Sustainable Cities for Asia – ADB's 3R Strategy

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Overview

Background - Reduce, Reuse Recycle Issues in Cities

What To Do – Initiatives in 3Rs: An Integrated Approach

Example Investment

Financing 3Rs in Cities

Asia's Urban Challenge

Cities on average provide 80% of the economic base — but as much of the noise and environmental impact including contamination of air and water.

Large disparities have emerged as poverty has urbanized – over 200 million people live in poverty in Asia’s cities

and many more are vulnerable to economic and environmental shocks.

Managing cities in this context requires a new approach:
> New forms of engagement
> New forms of finance and
> The flexibility to adapt to the circumstances of each city

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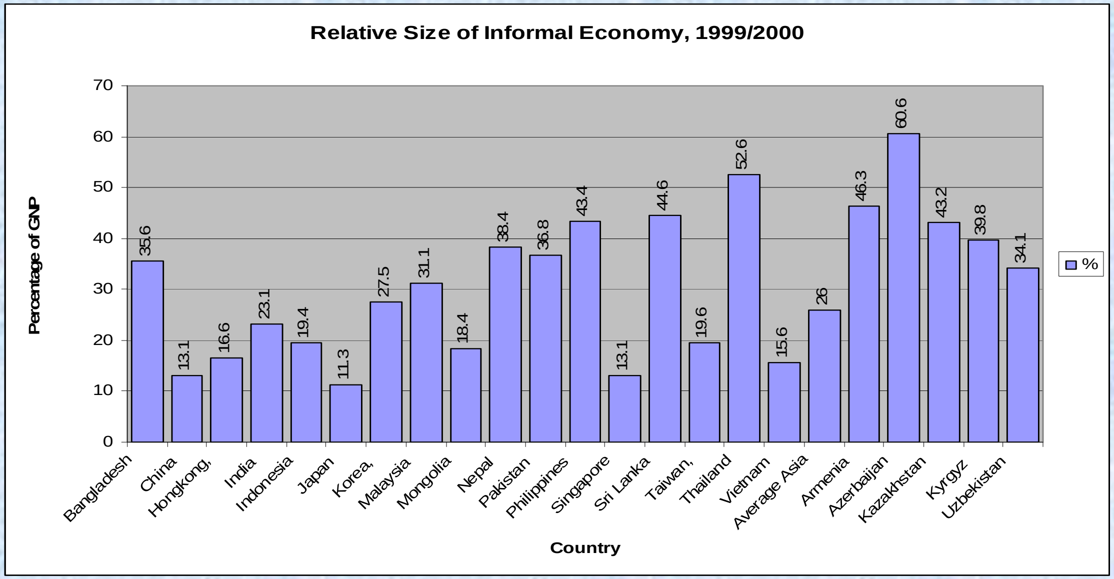
Informal Economic Giants

City	Country	Population '000s 2005	Economic Product $m 2004
Shanghai	China	12,665	89,980
Mumbai	India	18,336	83,528
Jakarta	Indonesia	13,194	24,592
Manila	Philippines	10,677	32,277
Bangkok	Thailand	6,604	63,088
Tokyo	Japan	35,327	740,000
	Sweden	8,855	255,400
	Denmark	5,300	174,400
	Cambodia	13,107	26,990
	Bangladesh	136,600	56,600

Megacities are nation-sized in population and economic product



But they contain a large informal economy

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Climate Change Background and Challenges

City Region Economies and the Energy System

- Cities use about 85% of energy and generate about 75% of GHGs to produce almost 80 % of the GDP
- CO_2-emissions are per capita in many third world cities as high as in cities of the western hemisphere

Asian Cities

- show an enormous population growth (average 3 %/a) compounding their global impact
- are especially vulnerable to climate change

Rise in pollution and sea levels puts trillions in economic output and hundreds of millions of people at risk

Urgent need for efficiency gains, reduction in pollution and GHGs and integrated planning for adaptation

Map of Metro Manila

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What Cities Can Do for More Efficient Resource Use: An Integrated Approach

- **Local land use and transportation patterns**. Municipal land use and transportation planning decisions directly influence whether people and businesses will have mobility choices that allow them to save energy and money.
- **Building construction and energy efficiency.** Through zoning codes, building codes and the permitting process, municipalities can encourage building designs that save energy and resources.
- **Local economic activity.** Municipal economic development initiatives are opportunities to encourage development in low-energy, zero-carbon directions, by both incentive and example.

