Country studies: Greater China
by Mingshun Zhang and Tze-Luen Lin
Eco-city and low-carbon city programs and networks in East Asia - Country studies: Greater China

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Authors: Mingshun Zhang and Tze-Luen Lin
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ICLEI East Asia Secretariat
14/F, Seoul Global Center Building, 38 Jongno, Jongno-gu, Seoul, South Korea (110-110)
icel-eastasia@iclei.org
www.iclei.org/eastasia

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Eco-city and low-carbon city programs and networks in East Asia

Country studies: Greater China

(As of February 2014)

by Mingshun Zhang and Tze-Luen Lin
Foreword

Learning more about eco-cities and low-carbon cities in East Asia

Cities worldwide have profiled themselves as “sustainable cities”, “environmental cities”, “green cities”, “ecological capitals” and “eco-cities” over the last decades. Already in the year 1990, environmentally minded cities joined together and formed ICLEI, which has meanwhile become the largest network of cities and local governments for sustainability. Today, projects of eco-city development, eco-districts and eco-industrial parks in East Asian countries draw the world’s attention.

Laying a strong focus on sustainable urban development in East Asia, the economically most vibrant region of the world, ICLEI has accepted an offer by Seoul Metropolitan Government in South Korea and opened an East Asia Secretariat.

The East Asia team has been aware of eco-city and low-carbon city projects in the various countries. It felt, however, that it would be useful to gain a systematic overview of relevant programs and networks in the region.

ICLEI East Asia has therefore commissioned country studies on eco-city and low-carbon city programs and networks in P.R. China, Chinese Taipei (Taiwan), Japan and South Korea. The findings shall be shared with all those interested in sustainable urban development through three publications, which contain the studies for Greater China, Japan and South Korea. I thank the authors – Mr. Mingshun Zhang, Mr. Tze-Luen Lin, Ms. Michie Kishigami and Ms. Naoko Ikeda as well as Mr. Taesang Kim – for their work.

The publisher is interested in learning more about eco-city and low-carbon city programs and networks in East Asian countries and will welcome any hint and information from the readers of this booklet.

Konrad Otto-Zimmermann
Founding Director
East Asia Secretariat, ICLEI – Local Governments for Sustainability
The authors

Mingshun Zhang

Professor Mingshun Zhang is the Executive Director of Beijing Climate Change Response Research and Education Centre of Beijing University of Civil Engineering and Architecture. He holds a PhD from Dutch Erasmus University on environmental policy and urban sustainability, and has 26 years of working experiences (6 years in the Netherlands and 20 years in China) in the field of urban sustainability, environmental policy, environmental planning and management. He has conducted numerous researches on EU-China comparative urban sustainability, environmental policies and management.

Since 2002, Professor Zhang has been working on various Dutch government and EC funded projects in China. He has been involved as either project coordinator or local coordinator in many projects within the programmes of EC's Asia Pro Eco I+II, Switch Asia, EC’s 6th Framework, EC’s ERASMUS Mundus, EU-China environmental sustainability and Dutch Asia Facility for China.

He has published more than 25 books and more than 70 academic articles related to urban sustainability, environmental policies, low-carbon development and eco-city planning and management.

Tze-Luen Lin

Tze-Luen Alan Lin is Associate Professor in the Department of Political Science at the National Taiwan University. His research interests focus broadly on the realms of global environmental politics, energy and climate policy, citizen participation and deliberative democracy, and urban governance. Recent projects examine urban strategy to combat climate change, environmental NGOs in China, the theory and practice of deliberative democracy, comparing climate policy networks, and risk communication.

Professor Lin is also a research fellow with the Taiwan Public Governance Research Center, Policy and Law Center for Environmental Sustainability, and the Risk Society and Policy Research Center. He also in the Taiwan Committee of International Human Dimensions Programme on Global Environmental Change (IHDP). He has been a consultant and has served on the advisory board for various organizations, including Environmental and Resources Foundation, Council on Environmental Quality, and Taiwan Science, Technology and Society Association.
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I. Environmental model city, low-carbon city and low-carbon and eco-city programs in People’s Republic of China

by Mingshun Zhang
1 Introduction: Purpose and background

Purpose

There are many local, national and international low-carbon city, eco-city and environmental city programs in China. Among them, three on-going city sustainability programs coordinated by the national government are the most established. These programs are: China Environmental Model City Program (EMCP), China Low-Carbon Eco-City Program (LCECP) and China Low-carbon City Program (LCCP). Managed by the central government, these three voluntary programs have made significant impacts on China’s sustainable urbanization.

In addition, there are various international low-carbon city and eco-city cooperative projects being implemented in China. A summary of these projects is included in section four of this report.

Background: China’s urbanization trend

China’s urbanization was 10% when the People’s Republic of China was founded in 1949. During the first three decades (1949 -1978), due to strict national urbanization policies, China’s urbanization was increasing slowly and reached only 18% in 1978 when China started its National Opening and Reforming Policy. There was no significant urban challenge such as traffic jams, urban pollutions and shortage of resources and materials during this period.

In the second three decades (1978 - 2008), China’s urbanization increased from 18% in 1978 to 45% in 2008, and 51.27% in 2011, meaning that more than half of the Chinese populations are now living in cities. During this period, the Chinese economy was growing annually at a rate of over 10%. With famers moving continuously from the rural areas to cities, there was a large surplus of urban labor force. While cities were transformed into crucial engines of socioeconomic development and centers of productivity and social advancement, they also began to embrace greater and more complex urban challenges in transportation, pollution, resource and noise. At the same time, urban environmental problems such as water pollution, air pollution and waste issue became more serious since the 1980s. For instance, Benxi, a city with many heavy industries and coal mining, was said to be invisible from the satellite due to its serious air pollution in the 1980s.

To address these issues, both the national and local governments began to prioritize urban environmental improvements through investment, urban comprehensive environmental control, phasing out pollution-intensive industries, moving pollution-intensive industries out of cities, and building environmental infrastructure.
2 Program profiles

2.1 China Environmental Model City Program (EMCP)

Summary
Established by China’s Ministry of Environmental Protection (MEP), EMCP is a voluntary program that has been implemented in China for 16 years since 1997. Under the program, 84 cities or districts of mega cities have been awarded the title of “China National Environmental Model Cities” until 2012. More than 120 EMCP candidate cities are in the process of implementing EMCP. Due to its success in engaging cities and mayors, the program has been recognized as the best urban program related to urban environmental performance and sustainability in China.

Initiation history
EMCP started in 1997, 20 years after China started its reform and open door policy. The program was a response to the increasing urban challenges resulting from decades of rapid industrialization and urbanization in China. To improve urban environmental quality, the Chinese central government launched its first city-level environmental program, Urban Environment Comprehensive Improvement Examination Program, in 1989. Under the Urban Environment Comprehensive Improvement Examination Program, the central government and provincial governments carried out examinations in 37 key cities and over 330 other Chinese cities. As such examinations were included in the work agendas of local governments, it has enhanced the sense of responsibility among local leaders in urban environmental protection. To improve urban environment in a comprehensive manner under the leadership of mayors, management system and operation mechanism were developed to coordinate and assign responsibilities to different departments and divisions.

In addition, the Urban Environment Comprehensive Improvement Examination Program also succeeded in motivating Chinese cities to increase their investment in environmental improvement, which speeded up the construction of relevant environmental infrastructure. For instance, 11,333 km² of smoke-and-dust zones and 1,800 km² of up-to-standard noise control zones were constructed; the area of public lawns has increased by 490 million m²; numerous urban waterways such as Zhongdong River in Hangzhou, Funan River in Chengdu, Haihe River in Tianjin, Suzhou River in Shanghai, Qinhuao River in Nanjing and Haohe River in Nantong were cleaned up on a large scale.

Based on the practices and experiences of the Urban Environment Comprehensive Improvement Examination Program, the State Environmental Protection Administration (SEPA), which was later promoted as the MEP, launched a new urban environmental program known as EMCP in 1997.

Initiator
EMCP was initiated by MEP. The Department of Pollution Prevention and Control of MEP is directly responsible for coordinating and implementing EMCP. The key technical supporting institute of EMCP is China National Environmental Monitoring Center (CNEMC), a public institute working directly under the MEP.

Country studies: Greater China

Program Manager
EMCP is coordinated and managed by the Department of Pollution Prevention and Control of MEP. The functions of MEP in EMCP are:

- Receiving, evaluating and approving EMCP application submitted by Chinese cities;
- Making policies, standards and key performance indicators (KPIs) applicable to EMCP;
- Conducting in-site inspection, checking data and progress in implementing EMCP;
- Awarding EMCP titles to EMCP candidate cities that have successfully complied with EMCP standards; and
- Re-checking and re-testing EMCP cities to ensure they comply with EMCP standards. Such re-checking and re-testing take place two years after the city receives the EMCP title.

Contact
Address: Department of Pollution Prevention and Control, Ministry of Environmental Protection of China, No.115, Xizhimennei Nanxiaojie, 100035, Beijing, China
Tel.: 0086-(0)10-66556242

Relation to other governmental institutions
EMCP has close connections with the following governmental institutions:

- China National Patriotic Health Campaign Committee Office, who initiated China Health City Program. As a pre-condition, cities need to obtain the title of “China Health City” in order to participate in EMCP.
- Ministry of Housing and Urban-Rural Development (MoHURD), who initiated China National Garden City Program (CNGCP). Many KPIs of EMCP are related to the KPIs of CNGCP.
- The Central Office of Spiritual Civilization Construction Commission, who initiated China National Spiritual Civilization City Program. Nine KPIs of EMCP are from the KPIs of China National Spiritual Civilization City Program.

Goals and objectives
The overall objective of EMCP is to improve urban environmental performance and sustainability through creating and up-scaling best practices in urban environmental improvement. The specific objectives of the program are:

- To improve urban environmental quality (air, waste management and water) through comprehensive environmental control and participation of stakeholders;
- To get commitments of municipalities in investing and implementing environmental solutions;
- To enhance awareness of urban policy-makers and stakeholders in urban environmental management; and
- To create and disseminate best practices in urban environmental performance through piloting and networking.

