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Exploration and Practice of Zero-Carbon Communities in China

中国零碳社区探索与实践

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Ministry of Housing and Urban-Rural Development, P. R. China

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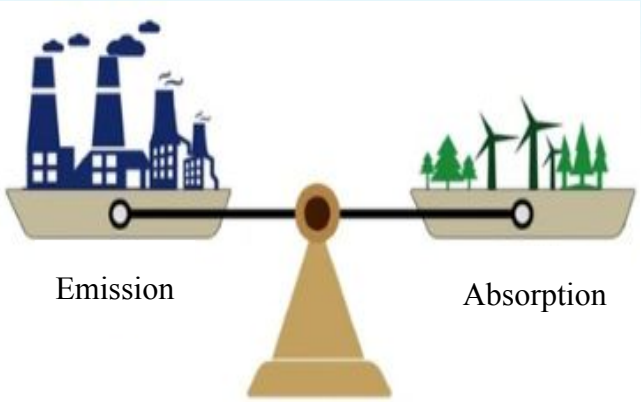
目 录
CONTENTS

目 录
CONTENTS

1 Work background
工作背景

Communities are important units for the green and low-carbon development of urban and rural areas
社区是城乡绿色低碳发展的重要单元

(1) From the perspective of carbon emissions:
从碳排放看



(2) From the perspective of challenges
从挑战看

01 The existing communities have great potential for carbon reduction
既有社区减碳潜力大

02 Some energy systems are aging
部分能源系统老化

03 People have put forward higher demands for the quality of life
人民对生活品质提出更高要求

(3) From the perspective of opportunity
从机遇看

Construction of new communities
新建社区建设

Existing communities retrofit
既有社区改造

1 Work background
工作背景

The construction of zero-carbon communities has been incorporated into China's "1+N" policy system for carbon peaking and carbon neutrality.
零碳社区建 设已被纳入中国碳达峰碳中和 "1+N"政策体系。

China will scale up its National Determined Contributions by adopting more vigorous policies and measures. We aim to have CO_2 emissions peaking before 2030 and achieve carbon neutrality before 2060.

中国将提高国家自主 贡献力度，采取更加有力的政策和措施，二氧化碳排放力争于 2030年前达到峰 值，努力争取 2060年前实现碳中和。

Opinions on Comprehensively, Accurately and Completely Implementing the New Development Philosophy and Doing a Good Job in Carbon Peaking and Carbon Neutrality
关于完整准确全面 贯彻新发展理念做好碳达峰碳中和工作的意 见

Implementation Plan for Carbon Peaking before 2030
2030年前碳达峰 实施方案

Implementation Plan for Carbon Peaking in Industrial Sector
工业领域碳达峰实施方案

Implementation Plan for Synergistic Efficiency in Reducing Pollution and Carbon
减污降碳协同增效实施方案

Implementation Plan for Carbon Peaking in Urban and Rural Construction
城乡建设领域碳达峰实施方案

Implementation Plan for Agricultural and Rural Carbon Emission Reduction and Sequestration
农业农村减排固碳实施方案

Financial Supports to Carbon Peaking and Carbon Neutrality
财政支持碳达峰碳中和意见

Technology Supports to Carbon Peaking and Carbon Neutrality
科技支撑碳达峰碳中和方案

Implementation Plan for Carbon Peaking in the Building Materials Sector
建材领域碳达峰实施方案

Standardization Action on Energy Carbon Peaking and Carbon Neutrality
能源碳达峰碳中和标准化行动

Public Agencies Promote Carbon Peaking Plan
公共机构促进碳达峰方案

Talent Training Plan for Carbon Peaking and Carbon Neutrality
碳达峰碳中和人才培养方案

Opinion on Carbon Peaking and Carbon Neutrality for Central Enterprise
中央企业碳达峰碳中和意见

