THEMATIC AREA 5: PROMOTING A SAFE AND SUSTAINABLE URBAN ENVIRONMENT

114. ***Promoting a safe and sustainable urban environment is a key priority of the Bank's Urban Strategy.*** In this section we review key challenges, consider what innovative cities are doing today, and outline approaches that the World Bank will support over the coming decade under its Urban Environment, Climate Change and Disaster Management Business Line.

Urban Form & Climate Change

115. ***The increased vulnerability of urban systems to climate change impacts poses numerous dilemmas for decision makers and stakeholders at the local, national, and regional level.*** A majority of the world's cities are located on coasts or river flood plains, especially mega-cities like Mumbai, Tokyo, and São Paulo. 360 million people live in urban areas in coastal zones, thus increasing their vulnerability to climate change impacts considerably. These specific climate changes risks must be understood in a context of deteriorating environmental health conditions due to rising air pollution, GHG emissions and significant risks to urban water supply due to mismanagement of watersheds in many instances. Linking environmental health, energy efficiency and livability concerns, leading cities are now considering how to build sustainability into the way they plan for the future. This has important climate change co-benefits, since a greater emphasis on public transit, higher density, and encouragement of energy efficient buildings with better facilities management can contribute to these city development objectives while also reducing a city's GHG footprint. And, current and possible future financial flows being considered under the UNFCCC negotiations, such as those coming today from the Clean Development Mechanism, could support an acceleration of the needed investments.

116. ***Cities can be efficient, but are not always designed that way.*** Recent research suggests that of the 48 major metropolitan areas in the US, an "average household" generates up to 35 percent less GHG emissions when located in the city rather than in the corresponding suburb[68]. Rapidly urbanizing cities in middle-income countries can determine for better or worse their efficiency levels in the choice of urban form and corresponding infrastructure investments, simply because such investments represent long-lived capital stock that can lock-in emissions for long periods. Such investments tend to be "lumpy" and can generate significant ancillary emissions. Taking into account this path dependency in the design of cities, it is important to bear in mind that consumers respond accordingly. That is, in cities where densities are low, consumers respond by locking into vehicle purchases, housing types, locations and access to employment that prevents them from responding to price signals and government-induced incentives to change behaviors. Good examples of cities that have addressed this challenge are Hong Kong and Tokyo, where they constrained individual car use and urban sprawl early on. Figure E-17 (Annex E) plots the relationship between GHG emissions and density gradients for a sample of cities, demonstrating a clear relationship between the two.

117. ***Wise residential land use practices in urban areas can help make inroads in the fight against global warming.*** Housing and transportation patterns literally define the landscapes of the world's cities, while the energy and environmental impacts are even more widely felt. Ninety percent of urban air pollution is generated by motor vehicles, which kill an estimated 800,000 people each year and contribute to CO^2 emission levels. Smart growth policies can address housing, transport and environmental concerns by promoting denser developments, as opposed to greenfields, when such density is desirable, and can support jobs, services and other amenities.

[68] Glaeser 2009.

Vulnerability of the Poor to Urban Environment & Climate Change Hazards

118. ***In a growing number of developing countries the poorest households living in substandard units in precarious locations are the most likely to bear the brunt of climate-induced disasters.*** Environmental problems affect the urban poor disproportionately because of the inadequacies in the provision of water, sanitation, drainage, health care and garbage collection, and low quality and overcrowded housing. The urban poor often live in environmentally unsafe areas, such as polluted sites near solid waste dumps, with open drains and sewers, and near industrial sites as these are the only lands available. The sites are typically more vulnerable to floods, landslides, and earthquakes, with substandard housing prone to fire, damage and collapse. This makes the urban poor extremely vulnerable to natural disasters and the growing impacts of climate change through sea level rises, warming temperatures, uncertain effects on ecosystems, and increased variability and volatility in weather patterns. Recovering from disasters is also particularly difficult for the poor as they do not have resources or adequate safety nets, and public policies often prioritize rebuilding in other parts of the city.[69]

119. ***Most global disaster hotspots are urban.***[70] Rapid urbanization has increased pressure to expand housing and commercial space resulting in increased vulnerability to multiple hazards. These urban conglomerations are particularly vulnerable to disruptions from natural and man-made hazards, especially in developing countries, where the combination of structural poverty, decaying and sub-standard infrastructure, high population densities and the concentration of economic assets and commercial and industrial activities magnify the problem.[71] Urban hazard risks are complex and have characteristics which can amplify the impact of even a low intensity event. Rescue and relief efforts have exposed lack of professional city emergency management systems.

Profile 12: Disaster Risk Reduction in Istanbul, Turkey. A major earthquake in Istanbul could result in hundreds of thousands of casualties. With a loan of $400 million from the Bank, Turkey is undertaking a major Disaster Risk Management initiative, focusing on emergency preparedness, mitigation for public facilities, and enforcement of building codes.

