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## LOW-CARBON URBAN DEVELOPMENT IN CHINA: *CURRENT INITIATIVES, FUTURE PLANS AND FIRST LESSONS*

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## LIST OF ABBREVIATIONS

|               |   |
|---------------|---|
| <b>GHG</b>    | Greenhouse Gas  |
| <b>ETS</b>    | Emissions Trading System                                  |
| <b>ICLEI</b>  | International Council for Local Environmental Initiatives |
| <b>INDC</b>   | Intended Nationally Determined Contribution               |
| <b>RMB</b>    | Renminbi (China's currency)                               |
| <b>UNFCCC</b> | United Nations Framework Convention on Climate Change     |

## SUMMARY

The aim of this Pocacito Policy Brief is to give an overview of the rapid urbanisation in China and the country's planned responses. It shows the strong dynamic in China towards low-carbon urban development. In addition to the low-carbon pilot projects in provinces and cities, China has launched national low-carbon industrial pilot parks, including green transportation provinces and cities, green highways and green ports. Instead of a taking a top-down approach, China is implementing a large variety of low-carbon pilot projects or policies to test different approaches at provincial, city and community levels and then incorporating successful elements into state-level pilots. Insights gleaned from these efforts may be valuable for the EU, especially in those areas where Europe is less advanced, such as industrial low-carbon pilot projects or urban-emissions trading. At the same time, the growing number of pilot projects in China may offer additional opportunities for the EU to transfer know-how or technologies in areas where the EU is a global leader, such as in bio-energy technologies, wastewater treatment or urban logistics. But China can benefit also from the EU's experiences. More frequent interaction at the city-to-city level will therefore play an important role, with Chinese experts gaining in-depth understanding from the EU's experiences, which they can disseminate in a way that is accessible to Chinese stakeholders and policymakers.

## 1 INTRODUCTION

This Policy Brief was written as part of the EU POCACITO project, which is dedicated to "Post-Carbon Cities of Tomorrow". The aim of the paper is to give an overview of the rapid urbanisation in China and China's planned responses to the phenomenon. It focuses on the implementation of low-carbon initiatives in cities and provinces but also the broader Chinese climate policy agenda. In addition, the Policy Brief gives detailed insights from a POCACITO case study on Guangyuan City. The observations and lessons drawn also aim to contribute to the EU's efforts to develop low-carbon cities.

The first section deals with the challenges posed to China from its rapid urbanisation. The second part covers China's climate change policy, presenting the achievements made, the country's Intended Nationally Determined Contributions (INDCs) under the UNFCCC, described in Box 1 on page 6, and a range of national low-carbon pilot projects at different levels (province, city, industrial park and community). That section is followed by a discussion of the main barriers to a low-carbon transition in China and the role of international cooperation. The example of Guangyuan City describes in detail the challenges of implementing a low-carbon city pilot project in China. The final section offers conclusions on the Chinese experience and its implications for the EU's actions aimed at fostering post-carbon cities.

## 2 THE CHALLENGE OF RAPID URBANISATION IN CHINA

Far more than the EU, China is in the process of a rapid urbanisation development, and more than three decades after the reform and opening up the country, China's urbanisation has made remarkable progress. From 1978 to 2015, the number of permanent urban residents in China soared from 170 million to 771 million. Along with this development, the urbanisation rate increased from 17.9% to 56.1% (NBS 2015). The number of cities in China rose from 193 in 1978 to 658 in 2010 and the number of designed towns surged from 2,173 to 20,113 in the period 1978-2010, according to the sixth demographic census in 2010. Three city clusters, namely the Beijing-Tianjin-Hebei Region, the Yangtze River Delta and the Pearl River Delta, represent 18% of the total population living on 2.8% of the national territory, and generating 36% of China's GDP. They became the main platforms to enable China's rapid economic growth and participation in international economic cooperation and competition (State Council 2014). Rapid urbanisation has facilitated an unprecedented economic transformation in the past 30 years, which catalysed China's strong GDP growth and pulled more than 500 million people out of poverty (WB and DRC, 2014).