Performance criteria
EMCP has set up clear performance criteria by using KPIs. Set up in 1997, the performance criteria have been updated on a regular basis.
Table 1: The latest edition (sixth) of EMCP KPIs and criteria published in 2011.²

<table>
<thead>
<tr>
<th>No.</th>
<th>KPIs</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-conditions:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Total emissions of main pollutants</td>
<td>Less than the quotas distributed by the national and provincial government.</td>
</tr>
<tr>
<td>2</td>
<td>There is no serious environmental accident happened in the past three years. Environmental emergency action plan has been established and is tested regularly. There is no serious environmental illegal case happened last year.</td>
<td>---</td>
</tr>
<tr>
<td>3</td>
<td>Score of Urban Environment Comprehensive Improvement Examination</td>
<td>Among the top five in its respective province.</td>
</tr>
<tr>
<td>Economic and Social Indicators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>The per-capita disposable income of urban residents Environmental investment sharing in GDP</td>
<td>10,000 CNY; 8,500 CNY in western city ≥ 500</td>
</tr>
<tr>
<td>5</td>
<td>Energy consumption per industrial value-added in large companies</td>
<td>Decreasing annually</td>
</tr>
<tr>
<td>6</td>
<td>Water consumption per GDP</td>
<td>Decreasing annually</td>
</tr>
<tr>
<td>7</td>
<td>Main pollutants emission per 10,000 CNY industrial value-added</td>
<td>Decreasing annually</td>
</tr>
<tr>
<td>Environmental Quality Indicators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>The annual average concentration of main air pollutants in urban area</td>
<td>Reaches the national air quality standard of level II 85% of total days of a year</td>
</tr>
<tr>
<td>9</td>
<td>Water quality of centralized drinking water sources</td>
<td>Complying with standards</td>
</tr>
<tr>
<td>10</td>
<td>Urban water quality</td>
<td>Reaches quality standards</td>
</tr>
<tr>
<td>11</td>
<td>Average noise in urban area (urban areas)</td>
<td>≤60 dB(A)</td>
</tr>
<tr>
<td>12</td>
<td>Average transport noise in main roads (urban areas)</td>
<td>≤70 dB(A)</td>
</tr>
<tr>
<td>Environmental Infrastructure Indicators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Urban green covering rate</td>
<td>35%</td>
</tr>
<tr>
<td>14</td>
<td>Rate of centralized wastewater treatment</td>
<td>≥80%</td>
</tr>
<tr>
<td>15</td>
<td>Emissions of key industrial pollution sources</td>
<td>Complying with emission standards</td>
</tr>
<tr>
<td>16</td>
<td>Rate of using clean energy</td>
<td>≥50%</td>
</tr>
<tr>
<td>17</td>
<td>Rate of Motor vehicle exhaust testing regularly</td>
<td>≥80%</td>
</tr>
<tr>
<td>18</td>
<td>Rate of household wastes disposal</td>
<td>≥85%</td>
</tr>
<tr>
<td>19</td>
<td>Rate of industrial waste treatment</td>
<td>≥90%</td>
</tr>
<tr>
<td>20</td>
<td>Hazardous waste disposal</td>
<td>100%</td>
</tr>
<tr>
<td>Environmental Management Indicators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>All stakeholders are taking required environmental responsibilities; environmental indicators have been included in KPIs of leaders at city level; EMCP plan has been developed; and environmental quality information is available for public.</td>
<td>--</td>
</tr>
<tr>
<td>22</td>
<td>Environmental Impacts Assessment (EIA) and the “three-at-the-same-time” system have been implemented. (i.e. facilities for preventing and controlling environmental pollution and destruction shall be planned, constructed and put into use at the same time)</td>
<td>--</td>
</tr>
<tr>
<td>23</td>
<td>Well-established environmental management organizations and their institutional capacities to meet the national requirements.</td>
<td>--</td>
</tr>
<tr>
<td>24</td>
<td>Public satisfaction with environmental protection</td>
<td>≥80%</td>
</tr>
<tr>
<td>25</td>
<td>Percentage of primary and secondary schools that are conducting environmental education</td>
<td>≥85%</td>
</tr>
<tr>
<td>26</td>
<td>The environmental health conditions and the environmental management of the urban-rural connection areas should meet the national requirements.</td>
<td>--</td>
</tr>
</tbody>
</table>

Workplan and project phases

To be an EMCP city, a city shall go through the following phases:\(^3\)

**Phase 1: Application submitted by a city**

Before submitting EMCP application, a city should develop an EMCP two-year action plan. MEP and local environmental authority will evaluate the EMCP action plan, while independent experts will be invited by MEP to carry out technical evaluation of the submitted EMCP action plan. After evaluation, the EMCP action plan will be revised and approved by the municipal government. As soon as the action plan has received approval from the municipality, the content of the plan should be made available for the public for supervision of the implementation of the actions. The first phase ends with the submission of the following application documents:

- Official letter by the municipality that shows the municipality’s decision to develop the city into a “National environmental model city” in the coming years
- EMCP action plan approved by the municipality
- Detailed implementation plan of the EMCP action plan, in which stakeholders responsibilities, investments, targets distribution and timing should be clearly defined

**Phase 2: Check and verification**

As soon as a candidate EMCP city has completed the implementation of the EMCP action plan (normally the implementation takes at least 5 years), the candidate EMCP city shall submit an official invitation to the provincial environmental protection bureau to conduct pre-checking and verification by using the 26 performance standards mentioned above. After the pre-checking and verification, the candidate city can submit an official invitation to MEP for conducting the final check and verification. Within two months after receiving the invitation, MEP will organize a technical working group consisting of independent technical experts to visit the city for in-site checking, surveys, inspections and verifications. The conclusions and recommendations made by the MEP technical working groups will be sent to the candidate city, who then should take additional implementation actions by taking into account the recommendations made by the technical working groups.

As soon as the additional actions have been implemented, the candidate city can submit a final application to MEP, requesting the title of “National environmental model city”. MEP will check and verify all documents submitted by the candidate city by using the 26 standards and will then made a decision on whether the candidate city shall be awarded.

**Phase 3: Public notice**

As soon as positive response is made by MEP, the municipality, MEP and the provincial environmental protection bureau shall publish the news in their main news channels (websites, newspapers, etc). Within seven days, citizens and all organizations could send their complaints and comments to MEP. If everything proceeds smoothly, MEP will award the candidate city the title of “National environmental model city”, which makes it an official EMCP member.

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\(^3\) MEP official document, 2011. *Huanban* (2011) No.11, *Regulation on creation of national environmental model city and relevant management*
Phase 4: Re-checking and verification

The title of “National environmental model city” is valid for five years. After five years, MEP will send a technical working group to the city for surveys, checking and verification. The group will also collect comments and complaints from citizens and NGOs. If the city fails to pass the re-checking and verification, it will lose its “National environmental model city” title.

Financial base

No subsidy is available from MEP for EMCP. All investments and finances are provided by EMCP candidate cities.

EMCP Current status

EMCP has been running as an ongoing city environmental program since 1997. It has proven to be effective in attracting Chinese cities to get involved in becoming a “National environmental model city”.

Cities participated in EMCP

Until April 2012, 84 cities have been awarded as “National environmental model cities”. The following table shows all EMCP member cities.

Table 2: EMCP Member cities (till April 2012)

<table>
<thead>
<tr>
<th>Time awarded</th>
<th>Number of cities</th>
<th>Name of cities</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 2011</td>
<td>4</td>
<td>Huai’an, Foshan, Lin’an, Yichang</td>
</tr>
<tr>
<td>May 2011</td>
<td>6</td>
<td>Dongguan, Liaocheng, Linyi, Qingpu district, Shanghai Xuzhou, Yinchuan</td>
</tr>
<tr>
<td>June 2011</td>
<td>1</td>
<td>Wujiang</td>
</tr>
<tr>
<td>January 2012</td>
<td>2</td>
<td>Langfang, Zhenjiang</td>
</tr>
<tr>
<td>February 2012</td>
<td>1</td>
<td>Jurong</td>
</tr>
<tr>
<td>March 2012</td>
<td>1</td>
<td>Daqing</td>
</tr>
</tbody>
</table>

EMCP cities that have passed the re-checking and verification five years after they have obtained the National Environmental Model City title

<table>
<thead>
<tr>
<th>Time awarded</th>
<th>Number of cities</th>
<th>Name of cities</th>
</tr>
</thead>
<tbody>
<tr>
<td>November 2011</td>
<td>1</td>
<td>Zhongshan</td>
</tr>
<tr>
<td>March 2012</td>
<td>2</td>
<td>Shaoxing, Zhuji</td>
</tr>
<tr>
<td>April 2012</td>
<td>4</td>
<td>Rongchen, Rushan, Wendeng, Weihai</td>
</tr>
</tbody>
</table>

EMCP cities that are to be re-checked and verified after five-years

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of cities</th>
<th>Name of cities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>5</td>
<td>Dalian, Shenzhen, Xiamen, Zhangjiagang, Zhuhai</td>
</tr>
<tr>
<td>1998</td>
<td>3</td>
<td>Kunshan, Laizhou, Yantai</td>
</tr>
<tr>
<td>1999</td>
<td>5</td>
<td>Haikou, Shanghai Minxin District, Shantou, Suzhou, Tianjin Dagang District</td>
</tr>
<tr>
<td>2000</td>
<td>2</td>
<td>Jiangyin, Qingdao</td>
</tr>
<tr>
<td>2001</td>
<td>4</td>
<td>Changshu, Hangzhou, Ningbo, Taicang</td>
</tr>
<tr>
<td>2002</td>
<td>6</td>
<td>Changchun, Haimen, Huizhou, Jiaozhou, Yangzhou, Zhaoyuan</td>
</tr>
<tr>
<td>2003</td>
<td>2</td>
<td>Dongying, Nanjing</td>
</tr>
<tr>
<td>2004</td>
<td>11</td>
<td>Changzhou, Chongqing, Fuzhou, Jiangmen, Jintan, Kelamai, Ku’erle, Liyang, Mianyang, Shenyang, Yubei District, Wuxi</td>
</tr>
<tr>
<td>2005</td>
<td>9</td>
<td>Baosi, Chengdu, Fuyang, Guilin, Jiaonan, Laixi, Penglai, Rizhao, Weifang</td>
</tr>
<tr>
<td>2006</td>
<td>11</td>
<td>Chongqing Beibei district, Jimo, Ma’anshan, Nantong, Huzhou, Pingdu, Quanzhou, Shanghai Pudong New District, Tianjin, Yixing, Zhaoting</td>
</tr>
<tr>
<td>2007</td>
<td>4</td>
<td>Guangzhou, Shouguang, Taizhou, Yiwu</td>
</tr>
<tr>
<td>TOTAL</td>
<td>84</td>
<td></td>
</tr>
</tbody>
</table>
In addition to the 84 EMCP cities, there are more than 100 EMCP candidate cities who are in the process of implementing their EMCP action plans (phases 1 and 2).

**Conditions for cooperation**

As a voluntary program, EMCP is open to all Chinese cities. Cities are encouraged to submit an application to MEP, which include their self-evaluation score against the 26 criteria. Cities whose scores are close to the EMCP standards are recommended to submit an application to MEP.

**Interim or results reports**

A survey entitled “Survey Report: China Low-carbon Eco-city development” was conducted by CSUS in 2012. According to the report, while governments and citizens of EMCP cities are proud of their cities’ “National environmental model city” title, the EMCP has also been recognized as a best practice in urban environmental performance. The following are some key figures reflecting the urban environmental performance results of EMCP cities:

The total area of all 84 EMCP cities shares 5.6% of the total territory of China, while the total population of EMCP cities shares 20% of the total Chinese population. However, the GDP of all EMCP cities accounts for 40% of China’s GDP

- Rate of urban environmental quality of EMCP cities complying with the national standard is 5% higher than the national city average
- Rate of air quality of EMCP cities complying with the national standards is 31% higher than the national city average
- Rate of industrial waste treatment of EMCP cities is 3.2% higher than the national industrial average
- Rate of centralized wastewater treatment of EMCP cities is 28.92% higher than the national city average
- Rate of household waste disposal of EMCP cities is 25.77% higher than the national city average
- Covering rate of green space of EMCP cities is 3.58% higher than the national city average
- Public satisfaction with the urban environmental performance of EMCP cities is 16.83% higher than the national city average

**Annual events**

There are two annual events organized by MEP. The first is an information exchange session organized for EMCP member cities to share their experiences in improving environmental performance of their cities. Special focus is put on how existing EMCP cities can pass the re-checking and verification five years after they have obtained the “National environmental model city” title.

The second annual event is an annual training workshop for EMCP candidate cities to build their capacities in developing EMCP action plan, implementing the action plan,

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4 MEP official document, 2011. *Huanban (2011) No.11, Regulation on creation of national environmental model city and relevant management*
raising funds and getting stakeholders to involve in creating an environmental model city. The major aims of the workshop are training and know-how transfers. In the workshop, MEP also provides showcases and best practices from the existing EMCP cities.

