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Experts and the science-policy interface in China's climate policy

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Chapter 8: Experts and China's Local Climate Policy

8.1 Introduction

I now explore the SPI in China's local climate governance. I ask: *How do experts engage in China's local climate policy, and what are the conditions for local policymakers to accept the experts' scientific input for developing climate policies?* Section 8.2 overviews the evolution of China's local climate policy and the primary scientific input. Then, taking three prefecture-level cities (Guiyang, Guangyuan, and Qingdao) as examples, Sections 8.3, 8.4, and 8.5 present how experts participate in driving local climate policies, particularly their engagement in the development of three pilot programmes (i.e., the low-carbon city pilot [LCCP], emissions inventory, and the ETS). Lastly, Section 8.6 explains the how science pushes China's climate policy at the local level.

8.2 China's local climate policy and the primary scientific input

While China released *China's National Climate Change Programme (CNCCP)* in 2007, the State Council issued a notice to all local governments and instructed them to start the deployment of climate-related policies (The State Council, 2007). At that time, the central government had not yet designed a policy framework for local governments. Hence, rather than clearly instructing local officials to implement some specific policies, the primary mission was to: (a) establish a dedicated office for energy conservation and emissions reduction, (b) map out the GHG emissions at the provincial or city level and prepare for the emissions inventory, and (c) explore innovative measures for climate change mitigation and adaptation (Ding and Yang, 2015).

8.2.1 Evolution of China's local climate policy

Initiated between 2007 and 2008, the first upsurge of China's local climate policy was marked by the trend of constructing a low-carbon city among municipalities between 2008 and 2010. Since 2011, a second wave of China's local policy development was the institutional establishment and implementation of the pilot ETS.

2008 was a watershed in the development of China's local climate policy with the World Wide Fund for Nature's (WWF) initiating the 'Low Carbon City Initiative' in Shanghai and Baoding (Hebei Province). Although this initiative was launched by an international ENGO, it received support from several ministries, indicating the endorsement of the Chinese central government (Interviews 10 and 57). Once the national policy directive of 'low-carbon city' (LCC) (低碳城市 *di tan cheng si*) became clear, LCC immediately became

a buzzword and emerged as a trend among Chinese municipalities. Between 2008 and 2010, at least one hundred cities claimed that they would become low-carbon cities (Sina.com, 2010). In 2010 and 2011 the National Development and Reform Commission (NDRC) and the Ministry of Housing and Urban-Rural Development (MOHURD) launched the first batch of low-carbon provinces and cities (LCPC) pilot programme and the low-carbon eco-cities (LCEC) pilot programme respectively (Zhang and Lin, 2014).

Apart from three batches of low-carbon province and city pilots launched in 2010, 2012, and 2017, another critical development of China's local climate policy was the local implementation to establish the pilot ETS and a nationwide carbon market (MEE, 2018 (a)). In October 2011, the NDRC launched the pilot ETS in two provinces and five cities.

8.2.2 Primary sources of scientific input for China's local climate policy

During the 2000s, the scientific input for China's local climate policy was mainly from the international or national level. Since 2010, local expert institutes began to play an important role in providing scientific input and support for local climate policies. For cities with a higher research capacity for addressing climate change, local expert institutes not only assisted the officials with carrying out the low-carbon related pilot projects but enabled pilot project proposals to the central government. Many pilot cities of the low-carbon city pilot (LCCP) received assistance from provincial or national expert institutes. After the cities had been selected as pilot cities, local officials established the municipal research centre for addressing climate change/low-carbon development (Zhang and Lin, 2014; Interview 29).

Before 2009, the institutional and knowledge capacity for addressing climate change was weak at the local level. Hence, foreign aid from the Asian Development Bank, World Bank, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH from Germany, and the Strategic Priorities Fund (SPF) from the UK helped transmit ideas and knowledge on GHG emission reduction to Chinese localities (Zhang and Lin, 2014). Using international funding, expert institutes in Beijing, notably Tsinghua University, Renmin University of China (RUC), the Energy Research Institute (ERI), and the Chinese Academy of Social Sciences (CASS), organised training programmes for local officials and researchers on low-carbon development (Interviews 03, 07, 23, 36, and 57).

The training sessions organised by the Beijing research institutes laid the foundation for local experts who participated in China's local climate policy. First, the local experts accumulated relevant knowledge from the training sessions and joined the line to provide scientific input for China's local climate policy when, starting in 2010, constructing low-carbon cities became popular among Chinese provinces and cities. In well-developed cities

along China's east coast, such as Shenzhen, Guangzhou, and Hangzhou, local universities and research institutes with a higher research capacity formed a team to assist local officials with carrying out the low-carbon related pilot projects. Yet, in most cities, particularly the cities in the least developed regions such as in Southwest and Northwest China, the institutional and research capacity for addressing climate change remained weak. Hence, in many cases, local officials sought assistance from research institutes at a higher level (Interviews 26, 29, 39, and 63).

I now take three prefectural-level cities (Guiyang, Guangyuan, and Qingdao) as examples to explain how experts engage with China's local climate policy (see *Table 8.1* and *Map 8.1*).