……

Accelerate the construction of green communities
加快推进绿色社区建设

Build green towns and green communities
建设绿色城镇、绿色社区

Explore the construction of zero-carbon communities
探索零碳社区建设

Promote research on the green and low-carbon technology system for communities
推进绿色低碳社区技术体系研究

China actively promote the construction of zero-carbon communities
中国积极推动零碳社区建设

目 录
CONTENTS

2 Exploration and practic
探索与实践

Since 2014, China has carried out active explorations on low-carbon communities, complete communities, etc., and incorporated zero-carbon indicators into demonstration requirements
2014年以来，中国就低碳社区、完整社区等已开展 积极探索，并将部分零碳指 标纳入示范要求

2022 Complete Communities Construction Pilot，MOHURD，P. R. China, etc.
完整社区建设试点，住房和城乡建设部等

2022 Implementation Plan for Pilot Construction of Near Zero Carbon Emission Zones in Chengdu
成都市近零碳排放区试点建设实施方案，成都

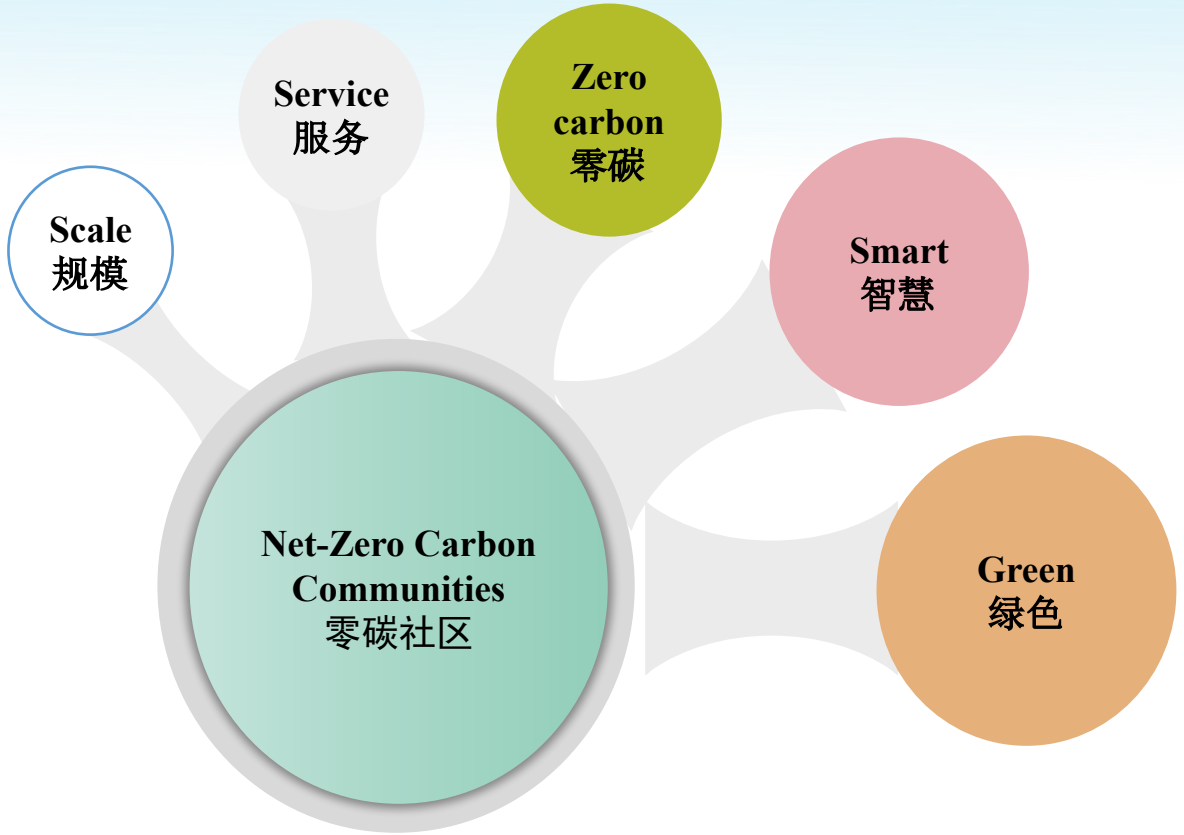
2020 Implementation Plan for Pilot Construction of Near Zero Carbon Emission Zones in Shenzhen
深圳市近零碳排放区试点建设实施方案，深圳