**Web address**

No EMCP website is available. However there is a specific section of MEP's website dedicated to EMCP: www.wfs.mep.gov.cn/mfcs/index.htm (in Chinese)

**Analysis of relevance to the Chinese national context**

As a result of rapid urbanization since the 1970s, Chinese cities have become crucial engines for socio-economic development. However, they have also became the central points of environmental destruction, as well as other urban challenges such as pollution, noise, congestion, shortage of water and energy. EMCP has been an effective instrument in addressing these two sides of urban development: while improving urban environmental performance, it also promotes sustainable urban economic development and social welfare. Therefore, the program is well accepted by municipalities and citizens alike. It is one of the most successful city programs on urban sustainability in China.

### 2.2 China Low-Carbon Eco-City Program (LCECP)

**Summary**

Launched by MoHURD, LCECP aims at redirecting China’s urbanization from industrialization-oriented to low-carbon and ecological friendly oriented. It focuses on new city development, new area development of existing city, and it covers all aspects of urban planning design, construction and performance. Till 2010, there are about 40 LCECP candidate cities that have been approved by MoHURD as national LCECP pilot cities. Although none of these pilot cities has obtained the title of “National Low-Carbon Eco-city”, many cities best practices have been created and recognized by MoHURD.

**Initiation history**

The “low-carbon eco-city” concept was raised by Mr. Qiu Baoxing, Vice Minister of MoHUR, in 2009. However, according to a CSUS survey, Chinese cities have already started including eco-city targets into their development plan since 1986. By 2013, there are 287 Chinese cities that have included both low-carbon and eco-city targets in their development strategies and plan. In 2010, MoHURD launched the LCECP, which has become one of the key city programs for MoHURD to promote China’s sustainable urbanization.

The reasons for launching LCECP are:

- To pursue sustainable development: It is estimated that an additional 500 million populations will move to Chinese cities in the coming 30 years. While urbanization has created opportunities to improve quality of life and social welfare in cities, it has

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also caused serious environmental degradation and unsustainable form of consumption. Pursuing sustainable urbanization is crucial to China’s future sustainable development.

- To move away from traditional industrialization-oriented urbanization: China’s tradition in urbanization was driven by industrialization, which has made cities and their fringes the homes of many energy and resource intensive industries. Learning from past mistakes, the Chinese government decided to change its strategy in urbanization from industry-centered to low-carbon and eco-friendly centered.

- To reduce emission: Chinese cities contributed more than 80% of the country’s total emission of pollutants and carbon. To achieve the national carbon target and to improve China’s urban environmental quality, China’s future urbanization must develop in a way that is low-carbon and eco-friendly.

- To leverage on MoHRD’s experience: MoHURD has decades of experience in implementing energy efficiency building program, and has accumulated many best practices for deepening low-energy and low-carbon housing development. These resources have become the key driving force for launching LCECP, in which green building and green areas development are its key elements.

Initiator
LCECP was launched by MoHURD. The Department of Building Energy Efficiency and Science & Technology of MoHURD is directly responsible for LCECP. The functions of MoHURD in LCECP are:

- Publishing regulations, technical standards, and planning guidelines for cities to implement low-carbon eco-city development;
- Receiving and evaluating low-carbon eco-city applications, and approving whether a city could become a candidate city of LCECP;
- Managing international cooperation on China low-carbon eco-city development; and
- Developing national plan for low-carbon eco-city development.

Program Manager
LCECP is technically supported and managed by China Society of Urban Studies (CSUS), a public institute working directly under the responsibilities of MoHURD. Established in January 1984, CSUS is a national, non-profit and academic organization formed by urban researchers, scholars, practitioners, a wide range of governmental agencies in the social, economic, cultural, environmental, planning, construction, and management fields, as well as research and educational institutions and enterprises. It is a legally registered corporation and plays an important role in facilitating and advancing China’s LCECP. The roles of CSUS in LCECP are:

- Conducting tasks assigned by MoHURD in LCECP, which include: developing technical standards and guidelines for low-carbon eco-city development, developing KPIs, conducting evaluations of city performance and conducting inspections and surveys in LCECP;
- Publishing LCECP annual report “China Low-Carbon Eco-city Development Report”. So far, two annual reports (2011, 2012) have been published.
- Networking, organizing workshops and training courses, and conducting capacity building for cities implementing low-carbon eco-city development; and
• Giving policy advice to MoHURD in designing, implementing and evaluating LCECP.

Mr. Li Xun, General Secretary of CSUS, is the coordinator of LCECP.

Contact
Address: Room 17B, Unite 2, Building 2, Zhonghaifuyuan, No.37 Zengguang Road, Haidian District 100835, Beijing, China
Tel.: (086)010-58933149   Fax: (086) 010-58933149
E-mail: asus 263.com
Website: www.chinasus.org/chinasu

Relation to other governmental institutions in China
LCECP is under the responsibility of MoHURD, no other governmental organization is involved.

Goals and objectives
The overall objective of LCECP is to guide and facilitate Chinese urbanization towards sustainable development in a way that achieves the highest efficiency with the least impacts, thus improving the general quality of life.

The specific objectives of LCECP are:
• To develop, test and disseminate low-carbon and ecologically sound polices, technical guidelines, regulations, criteria for guiding and facilitating Chinese sustainable urbanization;
• To complete the construction of about 100 LCECP cities or areas of cities by the end of 2015. The performance of these cities should be in line with LCECP performance criteria; and
• To enhance the awareness of urban managers and decision-makes in sustainable development through showcases, networking, training and benchmarking.

Performance criteria
MoHURD is still in the process of establishing performance criteria of low-carbon eco-city. The following are some preliminary performance criteria that have been confirmed by MoHURD:
• The land for construction should be efficiently used. It is suggested that the average population per km2 should reach 10,000 in LCECP candidate city area.
• Renewable energy should account for 20% of the total energy usage.
• At least 80% of the new buildings should comply with MoHURD’s national green building standards.
• Biodiversity conservation: original trees, grasslands and other natural environment should be protected.
• Green transport (walking, public transport and cycling) should share 65% of the total transport.

In 2011, CSUS developed China Urban Ecological Livable Development Index (UELDI), which is being used by CSUS to assess the performance of city development. UELDI
covers two types of KPIs: construction or process oriented KPIs, and result oriented KPIs. Evaluation result of UELDI 2012 shows that:

- Most of Chinese cities are still undergoing energy and materials intensive development, no significant achievement has been made in low-carbon eco-city development.
- The top 10 best performance cities in 2012 are: Dalian, Hangzhou, Kalamay, Qingdao, Shanghai, Shenzhen, Suzhou, Weihai, Wuxi and Xiamen.
- Some cities have made great progress in low-carbon eco-city development. Such progress was made in the aspects of urban planning and management, water management, low-carbon economic development, green building development, etc.

**Workplan and project phases**

LCECP is implemented through four phases:

**Phase 1: Applications.** A city that has complied with the basic conditions for cooperation can submit an application to MoHURD. After approval from MoHURD, the city becomes a LCECP candidate city.

**Phase 2: Construction and Implementation.** LCECP candidate cities implement their LCECP master plans and action or construction plans by adopting low-carbon and eco-city criteria. Phase 2 takes at least three years.

**Phase 3: Evaluation and award.** MoHURD conducts in-site checking and inspection to evaluate and verify whether LCECP candidate have achieved their targets and whether the LCECP candidate city’s performance is complying with the national performance criteria. If the candidate city pass the evaluation, it will be awarded as “National Low-Carbon Eco-city”; if candidate city fail to pass the evaluation, it will lose its status as LCECP candidate city.

**Phase 4: Continuous improvement and follow-up checking.** MoHURD is planning to set up a management system to check the performance of cities entitled as “National Low-Carbon Eco-city”. If cities fail to comply with the performance criteria, they will lose their “National Low-Carbon Eco-city” title.

**Financial base**

MoHURD provides 50 million RMB (i.e. 6.3 million EUR) to each LCECP candidate city. The subsidy can be used by LCECP candidate city for feasibility studies, strategic studies, planning, and capacity building in coordinating and managing local LCECP. All investments are provided either by city government or the private sector.

In addition to the LCECP subsidy, MoHURD also provides subsidy for green building development in LCECP. Criteria of MoHURD subsidy are as follow:

- 80 RMB per m2 for green buildings that comply with the standards of STAR III Green Building;
- 45 RMB per m2 for green buildings that comply with the standards of STAR II Green Building;

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LCECP candidate cities can also apply for subsidies from MoHURD and NDRC for using green energy.

Current status
Started in 2010, LCECP is still in its initial stage. No city has been awarded the title of “National China Low-carbon Eco-city”. However, many cities have already obtained approval from MoHURD to become LCECP pilot/candidate cities.

Cities participated in the program
Although 287 Chinese cities have already included low-carbon eco-city targets into their strategic development plans, master plans and construction plans, only a limited number of these cities have been approved and included in LCECP. In 2010, there are 10 city areas that have been approved as national candidate LCECP. These pilot cities are well-known in China and have become benchmarks of China in low-carbon eco-city development. They are:

- Caofeidian International Eco-city
- Chengdu Longquanyi Eco-city
- Shanghai Nanqiao New Town
- Shenzhen Guangming New Town
- Sino-Singapore Suzhou Eco-city
- Sino-Singapore Tianjin Eco-city
- Wuhan Wangjiadun Green CBD
- Wuxi Taihu New Town
- Xiamen Jimei New Town

In 2011 and 2012, more cities joined LCECP. In March 2013, MoHURD issued the 12th five-year plan of development of green building and low-carbon eco-city, which included a plan to approve 100 low-carbon eco-city applications submitted by Chinese cities. It is estimated that Chinese LCECP candidate cities will reach 120-140 by the end of 2015.

Conditions for cooperation
LCECP is open to all Chinese cities. A city that meets the following conditions can submit an application to MoHURD to become a China low-carbon eco-city candidate:

- New development area of existing city or new city area of more than 3 km²;
- Development of the area should not occupy or reduce the size of arable land;
- Distance from the downtown of the existing city should not exceed 30 km; it should have connection with a mega city with over 100 km² surface area;
- Close to highways or railways, or has planned convenient transportation system;
- If existed, the existing transportation system should comply with green transportation requirements; and
- Well-established organization that is responsible for local LCECP coordination and management.

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An application to MoHURD to become a China low-carbon eco-city candidate should include the following documents:

- Report of the status of natural environment and social-economic development, including existing conditions of land use, water resource, energy, ecological environment, transport, socio-economic development and related targets.
- Master plan of the pilot area that will be used for implementing low-carbon eco-city development. Targets of low-carbon and eco-city should be clearly defined.
- Action plan or construction plan of pilot low-carbon eco-city development.

**Interim or results reports**

CSUS publishes an annual report entitled *China Low-Carbon Eco-city Development Report* to provide updates on the issues, progress and lessons learnt in LCECP implementation. Three annual reports (2010, 2011, 2012) have been published so far. Some of the best practices included in past reports are summarized in the following table.