Table 8.1 Three prefectural cities for analysing SPI in China's local climate policy

	Guiyang	Guangyuan	Qingdao
Province	Guizhou Province	Sichuan Province	Shandong Province
Region	Western China	Western China	Eastern China
Time for selected in the low-carbon city pilot	1st batch of low-carbon province and city pilot (2010)	2nd batch of low-carbon city pilot (2012)	2nd batch of low-carbon city pilot (2012)
Recent target for CO ₂ emissions reduction	By 2020: 20% reduction in carbon intensity compared to 2015 levels. Pledge to peak CO ₂ emissions by 2025	Pledge to peak CO ₂ emissions by 2029	Pledge to peak CO ₂ emissions by 2020

Source: Author's fieldwork.

Map 8.1 Three case study cities: Guiyang, Guangyuan, and Qingdao



Source: Author.

8.3 Guiyang (Guizhou Province)

8.3.1 A sketch of Guiyang

As the capital city of Guizhou Province in Southwest China, Guiyang is one of the first Chinese cities that vowed to move towards the low-carbon development (LCD) path in the 2000s. When the NDRC launched the first batch of the low-carbon province and city pilot in 2010, Guiyang was also one pilot city among the five provinces and eight cities. Since 2009, Guiyang has organised the annual International Forum on Ecological Civilisation (生態文明國際論壇 *shengtai wenming guoji luntan*) and has built both its international and domestic reputation in the field of environmental protection and the circular economy. Behind the slogan of 'Cool Guiyang, Capital of Summer Escape' (爽爽貴陽，避暑之都 *shuangshuang guiyang, bishu zhidu*), Guiyang has gone through a difficult transition from the 'top 10 polluted cities in the world' and 'the three major acid cities in China' to a low-carbon, tourism destination during the 2000s (Interview 39).

8.3.2 Scientific input for Guiyang's climate policy

Behind Guiyang's journey towards low-carbon development, the most critical scientific input comes from two expert teams from Beijing: The Department of Environmental Science and Engineering, Tsinghua University, and the Programme of Energy and Climate Economics at the Renmin University of China (RUC-PECE). Other international actors such as the Climate Group, the Energy Foundation China, and the Clinton Climate Initiative (CCI) also played a role as 'facilitators' for the construction of Guiyang's eco-city (ISP-CEP, 2018). Lastly, local expert institutes, such as Guizhou Normal University, Guizhou Environment and Energy Exchange (GEEE), and Guizhou Environmental Science Research Design Institute, joined when Guiyang started to implement the LCCP around 2010 and 2011 (ISP-CEP, 2018; Interview 39).

8.3.3 Process of the interplay of science and Guiyang's climate policy

In terms of the interplay of science and climate policy in Guiyang, two expert institutes and two 'policy entrepreneurs'⁶¹ helped drive Guiyang's transition towards the circular economy and eco-city and low-carbon development. The two expert institutes are Tsinghua University and Renmin University of China (RUC), both in Beijing. The two policy entrepreneurs are the then-City Mayor, Sun Guoqiang (1997 to 2004), and then-Secretary of Guiyang Municipal Committee of the Communist Party of China, Li Jun (2007 to 2013). While the former obtained the support of central administrators and Tsinghua University to develop a plan for constructing Guiyang as a circular economy and eco-city, the latter accepted the recommendation from the RUC to address low-carbon transformation (Interview 39).

The first step of Guiyang is the transition to the circular economy model and the construction of an ecological city with the assistance of the expert team from Tsinghua University in the early 2000s. To change the extensive resource-development model that brought irreversible ecological disasters to Guiyang, the municipal officials sought developmental alternatives and strategies during the late-1990s. Eventually, then-Mayor Sun Guoqiang expressed his motivation to construct Guiyang as an eco-city to the then-administrator of the National Environmental Protection Administration (NEPA), Xie Zhenhua, in March 2000. By the end of 2001, the Guiyang municipal officials created a research project for a 'zero-emission construction project in the Jinyang New District' with Tsinghua University (from Beijing), aiming to establish a 'zero-emission symbiotic society' in the Jinyang New District in Guiyang. One year later, the NEPA suggested that Guiyang expand its experiment to the municipal level and approved Guiyang as the first pilot city

⁶¹ Policy entrepreneurs are "energetic actors who engage in collaborative efforts in and around government to promote policy innovations" (Mintrom, 2019: 307).

of the 'circular economy and eco-city' (GCEECLGO, 2002).

During 2002 and 2003, the interdisciplinary research team led by Chen Jining completed the project and drafted the *Guiyang's Master Plan for Constructing a Circular Economy and Eco-city*. In the *Master Plan*, experts laid out a road map for the transition to a circular economy model by focusing on six sectors: coal-based industry, phosphorus-based industry, aluminium industry, herbal medicine, tourism, and organic agriculture. Improving the phosphorus industry was seen as critical by the Tsinghua experts (Interview 42). The *Master Plan* first passed the expert committee's review organised by the NEPA in Beijing. The *Master Plan* then became *Guiyang's Regulations on Constructing a Circular Economy and Eco-city* through the legislative process of the Standing Committee of the People's Congress in Guiyang City and the Standing Committee of the People's Congress of Guizhou Province during July and September 2004 (Sun, 2004).

