

# Eco<sup>2</sup> Cities

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## Ecological Cities as Economic Cities

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**THIS IS A CONFERENCE EDITION**



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## SELECTED ABBREVIATIONS

|                 |   |                 |  |
|-----------------|---|-----------------|--|
| BRT             | Bus Rapid Transit                                     | LCC             | life cycle costing                                     |
| CAGECE          | Companhia de Água e Esgoto do Ceara                   | LED             | light-emitting diode                                   |
| CAPEX           | capital expenditure                                   | LFG             | landfill gas   |
| CBD             | central business district                             | LNG             | liquefied natural gas                                  |
| CDM             | Carbon Development Mechanism                          | LPG             | liquefied petroleum gas                                |
| CHP             | combined heat and power                               | MDB             | Multilateral Development Bank                          |
| CO <sub>2</sub> | Carbon dioxide  | MFA             | material flow analysis                                 |
| DSM             | Demand Side Management                                | MIGA            | Multilateral Investment Guarantee Agency               |
| DSS             | Decision Support System                               | NGO             | nongovernmental organization                           |
| ELP             | Environmental Load Profile                            | NMT             | non-motorized transport                                |
| ESCO            | energy service company                                | NPO             | nonprofit organization                                 |
| FAR             | floor-area ratio                                      | NPV             | net present value                                      |
| FY              | fiscal year   | O <sub>2</sub>  | oxygen   |
| GDP             | gross domestic product                                | OECD            | Organisation for Economic Co-operation and Development |
| GEF             | Global Environment Facility                           | OPEX            | operation expenditure                                  |
| GHG             | greenhouse Gas  | PPP             | public private partnership                             |
| GIS             | Geographic Information Systems                        | PSP             | private sector participation                           |
| IBRD            | International Bank for Reconstruction and Development | PT              | public transport                                       |
| IDA             | International Development Association                 | R&D             | research and development                               |
| IFC             | International Finance Corporation                     | SEK             | Sweden Krona   |
| IPPUC           | Institute for Research and Urban Planning of Curitiba | SO <sub>2</sub> | sulfur dioxide   |
| LCA             | life cycle assessment                                 | TDM             | travel demand management                               |
|                 |   | TDR             | transfer of development rights                         |
|                 |   | TOD             | transit oriented development                           |



# Foreword

Urbanization in developing countries is a defining feature of the 21st century. Some 90 percent of global urban growth now takes place in developing countries—and between the years 2000 and 2030, developing countries are projected to triple their entire built-up urban areas. Urbanization has enabled economic growth and innovation across all regions—currently accounting for three quarters of global economic production. At the same time, urbanization has also contributed to environmental and socio-economic challenges, including climate change, pollution, congestion, and the rapid growth of slums.

Global urban expansion poses cities, nations and the international development community with a fundamental challenge and opportunity. It sets forth before us a once in a lifetime opportunity to plan, develop, build and manage cities that are simultaneously more ecologically and economically sustainable. We have a short time horizon within which to impact the trajectory of urbanization in a lasting and powerful way. The decisions we make together today, can lock-in systemic benefits for current and future generations.

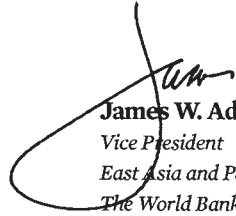
The Eco<sup>2</sup> Cities Program presents itself at a critical historic juncture in relation to this challenge and opportunity. This book, which marks the launch of the Eco<sup>2</sup> Cities Program, sends a positive message. The knowledge and expertise to resolve these challenges exist, and forward-thinking cities in developed and developing countries have already applied this knowledge to make the most of opportunities. Importantly, many cities have shown that cost is not a major barrier to accomplishing urban sustainability.

The Eco<sup>2</sup> Cities Program is an integral part of the World Bank's new Urban Strategy which is currently being developed in consultation with stakeholders. The Eco<sup>2</sup> Cities Program is also complementary to the ongoing efforts the World Bank and its development partners are making in sustainable development and climate change.

Cities are now on the frontlines of managing change and leading the global development agenda. It is only through cities that poverty reduction, economic growth, environmental sustainability, and climate change challenges can be addressed together. Sustainable city

planning, development, and management, can unite these objectives and link them to activities at local, regional, national, and global levels. We believe the Eco<sup>2</sup> Cities Program will

further enable cities to make the most of their opportunities in effective, creative, and holistic ways, thereby ensuring a more meaningful and sustainable future.



**James W. Adams**  
*Vice President*  
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# Preface

This book provides an overview of the ‘Eco<sup>2</sup> Cities: Ecological Cities as Economic Cities’ Program. The objective of the Eco<sup>2</sup> Cities Program is to help cities in developing countries achieve greater ecological and economic sustainability.

## What do we mean by Ecological Cities?

Ecological cities enhance the wellbeing of citizens and society through integrated urban planning and management that fully harnesses the benefits of ecological systems, and protects and nurtures these assets for future generations.