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Infrastructure Efficiency

Higher density reduces the allocation of required infrastructure per person. Infrastructure construction and maintenance. A one-block street segment that embodies a typical 100 million BTUs will be allocated across 8 households at 12 million BTUs per household. But the same street segment serving 20 households will be allocated at only 5 million BTUs per household.

Operating energy. This includes lighting, pumping, signals, irrigation, and other urban infrastructure energy systems. Higher density neighbourhoods require proportionately less operating energy per capita.

Transmission efficiency and loss. Losses from transmission can be as high as 7% or more, and there is a clear association with urban form. Higher density means shorter distances and more efficient distribution.

Cogeneration and district energy opportunities. These can be much more efficient than individual building systems– over 25% more efficient.

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External Energy Demand Costs

- ***Loss of ecosystem services.*** A low-density urban form consumes more land and destroys areas that may be contributing valuable "ecosystem services", such as water filtration, aquifer recharge and more. The loss of these services translates into yet more energy demand for pumping, water purification and the like.

- ***Loss of agricultural lands.*** Nearby agriculture reduces food miles, increases nutritional value, generally lowers cost, and generally lowers energy use per calorie. More distant agriculture relies upon increasingly greater shipping and energy.

- ***Heat island/albedo/vegetative cover per person***. Low-density residential form does not reduce heat island effects. On a per-capita basis, the reverse is often the case – particularly for auto-dominated development patterns. The result is an increased demand on cooling equipment in warm areas and seasons.

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Building Energy Efficiency

Higher-density urban areas include more multi-family and attached dwellings.

- ***Urban building type, exposure and orientation.*** According to U.S. DOE data, space-heating requirements can be as much as 2 percent less on a square foot basis for dwellings in multi-unit building.
- ***Prevailing size.*** Residential units in higher-density areas are typically smaller on average, in large part because of the higher prices commanded by greater proximity.
- ***Embodied energy in building materials.*** According to University of North Carolina research, attached dwellings have an average of 750,000 Btu per sq.ft. of embodied energy in their construction materials versus 790,000 Btu for detached dwellings – a reduction of 5%.
- ***The influence of building type.*** According to US Department of Energy research, multi-family homes in buildings with 5 or more units, the prevailing typology in higher-density areas, use approximately 40% of the energy used by single-family detached homes, the prevailing home type in low-density sprawl – a savings of 60%. A maximum possible savings of up to 6% of all energy used.

Industrial Ecology
– China's Circular Economy

China has a goal of increasing efficiency of resource utilization by a factor of 10. It seeks a 20 percent reduction in energy used over the current plan period (to 2012).

The Circular Economy approach to resource-use efficiency integrates cleaner production and industrial ecology in a broader system encompassing industrial firms, networks or chains of firms, eco-industrial parks, and regional infrastructure to support resource optimization.

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- At the individual firm level, managers must seek much higher efficiency through the three Rs of CP, reduce consumption of resources and emission of pollutants and waste, reuse resources, and recycle by-products.
- The second level is to reuse and recycle resources within industrial parks and clustered or chained industries, so that resources will circulate fully in the local production system.
- The third level is to integrate different production and consumption systems in a region so the resources circulate among industries and urban systems. This level requires development of municipal or regional by-product collection, storage, processing, and distribution systems.

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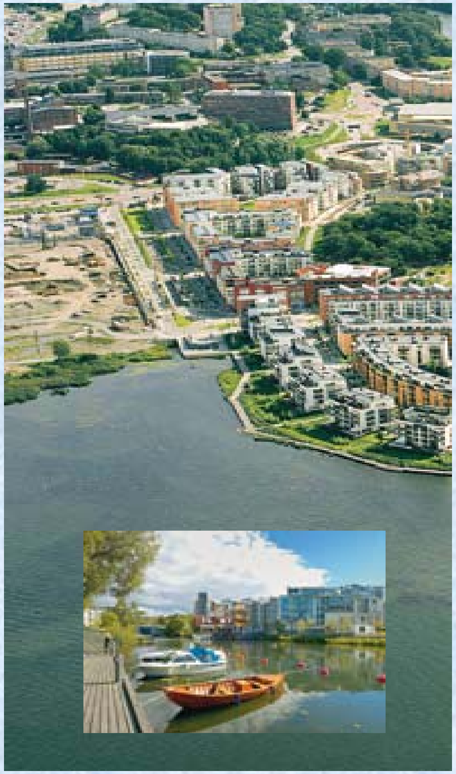
Hammarby Sjöstad
Retrofitting the City



Land usage: sanitary redevelopment, reuse and transformation of old brownfield sites into attractive residential areas with beautiful parks and green public spaces.