However, extensive and rapid urbanisation has also caused serious environmental, social and economic problems. Social and environmental progress has not kept pace with the speed of urbanisation. The production, living and ecological needs of urban and rural residents are not being satisfied. The regional development is unbalanced; the urbanisation level relatively lags behind the industrialisation level: a large number of migrant workers have made outstanding contributions to urban construction without enjoying 'citizen' treatment to which they are entitled.

At the same time, natural resources the and environment are coming under increasing pressures due to extensive and rapid urbanisation, with a strong growth of fossil energy consumption, carbon emissions but also air pollutants. Some cities expanded recklessly with mass-destruction and mass construction, consuming plenty of iron, steel, cement and other energy-intensive products and emitting a large amount of pollutants.

With the gradual slowdown of China's economic growth rate from 10% to 6.5% in 2016, China's urbanisation process in the future will also slow down and the country will attach particular importance to aspects such as the spatial distribution of cities and population in its development. It has been estimated that by 2030, cities will be home to 70% of China's population and generate 75% of its GDP (UNDP China, 2013).

The urbanisation process will exert a profound influence on the future development in China, including major impacts on energy consumption and carbon emissions. Chinese policy-makers have already started to respond to these challenges. China has included green and low-carbon development in its major policy strategies, including its climate Change policy and its new urbanisation plan (2014–20) (see Table 1).

|  | 2012 level | 2020 target   |
|--|------------|---------------|
| <b>Demographics</b>  |            |               |
| Increase the proportion of <b>urban residents</b> (%)  | 52.6       | 60            |
| Increase the proportion of urban <b>hukou holders</b> (%)  | 35.3       | 45            |
| <b>Public services</b>   |            |               |
| Give children from migrant families access to <b>state-funded education</b> (%)  | n/a        | More than 99  |
| Expand basic <b>state pension</b> coverage for urban residents (%)   | 66.9       | More than 90  |
| Increase access to <b>state-sponsored medical insurance</b> for all urban residents (%)  | 95         | 98            |
| <b>Infrastructure</b>  |            |               |
| Increase <b>use of public transport</b> as a proportion of total vehicular transportation in cities with more than 1 million residents (%) | 45 (2011)  | 60            |
| Increase household access to the <b>public water supply</b> in urban areas (%)   | 81.7       | 90            |
| Arrange for more <b>wastewater</b> to be 'properly processed' (%)  | 87.3       | 95            |
| Increase the proportion of <b>municipal waste</b> that is handled in a non-hazardous manner (%)  | 84.8       | 95            |
| Increase <b>broadband internet</b> speed in all cities (megabytes per second)  | 4          | More than 50  |
| <b>Environment</b>   |            |               |
| Contain <b>urban sprawl</b> by limiting urban space per capita (square metres)   | n/a        | Less than 100 |
| Ensure that more <b>new buildings</b> are 'green' (%)  | 2          | 50            |
| Increase the proportion of prefecture-level cities meeting China's <b>national air-quality standard</b> (%)                                | 40.9       | 60            |

Table 1. Targets of China's Urbanisation Plan

On 16 March 2014, the new plan was formally released, which is a macro, strategic and fundamental plan to guide the sound development of urbanisation in China, and also the first urbanisation plan promulgated by the central government. Green and low-carbon development is one of the main aims of the plan. The plan highlights the importance of integrating an ecological civilisational concept into new urbanisation towards green and low-carbon development, saving land, water and other nature resources, reducing impacts on natural environment, advocating sustainable consumption and production. In part, it is a response to the issues that rapid urbanisation has caused or exacerbated in China. However, urbanisation is not just a side effect of economic growth: it is a transformative force that drives the Chinese economy (EY, 2014).

### Box 1. China's Intended Nationally Determined Contribution (INDC)

Intended Nationally Determined Contributions (INDCs) is a term used under the United Nations Framework Convention on Climate Change (UNFCCC) for reductions in greenhouse gas emissions, which all signatories to the UNFCCC were asked to publish in the run-up to the 2015 United Nations Climate Change Conference in Paris in December 2015.

