The Economy of Green Cities

Local Sustainability

Volume 3

Series Editor: Monika Zimmermann

For other ICLEI publication, go to
<http://www.springer.com/series/10034>

Richard Simpson • Monika Zimmermann
Editors

The Economy of Green Cities

A World Compendium on the Green Urban
Economy

Springer

Editors

Richard Simpson
ICLEI - Local Governments for
Sustainability
World Secretariat
Kaiser-Friedrich-Str.7
53113 Bonn, Germany

Monika Zimmermann
ICLEI - Local Governments for
Sustainability
World Secretariat
Kaiser-Friedrich-Str.7
53113 Bonn, Germany

Chapter 7 “Working in Green Cities: Improving the Urban Environment While Creating Jobs and Enhancing Working Conditions,” by Edmundo Werner, is published with the kind permission of the International Labour Office (ILO). The copyright remains with ILO.

Chapter 9 is based on the Cities Chapter of UNEP’s Green Economy Report, Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication (2011). The copyright remains with UNEP.

ISSN 2211-2782

ISBN 978-94-007-1968-2

DOI 10.1007/978-94-007-1969-9

Springer Dordrecht Heidelberg New York London

ISSN 2211-2790 (electronic)

ISBN 978-94-007-1969-9 (eBook)

Library of Congress Control Number: 2012952571

© Springer Science+Business Media Dordrecht 2013

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed. Exempted from this legal reservation are brief excerpts in connection with reviews or scholarly analysis or material supplied specifically for the purpose of being entered and executed on a computer system, for exclusive use by the purchaser of the work. Duplication of this publication or parts thereof is permitted only under the provisions of the Copyright Law of the Publisher’s location, in its current version, and permission for use must always be obtained from Springer. Permissions for use may be obtained through RightsLink at the Copyright Clearance Center. Violations are liable to prosecution under the respective Copyright Law.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

While the advice and information in this book are believed to be true and accurate at the date of publication, neither the authors nor the editors nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Foreword

We now live in an urban age where cities and their economies dominate the global economy. Throughout their history cities have been centers of commerce and trade, a function that has enabled their growth and prosperity. Urban areas and metro regions are the hubs of their respective country's economy. Economic activities in cities are a key growth engine to a nation's economy. At the same time, due to the concentration of human population, consumption and economic activity, urban areas are the main contributors to greenhouse gas emissions as well as placing enormous demands on the world's natural resource base. Just as cities are the source of many environmental problems, their characteristics also offer many of the solutions, and should be recognized as such.

Following the recent economic crisis that has impacted most of the developed world economies, there has been a renewed interest in new forms of growth. Of these Green Growth and a transition to Green Economy are the most widely discussed. At the same time, new challenges are emerging in developing countries where local and national governments are struggling to keep pace with rapid urbanization, especially in providing housing, infrastructure and social services. Combined with the urgent need to reduce carbon emissions in cities to combat global environmental challenges, the urban economy needs to transition to a more sustainable and green growth trajectory. Yet, there has been little conceptualization in the literature regarding the Green 'Urban' Economy.

A transition to a Green Urban Economy needs to manifest itself in cities worldwide. It needs to realize the opportunities that exist in an urban system in terms of synergies, concentration of people and economic activities, and the strong interactions and symbiotic relationships between sectors. A Green Urban Economy needs to oversee a recasting of the economic structure of cities in favor of less carbon intensive activities, mainly by fostering 'clean tech' and green services and products as key growth sectors. By shifting behavior to more sustainable consumption patterns, which minimize environmental impact, urban economies can transition towards green economic development.

'The Economy of Green Cities: A world compendium on the Green Urban Economy' is a rich and overdue contribution to the discussion of what the Green

Economy can mean for urban areas. A key theme in the 2012 Rio+20 conference, the Green Economy can must resonate strongly in cities worldwide for it to be a vital tool for sustainable development and poverty eradication. Whether energy efficiency in buildings or new and innovative waste management systems, this publication is an excellent addition to the conceptualization of the Green Urban Economy – an imperative for cities in achieving economic viability, social equity and environmental harmony. It is a useful companion for local decision makers at the urban level to inform local policymaking.

By addressing our economic, social and environmental challenges, a Green Urban Economy is a holistic approach to analyze the urban system through an economic lens. Energy efficiency in the physical infrastructure including transport, waste management and water infrastructure as well as the protection of ecosystems highlight a fundamental principle of the Green Urban Economy: valuing environmental goods and services while contributing to climate protection. At the same time, new business models that promote green market development and a new economic structure can in turn create new jobs and migrate labor to less carbon intensive economic activities. This is essential for maintaining and enhancing competitiveness – a prerequisite for sustainable urban areas, economic growth and social development.

It gives me great pleasure to contribute to the publication of this book, which bridges the gap between the promotion of the Green Economy globally and the manifestation of this new growth strategy at the urban level. It is an essential recognition of the role of cities and urban economies in pioneering the Green Economy and how green cities are an imperative solution in not only addressing global environmental challenges but also in ensuring local socio-economic prosperity.

ICLEI – Local Governments for Sustainability

President
David Cadman

Author Bios

Dr. Essam Hassan Mohamed Ahmed joined the Climate Change Unit at the Egyptian Environmental Affairs Agency (EEAA) in 2007. Since then he has been involved in CDM projects, Mitigation and Adaptation studies, Green ICTs, Green Cities and Transportation sectors in particular. Dr. Ahmed is also lead author of WGIII; 5th IPCC Assessment Report. Before joining the EEAA, he worked in the Egyptian Military Armed Forces as Engineering Officer for 20 years.

Vito Albino has a Laurea degree in Mechanical Engineering, and was visiting scholar at the University of Cincinnati, USA (1986), visiting professor at the University of South Florida, USA (1994), and from 1988 to 2000 he taught Engineering Management at the University of Basilicata in Italy. He is now the Professor of Innovation and Project Management at Politecnico di Bari in Italy. He is a member of several national and international associations and has authored papers published for national and international journals and conference proceedings in the fields of innovation, energy-materials flow analysis, and industrial clusters.

Stefan Anderberg is Associate Professor of Human Geography and Co-director at the Lund University Centre for Sustainability Studies as well as Director of the Research School of Sustainability Science. His research is related to global sustainability issues such as the development of international trade and land use in the context of climate change, sustainable local and urban development, and the environmental history of cities and regions. It focuses on the development of resource flows in different scales, and related governance issues, on different methods for assessing resource flows, and on how cities, communities, regions and companies respond to the challenges of sustainable development and climate change.

Steven Bland graduated from Cambridge University (UK) in 2009 with a Starred first B.A. (Hons) in Geography. He then completed a Professional Masters (MProf) in Leadership for Sustainable Development, run by the leading sustainable development charity Forum for the Future. Steven joined the ICLEI World Secretariat in 2010. His responsibilities include preparing and delivering training programs on Cities and Climate Change, project proposal writing and being in charge of program

development for the ICLEI World Congress 2012. Previous work experience includes short term posts at the Department for Energy and Climate Change (UK), Birmingham City Council (UK), and as a research assistant at the Cambridge University Geography Department. Steven is an Associate at the Local Government Information Unit think tank (UK).