Promoting Energy Efficient Cities

120. ***Cities face major barriers to implementing sustainable energy measures.*** Even where there is a desire to improve their efficiency levels, cities often lack the requisite information, supportive national level policies, access to financing and other support. City managers and mayors are often not equipped with adequate information or resources to identify and prioritize energy actions and are left with more questions than answers. City leaders need help to remove barriers and to build capacity to acquire, adapt, and diffuse energy efficiency strategies and technologies. Many structurally sound, low-cost, low-tech green technologies exist in developing countries. For example, in India, some 6,000 units of low-income housing are being built using a new technology that has virtually eliminated the use of energy-intensive bricks. Aside from achieving substantial reductions in carbon emissions, the units are affordable and the technology transferable.

121. ***Reducing energy use through efficiency measures and improved urban planning can reduce a city's dependence on imported fuels and reduce energy costs, freeing up resources for***

[69] Fay, Ghesquiere, and Solo 2003.
[70] Highest hazard prone areas have higher than average agriculture GDP density, population density, GDP, and infrastructure(Global Disaster Risk Analysis: Natural Disaster Hotspots(The World Bank, Columbia University 2005)
[71] World Bank 2003a.

improved city services. It brings socioeconomic benefits, such as reduced commuting times, improved air quality and health, and more green and community space. And it improves competitiveness by lowering energy bills and operating costs. But there may be substantial barriers to energy efficiency. With respect to policy and regulations, there may be rigid procurement and budgeting policies, low energy prices, inadequate planning and design methods, and limitations on public financing. With respect to service providers, there may be limited technical and risk management skills, large project development costs, public repayment concerns, limited equity, and the need for new contractual mechanisms. With respect to public end-users, they may have limited incentives, unclear ownership of energy/cost savings, no discretionary upgrade budgets, and a general lack of awareness. And with respect to financiers, they may be faced with high transaction costs, high perceived risks, behavioral biases, and problems in adopting new technologies.

World Bank Strategy Approaches to Promote a Safe & Sustainable Urban Environment

122. An increased focus on climate change and its impact on developing country cities will require retooling of the approaches to Urban Environmental Management. The World Bank's approach will be informed by a five cluster analysis of key issues and constraints, as laid out below, and corresponding responses.

123. ***A Framework for Cities in Analyzing and Addressing Urban Environment Challenges.*** The framework below highlights 5 clusters of urban environmental challenges, each of which requires different responses:

- Cluster 1: Urban Household and Workplace Environmental Health Challenges are characterized by poor quality housing, cheap dirty fuel and inadequacies in provision of water, sanitation, and solid waste removal. This cluster also includes the environmental health aspects of occupational health and safety, such as biological pathogens, chemical pollutants, physical hazards, and health-damaging noise levels.
- Cluster 2: City System Environmental Challenges are comprised of air and water pollution, traffic accidents, and solid waste management issues.
- Cluster 3: City Eco-System Challenges are defined as those interactions between cities and their physical regions that include unsustainable use of freshwater resources, the erosion of protective eco-systems and poor watershed management, city expansion into hazardous sites, and the export of solid wastes, liquid wastes, and air pollution.
- Cluster 4: Disaster Risks to the City System are comprised of extreme events within and around the city, such as cyclones, storms, earthquakes, floods, and landslides.
- Cluster 5: Cities and Global Environmental Challenges are characterized by issues of resource availability and eco-system functioning at a global level, with rising greenhouse gas emissions being the most pressing issue.

124. ***Rather than tackling all clusters simultaneously, there are good reasons to prioritize different clusters over time and in accordance with a city's level of development.*** In low-income and middle-income nations, for instance, priority for the first cluster would be most appropriate. These challenges can and should be addressed through focusing on sound municipal management. For larger urban centers or centers of heavy industry (irrespective of national income), the second cluster must also be addressed. Larger and more successful urban centers need to give priority to the third cluster, while also having much to do to address the first two for their low-income population. The fourth cluster must be a priority for urban centers in locations where extreme weather events are already causing problems or are likely to do so in the near

future because of climate change. Since per capita greenhouse gas emissions of urban citizens in the developing world are usually one-twentieth to one-hundredth of those in high-income nations, cluster five may well be a lower priority for many cities. However, Carbon Financing and other incentive programs can make it worth a city's effort to contribute to the reduction of global GHG emissions. Many cities have taken initiatives on their own, and such innovations need to be shared across countries and regions to provide guidance for other cities wishing to emulate their success. (See Annex E, Table E-4)

125. ***World Bank assistance in addressing Cluster 2 challenges includes policy reforms and investments to strengthen solid waste management and to mitigate air and water pollution.*** Policies promoted by the Bank include focusing on phasing out highly polluting vehicles, improving public transport, and monitoring air quality more intensively.[72] With regard to solid waste management, new sector policy-based approaches are being tried, such as the case in Morocco where the first Solid Waste Management Development Policy Operation was approved this year and focuses on establishing a sound policy framework to set collection and management standards, ensure cost recovery, and put in place accountability measures between municipalities and national oversight agencies. More recently, working at the specific city level an investment project in the city of Amman, Jordan was attractive by the linkage to carbon financing and a green energy design feature that aims to capture methane gas at the city landfill and convert it to electricity to be fed back in the grid (See Profile).