China submitted its “Enhanced Actions on Climate Change: China’s intended nationally determined contributions” on 30 June 2015. The document contains several actions on low-carbon urban development. Based on its national circumstances, development stage, sustainable development strategy and international responsibility, China has determined its national actions by 2030 as follows:

- To achieve the peaking of carbon dioxide emissions around 2030 and making best efforts to peak early;
- To lower carbon dioxide emissions per unit of GDP by 60% to 65% from the 2005 level;
- To increase the share of non-fossil fuels in primary energy consumption to around 20%; and
- To increase the forest stock volume by around 4.5 billion cubic meters on the 2005 level.

Furthermore, China has adopted many policies and measures to implement enhanced actions on climate change. In the context of the “Innovating Low-Carbon Development Growth Pattern”, emphasis was placed on cities, with the aim, *inter alia*, to:

- advance low-carbon pilot projects in provinces and cities;
- carry out low-carbon pilot projects in cities (towns) as well as low-carbon industrial parks, low-carbon communities, low-carbon business and low-carbon transport pilots;
- conduct research on effective approaches to control carbon emissions in different regions and cities; and
- facilitate the emergence of low-carbon cities with rational space distribution, intensive utilisation of resources, low-carbon and efficient production and liveable green environment.

Source: Government of China (2015).

## 3 CHINA'S CLIMATE AND ENERGY POLICY

For several years now, China has attributed a great importance to addressing climate change. This is less motivated by international pressure but by internal motivation to pursue low-carbon development. China has already taken a series of climate actions, which may potentially make a significant contribution to combat global climate change.

In 2009, China announced that by 2020 it will lower carbon dioxide emissions per unit of GDP by 40% to 45% from the 2005 level, increase the share of non-fossil fuels in primary energy consumption to about 15% and increase the forested area by 40 million hectares and the forest stock volume by 1.3 billion cubic meters, compared to the 2005 levels (Government of China, 2013).

### ACHIEVEMENTS MADE BY 2014

In this context, China has accelerated the adjustment of its industry and energy structures and invested great efforts in improving energy efficiency, lowering carbon emissions and enhancing the ecosystem.

By 2014, the following has been achieved (NDRC, 2015):

- Carbon dioxide emissions per unit of GDP were 33.8% lower than the 2005 level.

- The share of non-fossil fuels in primary energy consumption is 11.2%

The forested area and forest stock volume have increased respectively by 21.6 million hectares and 2.188 billion cubic meters compared to the 2005 levels.

- The installed capacity of hydro power is 300 gigawatts (2.57 times that of 2005).

- The installed capacity of on-grid wind power is 95.81 gigawatts (90 times that of 2005).
- The installed capacity of solar power is 28.05 gigawatts (400 times that of 2005).
- The installed capacity of nuclear power is 19.88 gigawatts (2.9 times that of 2005).

China publishes a white paper on “China's Policies and Actions on Climate Change” every year to review the progress. The 2015 edition was launched on 19 November 2015.

China's policies and actions on climate change include making adjustments to its industrial structure, improving energy conservation and energy efficiency, optimising its energy structure, controlling non-energy GHG emissions, increasing forest carbon sinks and taking other efforts to control GHG emissions. As a result of these actions, China has lowered its carbon dioxide emissions per unit of GDP by 6.1% in 2014, with a cumulative decline of 15.8% since 2010, and completed 92.3% of its carbon-intensity decline target of the 12th Five-Year Plan.

#### NATIONAL LOW-CARBON PROVINCES AND CITY PILOT PROJECTS

The national target of energy conservation and emissions reductions was disaggregated to provinces that aim to reach them via low-carbon pilot projects.

Announced in July 2010, the first batch of low-carbon pilot projects involves five provinces (Guangdong, Liaoning, Hubei, Shaanxi and Yunnan) and eight cities (Tianjin, Chongqing, Shenzhen, Xiamen, Hangzhou, Nanchang, Guiyang and Baoding). The second batch announced in December 2012 includes the Hainan province and 28 cities (Beijing, Shanghai, Shijiazhuang, Qinhuangdao, Jincheng, Hunlunbeier, Jinlin, the Great Xingan mountain area, Suzhou, Huaian, Zhenjiang, Ningbo, Wenzhou, Chizhou, Nanping, Jingdezhen, Ganzhou, Qingdao, Jiyuan, Wuhan, Guangzhou, Guilin, Guangyuan, Zunyi, Kunming, Yanan, Jinchang and Urumqi).