David Cadman is the President of ICLEI – Local Governments for Sustainability. Elected in 2002, he had served as Vancouver City Councillor for 9 years, and 6 years as a Councillor with COPE, the Coalition of Progressive Electors prior to his election. He represented Vancouver on the Greater Vancouver Regional District and Metro Vancouver board of directors, serving on both the Land Use and Transportation and Environment and Energy committees.

A social and environmental activist for over 30 years, David has served as the President of the Society Promoting Environmental Conservation (SPEC). He has also served at the national and international level of the United Nations Association, and was awarded the United Nations Peace medal and United Nations 50th Anniversary medal.

David was born in Montreal and grew up in Toronto. He attended the University of the South in Tennessee and then moved to Geneva where he earned a master of arts degree in Interdisciplinary and International Development. He studied adult education at the Sorbonne in Paris and is fluent in French.

After spending several years in Tanzania and Kenya developing literacy programs, David returned to Canada in 1976 and settled in British Columbia. He worked for the Social Planning and Research Council in establishing the Community Development Institute.

Rosalie Callway has worked in the field of sustainable development for over 14 years. She worked with ‘Stakeholder Forum’ an international sustainability NGO where she edited and published the book ‘Governance for Sustainable Development: A foundation for the future’. Moving on to the UK Local Government Association’s ‘European and International Unit’, Rosalie supported a range of policy and practice exchanges between local government internationally. She now works as a consultant promoting sustainable institutional development and strategic environmental management. Rosalie is currently an associate advisor on ‘Public Engagement and Sustainability’ with ‘Involve’, a charity focusing on public engagement, participation and dialogue. She is also an associate on ‘low carbon communities’ for the ‘2DegreesNetwork’ – a sustainability portal.

Paul Chambers leads Auckland Council’s organization-wide corporate, community and business sustainability efforts, which encompasses environmental consideration, financial efficiency, social responsibility and community involvement. Activities include program development and implementation, analysis, reporting and compliance, as well as other related responsibilities to foster and develop sustainability and social responsibility throughout the council’s operations. Paul has recently returned from the U.S where he was selected to be a Climate Change Fellow by the Fulbright Program funded by the US State Department.

Dr. Amelia Clarke has been working on environment and sustainability issues since 1989, and was recognized as 1 of 50 Canadian environmental leaders by the *Green Living* magazine. She is now a faculty member in the School of Environment, Enterprise and Development (SEED) at the University of Waterloo and is Director of their Master of Environment and Business (MEB) program. She holds a Ph.D. in Management from McGill University. Amelia Clarke was also the President of Sierra Club Canada from 2003 to 2006. She has served on numerous advisory committees, including for The Canadian Earth Summit Coalition (2011–2012), the Atlantic Canada Sustainability Initiative (2007–2010); the International Forum on Applied Sustainable Development (2007); the World Peace Forum (2006); the federal government's National Advisory Committee to the U.N. Habitat's World Urban Forum III (2006); and the Canadian delegation during the United Nations World Summit on Sustainable Development (Johannesburg) negotiations (2002). In 1996, she founded the Sierra Youth Coalition, and is proud of having launched their sustainable campus program which has worked with more than 80 university campuses.

Dr. Sean Connelly is an Assistant Professor with the Geography Department at the University of Regina and an Associate with the SFU Centre for Sustainable Community Development. Sean's research interests are in urban and environmental geography, planning and sustainable community development. He is co-editor of *Seeds of Transition: The Convergence of the Social Economy and Sustainable Community Development* (Athabasca University Press, forthcoming). Sean previously worked with ICLEI-Local Governments for Sustainability in their Johannesburg office in preparation for the Local Government Session of the World Summit on Sustainable Development.

Rosa Maria Dangelico has a Laurea degree in Management Engineering and holds a Ph.D. in Innovation Management and Product Development. She has been post-doc Research Fellow and contract Professor at Politecnico di Bari in Italy, Research Fellow 2009 of the Aspen Institute, visiting scholar at De Groote School of Business – McMaster University, Canada, and at IESE Business School – University of Navarra in Spain. She is currently an Assistant Professor in Management Engineering at Sapienza University of Rome. Her main research interests concern the integration of environmental sustainability issues into firms' strategies and new product development.

Golda Arpudhalin Edwin received her M.Sc. degree from the Department of Zoology at the Pondicherry University is currently pursuing her Ph.D. Her area of research interest is sustainable water management practices with special reference to greywater management using constructed wetlands. She has authored several articles and presented in national/international conferences and workshops. She has undertaken community development projects such as rain water harvesting, health and hygiene workshop with guidance from the center for sustainable development, Guatemala. Her honors include general proficiency for two consecutive years and she is also a gold medalist in the Masters Degree program. She is a member of the International Water Association.

Dr. Matthew A. French is a development practitioner specialising in affordable housing, slum upgrading and community planning in developing countries. His professional qualifications include a Bachelor of Architecture (BArch) and Masters of Architecture (MArch, research) from Victoria University of Wellington, New Zealand, and a Ph.D. from the University of Cambridge, United Kingdom. His research and practice explores the interrelationship between environmental and socio-cultural dimensions of sustainable urban development. His funded research projects include the technical development of low-cost seismic reinforcing for adobe housing in Chile, Peru, and India (2005); an ethnographic investigation of the thermal performance and comfort of urban poor housing in Argentina (2007); and the environmental sustainability of slums in Kenya with respect to bio-climatic housing and settlement design (2010). He has coordinated capacity development workshops on participatory design of slum upgrading in Kenya and Brazil ('Change by Design' 2011). His current portfolio at the United Nations Human Settlements Programme (UN-Habitat) focuses on the development of normative guides, tools, and knowledge products in three thematic areas: housing policy, slum upgrading, and environmentally sustainable housing.

Professor Andy Gouldson leads the Centre for Low Carbon Future's work on the economics of low carbon cities. He is also Director of the ESRC Centre for Climate Change Economics and Policy at the University of Leeds in the UK. He has worked on issues of environmental policy and management for over 20 years, specializing in the design and delivery of policies that improve the relationship between economic development and the environment, particularly at the business and local levels.

Bernd Hendriksen, is Practice Leader in The Netherlands, Climate Change & Sustainability, KPMG Advisory N.V. For over 12 years Bernd has been advising KPMG's Netherlands based clients on sustainable development. In 2011, Bernd was appointed leader of KPMG's climate change and sustainability practice in the Netherlands, where he manages a team of over 40 professionals that serve both local and international clients. His experience covers a vast range of sectors, including Energy and Natural Resources, Building and Construction, Transport, Government, Urban Planning and NGOs. He regularly shares his latest research findings and best practices through public speaking engagements across the Netherlands and Europe. Bernd was the lead author on the CDP Cities 2011 Global Report – after KPMG was commissioned by the Carbon Disclosure Project (CDP) to gather and analyze data from a group of the largest cities in the world (C40) in order to publish their inaugural report. Prior to working for KPMG, Bernd was responsible for the development of large-scale energy/environmental projects for local municipalities such as Arnhem.

Asif Kabani has 15 years of experience of working with donor governments and has previously worked with UN DESA, UN office Geneva at IGF, UNICEF, UNHCR, UNODC, and UNDP. Kabani also worked as Consultant, Specialist, Technical expert and Program Manager with the Asian Development Bank (ADB) and Aga

Khan Development Network (AKDN). He has an M.Sc. in Development Studies, MBA in Information Technology, MBA in Management and post graduate diploma in public policy and internet governance. He is a fellow of UN and Diplo Foundation, Geneva, and a member of the DevEx Group, Washington D.C. He plays a key role in representing civil society and donor governments at international forums and debates. His key focus is public policy development with particular focus on sustainable development and with fostering relationships between Governments, businesses, civil society and academics.