The second step was the effort to construct a low-carbon city, and the RUC expert team (also from Beijing) provided the most critical scientific input during the second half of the 2000s. When Li Jun took up office as Secretary of Guiyang Municipal Committee of the Communist Party of China in 2007, he considered setting-up another plan for Guiyang to further drive the transformation of its sectoral and industrial structure. This time, led by Zou Ji, the RUC expert team focused on Guiyang's economic transformation. The RUC experts suggested a more fundamental change to Guiyang's development model—Guiyang should focus on the development of the tertiary sector, particularly tourism and providing sites for meetings, incentives, conferences, and exhibitions (MICE) rather than developing the secondary sector of the economy. According to Zou Ji's plan, "the income from tourism in Guiyang should reach 70% of the city's GDP" (21st Century Business Herald, 2011 (b)). Yet, the municipal officials and Party cadres had not accepted the idea initially, since they did not believe that Guiyang could develop without the manufacturing industry (Interview 39). Meanwhile, the then-Secretary, Li Jun, questioned the estimation of the experts on the CO₂ emissions per capita by 2020 and the annual growth rate of Guiyang's economic development (21st Century Business Herald, 2011 (a)). The RUC experts took a while to persuade the officials that Guiyang should take advantage of its natural resources and liveable environment to build the brand as a low-carbon city. Eventually, the Guiyang officials adopted the Outline of the *Action Plan for Low-Carbon Development in Guiyang (2010–2020)*, which was drafted by the RUC experts. They submitted the proposal to the central government as proof of Guiyang's preparation to experiment with the pilot project of the low-carbon city.

After the central government selected Guiyang as a pilot city in the first batch of the low-carbon province and city pilot, the *Outline* was modified as the *Medium- and Long-term Low-Carbon Development Plan for Guiyang City (2011-2020)* and passed the review

organised by the provincial government. Also, the officials established the expert committee for low-carbon development and co-built the Guiyang Municipal Research Centre for Addressing Climate Change and Low-carbon Development with Guizhou Normal University. Since then, local experts have joined to provide scientific input for Guiyang's climate policy, such as generating related policy documents (e.g., Guiyang's special plan and regulation for addressing climate change) and organising the annual International Forums on ecological civilisation (ISP-CEP, 2018; Interview 39).

8.3.4 Output of SPI in Guiyang's climate policy

Based on the Beijing experts' assistance and local officials' effective promotion, Guiyang has had a good reputation for striving toward the circular economy, ecological civilisation (see 4.4.4), and low-carbon development earlier than other cities in China in the 2000s. In this regard, I consider experts' impact on Guiyang's climate policy as between level 4 (high). By 2020, it has reduced its carbon intensity by 20% compared to 2015 levels. While the national target in the 13th Five-Year Plan (2016-2020) and the target distributed to Guizhou Province was 20%, Guiyang City is 2% higher than the national average (China Daily, 2021).

When discussing the Chinese cities that can demonstrate China's effort to pursue low-carbon development, both domestic and foreign observers and researchers recommend Guiyang as a role model (Interviews 31, 35, 42, 44, 48, and 49). Even though the city mayor and party-secretary have rotated, successors have not changed the grand strategy of ecological civilisation and low-carbon development. As many interviewees explained, "Once local policymakers set the brand of Guiyang, the successors will follow the trajectory since it brings Guiyang not only reputation but development opportunities" (Interviews 07, 10, 36, 39, and 42).

8.4 Guangyuan City (Sichuan Province)

8.4.1 A sketch of Guangyuan

Located in Northern Sichuan Province, Guangyuan is a peripheral city with few advantages for development since it lags behind other cities in Sichuan province concerning technological, financial, and human resources (Jiang, 2015: 13). Yet, it has abundant natural gas, hydropower, geothermal and other clean energy (Interviews 04, 23, and 47).

8.4.2 Scientific input for Guangyuan's climate policy

In terms of the scientific input for Guangyuan's climate policy, the external experts that came for the reconstruction work are the primary source of advice that drove Guangyuan towards the low-carbon economy (LCE). Among the external experts, the Institute for

Urban and Environmental Studies (IUE) at the Chinese Academy of Social Sciences (CASS) in Beijing is important. Dr. Jiang Wei, a postdoctoral researcher at the CASS-IUE, helped persuade local officials and connect the CASS and local officials and can be seen as a policy entrepreneur who stimulated policy change. Since there is no university in Guangyuan, Sichuan University (located in Chengdu, the capital city of Sichuan Province) also provided scientific support for Guangyuan.

To support the reconstruction work after the Wenchuan earthquake on 12 May 2008, experts, engineers, and technicians from different provinces came to Sichuan Province to provide professional assistance. The ninth batch of the 'Doctor Service Group' (博士服務團 *boshi fuwu tuan*)⁶² was dispatched from the Organisation Department of the Central Committee of the Communist Party of China (CCCPC) to Sichuan Province, including five 'PhDs.'⁶³ 'Hanging on a position' (掛職 *gua zhi*) (see 3.5.4.2) as Deputy Director or Deputy Secretary-General in the related municipal departments (e.g., the Guangyuan Municipal Development and Reform Commission (DRC) or the City Mayor's Office), the five PhDs provided both technical support and advice regarding the grand strategies and plans for Guangyuan's reconstruction (Jin, 2012: 78).