### Table 3: Best Practices identified by LCECP China

<table>
<thead>
<tr>
<th>Title</th>
<th>Area (km²)</th>
<th>Population (1,000)</th>
<th>Main Characters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anji Eco-county, Zhejiang (whole county)</td>
<td>1,886</td>
<td>450</td>
<td>• Developing eco-village&lt;br&gt;• Ecological civilization pilot&lt;br&gt;• Ecological industrial development&lt;br&gt;• Wastewater and wastes disposal</td>
</tr>
<tr>
<td>Baoding Ecocity, Hebei (whole city)</td>
<td>22,190</td>
<td>11,010</td>
<td>• Energy saving and emission reduction&lt;br&gt;• Low-carbon sector development&lt;br&gt;• Low-carbon technology&lt;br&gt;• Renewable energy uses</td>
</tr>
<tr>
<td>Chaofeidian International Ecocity, Hebei (one district)</td>
<td>150 (planned)</td>
<td>1,000 (planned)</td>
<td>• Circle economy&lt;br&gt;• KPI development&lt;br&gt;• Safety&lt;br&gt;• Sustainable energy and materials uses</td>
</tr>
<tr>
<td>Dezhou Ecocity, Shandong (whole city)</td>
<td>10.356</td>
<td>5,640</td>
<td>• Eco-education and communication&lt;br&gt;• Stakeholders’ responsibilities&lt;br&gt;• Sustainable energy development</td>
</tr>
<tr>
<td>Dongguang Ecocity, Guangdong (whole city)</td>
<td>780</td>
<td>1,790</td>
<td>• Ecological garden&lt;br&gt;• Ecological green city&lt;br&gt;• Ecological cultural city</td>
</tr>
<tr>
<td>Hefei Binghu Newtown, Anhui (one district)</td>
<td>196</td>
<td>150</td>
<td>• Ecological planning&lt;br&gt;• Eco-industrial development&lt;br&gt;• Green transportation&lt;br&gt;• Integrated water management&lt;br&gt;• Renewable energy using</td>
</tr>
<tr>
<td>Huainan Ecocity, Anhui (whole City)</td>
<td>2,596</td>
<td>2,430</td>
<td>• Comprehensive utilization of gas from mining&lt;br&gt;• Ecological repairing in collapsed areas&lt;br&gt;• Reusing and recycling</td>
</tr>
<tr>
<td>Kunming Chenggong Newtown, Yunan (one district)</td>
<td>155</td>
<td>1,000</td>
<td>• Low-carbon planning&lt;br&gt;• Sustainable land uses&lt;br&gt;• Urban ecological green system</td>
</tr>
<tr>
<td>Mengtougou Sino-Finland Eco-Valley, Beijing (one district of Beijing)</td>
<td>100</td>
<td>1,000</td>
<td>• Eco-friendly development&lt;br&gt;• Eco-planning&lt;br&gt;• Integrated sector system distribution</td>
</tr>
</tbody>
</table>
Shenzhen Ecocity, Guangdong (whole city) 813 8,770 • Green building development • Green transportation • Green ways • Lower impact infrastructure development

Sino-Singapore Tianjin Ecocity (one district of Tianjin) 25 (till 2020) 350 (till 2020) • KPI development • Sustainable energy uses • Green Transportation • Safety and Social progress

Turpan Pilot Ecocity (one district of Turpan) 8.8 60 • Ecological conservation • Energy and water saving • Historical heritage and cultural protection • KPI development

Wuhan Ecocity, Hubei (whole city) 8,494 9,100 • Integrated urban and rural development • Reforming land uses and tax & finance system • Resource-efficiency and environmentally friendly industrial development

Wuxi Tai Lake Newtown, Jiangsu (one district of Wuxi) 150 1,000 • Eco-city design • Green transportation • High efficiency of energy using • Original ecosystem

All LCECP candidate cities are still in their construction or implementation phase, no city has been awarded the “National Low-Carbon Eco-city” title. However, some lessons learnt have been drawn from the implementation of LCECP over the past three years:

• Incorrect selection of pilot sites: some of the selected pilot cities are not suitable for construction, thus their pilot LCECP have to be terminated.

• Wrong transport design: some cities are still adopting traditional large-scale transportation system design (e.g. very wide road), which is not feasible for developing green transport – one key element of LCECP.

• Some cities take the LCECP name for real estate development. Instead of promoting sustainable development, the program has turned into a real estate project in some LCECP cities.

• Buildings in LCECP are paying too much attention to the external design of buildings, cultural and geographical features are missing.

• Industries in LCECP do not share the same product chain or value chain, thus their connection are not in the same cycle.

• High design and construction cost.

• Adopting foreign concepts and experiences without digestion and adaptation.

Annual events
CSUS organizes annual networking event and many training courses and workshops for supporting LCECP candidate cities in their planning, construction and management.

Web address
There is no specific web address for LCECP. However, information on LCECP is available from the following three websites:

• MoHURD’s website: www.mohurd.gov.cn/jzjnykj/index.html
• CSUS website: www.chinasus.org/chinasus/
• China Eco-city Committee of CSUS: www.chinaecoc.org.cn

Other Low-carbon eco-city programs with international cooperation

In addition to LCECP, there are many international cooperation in China that focuses on low-carbon eco-city development, these cooperation are:

• China-USA low-carbon eco-city cooperation: 56 LCECP candidate cities have been selected jointly by MoHURD and USA. These six candidate cities include: Hebei and Jiyuan of Henan Province, Hefei of Anhui Province, Langfang of Hebei Province; Weihai and Rizhao of Shandong Province.

• China-Germany low-carbon eco-city cooperation: candidate cities are to be selected in the second half of 2013.

• China-Canada low-carbon eco-city cooperation: MoU was signed and candidate cities are to be selected.

• China-Denmark low-carbon eco-city cooperation: MoU was signed and candidate cities are to be selected.


Analysis of relevance to the Chinese national context

Witnessing the continuous environmental degradation caused by rapid urbanization over the past three decades, the Chinese government realized that the traditional way of urbanization from the West is not feasible for China. While western urbanization develops low-density housing and promotes the use of private cars, the large population in China and the limited construction space in Chinese cities or the nearby areas of cities, do not allow China to follow the same way. Instead, China must look for a way that is resource-efficient and can minimize emissions. Low-carbon and eco-city development provides a solution for urbanization that is highly relevant to the Chinese national context.

2.3 China Low-carbon City Program (LCCP)

Summary

Traditionally, the Chinese government adopted a sectoral approach in carbon emission reduction by distributing carbon targets to energy-intensive sectors. However, it soon realized that sectoral approach alone would not be enough to ambitious national emission target. As cities contribute more than 80% of the country’s emission, the NDRC recognized the crucial roles of cities and launched LCCP in 2009, aiming at contributing to the realization of the national carbon emission reduction target by 2020.

Under the program, six provinces and 36 cities have been approved as LCCP candidate provinces and cities until 2013. Although no province or city has been awarded as “National Low-Carbon Province/City” yet, LCCP has achieved significant progress in capacity building, raising awareness, creating best practices in low-carbon development, as well as encouraging stakeholders to participate and commit.
Initiation history

LCCP was established in July 2010. Due to its success in drawing more and more Chinese provinces and cities to get on board, it is now recognized as one of the key programs for the Chinese government to achieve its carbon emission target in 2020. The reasons for its establishment as follow:

- Challenge in carbon emission reduction: As the world’s largest country-contributor of carbon emission, China is facing increasing challenge in reducing carbon emission. Following the State Council’s announcement of China’s national carbon-emission in November 2009, Chinese provinces and cities also established their own targets. To achieve these goals, China needs effective and innovative low-carbon program.

- The need for integrated approach: China has traditionally adopted sectoral approaches in improving energy saving and emission reduction in the past decade, such as setting up sectoral targets, developing sector regulations and guidelines low-carbon development, etc. However experience showed that this alone is not enough to achieve ambitious emission cut, therefore more integrated approaches is needed. LCCP was developed to serve as a regional solution in contributing to the realization of national carbon emission target.

- Need for cooperation between national and local governments: Bringing together the national and local governments, LCCP aims at motivating and getting local governments to get actively involved in low-carbon development.

- Mobilization of public and private investment: By ensuring that Chinese local governments are participating in climate change mitigation, both private and public investments are mobilized at the local level to achieve low-carbon development.

Initiator

LCCP was initiated by NDRC. The Department of Climate Change of NDRC is directly responsible for managing and coordinating LCCP at the national level. The key technical supporting institute for LCCP is China National Strategic Research and International Cooperation Centre for Climate Change, a public institute working directly under the responsibility of NDRC.

Program Manager

LCCP is coordinated and managed by the Department of Climate Change of NDRC. The roles of NDRC in LCCP are:

- Developing and publishing LCCP related policies, performance criteria and guidelines for creating low-carbon city

- Receiving and approving applications submitted by local provincial and municipal governments who want to participate in LCCP; and

- Networking, organizing workshops and events for facilitating city-to-city exchanges and co-operations in low carbon development.

Contact

Address: No.38, Yuetang Beijie, Xicheng District, Beijing, 100824, People’s Republic of China
Email: qhs@ndrc.gov.cn
Relation to other governmental institutions in China

LCCP is managed and implemented by NDRC. No other governmental institution is involved at the moment.

Goals and objectives

The overall objective of LCCP is to achieve China low-carbon city development, thus contributing to the of the national carbon emission target in 2020. The specific goals of LCCP are:

- To minimize city carbon emission
- To guide Chinese city development towards high efficiency, low carbon emission, low environmental impacts and low energy consumption
- To build local governments’ capacities in developing and implementing low-carbon strategies
- To encourage exchanges and information sharing among Chinese cities through networking
- To disseminate and scale up best practices

Performance criteria

Official performance criteria and KPIs of low-carbon city have not been developed by NDRC. However, NDRC has defined the following tasks for low-carbon pilot cities:10

- Developing low-carbon development plan. In the plan, a pilot city should define its GHG emission targets quantitatively, its key tasks and specific measures.
- Framing and publishing local low-carbon green development policies.
- Building up step-by-step low-carbon industrial system, and encouraging research and development of low-carbon technologies.
- Establishing GHG emission monitoring, data collection and statistics system.
- Fostering local low-carbon lifestyle and promoting local low-carbon consumption.

KPIs programs by other national and international institutions

There are many low-carbon city KPI programs implemented by both national and international institutions. China Low-carbon Economy Media Federation has developed low-carbon city KPIs that cover aspects of low-carbon planning, medial communications, new energy and renewable energy uses, consumption of low-carbon products, urban greening, low-carbon transportation, urban air quality, urban carbon emission, and public satisfaction with low carbon development.11

World Bank report suggested that the following indicators can determine progress toward a low-carbon trajectory for Chinese cities.12

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- Carbon emissions: emissions per capita and emission intensity;
- Energy: energy consumption per capita, energy intensity, and share of renewable energy;
- Green buildings: energy consumption per square meter in commercial and residential buildings;
- Sustainable transport: share of green transport mode trips (percentage of citizens walking, cycling, or taking public transport);
- Smart urban form: population density and mixed land use.

**Workplan and project phase**

In the first phase of LCCP, five provinces and eight cities have been approved by NDRC as the first batch of China national low-carbon pilot provinces and cities. In November 2012, NDRC announced the second batch of pilot cities, which includes Hainan Province and 28 cities. Until now, there are six provinces and 36 cities participating in LCCP.

**Financial base**

There is no financial support from NDRC to LCCP provinces and cities. LCCP provinces and cities are responsible for securing sources of finance for LCCP implementation. At the strategic level, LCCP provinces and cities have special public funds to support the planning of their low-carbon development, GHG emission inventory development, low-carbon roadmap development, relevant policy framing and related research and development. At the project level, both public funds and private funds are mobilized to implement low-carbon projects.

**LCCP Current status**

Started in July 2010, LCCP is now in its second phase. Until now, there are six provinces and 36 cities participating in LCCP.