> ***Profile 13: Amman Solid Waste Management Project.*** Carbon Financing made a loan to the City of Amman, Jordan possible to strengthen its solid waste management system. In addition to overall efficiency improvements, the project will generate approximately $15 million in emission reduction revenues and $25 million worth of green electricity by 2019.

126. ***In addressing Cluster 3 challenges dealing with Eco-System Management, a combination of specific interventions and holistic approaches are being tested and developed.*** These approaches include focusing on urban design issues, such as including appropriate infrastructure and basic services for pedestrians, cyclists and other non-motorized transport in city planning schemes, creating a variety of housing and transportation options that would minimize motorized vehicle transport for low-income groups in accessing city jobs, using policies such as, inclusionary zoning, shared-equity arrangements, tax incentives, among other measures to create affordable, mixed-income communities in transit corridors. Increasing areas of support also include a focus on watershed management and protection of city rivers and water bodies from illegal dumping of untreated wastewater effluent (supported in collaboration with the Bank's ARD and Environment Departments). Most recently, the Bank has developed a holistic approach to promoting ecological and economic cities, which is defined as the ECO^2 Cities Model that combines energy efficiency design with environmentally sound technologies (See Profile). This approach begins with an ECO^2 Cities audit that diagnoses potential efficiency gains and emission reductions as a basis for interventions that include retrofitting of infrastructure and buildings coupled with introducing new technologies. In greenfield situations, the ECO^2 Cities model or approach can be adopted from the outset. In each of these areas, cities have a role to play, but

> ***Profile 14: Eco^2 Cities – Ecological Cities as Economic Cities.*** This new World Bank Program, initiated in East Asia, aims to help cities achieve both ecological and economic sustainability through holistic planning and long-term investment.

[72] World Bank 2008b.

there is often a need to coordinate with national-level transport, water and environment agencies at the policy level.[73]

127. ***In responding to Cluster 4 challenges, regarding disaster risks, the Bank supports both climate change-induced and other risks due to natural causes using ex-ante and ex-post approaches.*** *Ex-ante* interventions include: (i) risk assessments, (ii) mitigation measures, including zoning regulations, land use planning, building codes, disaster resilient construction of critical infrastructure, and iii) preparedness activities, including city level and sub-city level emergency plans. In the *ex-post* recovery phase the activities include the damage, loss and needs assessment, which forms the basis for the reconstruction and recovery plan. The strategic goal for the urban planner should be *mainstreaming* of the *ex-ante* and *ex-post* activities into the current and future policies of the city government. (See Annex G, Box 15)

128. ***To address Cluster 5 challenges concerning resource use efficiency and eco-system functioning at the global level a combination of energy efficiency measures, emissions monitoring and carbon financing approaches are recommended as outlined below:***

- In 2008, ESMAP[74] launched the Energy Efficient Cities Initiative (EECI) to help cities around the world meet their energy challenges in partnership with other organizations. The *Energy Efficient Cities Initiative* is a flexible, cross cutting, demand driven program that identifies innovative ways to improve energy efficiency in the delivery of city services and reduce the costs and environmental impacts of energy use. EECI will build upon existing work through broad consultation and would aim to leverage sustainable energy investments in cities through existing, and possibly new, financing instruments. Given the complex nature and the broad scope of this work, forging strong and strategic partnerships is critical for EECI to successfully respond to the needs of cities. EECI tools and support are comprised of: (i) analyzing city energy use, (ii) offering small grants to test new approaches, and (iii) sharing good practices and rewarding innovation.
- Introducing a *City-level Greenhouse Gas (GHG) Standard* consistent with the Global City Indicators Program. The aim of this demand-driven, voluntarily-applied standard is to enable cities that wish to monitor their emissions to do so with a standardized measurement tool that can enable benchmarking and monitoring activities within cities.
- Expanding the use of *climate finance instruments* targeting critical urban environment challenges, while achieving climate change co-benefits. Such forms of concessional financing can make it attractive for cities seriously consider investments that will address their immediate needs while responding to the climate change agenda.
- Within its own lending portfolio, the Bank's Urban Anchor is collaborating with the Environment Department and across other relevant sector units to track and identify urban investment projects and components that present opportunities to reduce carbon emissions and enhance energy efficiency in order to monitor the Bank's overall financing in urban operations devoted to reducing carbon emissions.

[73] These initiatives are in line with the Bank's Strategy on Climate Change reflected in Development and Climate Change: A Strategic Framework for the World Bank Group (2008).

[74] The Energy Sector Management Assistance Program (ESMAP) is a global knowledge and technical assistance partnership administered by the World Bank and sponsored by bilateral official donors since 1983. ESMAP's mission is to assist clients—low- and middle-income countries—in providing clean, reliable, and affordable energy services for poverty reduction and environmentally sustainable economic development.