



绿色创新发展中心  
Innovative Green Development Program

●●● 2017 Annual Report





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## Mission

### Mission

The mission of innovative Green Development Program (iGDP) is to promote robust and practical policies that push forward green growth in China. We believe that real solutions to climate change must take into account economic, environmental and energy considerations, and require innovative thinking in the policy, business and research communities. We create analytical tools, share professional knowledge, and facilitate multidisciplinary exchanges to foster comprehensive low-carbon solutions at the national, regional and city levels.

iGDP was launched by Energy Foundation China (EFC), which also provides funding and operational support. iGDP is the implementation organization of China's Green Low-Carbon Development Think Tank Partnership (GDTP), a network of Chinese regional and city-level low-carbon research organizations, and a committee member of the Green Finance Committee (GFC) of the China Society for Finance and Banking. It is also an expert institution member of the United Nations Economics and Social Cooperation for Asia Pacific (UNESCAP) North-East Asia Low Carbon City Platform (NEA-LCCP).

### Focus

iGDP is currently focused on the following areas:

- ❖ Clean Energy Policy
- ❖ Low-Carbon City Planning
- ❖ Energy System Analysis
- ❖ Carbon Emission Trading
- ❖ Green Finance, Taxes and Investment





# Annual Review

iGDP in numbers in  
**2017**

2

Research  
Tool

5

Research  
Report

3

Publications

44

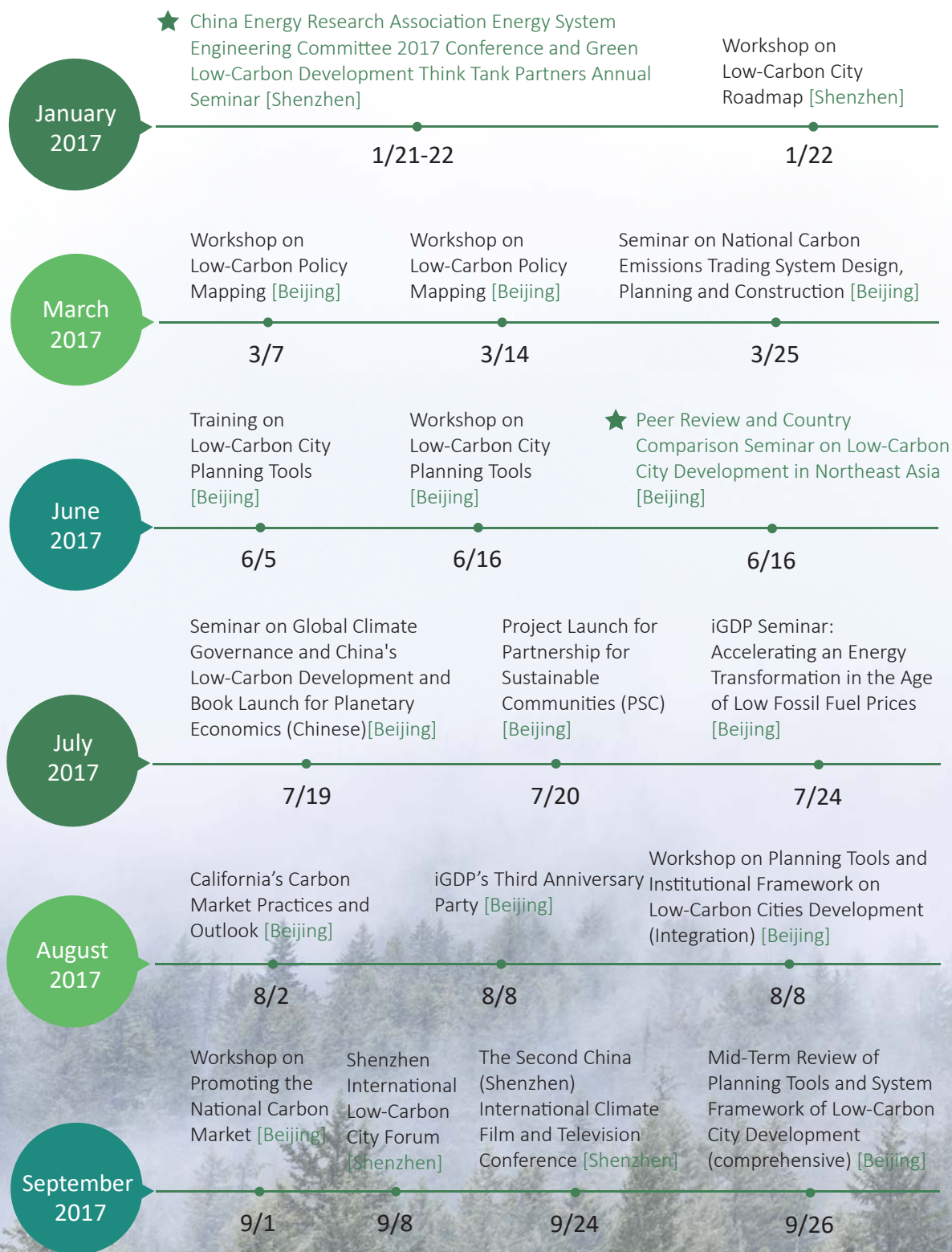
Opinion  
Pieces

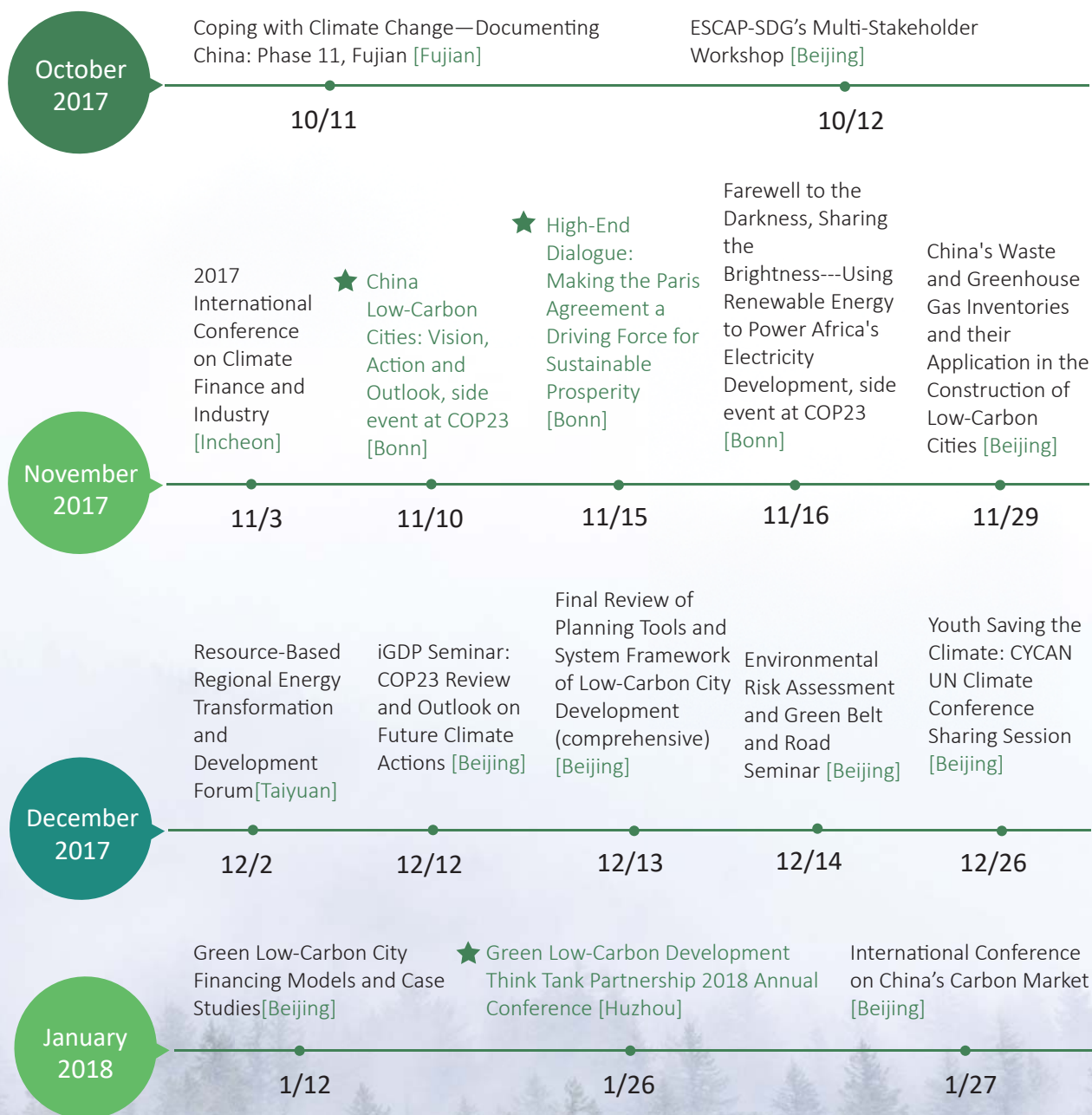
33

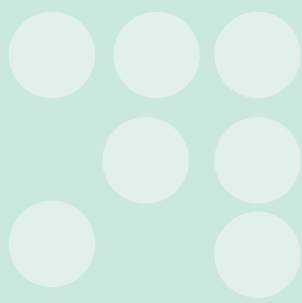
Professional  
Meetings



# Event Calendar





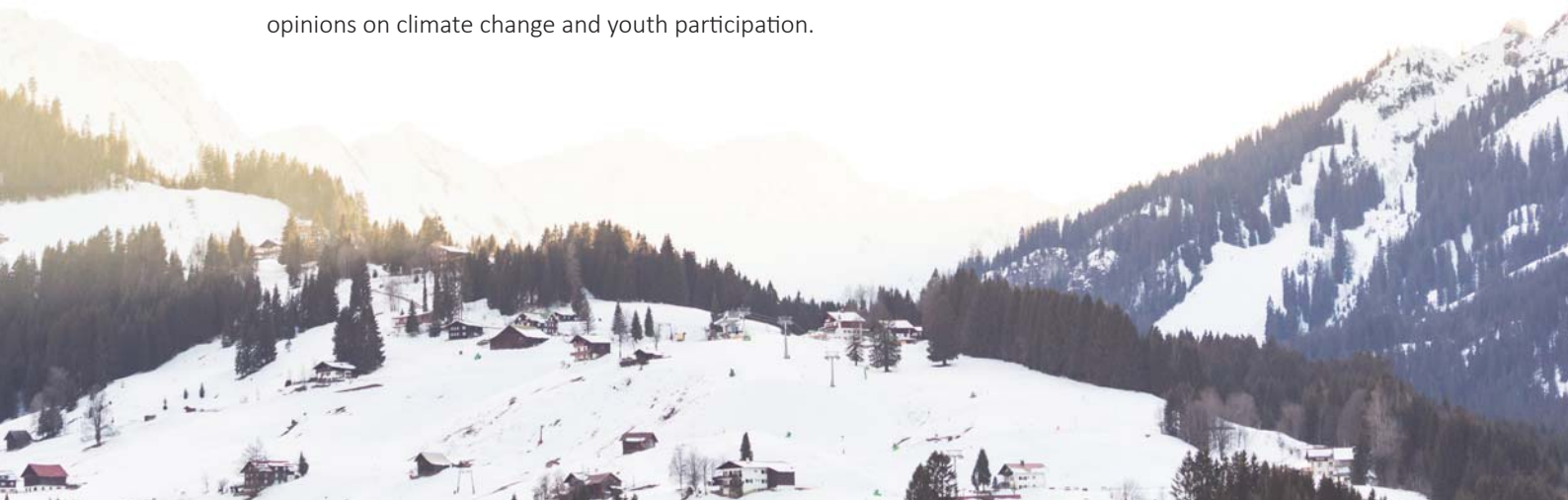


# Climate Change

On 12 December 2015, 198 countries signed up to the milestone Paris Agreement. Signatories agreed they should aim to keep global average temperature rises below 2°C above preindustrial levels and to strive to limit it further to below 1.5°C by the end of the century. China's document to the United Nations Framework Convention on Climate Change (UNFCCC), Enhanced Actions on Climate Change: China's Intended Nationally Determined Contributions (INDCs) outlined its pledge to peak carbon dioxide emissions by around 2030, and to raise the proportion of non-fossil fuels in the total energy mix to 20% by the same year.

The Paris Agreement came into force on November 4, 2016. At COP22 in Marrakech, countries met to agree on an implementation plan. The Bonn Climate Change Conference, held November 6-17, 2017, was where attendees worked on the implementation plan of the Paris Agreement.

iGDP has studied the INDCs of key countries, sustainable energy development and China's green and low-carbon transformation. It has also researched political, technical, economic and social approaches to peaking greenhouse gas emissions. It has developed analytical tools, promoted interdisciplinary exchanges, participated in climate change collaborative activities at home and abroad, and published opinions on climate change and youth participation.





## Activities

### The Second China (Shenzhen) International Climate Film and Television Conference

Wang Yanhui, iGDP Operations Director, was invited to speak at the Second China (Shenzhen) International Climate Film and Television Conference held from September 23 to 24, 2017. She spoke on communicating about climate change as part of the “High-End dialogue: How to Spread Green Messaging of China.”



### Coping with Climate Change—Documenting China, phase 11 (Fujian)

The China Meteorological Administration invited Wang Yanhui, iGDP Operations Director, to attend Coping with Climate Change—Documenting China, phase 11 (Fujian) from October 11 to 14, 2017.



### The 23rd Meeting of the United Nations Framework Convention on Climate Change (COP23)

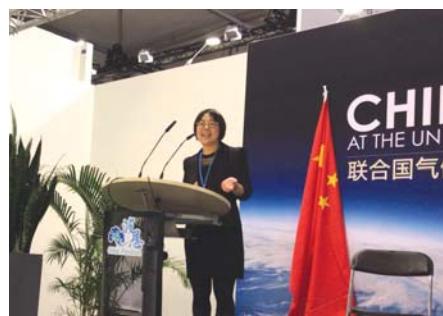
Wang Yanhui, iGDP Operations Director, attended the 23rd Meeting of the United Nations Framework Convention on Climate Change (COP23) as an observer in Bonn, Germany from November 6 to 17, 2017. She reported on this conference as special correspondent for Southern Weekly.

iGDP worked with the National Climate Change Strategy Research and International Cooperation Center, the Energy Foundation, and the World Resources Institute to organize the side event, “China Low-Carbon Cities: Vision, Action, and Outlook” on November 10.



iGDP and the Energy Foundation co-hosted the High-End Dialogue: Making the Paris Agreement a Driving Force for Sustainable Prosperity on November 15.