8.4.3 Process of the interplay of science and Guangyuan's climate policy

In terms of SPI in Guangyuan, one can divide the development process into three stages: (1) experts' efforts in idea dissemination and persuasion regarding the low-carbon economy model when setting the strategy for post-earthquake reconstruction in 2008 (the science-push model); (2) the officials' and experts' efforts in developing a low-carbon plan during 2009 and 2010 (the co-production model); and (3) the implementation of the low-carbon city pilot programme since 2010 (mix of science-push, policy-pull, and co-production model).

The first stage is the experts' efforts in idea dissemination and persuasion regarding the low-carbon economy (LCE) model for Guangyuan's reconstruction. For the earthquake-damaged cities, a simple way for reconstruction would be to attract investment and introduce the industries that have been eliminated by the eastern coastal provinces to accelerate both the pace of reconstruction and local economic growth. Many municipal

⁶² Noted: the 'doctor' here refers to someone who has a PhD degree, not someone who is a doctor in medicine.

⁶³ The five experts are (1) an accountant from the Department of Enterprise, MOF; (2) a postdoctoral researcher, Institute for Urban and Environmental Science, CASS; (3) a bridge designer, Department of Transport of Zhejiang Province; (4) an expert who specialises in water and soil conservation, China Institute of Water Resources and Hydropower Research; and (5) an investment manager, a state-owned enterprise (SOE) from Ningbo, Zhejiang Province (Interview 47).

policymakers considered 'business-as-usual' to rebuild its economy (Jiang, 2015). Yet, Dr. Jiang proposed that rather than focusing primarily on the gross domestic product (GDP) and the gross value of industries, Guangyuan should adopt the LCE model and take into account the indicators of environmental protection and energy-conservation and emission-reduction. Dr. Jiang first won the support of the Doctor Service Group, particularly the Group leader. Then, they sequentially approached and lobbied the then-Party Secretary and then-Mayor of Guangyuan City to support the idea of an LCE model for Guangyuan's reconstruction. Both the then-Secretary and then-Mayor did not have a background in energy or environmental economy-related disciplines. Finally, the two policymakers accepted the proposal due to the sincerity of the experts and the policymakers' trust in the experts (Interview 47). Once the decision was taken, the two policymakers, assisted the experts with horizontal coordination among different departments regarding the low-carbon economic development plan. Due to the PhDs' status as outsiders, the five PhDs encountered difficulties when communicating with the related departments. Hence, the assistance of the then-Secretary was critical to accelerating the acceptance of the officials (Interview 47). In November 2008, Guangyuan invited famous experts and scholars outside to visit the city to collect their advice on the city's reconstruction strategy (IVL, 2016: 1). After the Guangyuan officials agreed to adopt the model of a low-carbon economic development for its reconstruction, they made an effort to obtain the approval of the upper-level policymakers—the Sichuan Provincial Government (Jiang, 2015; Interview 47).

The second stage of the interplay of science and Guangyuan's climate policy was the officials' and experts' effort of developing a low-carbon plan during 2009 and 2010. Once Guangyuan anchored the concept of LCE as its development strategy, the second task was to come out with a development plan which embodies LCE. Due to the lack of knowledge, local officials attached great importance to the experts' scientific input, including the external experts. Using USD 250,000 from the UK's Department for International Development, Guangyuan signed a Memorandum of Understanding (MOU) with the CASS-IUE to undertake the research project to study its low-carbon economic development plan in April 2009 (Interviews 23 and 47).

The experts conducted field investigations to collect the opinion of the industries and citizens regarding the allocation of construction and development projects in the low-carbon plan. When they submitted the recommendation reports with notes of each project, the Guangyuan DRC officials had the power to decide which projects would be included in the low-carbon plan. The experts strengthened the description of environmental protection and highlighted energy-conservation and emission-reduction in the draft low-carbon plan based on the previous Five-Year-Plan texts. In most cases, the

content of environmental protection is in the final or the second-to-last chapter of a plan. While the experts did not have the authority to move the environmental protection chapter forward in the low-carbon plan, they substantialised the policy goals and implementation measures (Interview 47). In July 2010, the research project was finalised with five important reports. In August 2010, Guangyuan City founded its own research institute for low-carbon economic development (IVL, 2016: 2).