Of these 42 pilot provinces and cities, 13 established low-carbon development funds, and 36 set up developed carbon reduction target decomposition and assessment mechanisms (Ding Ding et al. 2014). Within this mechanism the city targets were disaggregated further to districts and counties.

All the pilot provinces and cities have put forward clear peak targets or are studying this issue, and the peak year proposed by most provinces and cities involved in pilot projects is 2025 or before. Each pilot area started from its own realities and worked out many well-established low-carbon development patterns, including urban carbon-emissions accounting and management platform, carbon-emissions impact assessment, carbon-emissions trading, corporate carbon-emissions accounting reporting, low-carbon product certification, etc. In September 2015, Beijing, Hainan, Shenzhen and other seven pilot provinces and cities demonstrated China's outstanding achievements in low-carbon urban construction and its response to climate change in the First Session of the US-China Climate-Smart/Low-Carbon Cities Summit.

The central government gave some guidelines and assigned priority tasks for low-carbon provinces and city pilot projects, such as making adjustments to the low-carbon planning of industrial structures, regarding the energy mix, energy-efficiency improvements and the use of carbon sinks. However, cities still have enough space to decide on important aspects themselves, based on their circumstances. Actually, the central government encourages low-carbon pilot cities to find their own ways to promote low-carbon development. In China, the government in principle plays a dominant role in decision-making, but some initiatives are taken by NGOs. For example, in 2004, some NGOs designed the 26°C air conditioner as an energy-savings initiative and gained support from the government and the public.

Besides low-carbon provinces and city pilots, there are also pilots of low-carbon industrial parks, communities, low-carbon cities (towns), etc., which are discussed in the next section.

## NATIONAL LOW-CARBON INDUSTRIAL PARK PILOTS

In October 2013, the Ministry of Industry and Information Technology (MIIT) and the National Development and Reform Commission (NDRC) started piloting low-carbon industrial parks and established an evaluation index and related support policies. The first 55 parks have been approved for pilot programmes and are developing implementation plans.

In June 2014, MIIT and NDRC published the result of their review of the first 55 national low-carbon industrial pilot parks and approved the implementation programme of an additional 39 low-carbon industrial pilot parks in 2015. Each pilot park witnessed a substantial decline in carbon emissions per unit of industrial added value by promoting renewable energies, accelerating the low-carbon transformation of traditional industries and developing new low-carbon industries. In about three years, China plans to create a number of low-carbon enterprises with a view to mastering core low-carbon technologies and advancing low-carbon management, and to explore the low-carbon management mode suitable for China's industrial parks to lead the low-carbon development of the industrial sector.

According to the National Plan to Address Climate Change (2014-2020), by the end of 2020, there will be 150 national low-carbon industrial pilot parks, 1,000 low-carbon business pilot programmes (such as hotels, tourist destinations, etc.).

## NATIONAL LOW-CARBON COMMUNITY PILOT PROJECTS

In March 2014, the National Development and Reform Commission started trials of low-carbon communities, introducing low-carbon ideas into community planning, construction, management and people's lifestyles. In February 2015, the NDRC issued Guidelines for Low-Carbon Community Pilot construction, which provided a category-based guidance for the selection standards, construction targets, construction contents and construction standards for newly built and existing communities. NDRC has also initiated studies on the evaluation

Indicator Systems for Low-Carbon Pilot Communities and carbon emissions accounting methods for low-carbon communities.

China's 12<sup>th</sup> Five-Year Plan called for the number of low-carbon pilot communities to reach 1,000 by the end of 2015, some of which were to be built into state-level pilot low-carbon communities. These would not necessarily be limited to the 42 national low-carbon provinces and city pilots.

