



Eco-innovations in the urban regeneration projects



Eco_Cities

Dominika P. Brodowicz, Przemysław Pospieszny, Zbigniew Grzymała



KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI



SZKOŁA GŁÓWNA HANDLOWA
W WARSZAWIE

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY



Reviewer:

Professor Agnieszka Cenker (Warsaw School of Economics)

Programme Committee:

Prof. Piotr Ostaszewski – Deputy Rector (Warsaw School of Economics)

Prof. Marek Bryx – Deputy Rector (Warsaw School of Economics)

Prof. Magdalena Kachniewska – Dean of Master's Studies (Warsaw School of Economics)

MSc. Alina Modrzejewska-Kołąkowska – Project manager (Warsaw School of Economics)

Prof. Anna Szelańska – Project methodological coordinator (Warsaw School of Economics)

This publication was supported by grant funds from the European Union's European Social Fund. The project "Eco-innovations in cities", performed at the Warsaw School of Economics, was commissioned by the Polish National Centre for Research and Development (POKL.04.03.00-00-249/12).

© Copyright Warsaw School of Economics until 31/12/2015

© Copyright NCBiR since 01/01/2016. All rights reserved.

No part of this publication may be photocopied, processed or distributed for any purpose or by any means without the prior written permission of the authors and the publisher of this book.

The CeDeWu publishing company and the authors used their best efforts in order to provide accurate and complete information in this book. Under no circumstance, however, they may be held liable for the consequences of its use or for possible violation of any copyrights.

Photo (Graphics) courtesy of:

Skeleton leaves on blue background, close up; File: #82119159 – Fotolia.com;
Futuristic City; Plik: #74284183 – Fotolia.com

Cover design: Agnieszka Natalia Bury

DTP: CeDeWu Sp. z o.o.

1st Edition, Warszawa 2015

ISBN 978-83-7941-216-7

EAN 9788379412167

Published by: CeDeWu Sp. z o.o.

00-680 Warszawa, 47/49 Żurawia Street

e-mail: cedewu@cedewu.pl

Publisher's office: (4822) 374 90 20, 374 90 22

Fax: (4822) 827 38 89

Economics Bookstore

00-680 Warszawa, 47 Żurawia Street

Tel.: (4822) 396 15 00...01

Fax: (4822) 827 38 89

On-line Economics Bookstore

www.cedewu.pl

www.4books.pl

Made in Poland

Contents

List of Acronyms	7
Publisher's note	10
Introduction	12

PART I

Typology and 'components' of eco-cities

Chapter 1

Typology of green cities – <i>Dominika P. Brodowicz</i>	14
Introduction.....	14
1.1. Greening of cities.....	14
1.2. Eco-city.....	15
1.3. Typology of cities branded around green issues.....	17
1.4. City branding.....	19
1.4.1. Eco-branding.....	23
Conclusions.....	25
References.....	26
Web references.....	26

Chapter 2

Trends affecting the 21st century cities – <i>Dominika P. Brodowicz</i>	27
Introduction.....	27
2.1. Cities and challenges.....	27
2.2. Academic approach.....	28
2.3. Industry approach.....	32
2.4. Regional approach.....	34
Conclusions.....	38
References.....	38
Web references.....	38

Chapter 3

Public participation and social engagement in greening the cities

– *Dominika P. Brodowicz* 39

Introduction.....	39
3.1. Top-bottom approach to participation and engagement of the society....	39
3.2. Bottom-up approach to participation and engagement of the society....	42
3.2.1. Water – Friends of the Chicago River.....	42
3.2.2. Waste – Keep America Beautiful (KAB).....	43
3.2.3. Green space – guerrilla gardening and city farming.....	44
Conclusions	45
References.....	46
Web references	46

Chapter 4

Green buildings and certification – *Dominika P. Brodowicz* 47

Introduction.....	47
4.1. Green buildings.....	47
4.2. Certification.....	48
4.2.1 BREEAM.....	48
4.2.2. LEED.....	51
4.2.3. Energy performance of buildings in the EU.....	54
Conclusions	56
References.....	57
Web references	57

PART II

High-technologies in cities operations

Chapter 5

Green Urban Technologies – *Przemysław Pospieszny* 59

Introduction.....	59
5.1. From green urban technologies to smart cities	59
5.1.1. Green technologies	59
5.1.2. Smart cities.....	61
5.1.3. Urban analytics – sensors, open data and knowledge discovery	64
5.2. Efficient districts	70
5.2.1. Energy management	70
5.2.2. Water management.....	74
5.2.3. Waste management	78
5.2.4. Smart buildings and management systems.....	79
5.2.5. Smart transportation.....	81
Conclusions	85
References.....	85
Web references	86