The third stage of the interplay of science and Guangyuan's climate policy was the implementation of the LCCP since 2010. Similar to the experts' engagement with Guangdong's climate policy (Chapter 7), the experts contributed more to Guangyuan's GHG emissions inventory than to the implementation of its LCCP. Due to the lack of relevant capacity at the local level, the absence and inaccuracy of related data are quite common and need triangulation and correction (Interviews 47 and 63). For instance, regarding the amount of petrol and diesel consumption of Guangyuan, the number disclosed by the local oil company differed from both the figure released by the Guangyuan DRC and the Guangyuan Statistics Bureau. Hence, with funding support from the Twelfth Five Year National Science and Technology Support Programme, the CASS-IUE experts organised a team for data collection and verification in Guangyuan. During the investigation, the experts' first choice was to use open resources to acquire items that are needed for the emissions inventory. If the relevant data did not exist in the official document, e.g., the statistical yearbook, experts would contact the related departments to request specific data. According to the interviewees' experiences, neither the head of the department (top-level) or the street-level (lowest-level) bureaucrat were the desired persons to inquire about data. Instead, those business backbones (業務骨幹 *yewu guban*) who often take a position at the vice-sectional or vice-bureau level in the functional department, are often the best choice with the competencies in providing such data (Interviews 39, 47, and 63). Based on the work of data collection and verification, the experts compiled the basic energy balance sheet of Guangyuan and corrected the GHG emissions inventory, particularly the emissions from the energy consumption of different industrial sectors (Interview 63).

Regarding the implementation of the LCCP, once the upper-level government approved the plan, each department was put in charge of policy implementation. The special agency, the Low-carbon Bureau (LCB) which is an adjunct to the Guangyuan DRC, played the dominant role as a hub in the governance network (Jiang, 2015: 17). Yet officials could still consult the Doctor Service Group or external experts when they encounter problems. Sometimes the industries and enterprises would also approach the experts since they knew that the experts 'have a say' in the policy field (Interview 47). When the experts submitted the 'internal reference' (內參 *neican*) reports to the Party-Secretary in

the name of the Doctor Service Group; the Party-Secretary was often open-minded to listen to the experts' feedback or suggestions. On some occasions, the Party-Secretary forwarded the experts' internal reference as learning materials to the officials. Further, he invited Dr. Jiang to give lectures in local cadres' study sessions to explain low-carbon related matters in detail. Given that the members of the Doctor Service Group can frequently meet the Party-Secretary, the experts and policymakers are much closer in Guangyuan than in other cities (Interview 47).

8.4.4 Output of SPI in Guangyuan's climate policy

In terms of the output of SPI in Guangyuan's climate policy, the decision and efforts to achieve a low-carbon economic development model as its strategy for post-earthquake reconstruction have brought the city not only reputation but opportunities. As an interviewee observes, the status of Guangyuan among the cities in Sichuan Province has shifted from "the child that is often forgotten by her parents" to "the child who draws more attention and gets more cookies" (Interview 47).⁶⁴ I consider experts' impact on Guangyuan's climate policy as level 4 (high), and will explain the policymakers' political considerations in Section 8.6.

Guangyuan was the only national low-carbon pilot city in Sichuan Province before 2017. When submitting the materials to the NDRC for the application of the first and second batch of the LCCP, the Sichuan Provincial Government ranked Chengdu (the capital city of Sichuan Province) ahead of Guangyuan for the central officials' reference. Yet, the NDRC did not choose Chengdu but Guangyuan in the second batch of the LCCP in 2012.⁶⁵ In the following years, Guangyuan earned titles such as 'low-carbon development outstanding contribution city' and 'low-carbon ecological advanced city' in the appraisal organised by either academic or civil society organisations (Jin, 2012: 79; Interviews 09, 16, 23, and 47). Further, when Guangyuan successfully built the brand of 'low-carbon city' nationally in around 2010 and 2012, the 'Matthew Effect'⁶⁶ brought it a certain degree of funding support, low-carbon-related construction and development projects, and opportunities for experimenting with environmental and sustainable development-related pilots. Both Chinese central officials and Sichuan Provincial policymakers are inclined to

⁶⁴ Before 2008, Guangyuan seldom drew attention and only received policy support from the upper-level governments, since it is located far away from the provincial centre (Chengdu) and historically marginalised in terms of governance.

⁶⁵ It was not until 2017 that Chengdu is selected as a pilot city in the third batch of the LCCP.

⁶⁶ The Matthew effect describes the phenomenon that the rich get richer and the poor get poorer. In China's local climate policy development, scholars have noticed that "an area chosen for a pilot scheme is likely to be selected for another national pilot scheme, while areas that are not chosen for a pilot scheme will encounter difficulty in securing new pilot schemes" (Zhao, Zhu, and Qi, 2016: 128).

deploy projects or pilot programmes to Guangyuan, enabling a concentration of resources and policy support (Interviews 04, 23, 47, and 63).

Lastly, regarding the performance of CO₂ emissions reduction, Guangyuan has met the CO₂ emissions reduction targets set in the 12th Five-Year Plan (2011-2015) and 13th Five-Year Plan (2016-2020) period. Additionally, Guanyuan has pledged to reach its carbon peak by 2029, one year earlier than the national target (Guangyuan DRC, 2021).

8.5 Qingdao City (Shandong Province)

8.5.1 A sketch of Qingdao

Located in Shandong Province on the east coast of China, Qingdao is one of the five 'cities that is listed in the national social and economic development plan' (計劃單列市 *jihua danlie shi*). Compared with other prefectural cities that are administratively controlled by provincial governments, Qingdao enjoys a sub-provincial status in general and a provincial status in economic and fiscal policy that is directly connected with the central government.