2020 Action Plan for Creating a Green Community, MOHURD，P. R. China, etc
绿色社区创建行动方案，住房和城乡建设部等

2017 Assessment Standard for Green Eco-district(GB/T 51255-2017), MOHURD，P. R. China.
绿色生态城区评价标准(GB/T 51255-2017)，住房和城乡建设部

2014 Guidelines for Building Smart Communities，National MOHURD，P. R. China
智慧社区建设指南，住房和城乡建设部

2014 Carry out Low-carbon Community Pilot Work，National Development and Reform Commission，P. R. China
开展低碳社区试点工作，国家发改委



2 Exploration and practice
探索与实践

At the national level, in recent years, China has explored the construction of zero-carbon communities from regional and project perspectives respectively.
在国家层面，近年来中国分 别从区域和工程角度，加快零碳社区建 设。

Regional level 区域层面

- The Implementation Plan for Carbon Peaking Before 2030: **Select 100 representative cities and industrial parks to carry out carbon peaking pilot projects.**
  《2030年前碳达峰实施方案》:选择100个具有代表性的城市和园区开展碳达峰试点。
- In October 2023, the "National Carbon Peak Pilot Construction Plan" was released.
  2023.10，发布《国家碳达峰试点建设方案》。
- In December 2023, the list of the first batch of carbon peaking pilot **(25 cities and 10 industrial parks)** was released.
  2023.12，发布首批碳达峰试点名单（25个城市、10个园区）。
- In March 2025, the list of the second batch of carbon peaking pilot **(15 cities and 12 industrial parks)** was released.
  2025.03，发布第二批碳达峰试点名单（15个城市，12个园区）。

Target 目标 → **Task** 任务 → **Project** 工程 → **Policy** 政策

Incorporate indicators of zero-carbon communities such as roof photovoltaic coverage rate, proportion of star-rated green buildings, energy consumption per unit area into the construction requirements.
将屋顶光伏覆盖率、星级绿色建筑占比、单位能耗强度等零碳社区指标纳入建设要求。

Project level 工程层面

- In August 2023, the "Implementation Plan for the Demonstration Project of Advanced Green and Low-Carbon Technologies" was released, supporting the construction of demonstration projects such as **low-carbon (near-zero carbon) industrial parks**.
  2023.08，发布《绿色低碳先进技术示范工程实施方案》，支持低（近零）碳产业园区等示范。
- In March 2024, the "List of Demonstration Projects for Advanced Green and Low-carbon Technologies (First Batch)" **(47 projects)** was released.
  2024.03，发布《绿色低碳先进技术示范项目清单（第一批）》(47个工程)。
- In April 2025, the "List of Demonstration Projects for Advanced Green and Low-carbon Technologies (Second Batch)" **(101 projects)** was released.
  2025.04，发布《绿色低碳先进技术示范项目清单（第二批）》(101个工程)。

The "Administrative Measures for Special Central Budgetary Investment in Energy Conservation and Carbon Reduction" : It focuses on supporting projects listed in the demonstration project list of advanced green and low-carbon technologies.
《节能降碳中央预算内投资专项管理办法》:重点支持列入绿色低碳先进技术示范项目清单的项目。

2 Exploration and practice
探索与实践

At the local level, some regions have also successively introduced implementation plans for the demonstration and creation of near-zero carbon communities.
在地方层面，部分地区也相 继出台近零碳社区示范 创建实施方案。