Wang Yanhui, iGDP Operations Director, was invited to deliver the keynote speech, titled “Sharing Low-Carbon Development Experiences: Low-Carbon Policy Mapping and LOGIC” at the side event, Farewell to the Darkness, Sharing the Brightness—Using Renewable Energy to Power Africa’s Electricity Development on November 16.



## iGDP Seminar: COP23 Review and Climate Action Outlook

This iGDP Seminar invited several experts from the Energy Foundation, the National Climate Change Strategy Research and International Cooperation Center, the China Climate Change Center, the Innovation Green Research Institute, and the Climate Home on December 14, 2017 to discuss COP23 and future climate actions.



## Youth Saving the Climate: CYCAN UN Climate Conference

China Youth Climate Action Network (CYCAN) invited Wang Yanhui, iGDP Operations Director, to deliver the keynote speech, titled “Youth Participation in COP23” at the Youth Participate in Saving the Climate: CYCAN UN Climate Conference Sharing Session on December 26, 2017.



## Outputs

### Policy Mapping

Policy Mapping is a database and interactive platform that tracks, synthesizes and compares low-carbon development policies and actions across regions and cities in China. Policy Mapping promotes best practices and learning by doing by identifying publicly-available key policy and performance indicators on low-carbon development. It was officially released at COP22 in Marrakech, November 2016. iGDP organized two feedback workshops for users in March 2017 to refine the tool. The first upgrade was completed in June 2017 when a city profile was added. A second upgrade was completed in October 2017, when a province page was added. The first data update was performed at the end of 2017, when non-carbon dioxide data was added.



Media  
Reports

人民日报



*Time to Cool Down the Earth*

2017/2/4

*How a New Policy Mapping Tool Helps Chinese Cities' Climate Efforts*

2017/3/14

*Bonn Climate Negotiations: How can China Lead for the First Time without the "U.S. Corner" at the Conference?*

2017/11/15

*The Bonn Climate Conference Concludes, What are the Benefits of the Trump Administration's Withdrawal?*

2017/11/24

Op-eds

The 12-Character Heart Sutra of  
"Interpretative Communications of  
Professional Knowledge" on Climate Change  
2017/9/25

Are Cities in China Ready to Embrace the  
Post-Fuel Vehicle Era?  
2017/11/3

COP23 Series Report

Farewell to Katowice  
2017/11/19

Low-Carbon Development Experience-Sharing  
Helps South-South Cooperation  
2017/11/17

Interview with the Founder of Climate Economics,  
Nicholas Stern  
2017/11/16

The World Praises China's Carbon Market  
2017/11/15

Cities Will Become the Main Battlefield for  
Combating Climate Change  
2017/11/14

U.S. Ambitions for Civil Actions  
2017/11/12

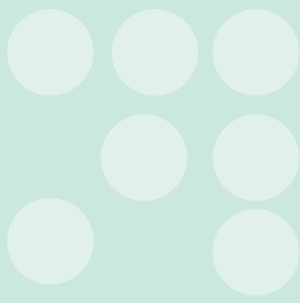
China Corner Discusses Low-Carbon City Actions  
and Future  
2017/11/11

What Other Actions Can Companies Adopt to  
Tackle Climate Change  
2017/11/10

Evaluating the Effect of Global Emissions Reduction  
Policies after the Paris Agreement  
2017/11/9

Heated Discussions on COP23  
2017/11/8

Curtain-raiser to COP23  
2017/11/7



# Low-Carbon Cities

China is experiencing large-scale and rapid urbanization: It is predicted that in the next 15 years, about 300 million people will move to urban areas. Sustainable development goals can only be achieved if the urbanization model becomes green and low-carbon, where transport, buildings, industry and personal lifestyles all emphasize efficiency and environmental awareness.

China launched its low-carbon pilot program in 2010. So far six provinces, 79 cities and two counties have become low-carbon pilots, giving urban administrators and others rich experiences in how low-carbon growth can be achieved. The Alliance of Peeking Pioneer Cities (APPC) was announced at the First U.S.-China Climate Leader Summit in 2015. After the nine cities and two provinces in the Alliance set targets for peaking their carbon emissions, many other pilot cities followed suit, putting forward their own targets and joining the APPC. Currently, 23 provinces and municipalities are APPC members.

iGDP tracks and evaluates the low-carbon development plans, roadmaps and greenhouse gas emission peaking efforts of China's cities. iGDP's approach is to perform comparative analyses of policies and other measures and evaluate performance results. This allows policymakers and practitioners to identify the practices most suitable local conditions. It also analyses low-carbon city case studies and offers independent, clear, and comparable information to help cities achieve their low-carbon plans.