## TRANSPORTATION AND CITY PLANNING

There are low-carbon pilots and demonstrations also in other fields, such as green transportation. The Chinese government has listed four green transportation provinces (Jiang Su, Zhe Jiang, Shan Dong and Liao Ning), 17 green transportation cities (Nanjing, Wuxi, Nantong, Huai'an and Zhenjiang in Jiang Su province, Wei Fang in Shan Dong Province, Hangzhou, Ningbo in Zhe Jiang Province, Bangbu in Anhui Province, etc.), 13 green highways, 7 green ports and 69 green transportation equipment projects. A liquidified natural gas (LNG) pilot plant in the shipping industry was also launched.

A new concept regarding city planning is the 'sponge city' concept, which is closely related to climate change adaptation. Sponge cities retain water for their own use within their own boundaries. In 2014, the Ministry of Housing and Urban-Rural Development (MHRUD) issued Technical Guidelines for Sponge City Construction (Trial) to guide the shift from traditional 'fast rainwater drainage' to the multi-objective whole-process integrated management model featuring infiltration, stagnation, storage, purification, utilisation and discharge, thereby promoting rainwater collection, purification and utilisation. MHRUD, in conjunction with MOF (Ministry of Finance), issued the Notice on carrying out a Sponge City Construction Pilot with Central Financial Support, and financial subsidies were granted to pilot sponge cities. At the present time, the construction of the identified 16 pilot sponge cities is progressing steadily. The core targets for the Sponge City Construction call for innovations allowing at least 20% of a city's built-up

area to be able to absorb or use 70% of its rainfall by 2020.<sup>1</sup>

### PLANS FOR ADDITIONAL NATIONAL LOW-CARBON PILOT CITIES (TOWNS)

In August 2015, the NDRC issued a notice on accelerating National Low-Carbon Pilot Cities (Towns), which proposed to build within about three years an additional number of national low-carbon model cities (towns) characterised by integration between industrial development and urban construction, rational space lay-out, intensive resources utilisation, low-carbon and environment-friendly infrastructure, low-carbon and efficient production, and a low-carbon and liveable lifestyle. Shenzhen International Low-Carbon City (Guangdong), Zhuhai Hengqin New District (Guangdong), Qingdao Sino-Germany Eco-Park (Shandong), Zhenjiang Guantang Low-Carbon New City (Jiangsu), Wuxi Sino-Sweden Low-Carbon Eco-City (Jiangsu), Kunming Chenggong and Low-Carbon New District (Yunan), Wuhan Huashan New Eco-City (Hubei) and Sanming New Eco-City (Fujian) were selected as the first batch of these additional national low-carbon pilot cities (towns) (China.org.cn 2016). Many cities are making their own green and low-carbon transportation planning and submitting their applications to the authorities to become pilot projects.

In early June 2016, The Second US-China Climate-Smart/Low Carbon City Summit was held in Beijing. It was announced that the number of low-carbon pilot provinces/cities will be expanded from 42 to 100. The Alliance of Peaking Pioneer Cities (APPC) was established at the first US-China Climate-Smart/Low-Carbon Cities Summit in 2015. It includes nine cities and two provinces from China.<sup>2</sup> Up to now, 23 low-carbon pilot provinces/cities as APPC members have committed to achieve an emissions peak before 2030. These provinces/cities account

for 17% of the population, 28% of GDP and 16% of China's carbon emissions.<sup>3</sup>

### EVALUATION OF CURRENT PILOTS AND BARRIERS

The Chinese central government is currently making a comprehensive assessment of the 42 province and city pilot projects underway, according to a set of indicators, and will start to assess the third batch of applications for funding additional low-carbon provinces and city pilot soon.

The assessment of existing low-carbon pilot projects will focus on the status and progress in the period 2010–15 of low-carbon development in each pilot, including concept, policies and measures and achievements, capacity-building and institutional innovation. So far in China, there are no officially issued low-carbon city index/indicators, but some cities have developed different kinds of indicators for performance evaluation.

Based on this assessment, it will be concluded whether low-carbon provinces and city pilot projects are effective instruments. In either case, the pilot programmes will continue and expand in the future as there is a principal political agreement in China towards sustainable urban development. If the assessment is not so positive, the government will give further guidelines to improve the pilot projects based on expert suggestions and will further promote low-carbon development in China.