Chapter 6	
Green Urban Transportation – Przemysław Pospieszny	88
Introduction	88
6.1. Challenges and opportunities	89
6.1.1. Urbanisation, congestion and transport demand	89
6.1.2. Climate change, pollution and health	91
6.1.3. Resources consumption	93
6.2. Green transportation	96
6.3. Public transportation	100
6.3.1. Bus transit	101
6.3.2. Rail transit	105
6.4. Personal vehicles	108
6.5. Bike friendly cities	111
6.6. Walkable cities	114
Conclusions	116
References	117
Web references	118

PART III

European and American legal requirements and strategies towards green cities development

Chapter 7	
Fundamental plot – a reason for introduction of Europe 2020 Strategy	
– Zbigniew Grzymała	120
Introduction	120
7.1. The main goals of the Strategy	121
7.2. Flagship initiatives	122
Conclusions	123
References	124

Chapter 8	
European and American strategies towards green cities development	
– Zbigniew Grzymała	125
Introduction	125
8.1. Europe 2020 Strategy	126
8.2. EU Initiatives	128
8.2.1. Smart Citizens and Smart Government	128
8.2.2. Smart Cities	129
8.2.3. Smart Energy and Climate Change	130
8.2.4. Smart Regions	131
8.3. American strategies	131

8.3.1. Pass green building codes	132
8.3.2. Cost-effectively finance energy efficiency	133
References.....	134
Web references	134
About authors	136
Dominika P. Brodowicz PhD	136
Przemysław Pospieszny	136
Professor Zbigniew Grzymała.....	137
Figure of contents	138
Table of contents	140

List of Acronyms

APMCHUD	Asia Pacific Ministerial Conference on Housing and Urban Development
AVAC	automated vacuum collection systems
BAS	building automation system
BEF2030	Built Environment Foresight 2030
BMS	building management system
BREEAM	Building Research Establishment's Environmental Assessment Methodology
BRT	Bus Rapid Transit
CH ₄	methane
CO ₂	carbon dioxide
CSR	Corporate social responsibility
CT	Communication Technology
CURC	College and University Recycling Coalition
DAE	Digital Agenda for Europe
DEGEST	demography, economy, government, environment, society and technology
DIT	Dublin Institute of Technology
EC	European Commission
EIP-SCC	European Innovation Partnership on Smart Cities and Communities
EIT	The European Institute of Technology
ENOLL	The European Network of Living Labs

EPA	Environmental Protection Agency
EPA	United States Environmental Protection Agency
EPBD	Energy Performance of Buildings Directive
EPCs	Energy Performance Certificates
EPIC	European Platform for Intelligent Cities
EU	European Union
FCFCG	Federation of City Farms and Community Gardens
GDP	Gross Domestic Product
GDP	Gross Domestic Product
GHG	greenhouse gas
GIS	geographic information systems
HVAC	Heating, ventilating and air-conditioning
ICT	information and communication technologies
ICT	Information and Communication Technologies
IntelCities	Intelligent Cities
IT	information technology
ITS	intelligent transportation systems
KAB	Keep America Beautiful
LED	light-emitting diode
LEED	Leadership in Energy and Environmental Design
LEZ	low emission zones
LRT	light rail transit
MPO	Miejska Partyzantka Ogrodnicza
MEF	Major Economies Forum
N ₂ O	nitrous oxide
NGOs	non-governmental organisations
NY	New York
O ₃	ozone
OECD	Organization for Economic Cooperation and Development
PEEST	policy, economy, environment, society and technology
PERIPHČRIA	Networked Smart Peripheral Cities for Sustainable Lifestyles
PPP	public-private partnership
PRT	private rapid transit

PV	photovoltaic
PWC	PriceWaterhouseCooper
R&D	Research and Development
RFID	radio frequency identification
RICS	Royal Institution of Chartered Surveyors
ROI	return on investment
SMARTiP	Smart Metropolitan Areas Realised Through Innovation & People
SUMP	Sustainable Urban Mobility Plans
TBM	tunnel-boring machines
TDM	travel demand management
UK	United Kingdom
ULI	Urban Land Institute
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
USA	United States of America
USGBC	US Green Building Council
WEEE	waste electric and electronic equipment