## Activities

### The Low-Carbon Green Index of Cities (LOGIC) Study

iGDP, the US Department of Energy Lawrence Berkeley National Laboratory China Energy Research Institute and the Energy Foundation jointly launched the “Low-Carbon Green Index of Cities” (LOGIC) Study to track the green, low-carbon progress of Chinese cities. It is hoped that this comprehensive study will help guide the transformation of urban development models.

LOGIC sets out a system to track progress. It is a database to evaluate performance, and an analytical tool to help cities identify improved solutions for low carbon and clean energy development, and early carbon peaking. The research team behind LOGIC gathered a large collection of city-level data on low-carbon development in China – with data from 115 cities, across 23 low-carbon and green indicators, and characterizing cities across eight economic and demographic dimensions. Data was collected and compared from two annual sets (2010 and 2015).

LOGIC tracks and compares green, low-carbon development in Chinese cities, encourages exchanges and cooperation between cities at home and overseas, and provides research support to help with cities’ future actions. This study will continue to release reports, providing a reference for policymaking and implementation for green, low-carbon sectors.

### Project on Planning Tools and System Framework of Low-Carbon City Development (comprehensive)

iGDP and the School of Environment at the Renmin University of China are working together on a research project titled, Planning Tools and System Framework of Low-Carbon City Development, which is commissioned by the NDRC’s Climate Change Department and the World Bank. The purpose of this project is to expand low-carbon pilot work and propose planning tools and policy options for the third batch of low-carbon pilot cities in China.

The research team is made up more than 30 senior experts in low-carbon development with Hu Xiulian, a researcher with the NDRC’s Energy Research Institute, leading the project. The researchers systematically reviewed and analyzed the methods, tools, and institutional frameworks of urban low-carbon planning through surveys and interviews. They have also evaluated the practices of low-carbon pilot cities, providing a theoretical basis for extending low-carbon pilot projects. The project has also looked into ways to spur private investment into urban low-carbon development. From this it has been able to construct investment proposals and suggest financing mechanisms and regulatory frameworks.



## North-East Asia Low-Carbon City Platform Peer Review and Comparative Study

Good global climate governance requires improved regional cooperation between cities on transitioning to a low-carbon economy. In 2014, the North-East Asian Subregional Programme for Environmental Cooperation (NEASPEC) established the Northeast Asia Low-Carbon City Platform (NEA-LCCP) to promote information exchange, technological research and capacity building for low-carbon urban development in the region. iGDP joined this platform as an expert member organization.

North-East Asia Low-Carbon City Platform peer review and comparative study is a project on the NEA-LCCP platform. One half of the project focuses on city case studies, provides a theoretical framework and methodology for evaluating urban low-carbon development in Northeast Asia, and promotes inter-city exchanges and experience sharing. The second half of the project draws up methodologies for comparing countries engaged in urban low-carbon development in order to better understand and compare low-carbon development in China, Japan, and South Korea.



Dr. Yang Li, iGDP Program Director/Senior Analyst, was invited to attend the 2017 International Conference on Climate Finance and Industry, held on November 2, 2017 in Incheon, South Korea. She gave the keynote speech: Progress and Prospects for China's Cities Seeking to Peak Carbon Emissions Early – Wuhan as a Case Study.



## Outputs

- ❖ Low-Carbon Green Index of Cities (LOGIC) Report
- ❖ Low-Carbon City Development: A Guidebook for Strategic Planning and Actions
- ❖ Northeast Asia Low-Carbon City Peer Review: Wuhan Report
- ❖ Northeast Asia Low-Carbon City Peer Review: Methodology
- ❖ Workshops on Low-Carbon City Roadmap

Workshops on Low-Carbon City Roadmap is an iGDP and Green Low-Carbon Development Think Tank Partnership (GDTP) initiated capacity-building project that focuses on best practices in provincial and municipal low-carbon policies. It organizes teams of experts from GDTP institutions to help with the needs of low-carbon development across different regions, providing evidence-backed policy advice to guide urban low-carbon transitions. These workshops also facilitate the sharing of low-carbon policy experiences to promote the collective early peaking of greenhouse gas emissions.

## Media Reports



*Pilot Cities Become Leaders in China for Transforming Development*  
2017/5/6



*Rubbish, Traffic Jams: How does Green, Low-Carbon Drive Urban Development?*  
2018/1/16

## Op-eds

Low-Carbon Development and Measures in Mongolia and Ulaanbaatar  
2017/7/4

The Urban Sustainable Index in 2016 Explained  
2017/7/7

Introduction to Urban Low-Carbon Development Index Research  
2017/7/10

iGDP expert explains China LOGIC on the Environment China Podcast  
2017/10/26



Wuhan's Plan to Peak Emissions: Using Science to Improve Low-Carbon City Planning  
2017/11/11



# Green Economy

A green economy is defined as one where growth is decoupled from carbon emissions, environmental pollution and resource exploitation. The measure of growth incorporates performance on environmentally-friendly industrial and commercial practices. In a green economy, economic growth and sustainable development are mutually compatible. A green economy can support the optimization of the economic structure, foster new engines of growth, create jobs and raise living standards.

Creating a green economy means improving resource productivity, especially in natural resources, and in providing investors with a stable price signal to encourage green investment and to prime the market for green products, services and technologies.

iGDP is closely studying China's path to a green economy and we believe China should, and is capable of, charting its own way towards a green economy. We focus on economic policy, including carbon pricing, environmental taxes, fossil fuel subsidies and green financing policies, and draft independent policy recommendations.





## Activities

### National Carbon Market

iGDP began working on carbon markets in early 2017, aiming to help China build its own national carbon market and to generate public support for the endeavor. To do this it engaged in research and worked on capacity building and strategic communications.

iGDP, the Energy Foundation, and Energy Innovation jointly organized an International Symposium titled The Design and Construction of the National Carbon Trading System on March 25, 2017. We invited more than 40 experts on carbon markets from the U.S., Germany, and Canada to offer their insights to China on building a national carbon market.

iGDP invited University College London professor of energy and climate change, Michael Grubb, to give an introductory speech at iGDP seminar on July 24, 2017. He spoke on how to accelerate the energy transformation in the age of low fossil fuel prices. Around a dozen scholars from domestic and overseas research institutions joined the discussion.

iGDP and the Beijing Energy Network invited Dr. Chris Busch, former member of California's Economic and Technology Advancement Advisory Committee, and now Energy Innovation's Research Director to speak about California's carbon market on August 2, 2017.

CHEN Mei'an, iGDP analyst, was invited to give the keynote speech on capacity building and strategic communications at a seminar on promoting the national carbon market jointly organized by the Energy Foundation and Energy Innovation on September 1, 2017.

China's National Development and Reform Commission (NDRC) held a press conference on December 19, 2017, to announce the official launch of China's national carbon market. iGDP worked together with the People's Daily and Energy Foundation to produce One Map to Understand the Carbon Market and 12 Questions on the Carbon Market. Both were disseminated on NDRC's official WeChat account.



## Environmental Risk Assessment

While financial institutions have carried out environmental risk assessments for many years, they have yet to fully incorporate these into their investment choices. This has led to excessive capital investment in areas of high environmental risk.

The G20 Green Finance Research Group believes that financial institutions are prevented from properly integrating environmental risks into their regular risk management by a series of challenges, including information asymmetry, short-term investment preferences, incentive mismatches, a shortfall in capability, and outdated risk assessment methodologies.

For this project, iGDP is working with investment institutions and academic research institutions. We are seeking to encourage financial institutions to bring environmental risks into their work by building a dialogue platform between government agencies and investment institutions. Coming up with a methodology for environmental risk assessment will be one of this project's key outputs.



## Low Carbon Finance in China's Green Cities

Green finance plays an important role in promoting China's building of an ecological civilization. This market-oriented institutional arrangement is an effective tool for ensuring that ambitious policy leads to real results on the ground.

To provide experts and practitioners with a thorough overview and in-depth case studies of this critical area, iGDP, a member of China's Green Finance Committee, has compiled a new edited volume, titled "Low Carbon Finance in China's Green Cities: Practices and Explorations." This book aims to illuminate cost estimation methods in the areas of financial investment that are most important in driving urban green and low-carbon development. The book contains case studies of public and private investment in China and other countries undergoing urban green and low-carbon transitions. It includes a comprehensive analysis of the various investment channels that are available in green low-carbon urban construction efforts, identifying the unique capital requirements of cities in different stages of development. It also provides urban green and low-carbon financing policy recommendations to encourage private investment in green and low-carbon urban construction.

This project has benefited from the participation and support of many research institutions and industry experts who are gratefully acknowledged in the book.



## Outputs

iGDP, the China Financial Institution's Green Finance Professional Committee, the Finance Research Institute of the Industrial and Commercial Bank of China, Energy Foundation China, the Oxford University Sustainable Finance Program, and the China Urban Finance Association jointly held a seminar on December 14, 2017, titled: Environmental Risk Assessment and the Green Belt and Road Initiative.