There are a lot of challenges and obstacles for low-carbon transition, for example:

- **Conception.** It is not easy for local government officials to change their conception of development from GDP growth to sustainable development, particularly in less developed areas. Training could be helpful and the new evaluation system will be very important.
- **Policies and measures.** Government used to rely on 'command and control' measures to close

<sup>1</sup> See guidelines for low carbon pilot communities by NDRC in Feb. 2015 ([www.sdpc.gov.cn/gzdt/201502/t20150225\\_665165.htm](http://www.sdpc.gov.cn/gzdt/201502/t20150225_665165.htm)).

<sup>2</sup> <http://www.igdp.cn/webproduct/pubtext?id=4>

<sup>3</sup> <http://datanews.caixin.com/2016-06-06/100951989.html>

down inefficient factories and plants. More and more policies and measures are introduced to create incentives for local government and companies. A national Emissions Trading Scheme (ETS) is planned to be launched in 2017 based on existing seven emissions trading pilot programmes. The Implementation of policies and measures are still great challenges.

### 3.1 THE ROLE OF INTERNATIONAL COOPERATION AND TRANSFER OF KNOW-HOW

Low-carbon urban development in China aims at taking up international experience. The following sections give a brief overview of important existing and planned cooperation.

#### CHINA-US COOPERATION

Since the US and China are the two largest emitters worldwide, US-China cooperation on climate change is of big importance. In September 2015, the first session of the US-China Climate-Smart/Low-Carbon Cities Summit was held in New York. Beijing, Hainan, Shenzhen and another seven pilot provinces and cities shared their experiences with mayors of American cities. The second session will be held in China in 2016 to continue the exchange.

#### EU-CHINA COOPERATION

There are various forms of cooperation between the EU and China. On a governmental level there is an EU-China strategic partnership that provides a framework for cooperation, including environment protection. To promote the project-level cooperation, the International Council for Local Environmental Initiatives (ICLEI) set up an East Asian office in Seoul in 2013 to strengthen the connection with China. Another initiative is the UK-China Smartcities initiative,<sup>4</sup> driving the development of a Joint Smart Cities Laboratory. The initiative is co-located in Shanghai and Manchester. In addition, the World Cities initiative<sup>5</sup> promotes the exchange of experience and best practice between the European Union and third countries.

There is still a lot of room, however, for improvement in know-how transfer. Due to barriers such as language skills, in general, Chinese local governmental officials have few chances to go abroad to learn about international experience or have access to material written in English. Thus, it is important to fill the gap by introducing Chinese experts to foreign experiences, enabling them to disseminate them in China in their own words tailored to the Chinese context rather than translating papers or documents. Transferring know-how or exporting technologies, however, needs to consider the differing technological, political or socioeconomic contexts in which smart cities are implemented. There is no general approach to transfer know-how, but the transferability depends a lot on the circumstances in specific cities. The city-to-city level work between the EU and China will therefore play an important role and China has a rapidly growing number of pilot cities to offer in which city-to-city collaboration should be established fast.

At the same time, China includes types of pilot projects that so far are less covered by the EU, such as green ports or industrial pilots. On the policy level, China has introduced urban emissions trading schemes with differing design elements to test and validate different approaches. The EU may benefit from early insights and experiences made in China when creating possible trading mechanisms for those sectors that are currently not under the EU emissions trading scheme.

### 3.2 THE EXAMPLE OF GUANGYUAN CITY

Guangyuan is one of the POCACITO Chinese case study cities. Within the POCACITO project, stakeholder meetings in Guangyuan are taking place where lessons from EU low-carbon cities are discussed and Chinese experiences are made available to European stakeholders.