山东省生态环境厅 政府信息公开

山东省生态环境厅关于印发山东省近零碳城市、近零碳园区、近零碳社区示范创建实施方案的通知

鲁环发〔2023〕16号

各市生态环境局：

现将《山东省近零碳城市、近零碳园区、近零碳社区示范创建实施方案》印发给你们，请结合实际，认真组织实施。

山东省生态环境厅

2023年7月6日

山东省近零碳城市、近零碳园区、近零碳社区示范创建实施方案

为积极探索近零碳发展模式，推动近零碳建设，提高绿色低碳发展水平，根据《生态环境部关于支持山东深化新旧动能转换推动绿色低碳高质量发展的实施意见》（环综合〔2022〕65号）、《山东省建设绿色低碳高质量发展先行区三年行动计划（2023—2025年）》（鲁发〔2022〕19号）等文件要求，制定本方案。

一、总体要求

以习近平新时代中国特色社会主义思想为指导，深入贯彻落实党的二十大精神，坚定践行习近平生态文明思想，认真落实省委省政府关于绿色低碳高质量发展的部署要求，以低碳工作基础较好、减排潜力较大的县（市、区）、园区和社区为突破口，开展近零碳示范创建。探索近零碳发展典型模式和关键路径，促进减污降碳协同增效，服务和推动绿色低碳高质量发展先行区建设。到2025年，建

Implementation Plan for the Demonstration Creation of Near-Zero Carbon Cities, Near-Zero Carbon Parks and Near-Zero Carbon Communities in Shandong Province
山东省近零碳城市、近零碳园区、近零碳社区示范创建实施方案

Shandong has set up **11 indicators in 6 types** to build demonstration communities of near-zero carbon.
山东设置6个类型11项指标，建设近零碳社区示范。

Evaluation indicators for the demonstration creation of near-zero carbon communities
近零碳社区示范创建评价指标

Low-carbon management 低碳管理	Low-carbon energy 低碳能源	Low-carbon building 低碳建筑	Low-carbon transportation 低碳交通	Low-carbon lifestyle 低碳生活	Carbon sink 碳汇
Per capita carbon dioxide emissions 人均碳排放	Clean heating rate 清洁取暖率	Proportion of newly built green buildings 新建绿建占比 Proportion of energy-saving renovations for existing buildings 既有建筑改造比例	Public transportation within 500 meters 500米内是否有公共交通等站点	Utilization rate of high-efficiency and energy-saving lamps for public lighting 公共照明高效节能灯具使用率 Classification of domestic waste 生活垃圾分类	Green coverage ratio 绿化覆盖率

2 Exploration and practice
探索与实践

Under the guidance and support of policies, the pilot and demonstration projects of zero-carbon communities are accelerating their construction
在政策的引 导和支持下，零碳社区 试点示范工程加速建 设。

Jiangbei New District
江北新区

Planning area: 33.2 km^2
Technological path: Regional utilization of clean energy, wooden structure buildings, net-zero carbon emissions buildings throughout entire life cycle…

Hexi New City
河西新城

Planning area : 15 km^2
Technological path: High-quality green buildings, green municipal facilities, comprehensive pipe galleries…

Sino-german Ecological Park
中德生态园区

Planning area : 54.7 km^2
Technological path: High-star green buildings, green transportation, rooftop photovoltaic systems, and green construction…

Carbon Neutrality Smart Island
碳中和智慧岛

Technological path: Comprehensive utilization of renewable energy, Smart residential areas and smart communities…

Dameisha Community
大梅沙社区

Planning area : 3.2 km^2
Technological path: Rooftop photovoltaic, energy-saving renovation of existing buildings, green transportation, and vertical planting…

目 录
CONTENTS

The Boao Near-Zero Carbon Demonstration Zone in Hainan Province is a pilot demonstration project jointly developed by the Ministry of Housing and Urban-Rural Development and Hainan Province in 2024