**Cities participated**

The first batch of LCCP pilot provinces and cities announced in 2010 includes:
- Five provinces: Guangdong, Hubei, Liaoning, Shanxi and Yunnan
- Eight cities: Baoding, Chongqing, Guiyang, Hangzhou, Nanchang, Shenzhen, Tianjin, Xiamen

The second batch of LCCP pilot provinces and cities announced in 2012 includes:
- One province: Hainan Province
- 28 cities: Beijing, Chizhou, Daxing’anling, Ganzhou, Guangyuan, Guangzhou, Guilin, Huai’an, HuLunbeier, Jigndezhen, Jilin, Jinchang, Jincheng, Jiyan, Kunming, Nanping, Ningbo, Qinhuangdao, Qingdao, Shanghai, Shijiazhuang, Suzhou, Wuhan, Urumqi, Wenzhou, Yan’an, Zhenjiang, Zunyi
Conditions for cooperation

LCCP has no limitation on the number of participating cities. It is open to all 657 Chinese cities. Based on the experience in phase 1, which includes provinces as candidates; future LCCP may consider excluding provinces and focus on city-level low-carbon program.

Interim or results reports

LCCP is still in its initial stage, so there is no information available on the concrete results that has been achieved yet. However, many efforts and actions have already taken place in the pilot province and cities, the following are some of the examples:

• Carbon emission inventory: All LCCP member cities and provinces are required to complete their carbon emission inventories so as to establish a baseline for tracking emission trends. These inventories are also being used by the emission trading pilot cities (Beijing, Chongqing, Shanghai, Shenzhen, Tianjin) and to design their emission trading schemes.

• Road maps: All LCCP member cities and provinces have completed their strategic studies on road maps towards low-carbon development.

• Pilot projects: Based on the road maps, LCCP member cities and provinces developed packages of projects that cover key urban carbon sectors including: energy, housing, transportation, environmental infrastructure (waste and wastewater treatment) and consumption. These projects are the key actions taken by LCCP member cities and provinces to achieve their carbon emission targets and to realize low-carbon development at the local level. Many best practices on the project level have been identified.

Although LCCP cities and provinces have already achieved considerable progress, there is still a big gap in terms of their performance when compared with global low-carbon cities. The following table compares the performance of Chinese and global cities by using selected quantitative low-carbon indicators.\(^\text{13}\)

Table 4: A comparison between Chinese and global cities by using selected low-carbon city indicators

<table>
<thead>
<tr>
<th>Category</th>
<th>Key low-carbon city indicators</th>
<th>Chinese cities</th>
<th>Global cities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CO2</strong></td>
<td>CO2 emission per capita (tCO2e/capita)</td>
<td>Chongqing: 3.7</td>
<td>Stockholm: 3.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beijing: 10.1</td>
<td>Tokyo: 4.9</td>
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<tr>
<td></td>
<td></td>
<td>Tianjin: 11.1</td>
<td>Singapore: 7.9</td>
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<tr>
<td></td>
<td></td>
<td>Shanghai: 11.7</td>
<td>London: 9.6</td>
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<td></td>
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<td></td>
<td>New York: 10.5</td>
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<tr>
<td></td>
<td>CO2 intensity (tCO2e/million US$)</td>
<td>Chongqing: 335</td>
<td>Stockholm: 71</td>
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<tr>
<td></td>
<td></td>
<td>Shanghai: 1,063</td>
<td>Copenhagen: 95</td>
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<tr>
<td></td>
<td></td>
<td>Beijing: 1,107</td>
<td>Hong Kong SAR: 102</td>
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<tr>
<td></td>
<td></td>
<td>Tianjin: 2,316</td>
<td>Tokyo: 146</td>
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<td></td>
<td>London: 162</td>
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<td></td>
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<td></td>
<td>New York: 173</td>
</tr>
<tr>
<td><strong>Energy</strong></td>
<td>Energy consumption per capita (gigajoules/capita)</td>
<td>Beijing: 80</td>
<td>London: 78</td>
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<tr>
<td></td>
<td></td>
<td>Tianjin: 90</td>
<td>Copenhagen: 81</td>
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<td></td>
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<td>Shanghai: 93</td>
<td>Oslo: 95</td>
</tr>
<tr>
<td></td>
<td>Energy intensity (megajoules/ US$)</td>
<td>Shanghai: 8.5</td>
<td>Stockholm: 105</td>
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<tr>
<td></td>
<td></td>
<td>Beijing: 8.8</td>
<td>New York: 129</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tianjin: 18.7</td>
<td></td>
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<tr>
<td><strong>Share of renewable energy</strong></td>
<td>Beijing: 4% by 2010</td>
<td>Beijing: 64%</td>
<td>Oslo: 65%</td>
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<tr>
<td></td>
<td></td>
<td>Tianjin: 92%</td>
<td>Stockhol: 20%</td>
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<tr>
<td></td>
<td></td>
<td>Shanghai Binhai Eco-city: 20% by 2020</td>
<td>Copenhagen: 19%</td>
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<tr>
<td></td>
<td></td>
<td>China national average: 8% now and 15% by 2020</td>
<td>London: 1.2%</td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td>Share of green transport mode (percentage of citizens walking, cycling, or taking public transport to work)</td>
<td>Shanghai: 56%</td>
<td>Stockholm: 93%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beijing: 64%</td>
<td>Hong Kong SAR: 84%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tianjin: 92%</td>
<td>Copenhagen: 68%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sao Paulo: 66%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>London: 63%</td>
</tr>
<tr>
<td><strong>Landuse</strong></td>
<td>Population density (people/hectare)</td>
<td>Shanghai: 286</td>
<td>Seoul: 322</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tianjin: 228</td>
<td>Singapore: 107</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beijing: 145</td>
<td>New York: 80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>London: 62</td>
</tr>
</tbody>
</table>

**Annual events**

Since its launch in 2010, there was one networking event hosted by NDRC in June 2012, where LCCP cities and provinces reported their progress and discussed relevant issues. The following issues, suggestions and comments were raised and discussed by LCCP during the event:

- NDRC required all LCCP members to quickly move from low-carbon development planning to implementation.
- There were more words than actions among LCCP participating cities and provinces, which reflects the need for NDRC to set up KPIs and benchmarking system.
Some LCCP members suggested NDRC to set up special low-carbon funds available for all LCCP members, but NDRC responded that it was not feasible to set up such funds at this stage, LCCP members should bear the full responsibilities in fund raising.

LCCP information-sharing platform shall be established.

NDRC encouraged LCCP members to start their pilot emission trading schemes; and if conditions permit, member cities and provinces should also start their feasibility studies on carbon tax.

Web address
No LCCP website is available. However official information about LCCP is being regularly published at the website of the Department of Climate Chang of NDRC: www.qhs.ndrc.gov.cn

Analysis of relevance to the Chinese national context
As a big developing country undergoing industrialization and urbanization, China faces complex challenges in simultaneously developing its economy and improving livelihoods, while protecting the environment and addressing climate change.

Before the 12th five-year (2011-2015), the Chinese government focused on heavy industries and carbon-intensive sectors in achieving its target in emission reduction. Although this sectoral approach has made some significant progress in cutting emission, as China faces increasing challenge in keeping its high economic growth while reducing emission and materials consumption, it soon became apparent that taking sectoral approaches alone is not enough in achieving ambitions emission target.

By focusing on the local and regional level, LCCP is effective in stimulating participation of cities in reducing carbon emission and material consumptions. The cooperation between NDRC and the local governments also helped ensure that China is moving towards its 2020 carbon emission targets at multiple levels.
### Synopsis

<table>
<thead>
<tr>
<th>Features</th>
<th>EMCP</th>
<th>LCECP</th>
<th>LCCP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Launching time</td>
<td>1997</td>
<td>2010</td>
<td>2010</td>
</tr>
<tr>
<td>Type of program</td>
<td>Voluntary</td>
<td>Voluntary</td>
<td>Voluntary</td>
</tr>
<tr>
<td>Initiator</td>
<td>MEP</td>
<td>MoHURD</td>
<td>NDRC</td>
</tr>
<tr>
<td>Daily manager/technical support</td>
<td>China National Environmental Monitoring Centre (CENEC)</td>
<td>China Society of China National Environmental Monitoring Centre Urban Studies (CSUS)</td>
<td>China National Strategic Research and International Cooperation Centre for Climate Change</td>
</tr>
<tr>
<td>Contact</td>
<td>Address: No.115, Xizhimen-nei Nanxiaojie, 100035, Beijing, China Tel.: 0086-(0)10-66556242</td>
<td>Address: Room 17B, Unite 2, Building 2, Zhong-haiyuan, No.37 Zeng-guang Road, Haidian District 100835, Beijing, China Tel.: (086)10-58933149 Fax: (086) 010-58933149 E-mail: asus.263.com</td>
<td>Address: No.38, Yuetang Beijie, Xicheng District, Beijing, China P.R. 100824 Email: <a href="mailto:qhs@ndrc.gov.cn">qhs@ndrc.gov.cn</a></td>
</tr>
<tr>
<td>Objectives</td>
<td>To improve urban environmental performance and sustainability through creating and upscaling best practice in urban environmental improvement.</td>
<td>To guide and facilitate Chinese urbanization towards sustainable development in a way that is highly efficient and creates the least impacts, thus improving the quality of urban life.</td>
<td>To achieve low-carbon city development in China, thus contributing to realization of the national carbon emission target in 2020.</td>
</tr>
<tr>
<td>Performance criteria</td>
<td>26 criteria well defined criteria</td>
<td>Under development</td>
<td>Under development</td>
</tr>
<tr>
<td>Workplan, project phases and steps</td>
<td>Implementation will take at least three years. Re-checking &amp; verifying after the fifth year</td>
<td>Checking every three years</td>
<td>Not clear</td>
</tr>
<tr>
<td>Financial base</td>
<td>No subsidy from MEP</td>
<td>MoHURD provides 50 million RMB to each candidate city. Green buildings in the program can also obtain subsidy.</td>
<td>No subsidy from NDRC</td>
</tr>
<tr>
<td>Current status</td>
<td>On-going</td>
<td>On-going</td>
<td>On-going</td>
</tr>
<tr>
<td>Cities participated</td>
<td>84 cities were awarded; more than 120 cities are in the process of implementation</td>
<td>About 40 candidate cities; no awarded city</td>
<td>6 candidate provinces and 36 candidate cities. No awarded city/province.</td>
</tr>
<tr>
<td>Entrance criteria</td>
<td>Top environmental performance cities in the provinces</td>
<td>New city or new development area of existing city</td>
<td>Not clear</td>
</tr>
<tr>
<td>Progress report</td>
<td>Available from MEP</td>
<td>Annual report by CSUS</td>
<td>Available from NDRC</td>
</tr>
<tr>
<td>Annual event</td>
<td>Annual event and training workshops</td>
<td>Annual networking event and training workshops</td>
<td>Annual event and training workshops</td>
</tr>
</tbody>
</table>
4 International bilateral low-carbon eco-city projects in China

4.1 Sino-Singapore Tianjin Binhai Eco-city Project

Summary

Established jointly by the governments of China and Singapore, the Sino-Singapore Tianjin Binhai Eco-city Project started its implementation in September 2008. It is the first China-overseas governmental cooperation project on eco-city development in China. This project is also part of the LCECP managed by MoHURD. The project covers an area of 31 km² located in Tianjin Binhai new area, which is 45 km away from downtown Tianjin and 150 km from Beijing. The planning population in the project area is 350,000 till 2020.

The project is expected to function as:

- National platform of R&D, innovation and promotion of ecologically and environmentally friendly technology.
- National center of training and up-scaling of ecological conservation and environmental protection.
- National base of modern ecological high-technology
- National window of international cooperation on eco-development
- National demonstration center of resource-efficiency, and environmentally sound and healthy city development.