Guangyuan (GY) located in the northern Sichuan Province, in the south-west of China, consisting of

4 <http://eu-chinasmartcities.eu>

5 <http://world-cities.eu/regions/chinese-regions/>

three districts and four counties with a long history. The area is about 16.3 thousand km<sup>2</sup> and has a population of about 3.14 million people. GY is the only low-carbon pilot city in the Sichuan Province, also known as an excellent tourist city, national forestry city and national sanitary city. GY suffered a large amount of human death and economic losses in an earthquake in 2008. After the earthquake, GY developed rapidly. The GY mayor paid high attention to low-carbon city pilots and set up the Low-Carbon Bureau as the leading group who is responsible for low-carbon development. GY worked with the Chinese Academy for Social Science, the WWF and other institutions to make a plan and a roadmap for low-carbon city development. A GHG inventory with the base year of 2010 was finished as an important basis for decision-making. GY issued concrete working schemes and priority tasks every year. GY then disaggregated the tasks to each district and county and set up performance assessment indicators and an evaluation system. GY developed a work plan and successfully implemented a national low-carbon industrial park pilot. Based on the pilot experience, GY developed guidelines and standards for city level low carbon communities and industrial parks. Currently, GY has set up one provincial-level, 12 city-level and 24 county-level low-carbon community (or village) pilots.

GY also organised a series of activities, such as forums, trainings targeted at different audiences, exchange with other cities and arousing public-awareness. For example, GY initiated a Low-Carbon Day five years ago, three years before the central government did so. GY established a low-carbon information website and published an annual report on low-carbon city pilots, etc.

From 2007 to 2013, energy use in GY increased from 2.54 Mtce to 5.58 Mtct, with an annual growth rate of 11.9%. GY has made great efforts to reduce the coal share in the energy mix. GY has explored a 400 billion m<sup>3</sup> natural gas reserve and an annual production capacity of 180 million m<sup>3</sup>. Natural gas consumption increased very fast in recent years. Not only in urban areas but also in rural areas, 358.5 thousand facilities, producing methane from biomass have been built, which occupy about 75%

of rural families who are suitable for building. Hydropower-installed capacity in GY is 2.15MWs. Wind and solar power-installed capacity is expected to reach 0.19 GW by the end of 2015. In this case, the non-fossil fuel share in the energy mix is expected to decrease to only 30% by then.

GY made every effort for energy conservation and emissions reductions, particularly in the industrial sector. In 2014, the value-added of energy-intensive industry compared to that of industrial enterprises is about 29.4%, which is 0.6 percentage lower than the level of 2013 (see Figure 1).

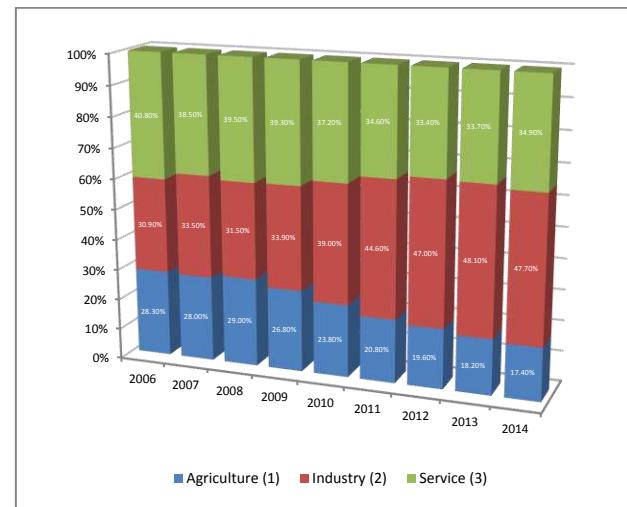


Figure 1. Economic structure in Guangyuan

- 1) Agriculture (GY developed its characteristic agriculture sector and established 71 modern agricultural parks and 21 low-carbon agricultural parks)
- 2) Industry (strategic emerging industry developed rapidly)
- 3) Service (GY has plenty of resources and advantages on tourism. GY paid attentions to promote ecological tourism and leisure attracting more and more tourists)

Through the retrofit and management of public buildings, the energy use per m<sup>2</sup> has been reduced by 3.2%, and the energy use per capita by 4% from 2010 to 2014. GY strictly implements energy-saving building pilots. GY developed a low-carbon public transportation system, including 150km of a special

'green lane' for riding bicycles and hiking, 1.000 bicycles for free, 6.300 natural gas buses, etc.