Maliha A. Kabani is currently working as Education Specialist with IKEA-Save the Children International, for children working in cotton fields in Pakistan. Kabani has more than 10 years' experience working with the grassroots communities, as well as working as consultant and technical expert on education projects for various donor governments. She has done flood assessment and program development for 2010 floods in Pakistan. She worked as ECO and Program Coordinator for various NGOs and is a member of UNESOC and WSIS, Geneva. She is regular speaker at national and international events and a regular contributor on the subject of Green Economy.

Shay Kelleher is a qualified Regional and Urban Planner. Educated in University College Cork, University College Dublin and Trinity College Dublin he holds a degree in Geography, a master's degree in Regional and Urban Planning and a M.Sc. in Environment and Development. He has worked with Ireland's Department of the Environment and as Town Planner. He has undertaken research in Ireland, Britain, Europe and Africa and has strong interests in urban planning, regional development, development economics, urban and regional economics, and environmental sustainability.

Andrew Kemp is a Project Officer for the contracts team at the Federation of Canadian Municipality's Green Municipal Fund. He is responsible for negotiating funding agreements and evaluating municipal sustainability plans, feasibility studies and capital projects. He has previously worked for a leading Canadian economic development consulting firm promoting local economic sustainability in Canada and has several years of experience in business evaluation in the financial services sector. Academically, Andrew Kemp is in the final stages of completing a master's degree in local economic development from the University of Waterloo.

Caroline King is a Researcher at the University of Oxford working on the geography of environmental change in the Northern Sahara. Her research interests environmental analysis and assessment in dryland ecosystems.

Santhosh Kodukula (Sunny) has a Master's Degree in Industrial Ecology and Environmental Management from Mahidol University, Thailand. During his Master's Sunny specialized in Urban and Regional Planning with focus on Urban Transport Planning and Management.

Currently, Sunny works as the EcoMobility Officer at the ICLEI – Local Governments for Sustainability World Secretariat office in Bonn, Germany. Prior to joining ICLEI EcoMobility, he worked with the GIZ Sustainable Urban Transport

Project (SUTP) providing technical assistance and implementing project activities in Asia and the Pacific.

At the GIZ-SUTP, Sunny was involved in the design and delivery of over 70 training courses on sustainable urban mobility and transport targeted at policy-makers and urban and transport planners in various countries. He has also worked extensively in the areas of non-motorised transport and pedestrianisation.

His research interests include public space modeling, planning for pedestrians and cyclists, and transport and livability. Sunny has contributed to various published papers, reports and newspapers, and was also involved in transport research at the university level.

Christophe Lalande has been working at UN-HABITAT over the past 7 years on promoting sustainable urban development. His professional expertise is in housing policy and development, in particular the design and implementation of slum upgrading and prevention programmes in developing countries, and in producing policy guidelines, methodologies and tools to address the specific challenges faced by the urban poor, indigenous peoples and the most vulnerable groups in cities in the realisation of their right to adequate housing. Christophe Lalande is coordinating UN-HABITAT's new initiative for green buildings and sustainable housing to respond to the global challenges of housing, slum upgrading and climate change, from the perspective of the environmental and socio-cultural sustainability of affordable housing solutions. Christophe is a national of France. He holds a Bachelor degree in Political Sciences (2001) and a Masters in Public Policy and Political Sociology (2003) from the Institut d'Etudes Politiques de Paris.

Art von Lehe is an attorney and a LEED Accredited Professional. His background in environmental science, law, and policy combined with knowledge of both the federal and local landscapes informs his current work with local governments. Mr. von Lehe serves as Senior Program Officer for ICLEI-Local Governments for Sustainability, USA's STAR Community Index, where he develops content for a strategic local government sustainability planning and performance management system. Before working on the STAR Community Index, Mr. von Lehe worked to provide ICLEI's over 600 city and county member network with information, analysis, and support regarding key policies relevant to sustainable local action. Before joining ICLEI, Mr. von Lehe analyzed emerging climate and clean air policy at the U.S. Environmental Protection Agency in Washington, DC. He also served as project manager with the Coastal Conservation League in Charleston, South Carolina, where he advised a large portfolio of local governments on climate and sustainability measures covering a range of relevant sectors. Mr. von Lehe received a bachelor's degree in environmental studies from the University of North Carolina at Asheville, a master's degree in environmental law from Vermont Law School, and a J.D. degree from the University of South Carolina School of Law.

Ulrich Mans is a Ph.D. candidate at the Amsterdam Institute for Social Science Research (AISSR). His research focus rests on sustainability transitions and the

importance of renewable energy in emerging market cities. He has a professional background in international development and conflict resolution. In the past, he has been employed by various think tanks on sustainability, governance, and societal transitions in post-conflict countries. With several years of practical experience as a consultant, he has also worked for government agencies, NGOs and the United Nations Environment Program.

Dr. Sean Markey is an Associate Professor with the Resource and Environmental Management program and an Associate with the Centre for Sustainable Community Development at Simon Fraser University. Sean's research concerns issues of local and regional economic development, rural and small-town development, and community sustainability. He has published widely in academic journals and is the principle author of *Investing in Place: Economic Renewal in Northern British Columbia* (UBC Press, forthcoming); *Second Growth: Community Economic Development in Rural British Columbia* (UBC Press, 2005); and co-editor of *The Next Rural Economies: Constructing Rural Place in Global Economies* (Cabi Press, 2010). Sean continues to work with municipalities, non-profit organizations, Aboriginal communities and the business community to promote and develop sustainable forms of community economic development. He also serves on the Board of Directors with the Vancity Community Foundation.

Kes McCormick is an Assistant Professor at the International Institute for Industrial Environmental Economics at Lund University, Sweden. With a background in political science and environmental science, he engages in a combination of research, education, communication and innovation activities. Broadly speaking he works in the fields of sustainability and governance. Specifically, he concentrates on exploring sustainable urban transformation and accelerating the implementation of renewable energy (and energy efficiency). Within sustainable urban transformation, his research activities are focused on models and tools for collaboration between a diversity of stakeholders, particularly local governments, universities, urban citizens and business.

Corina McKendry is an assistant professor at Colorado College, a liberal arts school in Colorado Springs, Colorado, USA. She teaches courses in environmental politics and political economy in the Political Science Department and for the interdisciplinary Environmental Program. Her primary research interest is the relationship between urban environmentalism and the changing role of cities in the global economy. She is also interested in the social equity implications of urban greening initiatives. She received her Ph.D. from the Department of Politics at the University of California Santa Cruz in 2011.

Sara Meerow works as a junior researcher in the Department of Human Geography, Planning and International Development Studies at the University of Amsterdam, where she completed a post-graduate degree in International Development Studies. Her master's research in Bangkok, Thailand focused on power sector resilience and policies for distributed, renewable electricity generation. She is also currently working on a research project on Caribbean urban innovation management.