Current status

The project has achieved the following progress since 2008:

- The master plan was completed in partnership with Sino-Singapore designing institutes and it has been approved by the national government of China.
- The project administration was established in 2007. This administration is a district level government of Tianjin Municipality.
- About 9 Km² of the project area has been developed; about 1,000 enterprises have been registered and have located in the project area.

Performance/construction criteria

The project has defined the following 22 criteria that are applied to all kinds of constructions, including infrastructure development, building development and industrial projects located in the project area.
Table 5: Performance criteria for all constructions under the Sino-Singapore Tianjin Binhai Eco-city Project

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Unit</th>
<th>Criteria</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Quality</td>
<td>Days</td>
<td>Days of air quality index better than level II ≥310 annually (about 85%)</td>
<td>Immediate</td>
</tr>
<tr>
<td>Groundwater quality</td>
<td>--</td>
<td>Complying with level IV of the national groundwater quality standard (GB3838-2002)</td>
<td>2020</td>
</tr>
<tr>
<td>Source water for drinking</td>
<td>%</td>
<td>100% complying with the national standard</td>
<td>Immediate</td>
</tr>
<tr>
<td>Noise</td>
<td>%</td>
<td>100% complying with the national standard</td>
<td>Immediate</td>
</tr>
<tr>
<td>Carbon emission per GDP</td>
<td>Ton-carbon per 1 million USD</td>
<td>150</td>
<td>Immediate</td>
</tr>
<tr>
<td>Loss of natural wetlands</td>
<td>--</td>
<td>0</td>
<td>Immediate</td>
</tr>
<tr>
<td>Green building</td>
<td>%</td>
<td>100</td>
<td>Immediate</td>
</tr>
<tr>
<td>Local plants index</td>
<td>--</td>
<td>≥0.7</td>
<td>Immediate</td>
</tr>
<tr>
<td>Public green area per capita</td>
<td>m²/per capita</td>
<td>≥12</td>
<td>2013</td>
</tr>
<tr>
<td>Water consumption per capita per day</td>
<td>c</td>
<td>≤120</td>
<td>2013</td>
</tr>
<tr>
<td>Waste generation per capita per day</td>
<td>Litre/person/day</td>
<td>≤0.8</td>
<td>2013</td>
</tr>
<tr>
<td>Green transportation</td>
<td>%</td>
<td>≥30 (2013), ≥90 (2020)</td>
<td>–</td>
</tr>
<tr>
<td>Waste recycling</td>
<td>%</td>
<td>≥60</td>
<td>2013</td>
</tr>
<tr>
<td>Percentage of communities with access to sports &amp; leisure facilities within 500m</td>
<td>%</td>
<td>100</td>
<td>2013</td>
</tr>
<tr>
<td>Hazardous waste and household waste disposal</td>
<td>%</td>
<td>100</td>
<td>Immediate</td>
</tr>
<tr>
<td>Accessibility facilities for disabilities</td>
<td>%</td>
<td>100</td>
<td>Immediate</td>
</tr>
<tr>
<td>Drainage networks</td>
<td>%</td>
<td>100</td>
<td>Immediate</td>
</tr>
<tr>
<td>Percentage of social houses</td>
<td>%</td>
<td>≥220</td>
<td>2013</td>
</tr>
<tr>
<td>Recyclable energy use</td>
<td>%</td>
<td>≥220</td>
<td>2020</td>
</tr>
<tr>
<td>Non-traditional water source (treated water) use</td>
<td>%</td>
<td>≥50</td>
<td>2020</td>
</tr>
<tr>
<td>Number of R&amp;D scientists and engineers per 10,000 employees</td>
<td>Person/year</td>
<td>≥50</td>
<td>2020</td>
</tr>
<tr>
<td>Employee and housing balance index</td>
<td>%</td>
<td>≥50</td>
<td>2013</td>
</tr>
</tbody>
</table>

Contact

Address: Administration Office, No.7, Hanbei Road, Tianjin Eco-city, 300467, Tianjin, China
Tel: 0086-(0)22-66328000; Fax: 0086-(0) 022-66328888
Email: public@eco-city.net.cn
Web: www.eco-city.gov.cn/
4.2 Sino-Swedish Wuxi Eco-City Project

Introduction

Started in July 2010, the *Sino-Swedish Wuxi Eco-City Project* is a three-year cooperation project between Wuxi Municipality and Swedish Environmental Ministry. It is part of LCECP being managed by MoHURD. The project covers an area of 2.4 km² and is located in the central area of Wuxi Taihu New Town. The master plan was designed by Swedish Tengbom Eriksson Architects Meritullinkatu; and adopts the experience of the Swedish Hammarby Sjstad eco-city. The issues covered by the project include:

- Sustainable energy use
- Water recovery and sustainable water use
- Integrated waste management and recycling and reuse
- Green transportation development

Current Status

According to the initial plan, the project should be completed in the second half of 2013. However, due to the issue of land acquisition and the difficulty in moving farmers out of the project area, the project could not be finished on schedule and it is still in the beginning of the construction phase. Construction of the waste vacuum collection system (including the central collection station and a 2.5km vacuum pipe) and all infrastructures, including water supply and sewage system, electricity system and transportation system, started in 2013. It is expected that the project will be completed at the end of 2015 or in mid 2016.

Performance/construction criteria

The project has defined the following 39 criteria that are applied to all kinds of constructions, including infrastructure development, building development and industrial projects located in the project area.

Table 6: Performance criteria for all constructions under the Sino-Swedish Wuxi Eco-City Project

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Percentage of low energy buildings</td>
<td>%</td>
</tr>
<tr>
<td>2</td>
<td>Energy consumption per GDP</td>
<td>t coal e.q. per 10,000 GDP</td>
</tr>
<tr>
<td>3</td>
<td>Percentage of recyclable energy in total energy</td>
<td>%</td>
</tr>
<tr>
<td>4</td>
<td>Rate of leakage in water distribution network</td>
<td>%</td>
</tr>
<tr>
<td>5</td>
<td>Usage of water-saving facilities in new buildings</td>
<td>%</td>
</tr>
<tr>
<td>6</td>
<td>Water consumption per capita per day</td>
<td>Liter</td>
</tr>
<tr>
<td>7</td>
<td>Percentage of water that is drinkable without heating</td>
<td>%</td>
</tr>
<tr>
<td>8</td>
<td>Collection and use of rain water</td>
<td>%</td>
</tr>
<tr>
<td>9</td>
<td>Rate of sewage treatment</td>
<td>%</td>
</tr>
<tr>
<td>10</td>
<td>Reuse of treated water</td>
<td>%</td>
</tr>
<tr>
<td>11</td>
<td>Groundwater quality</td>
<td>--</td>
</tr>
<tr>
<td>12</td>
<td>Waste generation per capita per day</td>
<td>kg/day/capita</td>
</tr>
</tbody>
</table>
### 4.3 Sino-German Qingdao Eco-Park Project

**Introduction**

The **Sino-German Eco-park Project** is a cooperative project between the Chinese and German governments. In July 2010, China’s Ministry of Commerce and German Federal Ministry of Economics and Technology signed a MoU regarding the joint establishment of the Sino-German Eco-park.

Located in the northern part of the Qingdao Economic and Technological Development
Zone, which is at the west coast of Jiaozhou Bay, the park includes a planning area of 11.6 km², a planning construction area of 7 million m², and a planned population of about 60,000 people. It is projected to be finished in 2020.

The Sino-German Eco-Park is built based on the principle of low-carbon and ecological sustainable development. It has high-end ecological demonstration area, ecological technology research and development area, ecological enterprise assembled area and harmonious suitable living new area. As the only eco-park jointly developed by the Chinese and German governments, it will allow the two countries to develop better understanding of each other, strengthen ties and promote future cooperation, especially in sustainable development of regional economy and society.

The development concepts of the Sino-German Eco-Park are:

- Highlighting Sino-German cooperation and featuring German elements;
- Standards setup before construction and investment;
- Aiming at high-end industry while accelerating projects settling;
- Maintaining the German construction quality while keep the speediness of Chinese construction;
- Adhering to people oriented principle and improving the urbanization and internationalization; and
- Constantly expanding financing channels and enhancing the investment platform.

The Sino-German Eco-Park will function as:

- An international park highlighting Sino-German cooperation;
- An ecological park advocating low carbon and environmental protection;
- A demonstration park promoting industry transformation;
- An intelligent park advancing research and development innovation;
- A livable park leading green living; and
- A dynamic park realizing sustainable development.

**Current Status**

The master plan, concept design plan, construction plan, energy plan and industrial development plan have been completed. The project is now in its intensive construction phase. According to the master plan, 45% of the project land will be used for high-tech and advanced industrial development, 25% will be used for residential and service development, and the rest of 30% will be used for ecological projects and road construction.

The construction of German Corporate Center - one of the key projects in the Sino-German Eco-Park, started in November 2013 under the auspices of the Chinese and German governments. The architectural design was done by SBA of Germany, while the construction drawing design was done by China Architecture Design and Research Group. The center will be built and identified as AAA level of Chinese Green Building with Gold Medal of DGNB standard.

Featuring energy conservation, selection of high-quality materials, simplicity, beauty, full-fledged infrastructure and first-class management, it will lead the trend in high-end...
business office and modern international services.

By providing full services including business office, market consultancy, business meeting, administration and translation, product display, catering and accommodation, as well as leisure and entertainment, the German Corporate Center will serve as a gateway for both Chinese and German businesses. While bringing German enterprises to engage in Qingdao’s development process and making the Chinese market more accessible to small and medium sized German enterprises, the center will also connect Qingdao the global network of German Center; thus advancing and leading Sino-German cooperation in economy, technology and trade in Qingdao, and even in Shandong and Germany.

Contact
Address: Administration Center, No. 2877, Tuanjie Road, Qingdao Economic and Technical Development Zone
Tel: 0086-0532-86988067 Fax: 0086-532-83155099,
Email: Zdxinxi@163.com
Website: www.sino-germanecopark.gov.cn/
www.sgep-qd.de/

4.4 China-Swiss Zhenjiang Eco-Industrial Park (CSZEIP)

Summary
The CSZEIP project is a China-Swiss governmental cooperation project that is being implemented jointly by China Zhenjiang Economic & Technology Development Zone (ZETDZ) and the Cleantech Switchland.

Started in 2012, the park is located in the Dagang Area of Zhenjiang New Town. It covers an area of 20 km² and includes four key areas: R&D area, Industrial area, living area and leisure and holiday area.

Current status
The first phase of the CSZEIP is completed. Key task of the first phase is to develop the Sino-Swiss Innovation Centre, which includes 11 buildings construction. All those buildings were constructed and the total floor space of those buildings is 220,000 m². In addition, all infrastructures have been constructed in the first phase. The second phase will be focusing on acquisition of industrial projects.

The CSZEIP adopts Swiss design, low-carbon technologies and best practices on low-carbon development. It is planning to develop entrance criteria for industries that are interested in locating in CSZEIP.

Contact
Ms. Qian Lu
Tel: 0086 (0)83177817
Email: zjsino_swiss@126.com

4.5 China-Austria Su Tong Eco-Park (CAEP)
Summary

China-Austria Su Tong Eco-Park (CAEP) is a collaborative project determined during the mutual visits of the Presidents of China and Austria in 2011. With a total planned area of 10.6 m², CAEP is located in the Nantong-Suzhou Innovation Park (NSIP). It is the first international collaborative platform set up at the national level.