Publisher's note

We're delighted to bring you the book series prepared by the Authors taking part in the "[Eco-innovations in cities](#)" Project (POKL.04.03.00-00-249/12-00). The series, which is available free of charge, consists of six books:

- "[Eco-cities](#)" by Dominika Brodowicz, Przemysław Pospieszny and Zbigniew Grzymała
- "[Green Project Funding](#)" by Hanna Godlewska-Majkowska, Katarzyna Sobiech-Grabka, Paweł Nowakowski
- "[Green Urban Regeneration Projects](#)" by Marek Bryx, Jacek Lipiec, Izabela Rudzka
- "[Planning and Management in Eco-cities](#)" by Stanisław Lobejko, Anna Stankowska, Mariusz Zabielski
- "[New Models of Urban Entrepreneurship](#)" by Marcin Wojtysiak-Kotlarski, Ewelina Szczech-Pietkiewicz, Katarzyna Negacz
- "[Making the 21st Century Cities](#)" ed. by Krzysztof Jarosiński.

The Project was designed and prepared by Professor [Marek Bryx](#), Deputy Rector of the [Warsaw School of Economics](#) (SGH), and Doctor [Dominika Brodowicz](#). The Project has been carried out within the Priority IV "Tertiary Education and Science", Measure 4.3 "Strengthening the didactic potential of universities in the fields of key importance for the aims of Europe 2020 Strategy". In line with the objectives, the Project is conducted from 1st July 2013 until 31st December 2015.

The main aim of this Project was to create at the Warsaw School of Economics a one-year specialisation entitled "[Eco-innovations in the urban regeneration projects](#)". What is more, the Project's aim is to develop the study offer concerning the area of green and socially responsible eco-innovations in cities regeneration. The main objective of this new specialisation is to enhance students' knowledge

about eco-cities, give them sufficient information and discuss case studies on the subject: how contemporary cities should be planned, developed and managed. As most of our communities exist within the urban environment, the provision of eco-innovations is essential for the well-being of society. This unique educational programme for M.A. students provides information on maximising the benefits of making innovative and creative cities to citizens, local authorities, planners, developers, students, researchers and non-government organisations interested in improving the quality of life in cities.

MSc Alina Modrzejewska-Kořakowska – Project Manager
Prof. Anna Szelągowska Ph.D. – Project Methodological Coordinator

Introduction

The challenges lying ahead of the urban areas, specifically cities are formidable. These include growing population, air pollution, congestion, energy efficiency and demand for high quality of living. Although they are varied and can appear as seemingly unrelated, they more often appear on international agendas of the United Nations, European Union and various non-governmental organisations (NGOs) under umbrella of sustainability or more often as green agenda.

This book is an introduction to the dynamically developing and evolving area of green innovations taking place in contemporary cities, with a specific focus on the European and North American examples. It is divided into three interconnected parts, each prepared by a separate author specialising in the areas like communal services, real estate and information technologies. First, authored by doctor Dominika P. Brodowicz focuses on green urban models and challenges facing 21st century cities. Second, developed by IT specialist and doctoral researcher Przemysław Pospieszny presents green transportation and smart technological innovations. Third, compiled by Professor Zbigniew Grzymała relates to European and American legal requirements and strategies towards eco-cities development.

PART I

Typology and 'components' of eco-cities

Chapter 1

Typology of green cities

Dominika P. Brodowicz

“What is a city, but the people”

Sicinius in Shakespeare’s “Coriolanus”, Act III, Scene I

Introduction

This chapter is a preliminary review of new and emerging concepts of environmentally friendly cities. It includes examples from the European Union (EU) as well as from the United States of America (USA), but not on a comparative basis. There are and will be significant differences between the EU and the USA cities, which are deeply rooted in the spatial planning tradition, space availability (European compact cities versus American sprawl), social issues and tradition (European walkable communities versus American car dependency). Therefore, this chapter includes examples as a lessons learned instead of comparisons.

1.1. Greening of cities

The world is facing an urban future. It has been projected that even more than 65 per cent of the population will be living in cities by 2050¹. All issues related to their functioning deserve attention of businesses as well as public bodies. It is vital nowadays, when many spatial planners and property investors are searching for ‘the next big thing’ and when new ideas and trends are transforming cities and influencing their inhabitants’ lives. Among the most

¹ UN (2014), „World’s population increasingly urban with more than half living in urban areas”, <http://www.un.org/en/development/desa/news/population/world-urbanization-prospects-2014.html>, accessed on 14.02.2015.