Axel Michaelowa is head of the group on international climate policy at the chair “Political Economy and Development”, University of Zurich and Center for Comparative and International Studies (CIS). Besides his research work, he is senior founding partner of the consultancy “Perspectives”. Axel is a lead author of the chapter on international agreements in the 5th Assessment Report of the Intergovernmental Panel on Climate Change due in 2014 and wrote on mitigation policies in the 4th Assessment Report of the Intergovernmental Panel on Climate Change published in 2007. He is member of the editorial boards of the journals “Climate Policy”, “Climate and Development” and “Greenhouse Gas Measurement and Management” as well as of the board of the research network “Climate Strategies”. For the last two decades, Axel has been working on climate policy issues and published over 100 articles, studies and book contributions, mainly on the Kyoto Mechanisms and especially the Clean Development Mechanism (CDM). Axel is a member of the CDM Executive Board’s Registration and Issuance Team and has contributed to the development of eight approved CDM baseline methodologies. As one of the leading European experts on CDM institution building in developing countries, Axel supported several governments in Asia and North Africa/Middle East.

Philip Monaghan is Founder and CEO of Infrangilis. He is a recognized strategist in the fields of the economic development and sustainability. He is acclaimed author of ‘How Local Resilience Creates Sustainable Societies’ (2012) and ‘Sustainability in Austerity’ (2010).

Hans Mönninghoff has 12 years experience working as consulting engineer in the fields of water and energy. He has been Director of Services for Environmental Affairs for the City of Hannover for 23 years, and Director of Economic Affairs for the Green Party for 7 years.

Dr. Raquel Moreno-Peñaranda is a Research Fellow at UNU-IAS OUIK. Her work focuses on sustainable natural resource management, looking at the linkages between nature and society. One of her core projects studies the role of urban ecosystems in sustainability and local well-being, paying special attention to local culture for enhancing local ecosystem services and biodiversity, and thus contributing to improve quality of life in cities and reducing urban ecological footprints. She has carried out extensive consultancy, advisory, and research co-ordination for several local and sub-national governments in different countries, international environmental NGOs, civil society organizations, and multilateral development institutions, including the Global Environmental Facility in Washington, DC. Originally from Spain, where she graduated in Biology, she earned a Ph.D. in Energy and Resources from the University of California Berkeley.

Jan De Mulder works as Public Governance counsel at the Representation of the Government of the Region of Flanders (Belgium) to the European Union. Previously he worked for more than 10 years with the Flemish Environment Administration as a legal advisor. He is also engaged as a voluntary researcher with the Department of Public International Law, University of Ghent, Belgium.

Nandhivarmen Muthu had obtained his M.Sc. degree in Zoology and has over 10 years of work experience as an environmentalist, researcher and an activist for sustainable development. He is currently pursuing his doctorate from Pondicherry University, India. His research interest includes an extensive study to evolve and implement Green Campus Initiative in Pondicherry University. The main objective of this research is to assess and provide factual solutions to the educational institutions like schools and colleges to make it sustainable with special reference to water, energy and waste.

Lena Neij is Professor and Director at the International Institute for Industrial Environmental Economics at Lund University, Sweden. Her research is focused on the dynamics of energy systems and the analysis of governance and policies for more sustainable development. The core issue in her research is the development and assessment of methods for analyzing the dynamics of energy systems in view of technical change (i.e. development, introduction, and diffusion of new technology) and policy measures for effecting and accelerating technical change. Her research, which is system-based and interdisciplinary, covers energy for sustainable development in general, with a focus on renewable energy technologies, energy efficiency in buildings and sustainable urban development.

Dr. Kenneth K. Odero is a Spatial Scientist. He holds a Ph.D. in Urban and Regional Planning from the University of Nairobi. Between 1999 and 2006, Dr. Odero taught Regional Economics, Regional Planning, and Institutional Development at the University of Zimbabwe. Previously Dr. Odero worked full-time as a consultant for ProPerArt Associates (Pvt.) Ltd. In 1997, Dr. Odero worked on a short-term contract as a Technical Advisor in the International Labor Organization's Rural Travel and Transport Program. Shortly after graduating (1988–1990) he worked for the Government of Kenya as a Land Use Planner. In 1990, Dr. Odero joined the Institute for Development Studies at the University of Nairobi as a Research Fellow where he researched and published on, inter alia, the agrarian question, urban management, sustainable development and rural transportation. Dr. Odero has an interdisciplinary orientation having been exposed to a wide range of development areas both as a scholar and professional. He is currently founder and President of Climate XL Inc and Executive Director of Climate Excellence Africa, a not-for-profit international climate change organization. He also lectures in regional planning at the University of Zimbabwe.

Eric Copius Peereboom, is Senior Consultant, Climate Change & Sustainability, KPMG Advisory N.V. Eric has been active in the public sector (local, national, EU) and private sector for over 12 years working as a consultant, and has performed many complex policy and strategy oriented advisory projects in the field of sustainability. Within KPMG, Eric has played a vital contribution in the development of KPMG's proposition Sustainable Cities. Projects he leads generally focus on vision and policy development, scenario development, benchmarking, policy monitoring and evaluation, and cooperation between the public and private sector. Eric worked alongside Bernd Hendriksen in the development of the CDP Cities 2011 Global Report, and has also been engaged in other KPMG studies that have focused on energy & climate strategy in the public sector.

Dr. Gopalsamy Poyyamoli (M.Sc. Marine Biology and Ph.D. Ecology) has been working as an Associate Professor in the Department of Ecology and Environmental Sciences, Pondicherry University, India, for more than two decades. He is focusing on Social Ecology and Sustainability with special emphasis on rural, urban and Industrial Ecosystems.

Dickella Gamaralalage Jagath Premakumara is a development planner, specializing in participatory environmental planning and sustainable urban development in Asia. He has over 15 years experience in working with academic, government, NGOs and bilateral and international agencies. At present, he is a policy researcher at the Kitakyushu Urban Centre of the Institute for Global Environmental Strategies (IGES) in Japan, where he is actively involved in strategic policy research in urban environmental planning and management. He focuses on drawing lessons from the practices and experiences of local actions taken by the local stakeholders at city-level, especially in the area of municipal solid waste management and sustainable material-cycle society, and makes policy recommendations to promote effective policy strategies that could be of great use for other cities in the Asia-Pacific Region. He is an active member of various regional networks and publishes regularly for academic and policy journals.

Rula Taher Qalyoubi, Ph.D. is an environmental economist for the Policy and Strategy Sector of the Environment Agency, Abu Dhabi, United Arab Emirates. She was formally Associate Professor of Economics at the University of Wisconsin – Stout, Wisconsin, USA. As a policy analyst and adviser, Qalyoubi wrote policy briefs regarding environmental health and climate change. She provided expert advice to government, NGOs and businesses regarding energy alternatives and indices, drafted gap assessments in environmental standing policies and procedures and lead efforts on waste management initiatives to achieve sustainability goals, and directed efforts in renewable technology implementation assessments and economic transformation using benefit cost studies.