Adjoining to Shanghai and South Jiangsu economic circles, CAEP possess regional advantages while benefitting from the rich resources of technology, education and information of the Yangtze River Delta. Leveraging on the solid base of Austrian technology in energy saving, environmental protection and new energy, CAEP will attract Austrian enterprises to engage in the development of the park, while making it into a model of low-carbon ecological industry, an industrial zone dedicated to new energy and international high-level industries, an innovative platform for the cooperation between China and Austria, and a livable and sustainable community.

Current Status

On 1 March 2012, the Ministry of Commerce of the People’s Republic of China (MOFCOM) and the Federal Ministry of Economy, Family and Youth of Austria (BMWFJ) confirmed the official name of the park as “China-Austria Su Tong Eco-Park” during the 23rd China-Austria bilateral economic and trade joint commission.

On 28 September 2012, the Memorandum of Understanding for joint development of CAEP was signed by MOFCOM and BMWFJ during the first meeting of China-Austria Energy Conservation and Environmental Protection Working Group held in NSIP. In the meeting, the general framework, cooperative principle, cooperative area, working mechanism and task list for the development of CAEP were also discussed.

In the spirit of the Memorandum, Chinese and Austrian institutions and enterprises will cooperate in the aspects of park design and planning, eco-environment monitoring system and operation platform construction, new energy and environment protection technology, projection introduction, as well as relevant education and training.

4.6 Other International bilateral low-carbon cooperation programs

Bilateral programs or cooperation on climate change

NDRC organized bilateral consultations on climate change with the EU, Germany and Denmark and pushed for the adoption of relevant framework agreements and the launch of cooperation projects. Memorandums of Understanding on cooperation concerning climate change were also signed with relevant departments from countries and states including the California state of the United States, Denmark and Switzerland.

NDRC continued to work on the following existing bilateral cooperation programs on climate change:

- Sino-Germany Climate Change Program
- Sino-Italian Climate Change Cooperation Program
- Sino-Norway Climate Change Adaptation Strategic Application Research Program

Australia-China Joint Coordination Group on Clean Coal

Country studies: Greater China
Training programs and preliminary research dedicated to key issues related to carbon capture and storage technology utilization was conducted with Chinese and Australian enterprises, academics and universities.

**Partnership with China’s Ministry of Environmental Protection**

China’s Ministry of Environmental Protection has partnered with Australia, Italy, Japan, Norway and the United States on a wide range of bilateral and multilateral cooperation projects concerning mitigation, adaptation, capacity building and public awareness. Some examples include: *Environmental Standard and Research on Implementation Details in Shale Gas Exploitation*, Sino-Norway Biodiversity and Climate Change Program and *Sino-Australia Studies on Environmental Impact and Risks of CO2 Geological Storage*.

**Partnership with China’s State Forestry Administration**

China’s State Forestry Administration has expanded its technology exchanges on climate change issues with Finland, Switzerland, United Kingdom and the United States.

**Partnership with China’s State Oceanic Administration**

China’s State Oceanic Administration has entered into partnership with Italy through the project *Capacity Building of Coastal Ecosystem to Adapt to Climate Change*.

**Sino-American research projects**

In cooperation with the Ministry of Energy of the United States, China has conducted a series of fruitful research projects on large-scale CO2 usage, capture and storage technology applied to new model connecting and amplifying underground heating system. Consensus were reached on a broad range of key topics including electricity system, clean fuel, petroleum and natural gas, climatology, energy and environmental technology.

**4.7 Other Low-Carbon initiatives in China**

Since 2012, Chinese government has continued to promote low-carbon pilot projects in selected provinces and cities, pushed forward pilot carbon emissions trading programs, researched and developed pilot and demonstration projects such as low-carbon products and communities. It has accumulated experience and laid a firm foundation in tackling climate change and low-carbon development.

**Pilot Carbon Emissions Trading Programs**

Since 2012, pilot programs for carbon emissions trading in Beijing, Chongqing, Guangdong Province, Hubei Province, Shanghai, Shenzhen and Tianjin have witnessed positive progress. In October 2012, Shenzhen implemented management rules. From July to August 2013, Guangdong Province, Hubei Province and Shanghai sought opinions on carbon emissions trading management.

Based on their local situations, the designated pilot areas considered the goals for energy saving and emission reductions, the trend of economic development, and the emission

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levels of enterprises. They then estimated the number of enterprises where carbon emission trading is applicable, and researched and determined the trading range and quota allocation. Depending on the industries that the trading scheme covered, each pilot area researched and set up calculation approaches and standards for carbon emissions, and carried out the calculations and checks on past data of enterprises’ carbon emissions.

In October 2012, Shanghai issued carbon emission calculation guidelines for industries like steel and electric power. In November 2012 and April 2013, Shenzhen published greenhouse gas emissions reports, guidelines for checking emissions, and detailed rules for the construction industry. A carbon emission trading platform was also launched in June 2013. So far, the total trading volume is over 110,000 tons and the turnover is more than 7 million RMB. On 27 November 2013, the Beijing Municipality launched the Beijing carbon emissions trading scheme; the price of carbon dioxide per ton is about 10 EUR.

Pilot low-carbon transport systems
The Chinese government has selected 26 cities such as Beijing, Chongqing, Kunming and Tianjin to establish pilot low-carbon transport systems. With 40 transport harbors of drop and pull transport, these 26 trial projects aim to promote pilot projects on inland water transportation by using boats fueled by natural gas. Pilot gas and petroleum recycle stations were also established at crude oil terminals.

Meanwhile, government studies were also organized to establish an evaluation index system for low-carbon transport cities, ports and the construction of low-carbon ports, sailing routes and low-carbon highways.

Pilot Carbon Capture, Use and Storage (CCUS) projects
- NDRC has published the Circular on Promoting the Trials of Carbon Capture, Use and Storage.
- Consisting of 40 enterprises, colleges and institutions, the China Technology Innovation Union of Carbon Capture was established.
- Sinopec Group has established the first full-phase demonstration project in China using CCUS for coal-fired power plants.
- By 2012, Shenhua Group’s CCUS demonstration project has stored 57,000 tons of CO2 in total.
- By June 2013, China’s first CO2 geological storage demonstration project in Ordos, Inner Mongolia has sequestrated 120,000 tons of CO2.

Low-carbon pilots in local areas
All provinces, municipalities and autonomous regions have practiced low-carbon development according to their local conditions. Provincial governments have shown strong support in low-carbon pilot and demonstration projects in key industries and areas such as energy saving construction, reduction of industrial consumption and new energy development. The following are some examples of low-carbon initiatives at the provincial-level:
- Sichuan Province designated Chengdu, Guangyuan, Suining, Ya’an and Yibin as the provincial-level pilot low-carbon cities. They are expected to actively explore low-carbon development models with local features.
• Anhui Province has explored demonstration and trial low-carbon communities and industrial parks. Special fund was set up to support the construction of complex low-carbon demonstration bases in nine industrial parks and communities in the province.

• Shandong Province has set up a series of special funds for low-carbon development, including development funds for energy conservation and green building development, new energy industries and new energy vehicles.

Trial certification of low-carbon products
In February 2013, NDRC and the Certification and Accreditation Administration jointly issued the *Interim Procedures for Low-carbon Product Certification Management*. There are four products in the first batch of certified products, including Portland cement, plate glass, aluminum profiles and small and medium three-phase asynchronous motors. Meanwhile, certification trials also started in Chongqing and Guangdong Province, who are in the process of exploring for a good system and environment for enterprises to produce low-carbon products that are affordable and suitable for general consumers.

Trials of low-carbon industrial parks and communities
NDRC and several other relevant government departments organized studies to establish trials on low-carbon communities, to explore new models for running community low-carbon management, as well as reducing energy consumption and carbon emissions in residential areas and other spheres.

NDRC and the Ministry of Industry and Information Technology have also started trials in low-carbon industrial experimental zones, and have established evaluation index to support such policies.
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II. Low-carbon city programs and networks in Chinese Taipei (Taiwan)

by Tze-Luen Lin
1 Introduction & Summary

Accounting for 1% of global GHG emissions, Chinese Taipei (Taiwan) emits roughly 12 tons per capital of GHG every year. The major contributors of CO2 emissions are industrial and energy sectors. However, nearly one third of Taiwan’s CO2 emissions come from daily activities of the average citizens, including agriculture, livestock husbandry, transport, housing, construction and commercial activities. Thus, individuals play key roles in the island’s overall emission reduction and the creation of low-carbon communities.

Chinese Taipei set the target to reduce its GHG emission back to its 2005 levels by 2020; and by 2025, back to its 2000 levels. In 2009, the Low Carbon City Program was adopted at the National Energy Conference. Under the program, four low-carbon cities and two low-carbon islands will be realized by 2014, while four low-carbon living circles – each in the four regions of Taiwan, will be created by 2020.

The first part of this report provides an overview of the history of development of low-carbon city programs in Chinese Taipei at the national level. It then provides a summary of low-carbon programs from five major cities in Chinese Taipei, including Taipei, New Taipei, Taichung, Tainan and Kaohsiung. All of these five cities are ICLEI Member cities, and three of them have been designated by the government as low-carbon model cities.
2 Brief history

2.1 “Low-carbon Homeland” policy

To gear towards the vision of low-carbon societies, the 2009 National Energy Conference proposed a ten-year timetable for implementing the “Creating a Low-Carbon Homeland” plan. The plan calls for the establishment for four low-carbon model cities and two low-carbon islands within five years; two low-carbon model communities in every municipality by 2011 (i.e. a total of 50 low-carbon communities across Taiwan); and the designation of six low-carbon cities by 2014. The plan also envisions that by 2020, the island will be divided into four major low-carbon living spheres: northern, central, southern and eastern Taiwan.

Establishing a low-carbon homeland is a complex and ambitious venture. To reduce emissions, not only the current energy consumption structure has to be changed, it also requires the gradual substitution of fossil fuels by renewable energy, which requires the support of new technologies and facilities in the fields of alternative energy conservation, emission reduction and efficient design. In addition, raising public awareness of the importance of low-carbon lifestyles is also crucial in creating low-carbon communities and improving the overall quality of life.

Given the complexities and challenges in creating low-carbon communities, the Environmental Protection Administration (EPA) decided to promote “low-carbon homeland” in stages, starting with small-scale experiment with low-carbon communities to test the feasibility of low-carbon economy at large. The success of the experiment will lead to the gradual implementation of the plan in six cities, then eventually in the four major low-carbon living spheres across Taiwan.

2.2 EPA’s tripartite policy: low-carbon communities, green energy industries, green lifestyles

The EPA adopts a tripartite policy towards the creation of low-carbon society: promoting low-carbon communities, green energy industries and green lifestyles. These strategies aim to encourage green energy developers, financial organizations and private investors to invest in local communities. On one hand, the strategy aims to create an environment conducive to organic growth by promoting green lifestyles through increasing employment opportunities in green industries; on the other, this approach provides a policy platform for energy service companies (ESCOs) to participate in the building of low-carbon communities.

2.3 Key features of low-carbon communities

Building low-carbon communities is one of the three major policies of the EPA in gearing towards low-carbon society at large. The following are some key features of EPS’s low-carbon communities:
Community selection criteria
In principle, the EPA uses “village/borough” as the unit for promoting low-carbon communities. It has created the Low-Carbon Model Community Selection Criteria Working Principles, which guides local governments to submit their application for evaluation by the EPA. The EPA team of experts shall carry out on-site evaluations in 50 selected low-carbon communities according to the Low-Carbon Model Community On-Site Inspection Team's Working Handbook.