8.5.2 Scientific input for Qingdao's climate policy

In terms of the scientific input for Qingdao's climate policy, both external and local expert institutes have undertaken research projects and provide substantial support for the Qingdao officials. Before Qingdao became a national low-carbon pilot city in 2012, the primary scientific input was from the WRI and the RUC (both from Beijing) and the Qingdao Engineering Consulting Institute (QDECI) which falls under the Qingdao Development and Reform Commission (DRC) (Interview 02).

When Qingdao became a national pilot city of the LCCP in 2012, more local expert institutes started to engage in Qingdao's climate policy practice. The Qingdao Institute of Bioenergy and Bioprocess Technology (QIBEBT) of the Chinese Academy of Sciences (CAS), was in charge of Qingdao's GHG emissions inventory. The Qingdao University of Science and Technology (QUST) provided the critical scientific base where more than one climate or low-carbon related research centres are established.

8.5.3 Process of the interplay between science and Qingdao's climate policy

In terms of the interplay between science and climate policy in Qingdao, this sub-section presents four waves of policy work that the experts were involved in: (1) undertaking the technical assistance project funded by the Asian Development Bank (ADB) to foster Qingdao's low-carbon development blueprint in 2011; (2) implementing the Sustainable and Liveable Cities Project funded by the Caterpillar Foundation during 2012 and 2017; (3) carrying out the LCCP, including compiling Qingdao's GHG emissions inventory since 2012;

and (4) the efforts to ‘implement and try the ETS in advance’ (先行先試 *xian xing xian shi*)⁶⁷ since 2013.

8.5.3.1 The Technical Assistance project funded by the Asian Development Bank

The first wave of the interplay of science and Qingdao’s climate policy is the implementation of the technical assistance (TA) project funded by the ADB in 2011. Before the Qingdao Municipal Government launched the one-year project, the WRI China won the bid to implement the project through a competitive tendering procedure (WRI, 2011). Led by Zou Ji, the WRI and the RUC played the most critical role in the transnational and interdisciplinary expert team (WRI, 2011; Interviews 39, 40, and 41). To foster Qingdao’s low-carbon development strategic planning, the expert team started research from ‘understanding the present’ and then stepped to ‘filtering one hundred key projects and the responsive financing mechanism’ and ‘developing technology and policy roadmaps’ (WRI, 2011). Since the WRI and RUC experts (from Beijing) had limited knowledge of Qingdao, they had to cooperate with local institutes to acquire and analyse the needed data. With the assistance of the QDECI and coordination of the Qingdao DRC, the TA expert team conducted field research to interact with the climate policy-related municipal departments and industries. In addition, the experts conducted a one-thousand-household survey of Qingdao residents’ common commuting behaviour characteristics to assess its present transport policy (WRI, 2011; Interviews 39, 40, and 41). According to the TA experts, the best strategy for industrial restructuring is to transit from light industry to high-end manufacturing, which means an upgrading of its industrial structure (Interview 39).

In terms of the interaction between experts and policymakers, the TA expert team collected feedback from Qingdao officials and the centre officials. The experts routinely met the Qingdao DRC officials to report their working progress and revised the interim report based on the officials’ comments and suggestions. Further, the expert team and the Qingdao DRC organised the Interim Workshop of the ‘Blueprint of Low-carbon Development in Qingdao’ in August 2011 to release its preliminary research results and policy suggestions. Not only officials from the NDRC’s Department of Climate Change (DCC) but high-end low-carbon development experts from Beijing reviewed Qingdao’s interim report (Interviews 39, 40, and 41).

The TA project laid a strong foundation for Qingdao to apply for the LCCP. According to the Qingdao officials, the application materials they submitted to the NDRC were

⁶⁷ It means that although the central government did not select Qingdao City as a pilot region to run the pilot ETS, Qingdao did substantial work to experiment with the ETS.

primarily based on the *Qingdao Low-carbon development Planning and Blueprint* drafted by the TA expert team in 2012 (WRI, 2014; Interview 39).

8.5.3.2 The Sustainable and Liveable Cities project funded by the Caterpillar Foundation

The second wave of the interplay of science and Qingdao's climate policy was the implementation of the Sustainable and Liveable Cities project, which the Caterpillar Foundation funded between 2012 and 2017. Based on the positive experiences of collaborating with the ADB TA project, the NDRC's DCC, the Qingdao Municipal Government, and WRI decided to continue project cooperation. Hence, Qingdao was selected again to undertake the Sustainable and Liveable Cities project (Interviews 39, 40, and 41).

The WRI and the RUC experts remained the core of the team, and the QDECI was the local research institute. Additionally, the WRI invited some NCSC and ERI experts (from Beijing) to develop the national policy framework and toolkits by studying Qingdao's case. While the previous ADB TA project generated the strategic planning and blueprints for Qingdao's low-carbon development, the Sustainable and Liveable Cities project transitioned to more substantial policy research on Qingdao's (a) energy, (b) water resources, and (c) transportation (Interviews 16, 39, 40, and 41).