## Media Reports



Environmental Taxes are Not Related to Smog  
2017/1/9



The National Carbon Market Launches: "The Carbon Market is for Reducing Emissions not for Speculation"  
2017/12/23

## Op-eds

Professor Grubb:  
Accelerating an Energy Transformation in  
the Age of Low Fossil Fuel Prices  
2017/9/11, 2017/8/10, 2017/8/7

Legislation First to Ensure Long-Term  
Policy Signals- the View from California's  
Carbon Market  
2017/9/30

Regional Environmental Taxes:  
Tax Rates will be Adjusted; 12 Provincial  
and District Tax Revenues will be Greater  
than Wastewater Fees  
2017/12/6

China-British Central Banks Joint Seminar Focuses on  
Environmental Risk Assessment and Information  
Disclosure  
2017/12/18

The National Carbon Market Launches Today, Will be  
World's Biggest, Passing the EU Carbon Market  
2017/12/19

How Foreign Media have Evaluated China's National  
Carbon Market  
2017/12/21

A Snapshot of the Carbon Market  
2017/12/22

Deep Water Purification: Environmental Taxes have  
been Launched  
2018/1/2



# GDTP

The Green Low-Carbon Development Think Tank Partnership (GDTP) was set up by the China Energy Research Council Energy Systems Engineering Committee. It is an informal platform that brings together China's leading low-carbon research institutes, economists, and well-known energy and environmental experts. GDTP was launched in June 2014.

GDTP aims to facilitate communication and research cooperation between partners and experts, focusing on the best low-carbon research tools and practices at home and abroad and building practical support systems for technology and decision-making. GDTP promotes green transformation and contributes to the global impact of China's low-carbon development. The Partnership's senior advisors are members of the China Engineering Academy, Mr. Du Xiangwan, Professor He Jiankun, Professor Liu Yanhua and Professor Zhou Dadi.

GDTP has 75 experts and 45 low-carbon think tank partners. The GDTP Secretariat has offices in Beijing and Shenzhen.





## Meetings

### Seminar on Global Climate Governance and China's Low-Carbon Development and Book Launch for *Planetary Economics*

iGDP and Dongbei University of Finance and Economics Press held a Global Symposium on Climate Governance and China's Low-Carbon Development and a book launch, the Chinese translation of *Planetary Economics* by Professor Michael Grubb on July 19, 2017. More than 60 experts and scholars attended the conference.



### Green Low-Carbon Development Think Tank Partnership 2018 Annual Conference

GDTP held its 2018 Annual Conference in Huzhou City, Zhejiang Province on January 26, 2018. Nearly 100 experts and think tank partners attended the conference, which was on the theme: “New Thinking behind China's Low-Carbon Development and Transformation” and focused on building a national carbon market, China's medium- and long-term development strategy, and local, low-carbon development during the 13th Five-Year Plan (2016-2020). Participants discussed regional low-carbon development, green finance, and the Belt and Road Initiative.



## Publications

### Series of Translated Books by GDTP

This initiative has translated and published a series of books under the leadership of Professor He Jiankun, a senior advisor of GDTP. It is supported by iGDP, and the books are published by the Dongbei University of Finance and Economics Press.

## Energy Statistics 2017 (Chinese)

Wang Qingyi, a GDTP expert has been working on China's energy statistics for more than a decade and has been releasing annual energy data reports. The report collates, processes, and integrates energy data from Chinese and overseas sources according to internationally-recognized indices, definitions, methodologies, and rules and offers a comprehensive and internationally-comparable set of data. So far, with iGDP's help, 2015 Energy Data (Chinese and English), 2016 Energy Data (Chinese) and 2017 Energy Data (Chinese) have been published.



## China's Population Resources and Environment (GDTP special edition)

Working with China's Population Resources and Environment magazine, GDTP called for submissions of annual conference papers for partner institutions and experts in July 2017. After receiving a total of nearly 40 submissions from partner institutions, experts, college teachers and students, nine articles were selected for publishing in the 2018 April issue of China's Population Resources and Environment.

### Media Platform

GDTP launched its official website and WeChat account in 2014. Since then, they have become platforms for think tank partners and experts to voice their opinions. Below is a list of op-eds published on the two platforms.

### Op-eds

Cooling the Earth: Experts' Discussion

2017/7/27

Article Highlights from Annual Meetings  
2017/2/8-2017/3/13

Ma Li | Carbon Reduction and Carbon in  
the Power Industry

Tang Renhu | Building Systems to Audit  
and Report Greenhouse Gas Emissions

Chai Qimin | Cross-Regional Carbon  
Markets and International Cooperation

Qi Shaozhou | Actions and Challenges in  
Linking the Hubei Pilot with the National  
Carbon Market

Duan Maosheng | Key Issues in the Design  
and Launch of the National Carbon Market

Lin Ling | Progress in International and  
Domestic Carbon Emission Management  
Standardization

Hal Havey | How to Create a Low-Carbon City: Twelve  
Basic Principles of Green Wisdom Development

Tang Jie | A Comparative Analysis of Economic Growth  
and Carbon Emissions in China and the United States

Zou Ji | Implementing the Paris Agreement: Establishing  
Links between Medium- and Long-Term Strategies and  
Policy Measures

He Jiankun | Hope for the China Model Becoming a  
World-Class Model

He Jiankun | Strategies to Creating a Unified National  
Carbon Market

He Jiankun | Peaking Emissions Does Not Only Depend  
on Time But Also Strength

He Jiankun | Now is the Right Time for Low-Carbon  
Development

# Progress and Prospects:

China's Cities Transitioning toward Energy Sustainability,  
and Pursuing Early Peaking of Carbon Emissions

2017 results from the 'China LOGIC' city index  
(‘LOGIC’ : Low-carbon & Green Index for Cities)

Innovative Green Development Program (iGDP)  
Lawrence Berkeley National Lab (LBNL)  
Energy Foundation China (EFC)



# Executive Summary

## Chapter E1. China's Low Carbon City Policy System

China is one of the two largest economies in the world. China is also in the midst of the largest wave of urbanization the world has ever seen – with 770 million people currently living in cities, up from 190 million in 1980. China is forecasted to have more than 1 billion urban inhabitants by 2030 – which will represent 70% of China's population, and 11% of the global population living in Chinese cities<sup>1</sup> at that time.

China also exerts a significant influence on the environment – locally and globally. China's industrial and urban development over the past 30 years has been a miracle – lifting 700 million<sup>2</sup> people out of poverty, and positioning China as a global leader in manufacturing, trade, business, and urban development. But this development miracle has come with steep environmental costs. Air pollution, soil and water pollution, energy use, and carbon dioxide emissions in China are well documented, well recognized, and China's government is responding through a range of measures.

China has reached a genuine turning point. With the urban population still expected to increase by more than 300 million people over the next 15 years, Chinese cities will continue to expand – requiring more infrastructure and housing, requiring new industries and jobs, consuming more land, energy, and natural resources, and at the same time producing more waste, pollution, and emissions. The choices that Chinese city leaders and policymakers make today will significantly shape future development patterns across China's cities. This matters for city residents, for their local environments, and for the entire planet.

Cities around the world are increasingly recognized as the primary centers of resource consumption and greenhouse emissions. Cities are also on the front lines facing the most intense early effects of climate change – from intensified flooding, dangerous heat waves, or water supply shortages. But cities around the world are also the primary centers for action. It is at the local level of cities that real climate and environment action takes place – i.e. improving energy efficiency, shifting to renewable resources, protecting of local environments, and safeguarding human health and livelihoods. Cities across the globe are coming together to share information and practices for more sustainable and resilient urban development.

And China is already seizing this opportunity. In recent years, Chinese government agencies have established many policies and initiatives aimed at transforming economies, improving local environments, reducing pollution, and piloting new innovations for greener growth in cities. During the 11th Five Year Plan (FYP), China's Ministry of Housing and Urban/Rural Development (MOHURD) launched an eco-city pilot program to promote urban sustainability. Since 2010, China's National Development and Reform Commission (NDRC) has

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<sup>1</sup> China's State Council. National Population Development Plan (2016-2030). Available at: [http://www.gov.cn/zhengce/content/2017-01/25/content\\_5163309.htm](http://www.gov.cn/zhengce/content/2017-01/25/content_5163309.htm). 2017-01-25/2017-10-10 (in Chinese)

<sup>2</sup> China's State Council. China's Progress in Poverty Reduction and Human Rights. [http://news.xinhuanet.com/politics/2016-10/17/c\\_1119730413.htm](http://news.xinhuanet.com/politics/2016-10/17/c_1119730413.htm). 2016-10-17/2017-10-10



launched low-carbon pilots in 81 cities and six provinces<sup>3</sup>. In 2014, the State Council issued the National New-type Urbanization Plan – setting indicators and targets for urban infrastructure and urban socio-economic development<sup>4</sup>. And in 2015, 21 Chinese cities joined a pledge to peak energy-related CO<sub>2</sub> emissions before the national target year of 2030 (Alliance of Peaking Pioneer Cities (APPC)). In the critical area of urban air quality, the Ministry of Environment Protection (MEP) and the State Council in 2012 and 2013 announced tougher controls on air pollution<sup>5</sup>; issued a new Atmospheric Pollution Prevention Action Plan<sup>6</sup>; and established a network of 500 PM<sub>2.5</sub> monitoring stations across 70 Chinese cities. There have also been a number of sectoral measures of implemented in cities for buildings, industry, energy efficiency, and electric vehicles, among others.

China is taking these challenges seriously and is rapidly moving in the right direction to meet its green and low-carbon carbon city goals.