Transportation: fast, attractive public transport, combined with carpool and beautiful cycle paths, in order to reduce private car usage.

Building materials: healthy, dry and environmentally sound.

Energy: renewable fuels, biogas products and reuse of waste heat coupled with efficient energy consumption in buildings.

Water & sewage: as clean and efficient as possible – both input and output – with the aid of new technology for water saving and sewage treatment.

Waste: thoroughly sorted in practical systems, with material and energy recycling maximized wherever possible.

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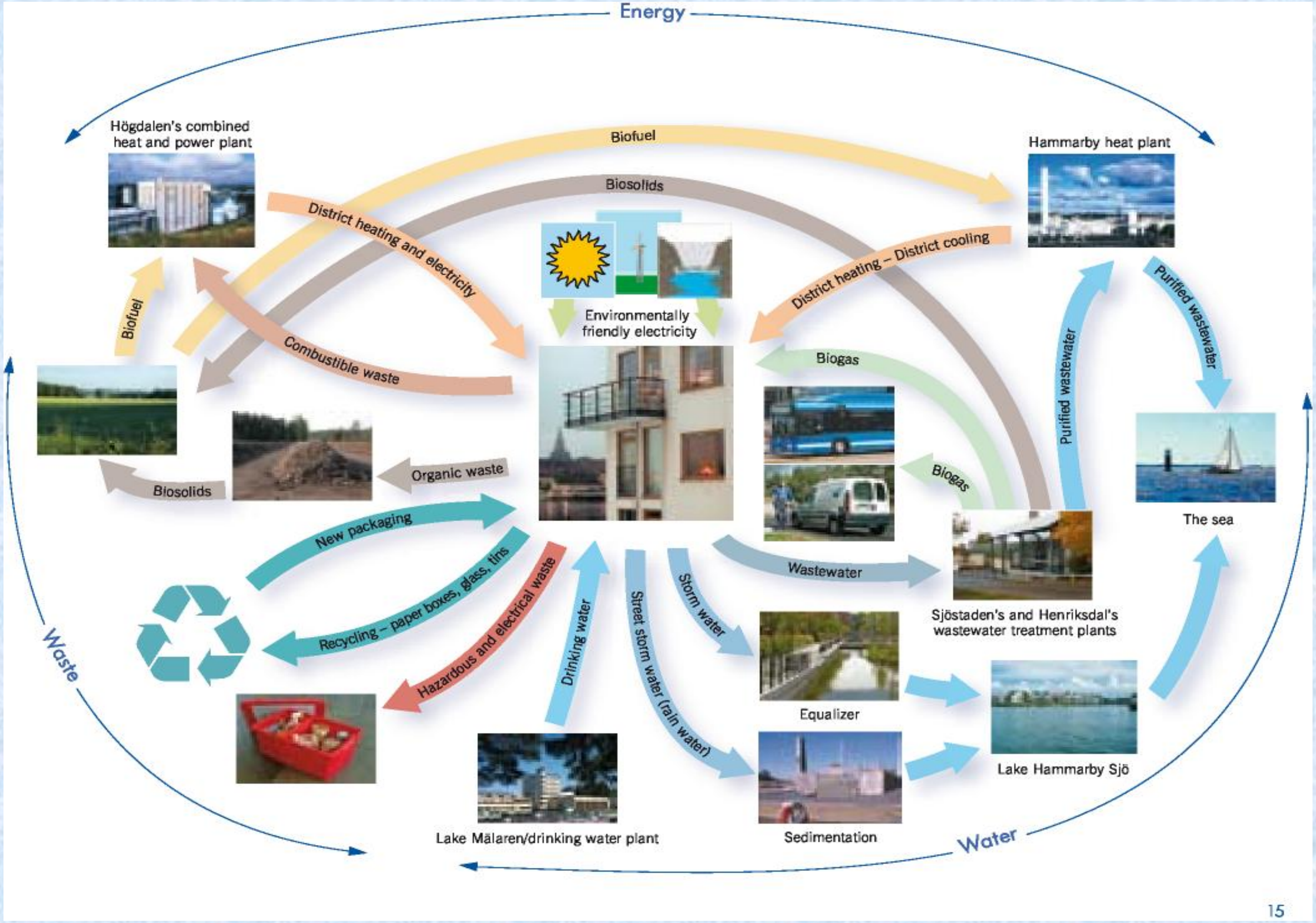
The Hammarby Model – A Unique Eco-Cycle