Regarding the policy research on Qingdao's energy issues, the experts and officials co-produced a platform to manage GHG emissions from the energy and industrial sectors. Due to the foundation laid out by the ADB TA project, the Qingdao officials no longer needed an energy plan or blueprint. Instead, they demanded a GHG accounting and management system to control the primary energy users. Hence, the expert team proposed the management system's design, framework, and methodologies; the Qingdao officials commissioned a local software development company to complete the management system (Interviews 40 and 41).

Based on the analysis of Qingdao's water-energy nexus, the experts proposed the idea of managing urban energy consumption of water resources. They suggested that Qingdao incorporates a carbon accounting and energy management system into water resources management to reduce the carbon footprint of the urban water system (Wen et al., 2017).

Lastly, regarding the low-carbon transportation in Qingdao, the experts suggested Qingdao combine 'reduction-transfer-optimisation' and the improvement of the urban traffic management system to achieve integrated low-carbon transportation (Zhang and Xue, 2014).

8.5.3.3 The low-carbon city pilot and GHG emissions inventory

The third wave of the interplay of science and Qingdao's climate policy is the implementation of the LCCP and the compilation of Qingdao's GHG emissions inventory since 2012.

Regarding the LCCP, *Qingdao's Low-carbon Development Plan 2014-2020* set the goal of cutting its carbon intensity emissions per unit of GDP by 50% in 2020 from 2005 levels and reaching the carbon peak around 2020 (C40 Blog, 2017). While the officials are responsible for implementing the work plan to achieve such goals, experts conduct policy-oriented research to generate more detailed measures for the related departments. In addition to Qingdao's roadmap to peak its carbon emissions around 2020, the experts from the QUST, the QIBEBT, and the Ocean University of China, also undertook research projects on Qingdao's climate change adaptation planning (Interview 02). In 2019, The Qingdao DRC and MEE announced *Qingdao's Climate Change Adaptation Plan (2019-2025)*.

Concerning the emissions inventory, the Municipality commissioned the QIBEBT to coordinate the work on making an emissions inventory. QIBEBT completed the emissions inventory of seven districts and five county-level cities. Additionally, the experts established the database and normalised the working procedure of emissions inventorying, including data collection, sampling and investigation, and methodologies for compiling the inventory (Interview 02). With the assistance of the experts, the Qingdao Municipal Government has completed Qingdao's GHG emissions inventory from 2010 to 2018 and has passed the review organised by the upper-level governments (PHRIQ, 2018).

8.5.3.4 The pilot ETS

The fourth wave of the interplay of science and Qingdao's climate policy is the attempt to 'implement and try the ETS in advance.'

Although the central government did not select Qingdao to experiment with the pilot ETS in 2011, the NDRC officials instructed Qingdao to enhance the role of the market mechanism in controlling its GHG emissions when commenting on the *Work Plan for Qingdao's Low-carbon City Pilot* in 2013. Hence, the Qingdao DRC established an expert team to prepare for the voluntary carbon market. It assigned the QDECL as the base and transferred some staff from the Qingdao Energy Conservation Monitoring Centre, the QUST, and the CQC (Qingdao branch) to form the task force for capacity building of constructing Qingdao's carbon market (Qingdao DRC, 2014). In June 2016, the experts of the Training Centre for National Carbon Market Capacity Building (from Beijing) and the CQC (Qingdao branch) organised a training session for approximately forty enterprises regarding the accounting, verification, and exchange of carbon emissions (Interview 02).

One year later, the NCSC (from Beijing) assisted the Qingdao DRC with establishing the Qingdao Centre for Strategic Research on Addressing Climate Change and Capacity Building for the Carbon Market at the QUST in March 2017 (Yang and Lo, 2019). Cooperating with both Beijing and local expert institutes and consulting companies, the Centre has then expanded the scale of the training sessions, allowing more participants from local or from neighbouring cities or provinces (PHRIQ, 2018).

Meanwhile, the Qingdao Municipal Government has built the Qingdao's expert committee for the ETS and the task force for researching and designing Qingdao's ETS to share the officials' workload (PHRIQ, 2018). While the experts are not responsible for the operational work of the pilot ETS, they have contributed to study and prepare for almost all the policy aspects of the ETS: (1) selected the covered enterprises that will be included in the Qingdao ETS according to the Guideline released by the central government; (2) research on the methodologies for emissions allocation their impact assessments; (3) drafted different categories of policy documents, including the Guidelines, Work Plans, and Operations Manuals, and Administrative Regulations, etc. (Qingdao DRC, 2014).

8.5.4 Output of the SPI in Qingdao's climate policy

Concerning the output of the interplay of science and Qingdao's climate policy, Qingdao has made it to the top ten low-carbon cities in many appraisals made by either academic institutes or the media during the 2010s (Ding and Yang, 2015: 196; Interviews 05, 10, and 39). Before 2017, Qingdao was the only city in Shandong Province that was selected by the NDRC as a national pilot city of the LCCP.⁶⁸ At the time of writing, the Qingdao Municipal Government had not yet announced whether Qingdao had peaked its CO₂ emissions by 2020. In a study report released by the Chongyang Institute for Financial Studies at RUC, Qingdao ranked number eight among more than two hundred cities regarding carbon emissions reduction (CIFS-RUC, 2021). Given the officials' high acceptance of the experts' input, I consider experts' impact on Qingdao's climate policy as level 4 (high).