Jonathan Dagadu Quartey is an Economist with special interest in environmental and natural resource issues. He is a certified trainee of the United Nations University World Institute for Development Economics Research (UNU-WIDER) in the Economics of Climate Change and also Climate Change Science and the modeling of Biophysical Impacts. He obtained his Master's degree in Economics from the Kwame Nkrumah University of Science and Technology (KNUST), Ghana in 2000. Since 2001, Quartey has taught Environmental and Resource Economics, Macroeconomics and Development of Economic Thought at the Kwame Nkrumah University of Science and Technology. Prior to 2001, he had worked for the Ghana Education Service. His research areas are Forestry Economics, Economics of Public utilities: Energy and Water, Economics of Climate Change and Economics of Natural Resources. Quartey has made a number of presentations on the Environment and Natural Resources in local and international conferences. He is currently pursuing a part-time Ph.D. program in Development Studies.

Dr. Golam Rasul, Head, Economic Analysis Division, is a development economist. He is a national of Bangladesh. Prior to his appointment as Head of the Economic Analysis Division in 2009, he served as a policy development specialist at ICIMOD for 5 years. Dr. Rasul holds a Ph.D. in regional and rural development planning from the Asian Institute of Technology (AIT), Thailand. He worked for more than a decade in the Bangladesh Civil Service in different ministries and in field administration in different capacities where he was involved in the formulation and implementation of development planning and programming. Along with development work, he has been actively involved in research in areas that include agriculture, natural resource management, poverty alleviation, and sustainable development in Bangladesh and the South Asian region. His research findings have been published in many international journals including *World Development*, *Environmental Management*, *Journal of Environmental Management*, *Environmental Conservation*, *Sustainability: Science, Practice and Policy*, *Society and Natural Resources*, *Regional Development Studies*, *Development in Practice*. Five of his papers have appeared as ‘most read papers’ in their respective journals. He is currently working on green economy, valuation of ecosystem services, sustainable mountain development, food security and regional cooperation. He is member of the OECD DAC Task Team on Green Growth and Poverty Reduction as one of the developing country experts.

Philipp Rode is Executive Director of LSE Cities and Senior Research Fellow at the London School of Economics and Political Science. He is Ove Arup Fellow with the LSE Cities Programme and co-convenes the LSE Sociology Course on ‘City Making: The Politics of Urban Form’. As researcher and consultant he manages interdisciplinary projects comprising urban governance, transport, city planning and urban design. Rode organised Urban Age conferences in partnership with Deutsche Bank’s Alfred Herrhausen Society in ten cities bringing together political leaders, city mayors, urban practitioners, private sector representatives and academic experts. The focus of his current work is on cities and climate change which includes his role as coordinating author of the cities and buildings chapters for UNEP’s Green Economy Report. He manages the Urban Age research efforts and recently co-authored ‘Transforming Urban Economies’ (2011) and ‘The Global MetroMonitor’ (2010); and published the reports ‘Cities and Social Equity’ (2009) and ‘Integrated City Making’ (2008). He has previously worked on several multidisciplinary research and consultancy projects in New York and Berlin and was awarded the Schinkel Urban Design Prize 2000.

Dr. Mark Roseland Director of the Centre for Sustainable Community Development and Professor of Resource and Environmental Management at Simon Fraser University. Dr. Roseland lectures internationally and advises communities and governments on sustainable development policy and planning. The 4th edition of Dr. Roseland’s *Toward Sustainable Communities* was published in Spring 2012 and released at the ICLEI – Local Governments for Sustainability 2012 World Congress and International Urban Researchers Symposium, associated with the Rio+20 Earth Summit. Dr. Roseland is leading development of the Pando | Sustainable Communities researcher-practitioner network. At SFU, he is a founding

member of the SFU Community Trust's Board of Directors, responsible for the award-winning UniverCity sustainable community development project.

Boshra Salem is a Professor at the University of Alexandria. Her research interests include ecosystem management, environmental impact assessment and biodiversity conservation in the North Western Desert of Egypt. She is a member of the UNESCO-MAB Committee in Egypt and was the National Team Leader for the UNU-UNESCO-IHP GWAHS-CS project in Egypt.

Maike Sippel has a background as an architect and city planner and did her Ph.D. in Economics on linkages between local and global climate policy. She has been working on greenhouse gas mitigation and energy strategies for cities and climate policy issues over the last decade, at the Hamburg Institute of International Economics and then at Stuttgart University. Her work has covered cities and the CDM since 2003. Maike is also consulting on this issue with cities and international organizations. She has published some 20 articles, studies, book contributions and newspaper articles. Besides her research work, she has co-founded the NGO network "Global Marshall Plan Initiative". She is a Coordinator for Sustainable Development at the University of Applied Science, Konstanz, and an assistant professor on sustainability at the University of Applied Science Ravensburg-Weingarten.

Phoebe Stirling graduated from the Architectural Association (London, UK) in 2011 with a masters' degree in Histories and Theories of Architecture and Urbanism. She is currently part of the Urban Research Team with ICLEI at the organization's Word Secretariat in Bonn, Germany.

Makoto Ueda was born in Kyoto in 1961 and joined the City of Kyoto in 1986. Since then he has promoted commerce, human-rights, and tourism before becoming the Director of Kyoto's Climate Change Prevention Office in the Environment Policy Bureau. He is motivated and deeply committed to addressing global challenges. He earned a doctorate in Policy Science from Doshisha University in 2009.

Andrew Walters leads a range of sustainability projects across the organization to identify opportunities to embed resource efficiency and world's best environmental and sustainability practice across all of Auckland Council's operations, services, programs and facilities. Activities include travel planning, environmental management systems, sustainable procurement, Greenhouse Gas accounting. Andrew has significant expertise in waste management, environmental management systems, policy and strategy planning, and implementation and sustainable buildings in New Zealand and the UK. Andrew has held senior policy and advisory roles in Auckland City Council, Ministry for the Environment in the Government Urban and Economic Development Office.

Dr. Edmundo Werna has worked for over 25 years on different aspects of urban development, with particular attention to labor. He joined the International Labor Organization in 2004. He has a Ph.D. in urban development from the University of London (UK), an M.Phil. in development studies from the Institute of Development

Studies in Sussex (UK), and a Bachelor's degree in urbanism and architecture from the Federal University of Minas Gerais (Brazil). Prior to joining the ILO, Werna coordinated the urban development agenda of UNDP's UN Volunteers Programme. He also undertook consultancies for several organizations, including local governments, the World Health Organization, European Commission, the World Bank, UN-Habitat, UNCDF/UNDP and also the ILO. Werna also has extensive academic experience, published eight books in the UK and USA, plus many chapters in edited books and several articles in scientific journals. He is now a member of the editorial board of the journals *Habitat International* and *International Journal of Sustainable Urban Development*. Werna received a number of prizes from his practical and academic work, including the Earth Summit 2002 Sustainable Development Award, one project selected as Best Practice for the UN-Habitat/Dubai Awards (2004), one project chosen as best practice for the Hanover 2000 Exhibition as well as awards for three articles and chapter for one book.

Dr. Jonathan Woetzel is a Director with McKinsey & Company and is based in Shanghai. He currently leads McKinsey's Cities Special Initiative globally, convening with urban authorities in over 40 countries worldwide. In his 27 years with the Firm, 26 of which in China, Jonathan has advised clients in a range of industries including energy, materials, technology and industrial, helping transform local companies into global leaders and developing policy recommendations for government. Dr. Woetzel co-chairs McKinsey's Urban China Initiative with Columbia and Tsinghua Universities, a not-for-profit think tank on urban issues. He leads McKinsey's service to the Government of China and has led Asia Energy and Materials practice, the McKinsey Global Institute in Asia, and its Corporate Finance practice in China. He established McKinsey's China practice in the 1990s including managing its Shanghai location. Dr. Woetzel has written several books including *Capitalist China: Strategies for a Revolutionized Economy* (Wiley, 2004) and *Operation China: From Strategy to Execution* (Harvard Business Press, 2008), co-authored with Jimmy Hexter. He holds a Ph.D. in political science from the University of Southern California, where his work focused on China's political economy. He is a lecturer at Beijing University's Guanghua School of Management and at the China Europe International Business School.

