application of the urban nexus approach on June 19, 2015 at the fifth regional workshop in Chiang Mai, Thailand. Through the statement, partner cities lay out general commitments to be implemented through future activities:

- *“Raise the level of ambition at the local level to design and implement programs and projects applying Nexus principles;*
- *Strengthen local government by creating an enabling environment for various departments to work together;*
- *Develop and implement initiatives to increase various stakeholders’ awareness of the nexus approach and its underlying principles;*
- *Continuously and actively engage with other cities to share nexus experiences and lessons learnt, and to replicate success where possible;*
- *Create multi-stakeholder platforms for discussions and dialogue in order to jointly identify solutions and enabling factors in the nexus sectors.”*

The Nexus Partnership Declaration unequivocally calls for further activities in partner cities.

The **general aims** of the **Nexus Partnership Declaration** need to be translated into **tangible goals and objectives**. Partner cities need to mainstream **integrated resource management** into administrative procedures, pivotal processes and infrastructure investment programs. Only by amalgamating urban nexus tenets with day-to-day operational activities of partner cities’ administrations, **long-term anchoring of the urban nexus approach in partner cities will be attained**. The Urban Nexus Development Strategy needs to be the result of **a transparent and extensive public participatory process**. Then, the Strategy will be instrumental in bridging the gap between the policy statements of the Nexus Partnership Declaration and the concrete project level.

A.II THE TASKS OF AN URBAN NEXUS DEVELOPMENT STRATEGY – A TEMPLATE FOR PARTNER CITIES

The purpose of the Strategy Document delineated in Section B. is to serve as a **template** for comprehensive Urban Nexus Development Strategies **to be devised by partner cities**. The template for the Urban Nexus Development Strategy has been designed to be useful across partner cities and it cannot reflect all the specific requirements and practices of urban management in different countries. It is a generic **work plan**, which suggests to city administrations what to do and in which chronological order. The template needs to be subsequently adapted to local conditions and local needs. Section B. shows how a comprehensive strategy document for **anchoring the urban nexus approach within a city administration** and **for implementing the urban nexus approach through the city administration** should look like. The template includes a **menu of strategic components**, which

should be a part of each urban nexus development strategy. It is recommendable to prepare strategic components in a simultaneous **joint effort** to not forego benefits of interaction. Yet according to a city's needs and preferences (as well as budgetary conditions), the template opens up the opportunity of **addressing strategic themes** on a separate basis. Strategic components selected for the template reflect thematic distribution of case studies in the GIZ-Project so far.

In its introduction the Strategy contains a briefing on primary nexus interrelationships and on the urban nexus interrelationships for policy-makers not yet familiar with the urban nexus approach. The Strategy Document then moves on to strategic commitments and strategic activities which need to be filled with life to attain an Urban Nexus Development Strategy based on wide-spread stakeholder involvement and consensus. Technical strategic activities begin with the next step. Information and data need to be gathered and assessed. Then, the formulation of theme-based **strategic components** follows. The components delineate the **core documents (outputs)** cities should prepare to be able to implement urban nexus informed projects. A set of **exemplary core targets** is formulated. **At its center, each strategic component contains a catalogue of infrastructure projects (COP)** relevant for realizing desired improvements in integrated resource management and resource efficiency.

Once a city has formally adopted an Urban Nexus Development Strategy, the Strategy should also serve as a point of reference for subsequent administrative procedural guidelines. For example, this could be an urban nexus checklist for assessing urban nexus dimensions of tentative infrastructure investment projects during budgeting processes or during the process of issuing building permits.

B. THE URBAN NEXUS DEVELOPMENT STRATEGY

B.I THE NEXUS APPROACH

In the Asia and Pacific region at present approx. 46% of the population live in urbanized areas.¹ The urban segment of the population is expected to reach 50% by 2026, indicating on-going strong urbanization. Currently, urban land covers approx. 3% of Asia and Pacific region's land surface. Spatial urban extent is expected to reach 5% to 6% of land area by 2050, in effect roughly doubling. Worldwide, though particularly in the Asia and Pacific region **urban areas** are **engines of economic growth**, with urban populations generating approx. 80% of regional GDP and enjoying increasing GDP per capita. Urban expansion is primarily driven by urban population growth caused by in-migration from rural areas to urban centers and by growing household incomes of an urban middle class.

In Asian cities two major trends can be observed - **intensifying resource flows** and increasing **conversion of agricultural land** for urban purposes:

- **Cities form major junctions of resource flows.** Growing numbers of urban dwellers consume more water and energy for production and household purposes. Households and firms discharge more waste water, generate more solid waste, and emit more greenhouse gases.
- Demographic dynamics as well as economic, social, and ecological demands **intensify competition for land.**

Against this backdrop, **the necessity to increase resource efficiency and resource productivity has begun to guide policy-making from the supra-national level down to the local level.** With resource constraints growing, the nexus approach has progressively gained momentum, expanding to urban core themes such as **urban infrastructure provision** and **integrated urban planning and development.** The intensified competition for land requires an evidence-based designation of additional settlement areas for in-migration from rural areas, subsequent clear delineations of urban growth boundaries, and urban densification within built-up urban areas. .