## Chapter E2. Introducing the China Low-Carbon and Green Index for Cities (LOGIC)

### China LOGIC

Despite the above efforts, there remains a need for a practical framework to measure, report, and analyze the progress made by a city as a whole – across a full and balanced set of green and low-carbon urban indicators. This project developed the China Low-Carbon and Green Index for Cities (LOGIC) to meet that need.

LOGIC is intended to provide a holistic assessment of China’s transition to both “green” and “low-carbon” urban development. “Green” indicators evaluate multiple environmental parameters related to urbanization and climate change: air quality, water use, solid waste, transport networks, and urban green space. “Low-carbon” indicators measure reduction of GHG emissions, with a focus on energy-related CO<sub>2</sub>.

LOGIC is a new index. It builds off existing international and domestic-Chinese city indicator systems, and includes indicators commonly used internationally (see section below), but it offers a new system that more fully reflects balanced ‘economic, green, and low-carbon’ objectives within China’s unique urban and policy context. Importantly, LOGIC relies on indicators that have publicly available data in China’s statistical system.

LOGIC builds upon past work on indicator systems, including China Academy of Social Sciences’ Regional or Local Economic and Social Progress Evaluation Methodologies, iGDP’s City-Level Carbon Emissions Calculator, iGDP’s Policy Mapping Tool, as well as LBNL’s Benchmarking and Energy Saving Tool for Low Carbon Cities (BEST Cities) and the Eco and Low-carbon Indicator Tool for Evaluating Cities (ELITE Cities) tools. LOGIC is scientifically rigorous and is designed to have meaningful practical applications. The process developing LOGIC involved many rounds of data review, analysis and testing, and review by key experts in China.

<sup>3</sup> China’s National Development and Reform Commission. Available at <http://www.ndrc.gov.cn> (in Chinese)

<sup>4</sup> China’s State Council. National New-type Urbanization Plan. Available at [http://www.gov.cn/zhengce/2014-03/16/content\\_2640075.htm](http://www.gov.cn/zhengce/2014-03/16/content_2640075.htm). 2014-03-16/2017-10-10

<sup>5</sup> China’s Ministry of Environmental Protection. 12th Five-Year Plan on Air Pollution Prevention and Control in Key Regions. Available at: <http://www.mep.gov.cn/gkml/hbb/bwj/201212/W020121205566730379412.pdf>. 2012-12/2017-10-10 (in Chinese)

<sup>6</sup> China’s State Council. Atmospheric Pollution Prevention Action Plan. 2013 Available at: [http://www.gov.cn/zwgk/2013-09/12/content\\_2486773.htm](http://www.gov.cn/zwgk/2013-09/12/content_2486773.htm). 2013-09-10/2017-10-10

The main purpose of LOGIC is to evaluate the status of environmental (“green”) and low-carbon development across a range of energy use, carbon emission, and environmental and socio-economic indicators for a large number of Chinese cities. LOGIC can be used to track city performance over time, in conjunction with policy cycles, recognizing that low-carbon development requires both immediate and sustained action. LOGIC can also inform current and future policy, and the data gathering needed to support it. The 2017 report analyzed data from 115 Chinese cities, making comparisons over the period from 2010 to 2015. The goals of the analysis and the report are to:

- Achieve a representative sampling of different kinds of Chinese cities
- Assess the state of green and low-carbon urban development in China in 2015; and look at changes in low-carbon city performance over the 2010 to 2015 time period
- Demonstrate the utility of LOGIC by exploring the index categories and indicators, as well as a few case studies in detail

## Selecting Chinese Cities for LOGIC

LOGIC team gathered the largest collection of city-level data on low-carbon development, with data for 115 cities, 23 indicators, plus ten economic and demographic characteristics, and two annual sets of data (2010 and 2015). In order to compare patterns and trends for different kinds of cities, five different city groups were examined, with each of the 115 cities being assigned to a sub-group under each group. The groups and sub-groups are listed here:

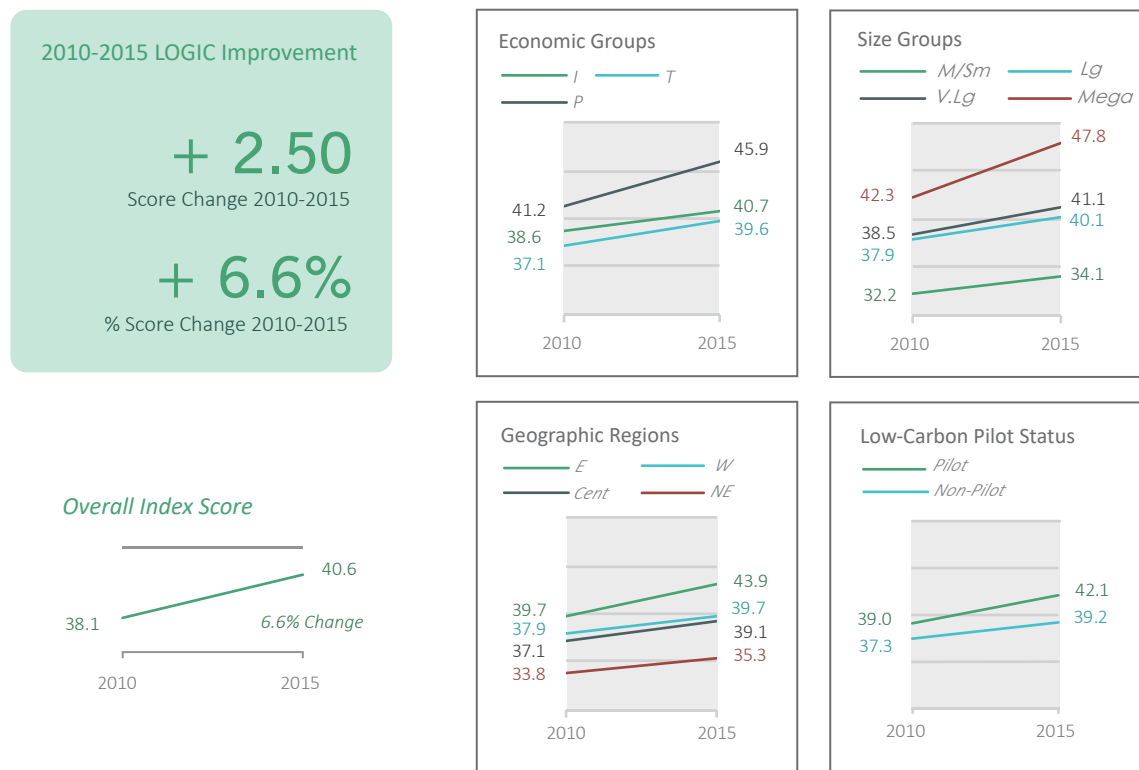
Economic Groups	Size Groups	Geographic Regions	Low-Carbon Pilot Status	Functional Zone
<ul style="list-style-type: none"> <li>● Group P (post-industrial)</li> <li>● Group I (industrial)</li> <li>● Group T (transitional)</li> </ul>	<ul style="list-style-type: none"> <li>● Mega (&gt;10M)</li> <li>● Very Large (5-10M)</li> <li>● Large (1-5M)</li> <li>● Medium/Small (&lt;1M)</li> </ul>	<ul style="list-style-type: none"> <li>● East</li> <li>● Central</li> <li>● Northeast</li> <li>● West</li> </ul>	<ul style="list-style-type: none"> <li>● Low-Carbon Pilot</li> <li>● Non-Pilot</li> </ul>	<ul style="list-style-type: none"> <li>● Optimized Development Zone</li> <li>● Key Development Zone</li> </ul>

## Chapter E3. Key Findings

China's cities are getting greener – overall green and low carbon index scores improved from 2010-2015.

The average overall index score across all of China's cities grew 2.5 points, or 6.6%, from 2010 to 2015<sup>7</sup>. In aggregate, cities of all types saw growth in their average overall scores – the economic groups, size groups, regional groups, and policy groups in this study all saw LOGIC score growth, ranging from 4% to 13%. China's large "Mega" cities, "post-industrial" cities, and low-carbon pilot cities performed particularly well over this period. Moreover, within the LOGIC framework, 6 out of 7 categories saw average scores increase from 2010-2015 (ranging from 1% (Energy & Power) to 30% (Economic Dimension); and 11 out of 19 indicators saw an increase (ranging from 1.7% {Heavy Industry Share} to 121% (Urban Rail Extent). The index allows exploring and understanding of these trends, along with observations, such as: how the Environment & Land Use category dropped by 4.7%, and how seven out of 19 indicators' scores dropped.

Figure 1 - LOGIC Score Changes from 2010 to 2015; Overall, and by City Groups



More than 90 out of 115 cities in the sample saw both GDP growth and LOGIC score growth over the 2010-2015 time period.

All of the 115 cities in the sample saw significant GDP growth from 2010-2015 (ranging from 40%, to greater than

<sup>7</sup> Note that in this report, LOGIC score comparisons between 2010 and 2015 exclude the 'Policy & Outreach' index category, because this category refers to planning and outreach efforts mandated after the year 2010. See further discussion in Chapter 4 of this report. However, if the Policy & Outreach category is included in the comparison, average overall LOGIC scores increased by 6.8 points, or 17.8%, from 2010 to 2015.

100% growth over the five-year period). More than 90 of these cities also increased their LOGIC scores over the same period – some with slight increases, others with as much as a 25% increase. Among these, there are two unique clusters of high-performing cities (see Figure 2). One cluster showed the highest total GDP growth (in the 90th percentile), and also had LOGIC score growth between 5-15% over five years. Another cluster showed the highest LOGIC score growth (in the 90th percentile), and also had GDP growth that was well above the national average. Cities in both of these clusters demonstrate that green and low-carbon goals do not need to come at the expense of economic performance.