Le-Yin Zhang obtained her doctorate from the University College London (UCL). She directs M.Sc. in Urban Economic Development in UCL and has many years' of professional experiences in a number of countries. Her climate change research focuses on the linkages between climate change and sustainable economic development in developing countries and cities.

Acknowledgments

Compiling a book on a newly created term, such as Green Urban Economy, and within a very short time is a challenge. The Urban Research team, led by Richard Simpson, of the ICLEI World Secretariat took up this challenge, and is now presenting a rich compendium on the Green Urban Economy.

To achieve this, the book is based upon an open call for contributions to draw out existing work from across the world from practitioners and researchers. Our thanks go to the contributors of this book that took the time to share their knowledge and expertise, their concepts and new thoughts, findings and facts, and good practice examples. We are grateful for the time they spent and the insights they share with us.

ICLEI's Media Partner, Springer, has supported us with the production of this book which follows two publications on the Resilient Cities 2010 and 2011 congresses within the series *Local Sustainability*.

We express our particular gratitude to the members of the Urban Research team at the World Secretariat. Phoebe Stirling for editing most of the contributions, and Shay Kelleher and Mitja Maletin for their comments and suggestions. In addition, a special thank you goes to Kristina Yuzva for her editorial support.

We are thankful to ICLEI for providing the supporting environment for this endeavor and to colleagues for providing valuable ideas and thoughts, in particular Konrad Otto-Zimmermann and Susanne Salz.

All of us look forward to continuing the dialogue and creative exchange with even more experts in the future.

Director, Capacity Center
Research Analyst, Capacity Center
ICLEI – Local Governments for Sustainability,
World Secretariat

Monika Zimmermann
Richard Simpson

Contents

Part I Agenda Setting for the Urban Future with a Green Urban Economy

Green Urban Economy: Agenda Setting for the Urban Future	3
Monika Zimmermann and Richard Simpson	

Part II Setting a Green Economy Agenda for Cities

Introduction: A Green Economy for Green Cities.....	13
Richard Simpson	
New Urban Spaces: The Emergence of Green Economies	17
Kenneth K. Odera	
Environmental Discourse and Economic Growth in the Greening of Postindustrial Cities	23
Corina McKendry	
Sustainable Urban Transformation and the Green Urban Economy	33
Kes McCormick, Stefan Anderberg, and Lena Neij	
Green Cities: Benefits of Urban Sustainability	45
Essam Hassan Mohamed Ahmed	
Working in Green Cities: Improving the Urban Environment While Creating Jobs and Enhancing Working Conditions	57
Edmundo Werna	
Sustainable Development for Cities and Citizens: Green Housing, Employment and Transport	71
Asif Kabani and Maliha A. Kabani	

Cities and the Green Economy	79
Philipp Rode	
Green Cities into Practice.....	99
Vito Albino and Rosa Maria Dangelico	
Emerging-Market Cities Could Set a New Standard for Sustainable Development	115
Jonathan Woetzel, Shannon N. Bouton, and Molly Lindsay	
 Part III Joining Forces to Accelerate Action	
Introduction: Joining Forces to Accelerate Action	125
Phoebe Stirling	
Accelerating Green Urban Growth	129
Bernd Hendriksen and Eric Copius Peereboom	
Linking Green City Politics with Green Business	149
Ulrich Mans and Sara Meerow	
Policy Instruments for Promoting a Green Urban Economy: The Changing Role of the State.....	161
Golam Rasul	
Local Sustainability: Driving Green Urban Economies Through Public Engagement	175
Rosalie Callway	
We Know Enough: Achieving Action Through the Convergence of Sustainable Community Development and the Social Economy.....	191
Sean Connelly, Sean Markey, and Mark Roseland	
Seven Conditions for Effective Green Governance.....	205
Rula Taher Qalyoubi	
 Part IV Strategies and Approaches for Greening Urban Economies	
Introduction: Strategies and Approaches to Greening Urban Sectors	217
Shay Kelleher	
The Economics of Low Carbon Cities: Approaches to a City-Scale Mini-Stern Review	221
Andy Gouldson, Niall Kerr, Corrado Topi, Johan Kuylenstierna, and Richard Pearce	
City Development Strategies and the Transition Towards a Green Urban Economy	231
Le-Yin Zhang	

Low Carbon Enterprise Zones: Towards a Fossil Fuel Free City Economy	241
Philip Monaghan	
Green Clusters and the Entrepreneurial Local Government: Portland's Economic Development Strategy	249
Shay Kelleher and Art von Lehe	
Green Cities Require Green Housing: Advancing the Economic and Environmental Sustainability of Housing and Slum Upgrading in Cities in Developing Countries	257
Matthew A. French and Christophe Lalande	
EcoMobility and Its Benefits in an Urban Context	285
Santhosh Kodukula	
Assessing the Cost of Groundwater Degradation in the Urbanizing Desert Area of Wadi El Natrun	295
Caroline King and Boshra Salem	
Constructed Wetlands for the Treatment of Domestic Grey Water: An Instrument of the Green Economy to Realize the Millennium Development Goals	313
Gopalsamy Poyyamoli, Golda Arpudhalin Edwin, and Nandhivarman Muthu	
Decentralized Composting in Asian Cities: Lessons Learned and Future Potential in Meeting the Green Urban Economy	323
Dickella Gamaralalage Jagath Premakumara	
Biodiversity and Culture, Two Key Ingredients for a Truly Green Urban Economy: Learning from Agriculture and Forestry Policies in Kanazawa City, Japan	337
Raquel Moreno-Peñaranda	
An Economic Assessment of the Deforestation of Ghana's Garden City of West Africa	351
Jonathan Dagadu Quartey	
Financing a Green Urban Economy: The Potential of the Clean Development Mechanism (CDM)	363
Maike Sippel and Axel Michaelowa	
Part V Experiences and Examples from City Governments	
Introduction: Experiences and Examples from City Governments	371
Steven Bland	

Synergies Between Environment and Economy Within a City Administration – Experiences Made by the City of Hannover, Germany	375
Hans Mönninghoff	
Auckland Council: Creating a Transformational Shift Towards a Sustainable Eco-Economy	381
Paul Chambers and Andrew Walters	
Sustainable Urban Development Policy in the Region of Flanders.....	391
Jan De Mulder	
Greening the Local Economy Through Municipal Sustainable Procurement Policies: Implementation Challenges and Successes in Western Canada	405
Andrew Kemp and Amelia Clarke	
City of Raleigh Office of Sustainability: Green Building Training Program	417
Lynn Graham, Emily Steele, Anna Leonard, Jen Baker, and Julian Prosser	
Changing to a Sustainable Socio-Economic System: A Challenge for Kyoto as a Historic City.....	425
Makoto Ueda	
Index.....	435