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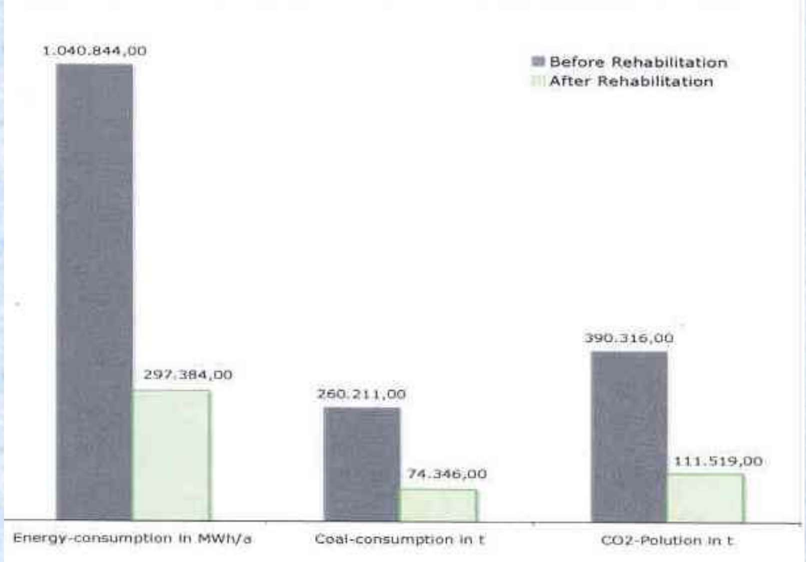
An example: energy savings for Mongolian housing
> Retrofilling the City

The Building – before and after



The Savings
– energy, coal and CO2
– ability to close one out of three power plants

The Financing
– ADB/CDM, KfW and local banks

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Solid Waste Management

- Composting of biodegradable portion of municipal solid waste
- Waste to energy through disposal facility/ incineration > net energy reduction
- Land savings from above

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Wastewater Treatment

- Methane capture in wastewater treatment projects
- Methane capture through treatment of sludge
- Energy production from methane capture > net energy reduction
- Water pumping/piping improvement.

Anaerobic Sludge Digester

Sludge Drying Beds

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Shortfalls in Current International Support for Climate Change Initiatives in Developing Countries

Key features of the current Clean Development Mechanism which make it user unfriendly for cities in developing countries:

- Requires high levels of technical competence to use and monitor "approved methodologies"
- Has high transaction costs in time and expertise
- Requires competent specialized institutions for project implementation, monitoring and certification
- Is unfriendly to 'multi-sector' projects requiring complex coordination and justification in each sector

It should be noted that these features require capacity in the exact areas where developing countries and cities have difficulty.

The resulting high transactions costs combined with "low" carbon price discourage climate friendly investment.

There are also VERs – Verifiable Emissions Reductions

But, like CDM, this mechanism is not, as yet, making a systemic difference

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ADB's Role in Catalyzing Finance for Sustainable Development

Preparation of 'bankable' projects

- Cities Development Initiative for Asia helps cities do investment prioritization and structures priority projects for private and/or public finance as appropriate

- ADB's loan and guarantee instruments provide low cost investment finance and can catalyze local and international financial participation in investments

- ADB is building e-Systems for project sponsors to attract a broader range of investors

- ADB can link to a diverse range of climate change and other funding for sustainable development

