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2010

中国城市科学研究会 主编

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本书由国内从事相关领域研究的众多学者合著完成。分三篇从认识与思考、方法与实践和探索等方面系统展现我国低碳生态城市年度的理论研究进展和实践。其中选取的国内 15 个典型案例具有一定代表性与示范性, 探讨了实现低碳生态目标的路径和模式。

本书对从事低碳生态城市规划、设计与管理人员有很好的指导作用。

* * *

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导 言

气候变化是 21 世纪人类所面临的最严峻挑战之一，将深刻影响着全人类的生存和发展。近年来，减少温室气体排放，积极应对气候变化已成为各国政府之共识。中国作为最大的发展中国家，改革开放以来高速的经济发展和快速的城镇化进程迅速地改变着产业结构、城乡格局、资源利用和能源消耗结构，对世界能源、资源、生态环境格局产生了巨大的影响。未来 20~30 年我国史无前例的城市化进程所带来的大规模能源消耗、资源开发、城市建设将对生态环境带来更加剧烈和持久的影响，对国家资源与能源安全、生态安全甚至政治安全带来巨大挑战。因此，探索可持续的城镇化战略已成为国家实现社会、经济和环境协调发展的核心问题。

城市约占目前地表面积的 2%，占世界总人口的 50%，创造约全球 80% 以上的 GDP，并消耗着全球 85% 的资源和能源，排出 85% 的废物和二氧化碳。当前，中国城镇建设消耗了全世界 45% 左右的水泥、38% 的钢材，住宅建设总量占全世界总量的一半。事实提醒我们，中国必须适时转变城市发展模式，走内涵挖潜的道路。哥本哈根会议前夕，中国向世界作出庄严承诺，至 2020 年单位国内生产总值二氧化碳排放比 2005 年下降 40%~45%，作为约束性指标纳入国民经济和社会发展中长期规划。这一目标的提出，对于实现中国经济增长方式、生活方式和消费模式向低碳转型将产生深远的影响。在全面评估过去 30 年城镇化快速发展道路的基础上，深刻反思进入工业文明以来城市化过程所走过的高消耗、高污染、高成本的弯路，探索一条基于低能源增长和低碳排放、高环境质量和高生活水准的新型城市发展道路是城市各级政府和科研工作者面临的重大课题。

1971 年联合国教科文组织（UNESCO）在“人与生物圈”计划中提出“生态城市”这一重要概念以来，生态城市的理念和相关研究在各国受到了广泛关注。自 20 世纪 80 年代初开始，我国开始探求具有中国特色的生态城市规划建设的理论与方法体系。据不完全统计，全国已有 170 多个城市从不同层次、不同角

度提出了建设可持续发展、生态城市或绿色城市的目标。最近几年,随着低碳概念的逐渐推广,保定、上海、贵阳、武汉、杭州、德州、无锡、吉林、珠海、南昌、厦门等多个城市提出了建设低碳城市的构想和规划,有近100个城市正在逐步加入打造低碳生态城市名片的行列。中国正成为世界上探索低碳生态城市建设最为积极和主动的国家之一。但在具体的实践探索中,仍存在着诸多的问题:低碳生态城市的概念混乱,认识程度存在差异,在具体实践中具有零散性和尝试性的特点,尚未形成系统的建设发展框架;从理论研究到实践层面,面临巨大的困难和障碍,急需政策、市场、技术的三方联动,全面推进政策突破、体制创新、技术进步和人文引导。各级政府、学界都需要制定一个较为统一的平台来科学反映低碳生态城市理论与实践的发展动态。

基于以上背景及目的,中国城市科学研究会于今年首次启动编写《中国低碳生态城市发展报告》。希望通过我们的努力,可以逐步绘制出一幅清晰的中国低碳生态城市建设路线图。报告由国内从事相关领域研究的众多学者合著完成。主要参编单位包括:中国城市科学研究会、深圳市建筑科学研究院、清华大学建筑学院、中国城市规划设计研究院等。在框架设计及章节设置方面充分考虑调动专家团队与相关学组的积极性,力图全面收集具有典型性示范意义的实践案例,系统展现中国低碳生态城市年度的理论研究进展与实践。