Contributors

Essam Hassan Mohamed Ahmed Egyptian Environmental Affairs Agency (EEAA), Cairo, Egypt

Vito Albino Department of Mechanics, Mathematics and Management, Politecnico di Bari, Bari, Italy

Stefan Anderberg Lund University Centre for Sustainability Studies, Lund, Sweden

Jen Baker Office of Sustainability, Raleigh, NC, USA

Steven Bland ICLEI – Local Governments for Sustainability, Bonn, Germany

Shannon N. Bouton McKinsey & Company, Shanghai, China

Rosalie Callway Sustainability Consultant, London, UK

Paul Chambers Auckland Council, Auckland, New Zealand

Amelia Clarke Master of Environment and Business (MEB) Program, School of Environment, Enterprise and Development (SEED), University of Waterloo, Waterloo, ON, Canada

Sean Connelly Centre for Sustainable Community Development, Simon Fraser University, Burnaby, BC, Canada

Rosa Maria Dangelico Management Engineering, Sapienza – Università di Roma, Rome, Italy

Golda Arpudhalin Edwin Pondicherry University, Puducherry, India

Matthew A. French UN-Habitat, Nairobi, Kenya

Andy Gouldson School of Earth and Environment, University of Leeds, Leeds, UK

Lynn Graham Office of Sustainability, Raleigh, NC, USA

Bernd Hendriksen KPMG Advisory N.V., Rotterdam, The Netherlands

Asif Kabani Founder and Hon. VP, International Sustainable Development Resource Centre, Geneva

Head of Research and Project Management, Ministry of Information and Broadcast, Govt of Pakistan

Maliha A. Kabani Founder and Hon. President, International Sustainable Development Resource Centre, Geneva

Manager, Education - IKEA, Save the Children International (SCI), Country office, Pakistan

Shay Kelleher ICLEI – Local Governments for Sustainability, Bonn, Germany

Andrew Kemp Green Municipal Fund, Federation of Canadian Municipalities, Ottawa, ON, Canada
University of Waterloo, Waterloo, ON, Canada

Niall Kerr School of Earth and Environment, Center for Climate Change Economics and Center for Low Carbon Futures, University of Leeds, Leeds, UK

Caroline King Oxford University Centre for the Environment, Oxford, UK

Santhosh Kodukula ICLEI – Local Governments for Sustainability, Bonn, Germany

Johan Kuylensstierna Stockholm Environment Institute, University of York, York, UK

Christophe Lalande UN-Habitat, Nairobi, Kenya

Art von Lehe ICLEI Oakland, California, USA

Anna Leonard Office of Sustainability, Raleigh, NC, USA

Molly Lindsay McKinsey & Company, Shanghai, China

Ulrich Mans Department for Geography, Planning and International Development Studies, University of Amsterdam, Amsterdam, The Netherlands

Sean Markey School of Resource and Environmental Management, Simon Fraser University, Surrey, BC, Canada

Kes McCormick International Institute for Industrial Environmental Economics, Lund University, Lund, Sweden

Corina McKendry Political Science Department, Colorado College, Colorado Springs, CO, USA

Sara Meerow Department for Geography, Planning and International Development Studies, University of Amsterdam, Amsterdam, The Netherlands

Axel Michaelowa University of Zurich, Zurich, Switzerland

Philip Monaghan Infrangilis, Manchester, M45BD, UK

Hans Mönninghoff Economic and Environmental Affairs, Hannover, Germany

Raquel Moreno-Peñaranda United Nations University-Institute of Advanced Studies-Operating Unit Ishikawa/Kanazawa (UNU-IAS-OUIK), 6F International Organizations Center, Yokohama, Japan

JanDeMulder Permanent Representation of Belgium to the EU/Flemish Representation, Brussels, Belgium

Nandhivarman Muthu Pondicherry University, Puducherry, India

Lena Neij International Institute for Industrial Environmental Economics, Lund University, Lund, Sweden

Kenneth K. Odero Climate XL Africa, Nairobi, Kenya

Richard Pearce Quantum Strategy and Technology Ltd., Warrington, UK

Eric Copius Peereboom KPMG Advisory N.V., Rotterdam, The Netherlands

Gopalsamy Poyyamoli Pondicherry University, Puducherry, India

Dickella Gamaralalage Jagath Premakumara Institute for Global Environmental Strategies (IGES), Kitakyushu Urban Centre, Kitakyushu, Japan

Julian Prosser Office of the City Manager, Raleigh, NC, USA

Rula Taher Qalyoubi, Ph.D. 3rd Group Consultancy Engineering (3G), United Arab Emirates

Jonathan Dagadu Quartey Department of Economics, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

Golam Rasul Economic Analysis Division, International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal

Philipp Rode London School of Economics and Political Science, London, UK

Mark Roseland School of Resource and Environmental Management, Centre for Sustainable Community Development, Simon Fraser University, Surrey, BC, Canada

Boshra Salem University of Alexandria, Alexandria, Egypt

Richard Simpson ICLEI – Local Governments for Sustainability, Bonn, Germany

Maike Sippel University of Applied Science, Konstanz, Germany

Emily Steele Office of Sustainability, Raleigh, NC, USA

Phoebe Stirling ICLEI – Local Governments for Sustainability, Bonn, Germany

Corrado Topi Stockholm Environment Institute, University of York, York, UK

Makoto Ueda Climate Change Prevention Office, Environment Policy Bureau, Kyoto, Japan

Andrew Walters Auckland Council, Auckland, New Zealand

Edmundo Werna Natural Resources and Industries, Department of Sectoral Activities, International Labour Organization, Geneva, Switzerland

Jonathan Woetzel McKinsey & Company, Shanghai, China

Le-Yin Zhang Development Planning Unit, University College London, London, UK

Monika Zimmermann ICLEI – Local Governments for Sustainability, Bonn, Germany

List of Boxes

Box 1	Green Urban Economy Agenda is Simultaneously Goal and Journey	4
Box 2	Green Urban Economy Core Messages	5
Box 3	Example of Local Action for Greening the (Urban) Economy: Municipalities... ..	6
Box 1	Encouraging Building Owners to Go Ahead with Energy Renovations	132
Box 2	Berlin: Energy Saving Partnerships	134
Box 3		143
Box 4	Status on Green Business Zones (Low Carbon Economic Zones).....	144
Box 1	Green Finance and Green Procurement Policy in China	168
Box 2	Ecological Fiscal Transfers: The Case of Brazil	168
Box 1	Making the Best Use of Local Powers in California and Tokyo	247

List of Figures

Fig. 1	This figure shows different ways to understand the relationship between sustainable urban transformation and the green urban economy – depicted as either overlapping concepts or integrated concepts	34
Fig. 2	This figure shows two dimensions of sustainable urban transformation – drivers of change and sustainable urban structures	37
Fig. 1	Deaths from environmental risks in 2004, WHO (2012)	62
Fig. 2	Disability adjusted life years from environmental risks in 2004, WHO (2012)	62
Fig. 1	Carbon emissions and income for selected countries and cities	81
Fig. 2	Capacity and infrastructure costs of different transport systems	83
Fig. 3	Enabling conditions, institutional strength and democratic maturity	91
Fig. 4	Selected financing instruments	94
Fig. 1	Eighteen indicators of urban sustainability, Urban China Initiative (Urban China 2010)	117
Fig. 1	Seven enablers that accelerate the green urban economy (Hendriksen et al. 2012)	130
Fig. 2	Typical sources of funds for city governments (Brookes 2011)	136
Fig. 3	European city typology grid (Hendriksen et al. 2010)	139
Fig. 1	The EIU green city index – global coverage (until November 2011)	152
Fig. 2	Thirty-three cities and their respective scores for being ‘green’ (EIU 2010a, b and own estimates)	154
Fig. 3	Correlation between green business and green politics	155
Fig. 4	Renewable energy business sub-sectors for 13 selected cities	155