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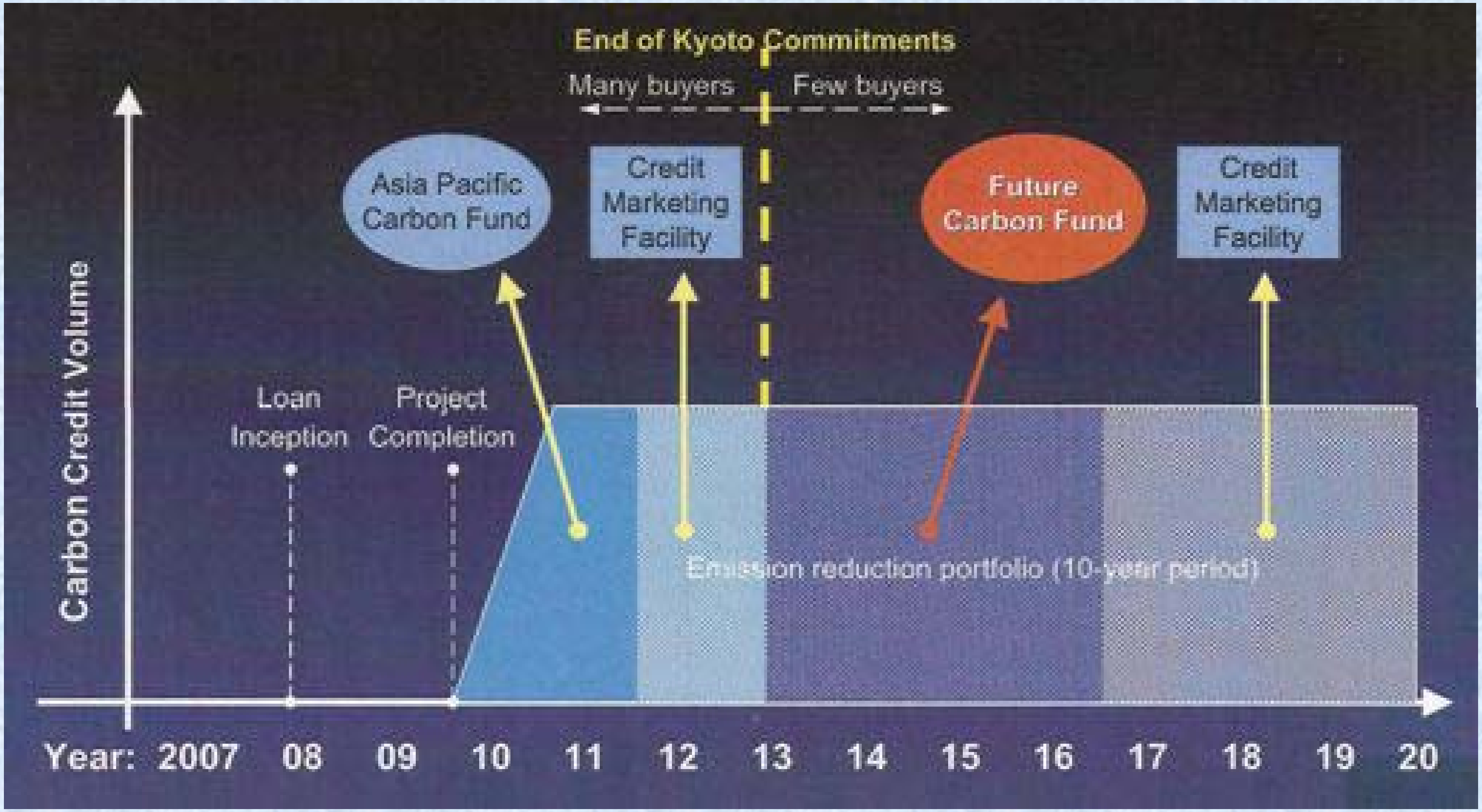
Carbon Market in Support



Example: Financing for Climate Change Infrastructure

Mitigation

Global Environment Facility (GEF) Climate Change Focal Area
$250 m/ year for GEF-4; GEF-5 target $450 m- $1b/year

Clean Technology Fund (CTF) of the Climate Investment Funds (CIF)
(WB as Trustee, thru MDBs)
$5 b pledged

Adaptation

Least Developed Countries Fund (LDCF)
(GEF as administrator)
$181 m pledged for GEF-4, allocated $107 m; GEF-5 target $500m

Pilot Program for Climate Resilience (PPCR) under CIF Strategic Climate Fund (SCF)
(WB as Trustee, thru MDBs))
$598 m pledged, loan/grant, 11 countries/regions chosen

Kyoto Protocol Adaptation Fund (KPAF)
(managed by KPAF Board; GEF as secretariat)
Up to $1.6 b by 2012

Both

Special Climate Change Fund (SCCF)
(GEF as administrator)
adaptation priority,$123 m pledged, $101 m allocated; GEF-5 target $500 m)

Strategic Climate Fund (SCF) of the CIF
(WB as Trustee, thru MDBs)
Pledges:
- PPCR (see 2nd box at left)
- Forest Investment Program (FIP) $349 m pledged
- Scaling up Renewable Energy Program (SREP) $199 m pledged; $250 m minimum to launch

* GEF-5 targets based on GEF-5 Programming Document, 18 Sep 2009
**CIF figures are as of October 2009

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Thank You

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