Figure 2 - Change in GDP Growth vs. Change in LOGIC Index Growth, 2010-2015; for all 115 cities in the sample

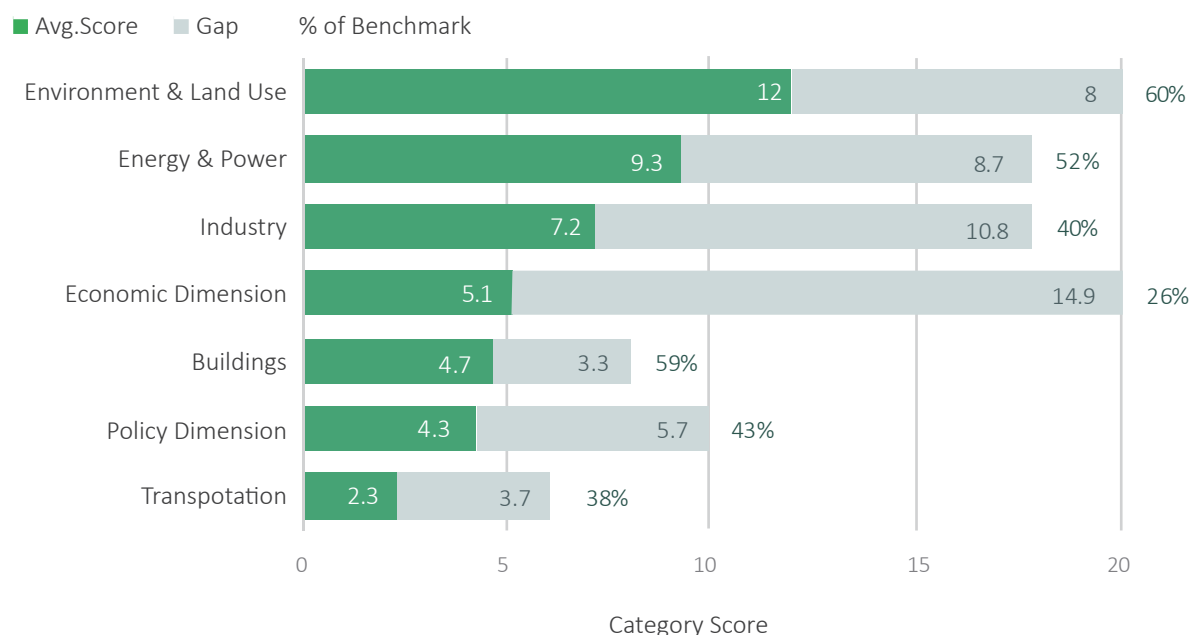


## Chinese cities have significant potential to improve their Green & Low Carbon performance.

While Chinese cities' LOGIC scores and economies have both grown in recent years, the average overall index score for all Chinese cities in 2015 is still only 44.9, out of 100. Chinese cities have room to improve. Yet, within the sample, some Chinese cities did achieve high scores; and the large margin between the average score, and scores achieved by China's best-performing cities indicates a positive pathway for all cities to catch up. China is early in the green & low-carbon transition of its cities and has made strong commitments to restructuring urban and economic development away from resource-intensity and pollution. Furthermore, LOGIC, by definition, is ambitious – its indicators are designed using world-class green benchmarks and are intended to push Chinese cities to do more, and quicker. LOGIC provides a scale to measure China's continuing progress; and the top-ranking cities, as well as the international benchmarks can help to point out a low-carbon path forward.



Figure 3 - Comparing Average LOGIC Scores by Category, along with performance relative to category benchmark values

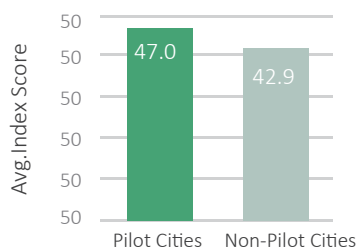


## China's Low-Carbon Pilot Cities have been quicker and more successful in achieving green & low-carbon results.

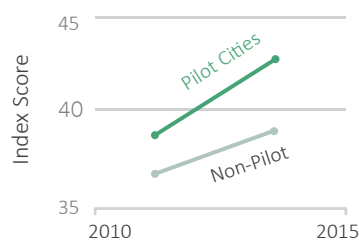
The average overall index scores in 2015 for *Low-Carbon Pilot Cities* was 47.0, compared to an average of 42.9 for non-pilot cities. Furthermore, *Low-Carbon Pilot Cities* make up 80% of the list of Top 20 LOGIC cities in 2015 (despite being less than half of the sample population). And, pilot cities saw a quicker increase in their scores over the 2010-2015 period – this quicker growth is true for the overall index score, as well as for most of the index categories/sub-categories<sup>8</sup>. Relative to all cities, China's low-carbon pilot program is working so far, although more work is required overall to fully achieve China's green and low carbon goals.

Figure 4 - Comparing Low Carbon Pilot City and Non-Pilot City Performance; 2015 average scores, and improvement from 2010 to 2015

### Pilot Cities have higher average scores



### ...and, Pilot Cities scores improve faster



<sup>8</sup> Note: comparison of LOGIC scores between 2010 and 2015 excludes the Policy & Outreach category. See Chapter 4 for more discussion on this.

## Cities of all types can be Top-Performers in green & low-carbon development.

Results from LOGIC indicate that cities of all types can be top-performers; and that no matter which type of city, or which category of measurement, cities can always learn from others and explore ways to be greener. Table 1 shows that the list of Top 20 LOGIC cities in 2015 includes a diverse range of cities from most Economic Groups, Size Groups, Regions, and policy groups (only Medium-Small cities, and Northeastern cities are not represented on the list). Furthermore, within each group, there are high performers and low; and peer cities can learn from their high-performing counterparts. Likewise, within each of the index categories/sub-categories, there is a range of city performances – high and low. Peer cities can learn specific green and low-carbon policies and actions from high-performers in any category. LOGIC can be used for city knowledge sharing, and to analyze pathways for any kind of city, across any metric.

Table 1 - List of Top 20 Cities, Ranked by 2015 Overall Index Score

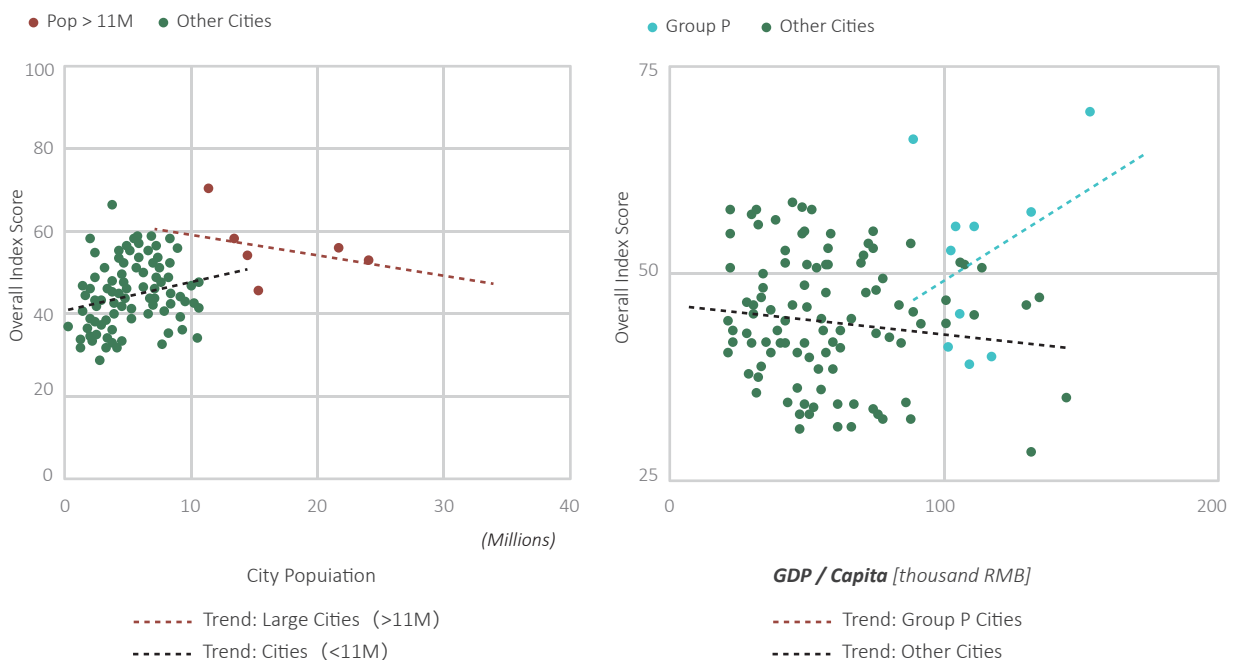
City Name	Rank, Overall Index	Overall Score	Economic Group	Size Group	Region	Low Carbon pilot Status
Shenzhen	1	69.7	Group P	mega	East	Pilot
Xia'men	2	66.0	Group P	large	East	Pilot
Changde	3	58.5	Group I	large	Central	Non-Pilot
Nanning	4	58.2	Group I	large	West	Non-Pilot
Haikou	5	57.7	Group T	large	East	Pilot
Ganzhou	6	57.5	Group I	large	Central	Pilot
Guangzhou	7	57.5	Group I	mega	East	Pilot
Shantou	8	57.4	Group T	large	East	Pilot
Jieyang	9	56.7	Group I	large	East	Pilot
Guilin	10	56.3	Group I	large	West	Pilot
Zhanjiang	11	55.8	Group I	large	East	Pilot
Beijing	12	55.5	Group I	mega	East	Pilot
Hangzhou	13	55.3	Group I	very large	East	Pilot
Nanchang	14	54.8	Group T	large	Central	Pilot
Wenzhou	15	54.8	Group T	very large	East	Pilot
Guangyuan	16	54.7	Group I	large	West	Pilot
Jiangmen	17	54.5	Group I	large	East	Pilot
Kunming	18	54.5	Group T	large	West	Pilot
Chengdu	19	53.7	Group T	mega	West	Non-Pilot
Yangzhou	20	53.6	Group T	large	East	Non-Pilot