报告在对目前低碳生态城市的理论进行系统梳理的基础上,从认识论的角度阐释有关中国低碳生态城市的理论框架体系,从发展模式、理论框架、研究动态等方面,表述有关中国低碳生态城市发展的现状特征、发展脉络、未来趋势和行动计划;在理论认识的基础上,对生态城市改造技术、垃圾低碳处理技术、水环境和水循环系统以及大型公共建筑节能等四个领域进行重点介绍,从方法论的角度提出低碳生态城市的建设的技术方案;从认知到方法论,最后落实到实践层面,报告从国际研究与案例动态入手,以国际视野辨识低碳城市发展和规划的理论框架内容,帮助厘清中国低碳城市发展和规划的现状、趋势、问题和解决途径等,选取的国内18个典型案例具有一定代表性与示范性,以点带面,以微见著,探讨实现低碳生态目标的路径和模式。

需要说明的是,中国低碳生态城市在理论体系建设、规划建设实践等方面目前正处在探索前行的阶段,观点繁杂、理论纷争,本报告立足于宏大背景下有限目标的实现。现阶段的国情需要我们从认识论到方法论再到实践探索多头并举。作为第一本报告,我们的工作更多的是梳理、整合资源,集众人智慧之大成。由于是初次编写,编写周期短,其中框架又几易其稿,难免有不当之处,恳请各位读者朋友不吝赐教,多多海涵。

最后向所有参与写作、编撰工作的专家学者致以诚挚的谢意！中国城市科学研究会生态城市研究专业委员会承担了本次报告的大部分编写组织工作，作为一个新生的学术组织，也寄望通过报告的编写与出版，可以更多地联系国内外同行，推动生态及生态城市相关领域最新研究成果在城市规划建设中应用，指导各地生态城市建设实践的需要。报告的出版得到了中新天津生态城管委会的资助，在此感谢中新天津生态城对于中国生态城市建设的持续关注和无私贡献！

Introduction

Climate change, one of the most daunting challenges the world faces in the 21st Century, will have a profound impact on the prospect of mankind's future survival and development. Over the recent years, there has been an increasing consensus among national governments to take proactive efforts to reduce greenhouse gas emissions and deal with climate change. The unprecedented economic growth and rapid urbanization in China from the year that opening and reform policy began, which is still the largest developing country of the world, have accelerated the transformation of its industrial structure, urban and rural relationship, structure of utilizing natural resources and energy consumption, which have had a tremendous impact on the energy, resources and ecosystem. China's continuing urbanization in the next two or three decades on a scale with no parallels in human history, and the resulting energy consumption, resource use and urban development on massive scales, will cause even more drastic and longer-lasting impact on the nation's ecosystem, and pose substantial challenges to the nation's resource and energy security, eco-sustainability and even political stability. Thus, identifying a strategy for sustainable urbanization has become central to achieving coordinated growth, balancing social, economic and environmental considerations.

Only 50% of world's population lives in cities; however, it is responsible for 85% consumption of resources and energy, and 85% of its solid waste and CO₂ emissions. Currently, China's urban construction consumes over 40% of world's cement and 58% of its steel, with the total floor space of residential buildings completed in China every year amounting to about half of the world's total. Cities have been the most part to enhance energy efficiency and emission reduction. On the eve of the Climate Conference in Copenhagen, China made a solemn commitment of reducing per GDP unit CO₂ emissions by 40%~45% from 2005 levels by 2020, which will also be adopted as a "binding" goal in the medium and long-term

planning for national economic and social development. This will inevitably have a far-reaching significance and cause a paradigm shift in China's economic growth, prompting a move toward low-carbon in lifestyle choices and consumption patterns. Identifying a new urbanization path that is modeled on low energy increase and low carbon emissions, higher environmental standard and better quality of life, has become a major field of investigation for municipal governments and academic researchers, with benefits of a comprehensive evaluation of China's urbanization in the last three decades, a serious critique of urbanization lessons since the onset of western industrialization, exemplified by excessive energy intensity, severe pollution and high social costs.