B.I.1 The Urban Nexus Approach as a New Management Process

The urban nexus approach strives for efficient uses of water, energy and land by taking a holistic look at the interrelationships between the three nexus dimensions – a systemic view. Thus, applying the urban nexus approach means to introduce new management processes which call for new and different ways of interrelated thinking. With optimization of resource efficiency at its core, the urban nexus approach is inextricably intertwined with the **circular flow of resources.** Instead of old linear (mono-sectoral thinking), circular thinking in life-cycles of infrastructure projects or building projects is required – a new mind-set. This new systemic thinking needs to be mainstreamed into administrative practice.

¹ UN-ESCAP (2013) Urbanization Trends in Asia and the Pacific; Bangkok.

B.I.2 CORE NEXUS INTERRELATIONSHIPS

Between the natural resources water, energy, and (agricultural) land, several major nexus interrelationships exist. The nexus approach requires that **mutual links** between two or more resources are investigated simultaneously. To enable smoother conceptualization, Synopsis I below dissects major nexus interrelationships into main components:

SYNOPSIS I: PRIMARY NEXUS INTERRELATIONSHIPS

ENERGY ↔* WATER	
Energy for Water: <ul style="list-style-type: none"> ▪ Pumping from the ground ▪ Treatment for reaching tap water quality (purification, desalination) ▪ Conditioning of water ▪ Long-distance transport from lakes, rivers and other natural sources to treatment plants ▪ Transport to end users ▪ Pumping within buildings 	Water for Energy: <ul style="list-style-type: none"> ▪ Extraction of fossil fuels (coal, crude oil, natural gas) ▪ Cooling in thermo-electrical power plants ▪ Processing of water in production of biofuels
WATER ↔ (AGRICULTURAL) LAND	
Water for (Agricultural) Land: <ul style="list-style-type: none"> ▪ Crop agriculture ▪ Animal agriculture ▪ Forests and ecosystems 	(Agricultural) Land for Water: <ul style="list-style-type: none"> ▪ Water capture ▪ Watershed ▪ Recharging of groundwater ▪ Hydro-Geology
LAND ↔ ENERGY	
Land for Energy: <ul style="list-style-type: none"> ▪ Dams/reservoirs ▪ Power plants ▪ Refineries (crude oil) ▪ Solar farms and wind farms ▪ Biomass feedstock ▪ Production of biofuels ▪ Power lines ▪ Pipelines 	Energy for Land: <ul style="list-style-type: none"> ▪ Development (land conversion, construction) ▪ Transportation (cars, trucks motorbikes; railroads; air transportation; shipping)

* The bidirectional arrow visualizes mutual interrelationships. Compilation based on: US Department of Energy (DOE) – Office of Science, Climate and Water-Energy-Land-Interactions, Richland (WA), 2012.

B.I.3 URBAN NEXUS INTERRELATIONSHIPS

The urban context adds subsets to the primary nexus interrelationships such as the **wastewater/energy interrelationship** and the **solid waste/energy interrelationship**. A further significant nexus interrelationship exists between **urban development and energy** (a subset of the energy/land nexus). Urban development and expansion directly interact with the energy dimension in significant manners. Construction of new buildings brings about scores of opportunities to lock-in long-term reduction of energy consumption, while the existing building stock presents numerous opportunities for retrofitting. Reducing energy consumption through technical building codes and shaping compact settlement development via spatial planning regulations and merits an accentuated role in the context of the Urban Nexus Development Strategy. Synopsis II summarizes specific urban nexus interrelationships:

SYNOPSIS II: URBAN NEXUS INTERRELATIONSHIPS

Energy ↔ Wastewater	
Energy for Wastewater: <ul style="list-style-type: none"> ▪ Transportation (pumping stations) ▪ Sewage treatment plant 	Wastewater for Energy: <ul style="list-style-type: none"> ▪ Black water (separately collected from rainwater e.g. via vacuum sewer system) can be used for electricity production in anaerobic digesters ▪ Sludge for fertilizer production
Energy ↔ Solid Waste	
Energy for Solid Waste: <ul style="list-style-type: none"> ▪ Transportation ('waste miles') ▪ Waste treatment facilities 	Solid Waste for Energy: <ul style="list-style-type: none"> ▪ Energy generation from landfills (landfill gas to energy)
Energy ↔ Urban Development	
Energy for Urban Development <ul style="list-style-type: none"> ▪ Horizontal low density development ▪ Urban sprawl ▪ Preponderance of car usage ▪ Loss of biodiversity ▪ Loss of agricultural land 	Urban Development for Energy (Reduction of energy consumption - long-term view) <ul style="list-style-type: none"> ▪ Compact city form ▪ High density city (high rises) ▪ Public transit ▪ Bus rapid transit ▪ Subway systems ▪ Energy efficient buildings ▪ Retrofitting existing building stock

Source: author's compilation

Urban nexus interrelationships are affected by **multi-jurisdictional governance issues**, generating high levels of managerial-administrative complexity. Coping with urban nexus convolutions is hampered by the horizontal fragmentation of large urban areas into separate administrative municipal jurisdictions, by functional horizontal segmentation within city administrations, and by vertical fragmentation across different levels of government. On the institutional level, these 'silos' frequently create frictions and inefficiencies, which lead to sub-optimal outcomes. **To avoid the latter, integrative approaches of urban development and urban resource management need to be applied.** Conditions within the urban domain forcefully call for the application of the urban nexus approaches. Furthermore, the urban nexus approach with its understanding of interrelated links between water, energy, solid waste, and land can facilitate required transitions to **national economies increasingly based on circular flows**. In particular, **municipal solid waste management** opens up significant avenues towards **circular economies**.

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