8.6 Conditions for accepting the experts' recommendation for low-carbon development

This section explains the conditions for local policymakers to accept the experts' recommendation for LCC, LCD, and LCE. I first explain that the external (Beijing's) assistance and the local need to promote the city is common for the three cities. I then differentiate the political considerations of the three cities: (1) For Guiyang and Guangyuan officials,

⁶⁸ It is until January 2017 that Jinan, Yantai, and Weifang, three prefectural cities in Shandong Province were selected in the third batch of the LCCP.

LCD is almost the only card they can play to lead among other Chinese cities; and (2) Although LCD is not the only card they have, Qingdao officials have to play well to attract the centre's attention due to Qingdao's position among other Chinese cities.

8.6.1 External assistance, local need to promote the city, and local policymakers' political sensitiveness

In terms of SPI input, the three cities have received technical and financial assistance aided by external actors from Beijing. Since the climate change issue was novel for local Chinese policymakers during the 2000s, the external experts played a critical role in capacity building and disseminating the related knowledge. Additionally, three cities have received funding support from international organisations to carry out policy-oriented projects. The incentives for local officials to experiment with such projects increased since they were not responsible for providing the needed funding support.

With the focus on the policymakers, the officials of the three cities share some common characteristics. They are politically sensitive to following the national directive of LCD even when such a discourse had not yet become dominant with Chinese local authorities (Interviews 16, 17, 29, 57, and 63). Second, the officials and Party cadres widely used LCD as the slogan for city branding, highlighting their political performance. This effort had a positive impact in terms of regional competition among local governments (Chen, 2017: Interviews 47, 57, and 63).

8.6.2 LCD as the only card to play (Guiyang and Guangyuan) or the card that has to be played well (Qingdao)

Upon receiving the scientific advice on constructing a low-carbon city, the decisions made by policymakers in Guiyang, Guangyuan, and Qingdao were based on different political considerations. Such considerations mirror the differences in the development stage and endowment between the east-coast cities (Qingdao) and the cities in the southwest (Guiyang) and west of China (Guangyuan).

Located in the southwest and west of China, Guiyang and Guangyuan are underdeveloped with fewer resources in terms of industry, technology, and finance, compared with the east-coast cities such as Qingdao. The municipal officials do not have advantages in branding the cities by conventional slogans such as smart city, high-tech city, financial city, etc. (Interviews 09, 31, and 47). Since the officials needed an alternative strategy to promote the city, novel concepts, such as circular economy, eco-city, and low-carbon economic development, have emerged on those cities' policy agendas. Jiang (2015: 13) explained that among all the earthquake-damaged municipalities in Sichuan Province, Guangyuan is the only city that adopted the low-carbon strategy while others did not:

Guangyuan had no opportunities to win the city game due to its disadvantage since it lagged far behind other cities in Sichuan province with regard to technological, financial, and human resources. However, if Guangyuan took the lead in low-carbon rebuilding while other cities could not, it might have 50%+ possibility of winning. And Guangyuan knew well that other cities would not (because low carbon was not the favourable policy at Sichuan provincial level during that period)! Therefore, it was a sequential game.

Jiang (2015: 13)

Similarly, when the RUC experts suggested that Guiyang focus on developing the tertiary rather than the secondary sector of the economy, the officials eventually accepted the advice due to the recognition of Guiyang's comparative advantage (Interviews 39 and 45). The officials realised that tourism and the MICE industry are among the few industries that they can lead among the Chinese localities.

Yet, compared to Guiyang and Guangyuan, LCD is not the only card that Qingdao can play due to its relatively better development stage and endowment. Compared to the others, Qingdao officials are more politically sensitive to the policy debates in Beijing since they are closer to the political core and have more incentives to get a promotion to the central government (Interviews 46 and 63). Additionally, in general, local Chinese policymakers in the east-coast regions are more willing to accept and experiment with innovative concepts and policy measures due to the high frequency of idea exchange and international trade (Interviews 05, 29, 33, 41, 58, and 60).

Hence, while the ADB and the Caterpillar Foundation were looking for Chinese municipalities to carry out LCD policy-oriented projects, Qingdao expressed its interests in implementing the projects to the centre officials. Such political performance considerations also pushed Qingdao officials to 'implement and try the ETS in advance' even though the central government did not choose Qingdao as an ETS pilot city (Interview 02).

8.7 Inferences

This chapter set out to answer the question of *how do experts engage in China's local climate policy, and what are the conditions for local policymakers to accept the experts' scientific input for developing climate policies?* I answer this with the following conclusions. First, expert input from the international and national level has remained critical in driving China's local climate policy since the 2000s, and local experts have begun to play a vital

role in carrying out policy projects since 2010. Second, rather than combating climate change, experts use terms such as low-carbon development (LCD), low-carbon economy (LCE), and low-carbon city (LCC) to speak to policymakers when promoting climate change-related policy programmes. Third, the external technical and financial assistance, local policymakers' political sensitiveness, and the local need for city branding and highlighting political performance are critical when explaining the conditions that science can drive China's local climate policy.