海南博鳌近零碳示范区是2024年住房城乡建设部与海南省共同打造 试点示范工程

Boao near zero carbon building demonstration zone
博鳌近零碳建筑示范区

Construction time: 2024
建成年代：2024

Project location: Hainan, China
项目地点：中国海南

Project scale: 190.15 hectares
占地面积：190.15公顷

Floor area：166,000 square meters
建筑面积：16.6万平方米

Construction type: Retrofit
建设类型：改造

Center of Science and Technology and Industrialization Development, Mohurd

This project adopts local appropriate technologies in a targeted manner, significantly reducing the energy demand of buildings
该项目有针对性地采用当地适宜技 术，大幅降低建筑用能需求

(1) Reduce energy demand
降低用能需求

With the help of software simulation for identification technology measures, improve the performance of key parts; add horizontal, vertical and green shading; and reduce the building air conditioning load without affecting the building style.
借助软件模拟识别技术措施，提升重点部位性能，增 设水平、竖直和绿植遮阳，在不影响建筑 风貌的前提下降低建筑空 调负荷。

Before retrofit
改造前

After retrofit
改造后

Adopting a modular refrigeration machine room renovation plan, significantly enhances the system's energy efficiency and shortens the construction period
采用模块化制冷机房改造方案，大幅提升系 统能效水平、缩短施工周期

(2) Improve the energy efficiency of system
提高系统能效

High-Performance Equipment: Formulate a renovation plan for a high-performance modular refrigeration machine room and adopt magnetic levitation variable frequency water chillers.

高效设备：制定高性能模块化制冷机房改造方案，采用磁悬浮变频冷水机组。

Optimize system: Optimize the pipeline in the machine room with BIM to achieve level 1 energy efficiency, and the annual system energy efficiency is above 6.0.

系统优化：结合BIM优化机房管路，实现一级能效，全年系统能效6.0以上。

Construction Technology: The modular construction scheme was adopted to complete the retrofit in only 3 months, which was 50% shorter than the original construction period.

施工技术：采用模块化施工方案，仅3个月即完成改造，较原工期缩短50%。

Adopting technologies such as BIPV, Photovoltaic-Storage-Direct Current-Flexible system, and electrification of cooking, and the maximum utilization of renewable energy can be achieved
采用光伏建筑一体化、光 储直柔、炊事 电气化等技术，实现 可再生能源最大化利用

(3) Transform energy Use patterns
转变用能方式

Energy type: Using rooftop photovoltaic, photovoltaic grid, photovoltaic corridor and other forms of photovoltaic applications.

能源类型：采用屋顶光伏、光伏格栅、光伏连廊等多种光伏应用形式。

Energy system: Demonstration of a new energy system "energy storage + water storage + PEDF".

能源系统：开展新型储能+水蓄冷+光储直柔的新型能源系统示范。

Electrification: Air source heat pump and electric cooking equipment are used to replace the original gas equipment to achieve 100% electrification of the building.

电气化：采用空气源热泵、电炊事设备代替原有燃气设备，实现建筑100%电气化。

Landscape photovoltaic
景观光伏


Facade photovoltaic
立面光伏


Rooftop photovoltaic
屋顶光伏

Photovoltaic floor tile
光伏地砖

The multiple goals of energy saving, carbon reduction and cost reduction were achieved at the same time
该项目实现节能、降碳、降费等多重目标

According to the actual energy consumption data, the energy consumption of buildings after retrofit (excluding photovoltaic) decreased by about 25% compared with 2019; combined with the photovoltaic production capacity of the building and its surroundings, the overall carbon reduction ratio of the building (including photovoltaic) reached 51.9%.

根据实际用能数据，改造后建筑用能（不含光伏）较2019年下降约25%；结合建筑及周边光伏产能，建筑整体减碳比例（含光伏）达到51.9%。

Technical path
技术路径

Thank you for listening ！