Forestry coverage in GY was about 54.6% in 2014, 2.3 percentage higher than in 2010.

As a result of considerable effort, GY has made some promising progress: CO<sub>2</sub>/GDP decreased about 33% from 2010 to 2014, which is beyond the 12<sup>th</sup> Five-Year target of 30%, and thus is one the best-performing cities in Sichuan Province (see Figure 2).

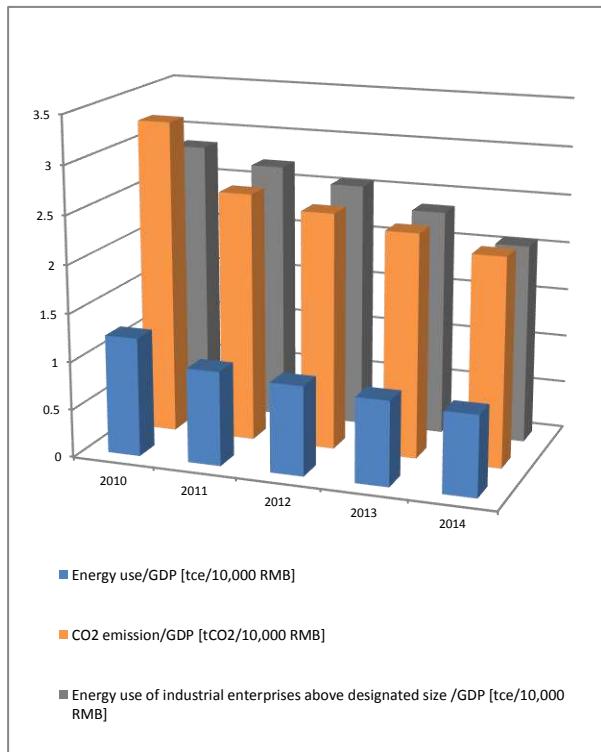


Figure 2. Energy, CO<sub>2</sub> and energy use of a large industrial enterprise per GDP

## 4 CONCLUSIONS AND IMPLICATIONS FOR THE EU

This Policy Brief has shown the strong dynamic in China towards a low-carbon urban development. As discussed, the drivers are not only climate change, but air pollution and other aspects of sustainability in the context of urbanisation processes. In addition to the first set of national low-carbon provinces and city pilots, a second set of low-carbon cities was recently decided, but many cities are making their own green and low-carbon transportation planning,

even if they don't become official pilot cities. In addition to low-carbon cities, China started with national low-carbon industrial parks, including green transportation provinces, and green transportation cities, green highways and green ports. Instead of a top-down approach, China is implementing a large variety of different types of low-carbon pilot projects or policies to test different approaches at provincial, city and community level and then building successful elements into state-level pilot projects.

China is taking a very broad approach towards decarbonising its economy. The large number of pilot programmes in China could serve as an interesting laboratory and also provide important lessons to the EU, even if the political and socio-economic context is different. Early insights may be valuable in particular for those areas where the EU is less advanced, such as industrial low-carbon pilots or urban-emissions trading. At the same time, the growing number of pilot projects in China may offer additional opportunities for the EU to transfer know-how or technologies in areas where the EU is leading worldwide, such as in bioenergy technologies, waste-water treatment, urban logistics, decentralised off-grid renewable energy projects or adaptation technologies (e.g. mitigation of urban heat islands, etc.).

But China can also benefit from more cooperation and from European insights, for example, in evaluating the performance of low-carbon pilot cities. It will be of critical importance for China to introduce the EU's experiences in a way that makes them more easily accessible to Chinese stakeholders. An increased and more frequent interaction at the city-to-city level will therefore play an important role, with Chinese experts gaining in-depth understanding of experiences made in the EU so that they can disseminate those experiences in a way that is accessible to Chinese stakeholders and policymakers.



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## PROJECT

This Policy Brief was written as part of the POCACITO project (Post-Carbon Cities of Tomorrow – foresight for sustainable pathways towards liveable, affordable and prospering cities in a world context), coordinated by Ecologic Institute.

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