## Large (but not too large) cities, and post-industrial cities are greener.

LOGIC results show that cities with larger populations have higher overall index scores – *except* for the largest mega cities (with populations above 11 million people), where overall index scores *decline* with increasing population. This is illustrated in Figure 5 below, with the scatter plot showing two groups of cities by population size with two trend lines going in opposite directions. One explanation for this is that generally, as cities grow, agglomeration effects allow greater efficiency (in terms of resources, transport travel times, and other urban services); but at a certain scale, large cities lose these size and efficiency benefits. Therefore, the largest mega cities will need special policy attention, and different strategies to maintain and improve green and low-carbon performance.

Also observed in LOGIC is that cities at the post industrialization stage (Group P) show a decoupling between economic growth and carbon & pollution emissions. For Group P cities: higher incomes, come with higher index scores. While for Group T and Group I cities, the reverse is true: higher incomes go with lower scores. There appears to be a turning point marking the shift in economic development pattern from manufacturing and transitioning cities (Groups T and I, which rely on heavy industry), to post-industrial cities (Group P, which focus on more efficient manufacturing and the service sector for growth). This again indicates that special attention needs to be given to cities' green and low-carbon policy actions, based on their level of economic development. An important aim will be focusing on how to improve industrial and transition cities, and how to maintain and promote the performance of wealthier post-industrial cities.

*Figure 5 - LOGIC Turning Points: (left) the largest mega cities' scores decline; and (right) the wealthiest post-industrial cities' scores increase*



As might be expected, within the LOGIC framework, the three inter-related categories of Economic Dimension, Industry, and Energy & Power are assigned relatively high weights in the model (i.e. importance). This also reflects an ongoing challenge and primary driver of China's ability to pursue its green & low-carbon objectives. Looking at the 2015 LOGIC results can provide some insights. Examining the categories that contributed most to the differences between high-performing and low-performing cities shows that the Economic Dimension, Industry, and Energy & Power categories had the most influence. Figure 6 shows all 115 cities lined up from lowest to highest score. Beneath, the category differences that contributed to cities being among the Bottom 20 cities, the Middle Range cities, and the Top 20 cities are shown as a waterfall diagram. However, city performance overall in these three categories is relatively weaker in 2010 and 2015. This is related to China's well-known challenge of transitioning from an energy- and resource-intensive economy based on investment, heavy industry, manufacturing, and export and toward a more modern, high-tech, and high-value knowledge and service economy.

Figure 6 – All cities' LOGIC scores, and category contributions to Top Performing and Bottom Performing scores

The chart displays the LOGIC Score for three groups of cities: Bottom 20 cities, Middle Range Cities, and Top 20 Cities. The scores are calculated by adding the contributions of various categories, with the final score for the Top 20 Cities being 57.1.

Category	Score
Bottom 20 cities	33.3
Energy & Power	4.5
Industry	2.3
Economic	2.1
Environment	1.2
Health	0.8
Education	0.3
Transportation	0.1
Middle Range Cities	44.7
Environment	0.0
Health	0.4
Education	0.5
Transportation	1.5
Industry	2.9
Economic	3.4
Energy & Power	3.7
Top 20 Cities	57.1



The Environment & Land Use category also needs special attention – this was the only category to have an overall decrease in scores from 2010 to 2015.

*Rapid urbanization in China has come with the cost of severe environmental degradation; and these well-known challenges (air quality, water pollution, etc.) will need a new focus on implementation of policies and the right political and economic structures to reverse this trend.*

The LOGIC methodology and tool allows deep and detailed exploration of city performance: to identify promising opportunities, and to understand challenges.

LOGIC has been designed to answer key questions such as: *which types of Chinese cities perform better? And, what factors most determine cities' green and low carbon success?* Exploring index results and trends over time allows answers to these questions. The rest of the report is devoted to exploring these kinds of questions in more detail.

- Which types of cities tend to perform better in the index?
- How does city performance vary across LOGIC component categories?
- What are the overall trends, and what potential policy pathways can cities pursue for green & low-carbon development?

## Chapter E4. Recommendations

LOGIC gives us a snapshot of how cities in China have been performing with respect to their green and low-carbon transition goals. Looking forward, LOGIC also helps to identify and highlight the priorities and challenges that will help China's cities to effectively pursue low-carbon development and energy sustainability in smart and effective ways. Based on the results of the 2017 LOGIC analysis, our team makes the following recommendations for the low-carbon and green transition in China's cities:

**Cities and high-level policymakers in China can use the LOGIC framework and benchmarks to accelerate their progress and promote the best green & low-carbon policy pathways according to their specific contexts and needs.**

Clearly, there is no single set of solutions to apply to all cities – especially for China's cities, which vary widely in economic, population, and natural conditions. The LOGIC framework and tool can be used as a guide for cities to tailor individual pathways in their green and low-carbon transition. LOGIC's set of seven categories and 23 indicators help cities identify which aspects are important. The benchmarks and scoring process help cities to evaluate their performance against international best cases, against other cities in China, and against their own past and future performance. This helps cities to identify their strengths, and also identify key gaps for future attention. Most importantly, LOGIC includes data and scores from 115 cities across China – from different regions, different economic development stages, and different population sizes. Any city using LOGIC can

identify with one of these groups, and look to the top-performing cities in each group, and in each category (energy & power, environment, transport, etc.) to make connections and find specific actions to implement in their own green and low-carbon pathway.

### **Cities at different stages of economic development have different priorities and should design low-carbon policies and pathways to suit their unique needs.**

Analysis of the 2015 LOGIC scores indicates that the economic development stage of a city (industrial, transition, or post-industrial) plays an important role in green and low-carbon performance, and that these different types of cities all have their own unique challenges and priorities. Sample cities' economic development stages ranges widely – from cities with GDP per capita of \$3,678 USD (such as Wuwei in 2015, which is still under the national average), to cities with GDP per capita of \$24,690 USD (such as Shenzhen, which is above the level of 'high-income' countries<sup>9</sup>). In LOGIC, cities are analyzed and compared in three economic groups: Group I (industrial), Group T (transitional), and P (post-industrial). These economic groups vary in their scoring and show different patterns of performance for different index sub-categories and indicators. These differences suggest that cities need to focus on different priorities, but also that cities with similar levels of economic development can learn from each other. Industrial cities (Group I) need to focus on improving industrial energy efficiency and investing more in low-carbon and non-fossil fuel power sources (i.e. upgrading existing industrial facilities and setting high energy-efficiency standards for new industrial projects). Transitioning cities (Group T), which have somewhat higher income levels, could prioritize decarbonizing their economies, reducing the share of heavy industry in the economy, and investing in the service sector (including consumption, technology, and information-oriented growth). The post-industrial cities (Group P) need to focus on transportation systems, and energy efficiency levels in buildings, as well as promoting low-carbon lifestyles among their residents.

### **Chinese cities should continue to demonstrate strong political leadership and ensure consistent follow-through and action on their low-carbon commitments.**

Policy leadership and political will are critical factors for cities to achieve a green and low-carbon transition. And it is clear from the 2015 LOGIC results that China's Low-Carbon Pilot Cities performed, on average, better than non-pilot cities. Pilot cities had higher overall index scores; and for six out of seven index categories, pilot cities had higher average category scores, and faster growth between 2010 and 2015, as compared to non-pilot cities. In this regard, the policy efforts promoted through these pilot cities have been effective. However, it is interesting and surprising to note that for the Environment & Land Use category, pilot cities had lower scores than for non-pilot cities. Also, that among the 21 cities in China whose LOGIC scores dropped from 2010 to 2015, eight were pilot cities. This implies that so far, the low-carbon policies and actions applied in this set of cities have not been working, despite the political attention and momentum they have enjoyed. At this stage, further analysis and deeper study of these cities is required to understand the drivers behind both the most-successful and least-successful pilot cities. This will be follow up work for our team, based on the 2015 LOGIC results. However, the immediate conclusion is that political leadership is important and does make a difference (pilot cities were spurred to perform and improve faster); but the "will to be green" is not enough – the political will

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<sup>9</sup> High Income countries are defined by the World Bank as having per capita GDP values above \$12,615 USD

needs to be backed up by real actions that make a real difference in transitioning cities onto the green and low-carbon pathway. The LOGIC framework and tool gives fairly high weight to the “policy and outreach category”, and can be used to track city green performance into the future.