Ecological cities value their own ecological assets as well as the regional and global ecologies they depend on. Through their leadership, planning, policies and regulations, institutional measures, strategic collaborations, urban design, and holistic long-term investment strategies, they drastically reduce the net damage to the local and global environment—while simultaneously improving the overall wellbeing of their citizens and the local economy.

Ecological cities also learn from and incorporate management and design solutions from the efficient self-organizing strategies used by ecosystems.

## What do we mean by Economic Cities?

Economic cities create value and opportunities for citizens, businesses, and society by efficiently utilizing all tangible and intangible assets, and enabling productive, inclusive, and sustainable economic activity.

Often, when people talk about economic cities, they are referring to a narrower definition of ‘productive’ cities, driven by a singular emphasis placed on the indicator of GDP. While productivity is certainly a fundamental attribute of economic cities, it is not the only one, and often the short term and excessive pursuit of productivity or profit displaces fundamental social and cultural considerations, and might undermine longer term economic resilience. In some cases, productivity overshadows our basic value systems, and exposes us to substantial risk—as is evidenced in the

causes and consequences of the current global economic crisis. In the Eco<sup>2</sup> Cities program, we propose a more balanced notion of economic cities—where the emphasis falls on sustainable, innovative, inclusive, and resilient economic activity, within the context of a larger cultural and value system.

### **So what do we mean by an Eco<sup>2</sup> City?**

As the name implies, an Eco<sup>2</sup> City builds on the synergy and interdependence of ecological and economic sustainability and their fundamental ability to reinforce and strengthen each other in the urban context.

Innovative cities have demonstrated that with the appropriate strategic approach they can greatly enhance their resource efficiency by realizing the same value from a much smaller and renewable resource base—while simultaneously decreasing harmful pollution and unnecessary waste. By doing so, they have improved the quality of life of their citizens, enhanced their economic competitiveness and resilience, strengthened their fiscal capacity, and created an enduring ‘culture’ of sustainability. At the same time, many of their interventions have also provided significant benefits to the poor. Urban sustainability of this kind is a powerful and enduring investment that will pay compounding dividends. In a fast-paced and uncertain global economy, such cities are most likely to survive shocks, attract businesses, manage costs, and prosper.

It is with the purpose of enabling cities in developing countries to realize this value, and to take on a more rewarding and sustainable growth trajectory while the window of opportunity is still open to them, that the Eco<sup>2</sup> Cities Program has been developed.

### **How does the Eco<sup>2</sup> Cities Program work?**

The World Bank’s Eco<sup>2</sup> City program is a broad platform that will provide practical and scalable, analytical and operational support for cities in developing countries to achieve ecological and economic sustainability.

The issuing of this book marks the completion of the first phase of the Eco<sup>2</sup> Cities Program—the development of the analytical and operational framework. This framework can be adapted by cities in developing countries to systematically work toward and accomplish the positive results mentioned above. The analytical and operational framework is rooted in four key principles. These are 1) ‘A City Based Approach,’ which enables local governments to lead a development process that takes into account their specific circumstances, including their local ecology; 2) ‘An Expanded Platform for Collaborative Design and Decision Making,’ that accomplishes sustained synergy by coordinating and aligning the actions of key stakeholders; 3) ‘A One System Approach,’ that enables cities to realize the benefits of integration by planning, designing, and managing the whole urban system; and 4) ‘An Investment Framework that Values Sustainability and Resiliency,’ by incorporating and accounting for life cycle analysis, the value of all capital assets (manufactured, natural, human, and social), and a broader scope of risk assessments in decision making.

Through these principles are derived a set of core elements. Using the analytical and operational framework, each city can operationalize the core elements into a series of concrete action items or ‘stepping stones,’ that should take into account local conditions, in a logical sequence. Together these stepping stones enable a city to develop its own unique Eco<sup>2</sup> action plan, called an Eco<sup>2</sup> Pathway.

In this context, an Eco<sup>2</sup> City is a city which formally accepts the four key principles, ap-

plies the analytical and operational framework to its particular context, and by doing so develops and begins to implement its own Eco<sup>2</sup> Pathway.

Clearly, taking on all the core elements simultaneously may not always be possible for all cities. Many cities will probably need to take an incremental or phased approach. Often, cities may begin by engaging in capacity building and by targeting their most critical priority through the development and implementation of an Eco<sup>2</sup> Catalyst project. Unlike stand alone projects in resource efficiency, what will distinguish an Eco<sup>2</sup> Catalyst project is its explicit objective and ability (beyond its immediate project scope and objectives) to drive the city forward on its Eco<sup>2</sup> Pathway by catalyzing a process of change.

## How will the Eco<sup>2</sup> Cities Program Evolve?

The second phase of the Eco<sup>2</sup> program has begun with the release of this book, and will focus on the application of this framework in specific pilot cities.