The concept of eco-city and related studies have drawn extensive interest around the world, since it was first proposed by UNESCO in 1971 in its *Man and Biosphere (MAB)* program. Since the early 1980s, China has been exploring theories and methodologies for eco-city planning and construction with Chinese characteristics. There are more than 170 cities in China that have proposed goals of varying scale and focus for sustainable, ecological or green city development, though the tally may be incomplete. Over the recent years as low-carbon development has been gaining currency in China, cities including Baoding, Shanghai, Guiyang, Wuhan, Hangzhou, Dezhou, Wuxi, Jilin, Zhuhai, Nanchang and Xiamen have all developed studies and plans for low-carbon cities, and a total of nearly 100 cities are moving to position their cities as low-carbon. Indeed, China has become one of the most proactive nations in pursuit of eco-city development. However, there are still practical issues to be resolved, which include competing and confusing definitions for eco-city or low carbon city, knowledge gaps, efforts being sometimes patchy and hesitant, a lack of systematic framework for planning, and other daunting obstacles in modeling and construction practice. Coordinated measures addressing policy, market and technology are urgently needed to deliver policy breakthrough, innovative business approach, technological advancement and attitudinal changes. It will also require greater awareness, actions and commitment by all sectors in society for achieving sustainable growth. A platform to facilitate communication among different levels of government and the academic establishment will help assessing progress of eco-city theory and practice.

It is with such a background and objectives that the China Society for Urban Studies launched "The Progress Report on China's Low-Carbon Eco-city Devel-

opment” for the first time this year. It is hoped that such and future compilations will help provide an increasingly clearer roadmap for China’s low- carbon eco-city development. Scholars in eco-city related research have contributed to this first report, whose organizations include the China Society for Urban Studies, Shenzhen Institute of Building Research, Tsinghua University, China Academy of Urban Planning and Design, etc. The structure of the report was designed to encompass work and initiatives by multiple expert teams and others in related disciplines, to represent a range of best practices that may serve as models for other cities, and to highlight progress of research and construction practice in low-carbon eco-city development in the report year.

On the basis of systematic assessment of current theories concerning low-carbon eco-city, the report firstly outlines a theoretical framework as the view from knowledge, and highlights the current status, development patterns, future trend and action plans, for China’s low-carbon eco-city development. It also endeavors to present technologies, as the view from methodologies, applicable to four key areas, including eco-retrofitting, low-carbon waste treatment, water environment and water recycling system, and energy efficiency for large-scale public buildings, as well as providing technical solutions for city construction. From the knowledge to methodology and then to practice, and based on international researches and cases, the report clarifies a theoretical framework for urban development and planning in the international context, and clarifies the current pattern, future trend, problems and solutions. The studies on 15 Chinese city cases, which are representative of different development approaches, offer discussions on appropriate paths and mode for achieving low-carbon eco development goals.

It should be noted that low-carbon eco-city development is still in initial phase of trial and progress, seeking to build a common platform, and engaging in planning and city building practice. Against this broad background with a plethora of diverging views and competing theories, the report aims to achieve well defined, albeit limited, objectives. The current conditions in China require concurrent efforts to bridge knowledge gaps, to develop methodologies and to identify best practice cases. What we have accomplished in this report are categorizing, assessing and assembling data and research, pooling collective wisdom of all participating contributors. Because this is the first ever such compilation, we sincerely hope to hear feedback and critique from our readers for any inappropriateness that may be inevitable against an extremely tight schedule with several

major changes to the original contents along the way.

In conclusion, we would like to express our heartfelt appreciation for all experts and academic researchers who have contributed papers or editorial support. The Eco-city Research Committee of China Society for Urban Studies undertook the organization and facilitation of most of the writings in this report. Being a newly established academic entity, the Committee intends to extend networking with more specialists in this field, promote the adoption, in urban planning and construction, of the latest research outcome in eco-city and related studies, and provide guidance to eco-city construction across the country, through the compilation and publishing of this report. The Administrative Committee of Sino-Singapore Tianjin Eco-city (SSTEC) provided funding for the report's publication and we would like to extend our appreciation for its generous support as well as continuous commitment to China's eco-city development.

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