**As Chinese cities continue to develop and become wealthier, they should promote policies for green citizen lifestyles, backed by green urban planning and infrastructure development as the key to ensuring they can meet early carbon peaking goals.**

China has already committed to peaking its carbon emissions before 2030, at national level. Reaching this goal will depend on the local policies and performance in hundreds of cities across China. Analysis shows that China can potentially reach its CO<sub>2</sub> peaking goal by 2030, at which time it is expected to have an income of \$14,000 USD GDP per capita, which is lower than many developed countries. Reaching this peak level and this income level would mean that most of the cities will have developed into the post-industrial (Group P) cities analyzed in this report. The 2015 LOGIC results showed that while there is an overall trend for the wealthier and more economically developed cities (i.e. Group P cities, larger cities, and cities with higher GDP) to have higher overall index scores; these cities also tended to perform worse in the Energy & Power, Buildings, Transport, and Environment index categories. This implies certainly that in order to improve in these areas, wealthier cities need new policies and action in these areas. But more importantly, if the trend is for all cities in China to become wealthier and more developed, then there is a risk that increasing wealth will come with lower performance in these key LOGIC categories. Cities and policy makers across China need to take strong actions now to avoid high energy and high carbon urban lifestyles. Cities instead need to promote more energy efficiency in buildings and transport, low-carbon lifestyles, and reductions in resource use and environmental pollution. To that end, to avoid lock-in effects cities need to start early to introduce green urban planning rules, tighter building codes and high efficiency home appliances. Cities also need to cultivate lifestyles which are less material-oriented, curb high levels of car ownership, and avoid energy waste in heating and cooling of empty houses, etc.

**Mega-cities in China need special attention, to avoid pitfalls and backsliding on low-carbon and green development goals.**

A number of recent reports have shown that, up to a point, as cities become bigger, their increasing population size comes with density and efficiency advantages that help to improve their green and low-carbon performance<sup>10</sup>. However, this beneficial trend breaks down for very large, mega cities – which tend to have weaker green and low-carbon index scores than their smaller peers. This finding was illustrated in a 2017 study by the Urban China Initiative and McKinsey and Co<sup>10</sup>; and is consistent with the 2015 LOGIC results. LOGIC finds a linkage between city size, in terms of population, and index performance: up to a population of 11 million people, as a city grows, its overall LOGIC score increases; but when city population passes a 11 million, the overall index scores decrease as population grows. In most cases, these mega cities are also the wealthier and more developed cities (i.e. Group P cities, in this study). As noted before, these larger, higher-income cities tend to have higher energy use and elevated carbon emissions in the transportation and building sectors. Therefore, LOGIC suggests that mega cities need to consider green and low-carbon transitions carefully, and differently than

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<sup>10</sup> Urban China Initiative. Urban Sustainability Index – USI 2016. Available at: [www.urbandchinainitiative.org](http://www.urbandchinainitiative.org). 2017-04-13/2017-10-10

other, smaller cities. This includes special attention to population size and city sprawl, and consideration of the need to set development constraints (not only in terms of territory, but also population), while planning their long-term green and low-carbon development vision.

**Cities and high-level policymakers should continue to use comprehensive data-driven analysis to evaluate, track, and compare low-carbon and green performance.**

Using data and indicators is critical for cities to understand their progress and performance in their green and low-carbon goals. LOGIC was built as a third-party framework and tool to serve the need for transparent and consistent data measurement and reporting for China's green transition. And the 2015 LOGIC results show the benefit of green measurement and tracking – with the ability to evaluate individual cities, or groups of cities over time, and across a wide range of index categories and indicators. Cities in China need to further employ this data-driven approach to evaluate their own plans and progress. Cities need to develop official measurement, reporting and evaluation (MRE) systems; which help to evaluate and prioritize low-carbon actions and investments. Such MRE systems can also serve as important communication tools for cities to share performance and actions with other cities, with the public, or with the international community. LOGIC can provide such a tool and platform.

**The critical steps to turn political will into action will be for city leaders and policymakers to prepare integrated low-carbon action plans, coupled with robust policy implementation and social-economic analysis that support decision-making and concrete action.**

The LOGIC tool provides snapshots in time to evaluate the green and low-carbon performance indicators across the different index categories. The next steps are for cities to take these results and conduct deeper, integrated cross-sector analysis to understand the real opportunities for actions in all categories; and to develop strategic action plans to implement the most cost-benefit pathways. Developing the low carbon action plans or city early peaking plans should be a practice in all cities. And improving the quality of these plans is key to really identifying actionable measures and projects to capture the best mitigation gains.







# Partnerships

(Pinyin for the order)

## Founding Organization

- ❖ Energy Foundation (China)

## Partners

- ❖ China Academy of Fiscal Sciences
- ❖ China Sustainable Development Institute
- ❖ China Energy Group, Lawrence Berkeley National Laboratory
- ❖ Energy Research Institute, National Development and Reform Commission
- ❖ Huazhong University of Science and Technology
- ❖ Institute of Low-Carbon Economy, Tsinghua University
- ❖ International Institute for Sustainable Development
- ❖ National Center for Climate Change Strategy Research and International Cooperation
- ❖ Rocky Mountain Institute
- ❖ Shenzhen Low-Carbon Development Foundation
- ❖ School of Environmental and Natural Resources, Renmin University of China
- ❖ UNESCAP East and North-East Asia Office
- ❖ Wuhan University
- ❖ World Resources Institute
- ❖ Yuheng Sustainable Transportation Research Center
- ❖ Zhejiang Province Center for Climate Change and Low Carbon Development

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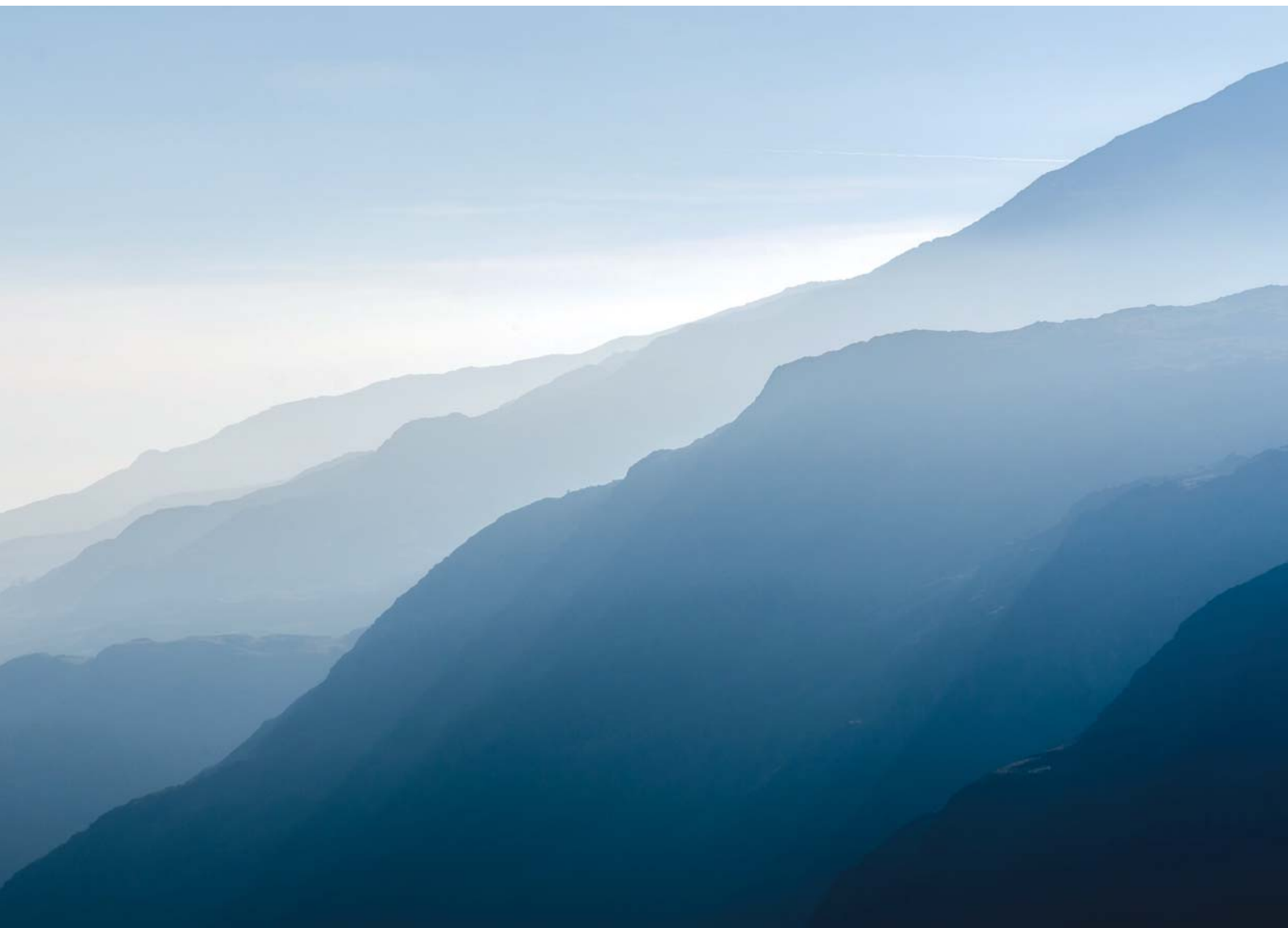


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<http://www.igdp.cn>





iGDP

ADDRESS:7-1-51, JIGUOMENWAI DIPLOMATIC RESIDENCE COMPOUND, NO.1 XIUSHUI STREET, CHAOYANG DISTRICT,  
BEIJING, 100600, PEOPLE'S REPUBLIC OF CHINA

TEL:86-10-8532-3096

FAX:86-10-8532-2632

EMAIL:IGDPOFFICE@IGDP.CN

WEB:WWW.IGDP.CN