Application in the real world will initially require strong efforts and commitment. It will require political will, leadership, capacity building, collaboration, institutional reform, and even a new process for creative design and decision-making. However, the successful application of such a program will leave behind a legacy—as it has already done in the inspiring cases you will encounter through this book. The Eco<sup>2</sup> Program is intended to provide the support that cities will need to make their own transition. It brings together a network of partners and practitioners, who share in the Eco<sup>2</sup>

philosophy, and who can all contribute to the process in their own capacities.

It will be important that the first set of pilot Eco<sup>2</sup> Cities demonstrate strong political will and city leadership. A fundamental issue in the second phase is to ensure that the first set of pilot cities provides a genuine and strong opportunity to mainstream Eco<sup>2</sup>, and to effectively implement changes. Diversity between the conditions and contexts of the first set of pilot cities (city size, geographic conditions, socio-economic conditions, institutional framework, fiscal capacity, etc.) will also be important. This will provide a broader and richer platform on which to apply the Eco<sup>2</sup> framework, and thereby enable the program to learn from and assess its value-added in different circumstances.

It is evident that a city-by-city approach will be important as we pilot Eco<sup>2</sup>, and learn from the ground level experiences of each case. However, given the magnitude and rate of ongoing urbanization, we will not be able to achieve the desired global impact within the window of opportunity that currently presents itself, if we limit ourselves to a city-by-city approach. Accordingly, the third phase of Eco<sup>2</sup> will aim at mainstreaming and scaling up the Eco<sup>2</sup> Cities Program through institutionalized national programs.

As we continue to work towards our common objectives, the Eco<sup>2</sup> Cities Program will evolve and grow as new knowledge, methods, tools, and resources become available. As we forge new partnerships and work with more cities, new possibilities and innovative ideas will continue to present themselves. The Eco<sup>2</sup> Cities Program will constantly work to incorporate these in an inclusive, iterative, and purposeful way.



# The Structure of this Book

This book is divided into three parts.

**Part One** is the framework for Eco<sup>2</sup>. It describes the approach, beginning with the background and rationale. Key challenges are described, and lessons are drawn from cities which have managed to turn these challenges into opportunities. A set of four key principles are introduced. The program is then developed around these four principles. Each of the principles is addressed in separate chapters that describe the core elements of the program, and the stepping stones that each city can follow as they develop their own unique Eco<sup>2</sup> ‘pathway.’ Part One concludes with an overview of some of the ways in which cities can draw on the resources of various development partners as they embark on their Eco<sup>2</sup> pathways.

**Part Two** of the book is a City-based Decision Support System that introduces a set of core methods and tools to help cities as they develop their own Eco<sup>2</sup> pathway, and work towards applying some of the core elements and stepping stones outlined in Part One. Part Two

looks into methods for collaborative design and decision-making, and methods to create an effective long-term framework that can align policies and actions of stakeholders. Part Two then looks into material flow analysis, as well as the use of layered maps to facilitate a more integrated approach to urban infrastructure and spatial planning. Techniques for life cycle costing are described, and specific tools are referenced. Finally, Part Two introduces methods for forecasting workshops and resiliency planning. It is expected that as the Eco<sup>2</sup> program grows, there will be greater depth of information generated to enrich the City-based Decision Support System.

**Part Three** of the book is a ‘Field Reference Guide’ that contains background literature designed to support cities in developing more of an in-depth insight and fluency with the issues at two levels. This section provides a city-by-city and sector-by-sector lens on urban infrastructure. It begins with a section on a series of case studies from best practice cities around the world. Each city offers the program a very different example of how various elements of

the Eco<sup>2</sup> approach can be applied. Most of these cities have already agreed to be a partner in the Eco<sup>2</sup> Cities Program. The next section comprises of a series of Sector Notes, each of which explores sector specific issues as they pertain to urban development. The sectors include: energy, water, transport and solid waste. This section also includes a note on the management of the spatial structure of cities. Together, these sector notes provide insight on how each sector functions, and on how they currently interrelate with each other. As we view these issues from a city-by-city and sector-by-sector lens, a bigger picture starts to emerge. Part Three also includes a final section on some of the specific financial instruments of the World Bank.

While the first two parts of this book address the Eco<sup>2</sup> Cities Program directly, the Field Reference Guide provides the background on current best practices, and a full scope of policies, specific measures, and institutional structures which need to be considered. Together, these three parts provide cities with an up-to-date survey of the terrain ahead, and guidance on how to move forward on an Eco<sup>2</sup> pathway. This book is a conference edition that lays out the scope of Eco<sup>2</sup>, and should be viewed as an evolving document, particularly Parts Two and Three. We will soon be launching the Eco<sup>2</sup> Cities program website at [www.worldbank.org/eco2](http://www.worldbank.org/eco2), which will provide detailed and updated information on a regular basis.