Combining central government resources with interdepartmental promotion at the local government level
Low-carbon communities and cities will be given priority when allocating central government resources and funds that have been budgeted to plans related to the National Energy Conservation and Carbon Reduction campaign. For example, the Bureau of Energy under the Ministry of Economic Affair has already designated the selected low-carbon communities as targets for grants for 2010; and the EPA has also provided guidance to 16 communities to obtain other grants. In the future, low-carbon communities and cities will also benefit from the prioritized installation of intelligent electricity meters and the adoption of intelligent green building design.

In addition, the EPA has also asked local governments to set up Low-Carbon Homeland Promotion Task Forces, which all of the nation's local governments have already done. These task forces are charged with coordinating and integrating manpower, as well as funds from government departments, bureaus, and offices; so that resources are concentrated where they will be most effective for the implementation of low-carbon measures.

Electric Vehicle Strategic Business Alliance
On 22 April 2010, the EPA formed the Electric Vehicle Strategic Business Alliance with electric vehicles and battery manufacturers. The alliance has agreed upon a set of standard specifications for batteries and rechargers for electric vehicles so that vehicle manufacturers would be able to produce electric vehicles that carry removable batteries.

To overcome the inconvenience of battery recharging and the comparatively high price of electric vehicles, a system for renting batteries, a scale of rental charges and a widespread network of recharging and exchange stations have been established.

Establishing systems of low-carbon assessment indices and low-carbon labeling for local communities
Plans are being drawn to use data (the amount of electricity, water, oil, gas and waste, etc. produced and consumed) from low-carbon model communities to calculate carbon emission volumes and to develop assessment indices for local communities. A public competition will be held to award communities with outstanding achievements. Citizens, experts and scholars will be invited to participate in the online election.

ESCOs and the low-carbon communities
On 22 April 2010, the EPA signed an agreement with a number of ESCOs to establish the Energy Source Service Strategic Alliance. The alliance ensures that every low-carbon community will be assisted by an ESCO to manage its energy resources, to seek ways to save energy and to make improvements.
and operational services are available from banks in the form of self-liquidating loans. Income from feed-in tariffs and savings from energy expenses will be used to repay these loans. The EPA also provides guidance for private and public enterprises to participate in carbon emission trading.

Seven specific measures to reduce carbon emissions
At the community level, seven specific measures have been rolled out to address emission reduction in communities, scenic areas or sites of culture interests, so as to encourage the general public to participate in the building of low-carbon communities. These measures are designed to cater for the needs and circumstances of individuals, they are:

- Using renewable energy sources: Solar-powered lighting, solar water heaters, small/medium-sized wind turbines, and biofuels as alternatives to fossil fuels.
- Saving energy: Using energy-efficient domestic appliances and lighting, and installing intelligent electricity meters.
- Eco-friendly transport: Walking, cycling, taking public transport, and using other low-emission means of transportation.
- Recycling and reuse of resources: Reducing the amount of refuse produced at source and recycling any recyclable waste for reuse; catching and storing rainwater; and reusing household gray water for flushing toilets, watering gardens, and washing vehicles, etc.
- Low-carbon construction: Constructing health and energy-efficient buildings by using green architectural concepts, materials and building methods that produce minimum waste.
- Greening the environment: Planting trees, hedges, and gardens in local communities.
- Low-carbon lifestyles: Practicing green consumption whenever possible, including food, clothing, household items, transportation, education, leisure, and entertainment.

Education and guidance
To raise awareness and encourage the public to participate in the building of low-carbon communities, the EPA held the Low-Carbon Homeland Promotion Strategy Symposium on 4 June 2010. Knowledge and data pertaining to the Low-Carbon Homeland program are also made available on the Ecolife website (www.ecolife.epa.gov.tw/). Such data includes the results achieved by local communities in advancing towards low-carbon society, as well as the assessment of the performances of villages, cities, townships and counties across Taiwan.

2.4 Challenges of “Low-Carbon Homeland” policy
Promoting the Low-Carbon Homeland policy involves many levels of implementation. All plans and measures require sustained coordination and cooperation between the government, enterprises, organizations and general citizens. The following are some key observations from the implementation of low-carbon policy:

- Political will is crucial: Experiences from many countries have shown that the building of low-carbon communities require medium to long-term planning, few cities succeeded in their first attempt in promoting low-carbon communities. Thus, the political will of local governments leaders is crucial to the sustained efforts needed for pursuing this
ambitious goal of community transformation. Many governments who have shown the political will to pursue this goal is in the process of planning and designing trial models; this process, together with implementation of policies at a later stage require mutual cooperation between government agencies, especially in terms of funds and manpower.

- **Local uniqueness**: Every community or city has its own unique features and circumstances such as geography and environmental resources. Any successful low-carbon measures must understand, respect and care for the needs of local communities. Replication without adaptation rarely ends with success.

- **The need for continuous effort and upgrading**: Due to the long-term nature of low-carbon community projects, enormous costs are naturally involved in the implementation of such projects. Thus, the grants from the government and the participation of the general public are crucial in supporting the long-term development of the projects. As government funding has also its own limits, attracting private investment from the private sector in the form of bank financing, corporate donations and adoption schemes are vital for the sustainability of the schemes.

- **Motivation for public participation**: The successful establishment of low-carbon communities and cities is predicated on the government’s ability to create economic benefits and to offer better quality of life for residents. The private sector also needs imperative to invest on green industries, as many of them require costly and new high-tech facilities. In Chinese Taipei (Taiwan), there are still great difficulties in saving energy through industries as renewable energy and its relevant technologies and facilities are still too expensive for local businesses, especially when compared with the tradition fossil fuel. The government is currently actively promoting the “National Energy Technology Plan” and the “Green Energy Promotion Plan”.

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_Eco-city and low-carbon city programs and networks in East Asia_
### Synopsis

The following table provides a summary of low-carbon programs from five major cities of Chinese Taipei, including Taipei, New Taipei, Taichung, Tainan and Kaohsiung.

Table 1: A Summary of low-carbon programs from the cities of Taipei, New Taipei, Taichung, Tainan and Kaohsiung.

<table>
<thead>
<tr>
<th>City</th>
<th>Target</th>
<th>Low-carbon city plan</th>
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<tbody>
<tr>
<td></td>
<td>2030: Reduce to 25% below 2005 levels</td>
<td>8 focus areas: Green building, Green transport, Green energy, Low carbon schools, Low carbon lifestyle, Resource management, Green environment, Renewable energy, Energy conservation</td>
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<tr>
<td></td>
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<td>8 focus areas: Green building, Green transport, Green energy, Low carbon schools, Low carbon lifestyle, Resource management, Green environment, Renewable energy, Energy conservation</td>
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<td>8 focus areas: Green building, Green transport, Green energy, Low carbon schools, Low carbon lifestyle, Resource management, Green environment, Renewable energy, Energy conservation</td>
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<td>New Taipei</td>
<td>2014: Reduce to 5% below 2009 levels - 113 tons of CO2 reduction</td>
<td>5 focus areas: Green Building, Green Transport, Green Energy, Resource Management, Sustainable Living Environment</td>
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<tr>
<td></td>
<td>2020: Reduce to 5% below 2005 levels - 164 tons of CO2 reduction</td>
<td>5 focus areas: Green Building, Green Transport, Green Energy, Resource Management, Sustainable Living Environment</td>
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<td>Tainan</td>
<td>2014: 13% reduction - 1.04 million tones eCO2/year</td>
<td>12 projects: Low carbon community, Low carbon transportation, Low carbon buildings, Green energy, Low carbon cultural tourism, Ecologically functioning city, Low carbon lifestyle, Material recycling, Green remediation, Low carbon campus, Low carbon Education and City image, International cooperation</td>
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<tr>
<td></td>
<td>2020: 26% reduction - 2.23 million tones eCO2/year</td>
<td>12 projects: Low carbon community, Low carbon transportation, Low carbon buildings, Green energy, Low carbon cultural tourism, Ecologically functioning city, Low carbon lifestyle, Material recycling, Green remediation, Low carbon campus, Low carbon Education and City image, International cooperation</td>
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Low-carbon city networks

Instead of solely running local projects in their regions, cities across Taiwan also collaborate with each other through various networks to ensure that they are gearing towards the common goal of addressing environmental challenges and climate change. There are two predominant networks of low-carbon city in Chinese Taipei (Taiwan): one emerged out of ICLEI – Local Governments for Sustainability; the other emerged out of the Low Carbon City Program implemented by the EPA.

ICLEI – Local Governments for Sustainability (ICLEI)
ICLEI is the world’s leading association of cities and local governments dedicated to sustainable development. With members coming from 12 mega-cities, 100 super-cities and urban regions, 450 large cities as well as 450 medium-sized cities and towns in 86 countries, it promotes local action for global sustainability and supports cities to become sustainable, resilient, resource-efficient, biodiverse, low-carbon; to build a smart infrastructure; and to develop an inclusive, green urban economy with the ultimate aim to achieve healthy and happy communities.

As of 2013, there are 11 ICLEI Member cities and townships in Chinese Taipei (Taiwan), including Chia Yi County, Kaohsiung City, Ping Dong County, Taichung City, Tainan City, Taipei City, New Taipei City, Taoyuan County, and Yilan County. The ICLEI network provides a policy platform for cities to connect and share experiences on a wide range of low-carbon projects, as well as fostering partnership and cooperation.

Networks emerged out of EPA’s Low-Carbon City Program
The Low-carbon City Program by the EPA is now being implemented in six cities in Chinese Taipei (Taiwan), including New Taipei City (northern Taiwan), Tainan (southern Taiwan), Taichung (central Taiwan), Yilan County (eastern Taiwan), Kinmen and Penghu (islands). Besides establishing their respective low-carbon city offices, these six cities also act as a leader in their surrounding areas by hosting conferences and inviting other cities to participate. Although each community and city has its own unique characteristics, including their geography and environmental resources, they benefit from learning from each other’s experiences in designing and implementing low-carbon programs, as well as in formulating policies related to low-carbon transportation and tourism.

The promotion of exchanges between cities, counties and regions is expected to lead to the goal of forming a network that stretches across Taiwan, fostering deeper and closer relationships between cities while pursuing the creation of four low-carbon living spheres.

These above networks have their own uniqueness. However, as many Chinese Taipei (Taiwan) cities are active members of both networks, this makes the two networks very much connected. For instance, some of the commissioners for the Bureau of Environmental Protection are also ICLEI Members. In September 2012, they attended a conference in Tainan where they discussed the organization of future international events and learned from Tainan’s experience. At the end of the conference, an agreement was reached to upscale the conference into a Commissioner’s Alliance, aiming to strengthen cities’ ties by having more frequent meeting and communication in the future. It is expected that a new platform of networks in Chinese Taipei (Taiwan) will emerged out of this alliance.
ICLEI is the world’s leading association of cities and local governments dedicated to sustainable development. ICLEI is a powerful movement of 12 mega-cities, 100 super-cities and urban regions, 450 large cities as well as 450 medium-sized cities and towns in 86 countries.

ICLEI promotes local action for global sustainability and supports cities to become sustainable, resilient, resource-efficient, biodiverse, low-carbon; to build a smart infrastructure; and to develop an inclusive, green urban economy with the ultimate aim to achieve healthy and happy communities.

ICLEI East Asia Secretariat
14/F, Seoul Global Center Building, 38 Jongno, Jongno-gu, Seoul, South Korea (110-110)
Phone: +82-2-3789-0496
Fax: +82-2-3789-0497
Email: iclei-eastasia@iclei.org

World Wide Web
www.iclei.org/eastasia

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