Fig. 1	'Limits to Growth' model projections relating a growing population, resources and pollution, with an additional timescale between 1900 and 2100 (Hall and Day 2009)	177
Fig. 2	Key steps in participative processes – overview	186
Fig. 1	Community capital framework	195
Fig. 1	Impacts on carbon footprint	227
Fig. 1	Sectors of the green economy according to recent studies (Adapted from Chapple 2008)	236
Fig. 1	A framework for governing LCEZs	246
Fig. 1	Situation analysis identifying the key trends and challenges of the green economy in the housing sector in developing countries.....	266
Fig. 2	Integrated Housing Development Programme condominium units in Addis Ababa, Ethiopia (© Katherine Hegab)	267
Fig. 3	Slum upgrading often involves the improvement of the physical environment, regularization of tenure, and promoting socio-economic development. This example is of a new street in Kibera, Nairobi (© Matthew French)	268
Fig. 4	Barrio Carioca in Rio de Janeiro is being constructed for households earning between 0 and 3 minimum wages as part of the Brazilian 'My House, My Life' program, which is showing promise of supplying housing to low-income households (© Matthew French).....	269
Fig. 5	Cities throughout Latin America have a considerable stock of informally-built consolidated housing that will remain for decades to come and therefore needs retrofitting. Buenos Aires, Argentina (© Matthew French)	270
Fig. 6	Retrofitted housing in Cato Manor, Durban, South Africa (© Photo courtesy of Green Building Council of South Africa. Photographer: Willem De Lange).....	271
Fig. 7	Upgrading post-war housing blocks in the Czech Republic (© Matthew French).....	272
Fig. 8	Stabilized soil block technology in use in Sudan (© Fernando Murillo).....	274
Fig. 1	Flow diagram of the greywater treatment system	318
Fig. 1	Pusdakota's compost center in Rungkot Lor, Surabaya.....	327
Fig. 2	Sevanatha's compost center in Gongawela, Matala	332
Fig. 1	Location of the city on Kanazawa in Japan (<i>left</i>); main land uses and geographical elements of the municipality (<i>right</i>). Source: United Nations University Media Center	340

Fig. 2	The 15 varieties currently under the Kaga vegetables designation, including bulb, fruit, leaf, root, stalk and tuber vegetables. Source: Kanazawa Kaga Vegetables Association	342
Fig. 3	Vegitan, official image of the Kaga vegetables brand.....	344
Fig. 4	Basic framework of the local forestry policy for revitalization of traditional forest uses. Source: Kanazawa City (2011).....	347
Fig. 1	The Auckland Plan.....	382
Fig. 2	Vision for a proposed Auckland waterfront development	383
Fig. 3	Local boards of the Auckland Council	384
Fig. 4	Auckland Mayor Len Brown	386
Fig. 5	Vision of Auckland's Queen Street.....	386
Fig. 1	According to the Urban Land Institute magazine, Raleigh took fifth place among metropolitan areas posting the highest total economic growth. From 2007 to 2010, Raleigh realized 10.5% growth in its gross domestic product.....	419
Fig. 2	Students perform hands-on installation of rooftop solar panels at Wake Technical Community College.....	420
Fig. 3	BPI participants identify air leakage and solutions during Building Analyst training	420
Fig. 4	Raleigh's leadership in LEDs is dramatically illustrated by the iconic Cree Shimmer Wall adorning the west face of the LEED Silver-certified Raleigh Convention Center.....	423
Fig. 1	Change in the amount of emission of greenhouse gases (GHGs) in Kyoto.....	427
Fig. 2	Departmental and modes of reduction countermeasure's reduction potential (2030).....	428
Fig. 3	Changes taken place in the number of subsidy cases for the house solar photovoltaic system	428
Fig. 4	A photovoltaic panel roof installation.....	429
Fig. 5	Scheme of the system of DO YOU KYOTO? Credit	430
Fig. 6	Changes in the number of used cooking oil collecting points	431
Fig. 7	A used cooking oil collection point	431
Fig. 8	A Kyoto City facility for used cooking oil fuel established in 2004, producing 5,000 l per day.....	432
Fig. 9	EV car sharing (renting to citizens and enterprises)	433

List of Tables

Table 1	The green cities practices matrix applied to Stockholm.....	103
Table 2	The green cities practices matrix applied to Hamburg	106
Table 3	The green cities practices matrix applied to Vitoria-Gasteiz.....	108
Table 4	The green cities practices matrix applied to Nantes	110
Table 1	Characteristics of regulatory and economic policy instruments.....	167
Table 1	Participative tools for an ‘inclusive’ green economy	187
Table 2	‘Development Dividend’ sustainability indicators	188
Table 1	Selection of FCM sustainable community award winners 2011 (Adapted from FCM 2012)	199
Table 1	Examples of LCEZs from around the world	243
Table 2	Common and unique features of LCEZs	244
Table 3	Initial drivers for establishing LCEZs	245
Table 1	Menu of methods for valuation of changing groundwater conditions (adapted from DeFries et al. 2005; Bolt et al. 2005; Hussain and Gundimeda 2010).....	298
Table 2	Ecosystem services in the study area and their exposure to groundwater threats (after Zahran and Willis 2009; Salem et al. forthcoming)	306
Table 1	Composition of the greywater generated from various sources.....	318
Table 2	Annual water saving by using treated greywater.....	319
Table 1	Basic facts on solid waste management in Surabaya City, 2010 (Surabaya City 2011) compiled by the author.....	325
Table 2	Basic facts of the pilot composting center in Rungkot Lor, Surabaya (KITA 2007) compiled by the author	326
Table 3	Basic information of the existing decentralized compost centers in Surabaya, 2010 (Surabaya City 2011) compiled by Abe and Premakumara	328

Table 4	Basic facts on solid waste management in Matale City, 2010 (Jayaratne 2009) compiled by the author	330
Table 5	Basic facts of the pilot composting center in Gongawela, Matale (Chularathne et al. 2007) compiled by the author	331
Table 6	New user charges system introduced in the pilot area (Chularathne et al. 2007) compiled by the author	332
Table 1	Production of the varieties currently designated under the Kaga vegetables brand. Source: Kanazawa City Agriculture Center (2007)	343
Table 1	Percentage land use change trends in Kumasi from 1986 to 2007, in hectares (derived from Tontoh 2011).....	354
Table 2	Factors influencing price of land in Kumasi (author's fieldwork 2011)	359
Table 3	Assessment of drivers of WTP for one tree in the KFR (author's fieldwork 2011)	359
Table 1	Comparison of Auckland, New Zealand with reduction targets of selected international cities.....	387
Table 1	Participating governments and their related procurement policies	409
Table 2	Motivations identified in the literature and by interviewees	410
Table 3	Barriers identified in the literature and by interviewees.....	412