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

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## Chapter 3: Methods

### 3.1 Introduction

While Chapter 2 has provided a theoretical discussion of SPI, this chapter answers the question: *How can one empirically study science-policy interactions in China's multi-level climate governance?* I first explain social constructionism as the epistemological position of this study (see 3.2). I then present the single layered case study on China and nine selected policy issues and programmes as the embedded multiple cases for extensive analysis (see 3.3). Thereafter I explain the units of analysis (experts, knowledge, policymakers, policy, and politics) and units of observations (experts, research institutes, policymakers, and policy documents) that turn research questions into empirical studies (see 3.4). Lastly, I explain my research methods, particularly the literature review, fieldwork, and in-depth interviews conducted in Beijing and Guangzhou (Guangdong Province) (see 3.5).

### 3.2 Epistemological position of this study

Rather than the mainstream approach in Public Policy which is based in empiricism/positivism, this study assumes a constructivist ontology and a hermeneutic epistemology while employing an interpretive policy analytic perspective (Fischer and Forester, 1993; Hajer and Wagenaar, 2003; Grin and Loeber, 2007; Wagenaar, 2011; Fischer and Gottweis, 2012) to examine SPI and China's climate policy. First, when analysing SPI in relation to different policy problems, this research does not assume the existence of universal and absolute values/norms, nor the given policy-relevant knowledge. Instead, it believes in multiple realities, asserting that values/norms and policy-relevant knowledge are socially constructed by different categories of actors at different governance levels.

Second, concerning the relationships between science/knowledge and politics/policies, this research speaks to a central strand of research in Public Policy and STS. Since science/knowledge does not speak for itself, I pay attention to 'experts' as the 'vehicles' that produce and disseminate knowledge to inform policymakers. Yet, referring to STS, I noticed that the term science-policy interface (SPI) is a simplification that can be criticised since it draws a distinct line between science and politics (Wilson Rowe, 2013: 6-7; Owens, 2015: 13). From the STS perspective, SPI is not just a linear model which holds that science informs politics/policymaking; it is an ongoing co-production between the scientisation of politics and the politicisation of science (Hoppe, 1999, 2005; Jasanoff, 2004; see 2.3.3.3). Therefore, I also pay particular attention to the political context where knowledge is produced by experts and the political dynamics that influence the policymakers' use of knowledge.

Third, this research employed interpretive policy analysis (IPA) approaches to understand policy actors' varied values/interpretations/objectives at multiple governance levels and policy stages (Yanow, 1996, 2000). Instead of assuming that policy actors (e.g., policymakers and experts) are homogeneous individuals, the IPA approach focuses on how policy actors in different positions shaped the situated/contextualised meanings of the same policy programme (Yanow, 2000, 2015). It enables me to explain how climate policies are decided in a political setting and how experts interpret themselves in participating in the policy process.

### **3.3 The Case study approach: China as a case and cases in China**

This section explains my case study approach. I adopted a two-level strategy to explore how science influences policy at multi-level and in cross-level dynamics of climate governance. In dialogue with the SPI and Public Policy literature, China serves as a case of a centralised political system, which can provide insights into the understanding of how SPI plays out in an authoritarian context. Further, in examining SPI at multi-level and in cross-level dynamics within China, nine policy issues and programmes are selected as exploratory cases for analysis.

#### **3.3.1 The single-case study approach: China as a case**

This research adopts a single-case study approach to examine SPI under China's climate governance between 1990-2020. According to Yin (2018: 15), a case study is an empirical method that "investigates a contemporary phenomenon in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident." The advantage of a single-case study approach is its significant contribution to knowledge and theory building (Yin, 2018: 49). At present, scholars have accumulated very little knowledge about SPI and climate change from a multi-level and cross-level perspective and SPI in China's climate policy (see 2.2). A single-case study approach, hence, enables me to explain how SPI works within a single country (China) at multiple levels of governance. Additionally, compared to multiple-case studies, a single-case study approach decreases the difficulties of studying the case at different points in time (Yin, 2018). In other words, a single-case study approach enables me to provide a longitudinal analysis of SPI and China's climate policy (1990-2020) and thus can better explain the conditions for science to influence policymaking.

Meanwhile, there are some disadvantages and limitations of the single-case study approach. From a positivist view, the significant limitation of a single-case study is the 'researcher bias' (i.e., researchers unconsciously select, interpret or manipulate data to meet their purposes) particularly in qualitative research. The second disadvantage is its lack of external validity—the inability to extend the case study findings to other cases and generalise. Further, some question the reliability of a single-case study—whether subsequent research can replicate the research

and obtain the same results again (Lincoln and Guba, 1985; King, Keohane, and Verba, 1994; Mariotto, Zanni, and Moraes, 2014; Yin, 2018).

I adopted three strategies to address these limitations. First, I used multiple sources of evidence, i.e., triangulation, when collecting data to increase the construct validity of this research (Yin, 2018: 43-44). Second, I used an embedded multiple case study design to analyse multiple subcases in the single case study (see 3.3.2). Third, I followed the principle of maintaining the chain of evidence, which means tightening the multiple forms of evidence presented and the research findings (Yin, 2018: 134-136).

### **3.3.2 The embedded multiple case study design: cases in China**

To depict a comprehensive picture of SPI and China's climate policy, I further adopted the embedded multiple case study design to examine the role of experts in relation to different problem types, dimensions, stages, and results of China's climate policy. By doing so, the cases can "add significant opportunities for extensive analysis while maintaining the single case study's focus" (Yin, 2018: 53-54). In order to select the appropriate policy or programme from other possible candidate cases, I used five criteria:

First, it should enable examination of the intersection between science and climate policy at multiple levels of governance from local to international and provide opportunities to analyse the cross-level interactions between science and policy.

Second, it should allow examination of different types of knowledge (i.e., scientific, administrative, stakeholder, and discursive knowledge) that are demanded by policymakers and provided by experts in China's climate policy dynamics.

Third, it should be possible to apply the different models of interaction between experts and policymakers, namely the science-push, policy-pull, and the co-production models.

Fourth, it should enable comparison between the varied influences experts exert on different stages of the policy process, i.e., issue framing and agenda-setting, policy formulation, implementation, and evaluation.

Fifth, it should cover one of the four types of policy problems (i.e., structured, moderately structured (ends), moderately structured (means), and unstructured problems) to enable examination of the role of science and experts in each problem type and the dynamics of problem structuring.

Based on the above criteria, I selected nine contested policy issues and programmes in China's climate policy for study. I divided the nine cases into three groups: SPI and China's climate policy at the international, national, and the local levels (namely provincial and prefectural

levels). *Table 3.1* presents the nine cases in relation to their level of governance, problem type, and stages in the policy circle. The following chapters will explore the details of these cases, and Chapter 10 will summarise the results. Adopting the five-level cumulative scale (see *Table 2.6*), I evaluate experts' impact on different stages in the nine case studies based on the empirical data and present in *Table 10.1* and *Figure 10.1*.

The first group of three embedded cases for extensive analysis of SPI and China's climate policy at the international level are: (1) the principle of cumulative emissions per capita when debating burden sharing of GHG emissions, (2) the carbon budget proposal, and (3) technology development and transfer. While the first two issues are both unstructured problems, the case of technology development and transfer is moderately structured (ends). Chapter 5 examines how experts first engaged in shaping the Chinese discourses on the three issues domestically and then tried to influence the process and results of the international climate negotiations.

The second group of embedded cases are: (4) the target-setting of carbon intensity emissions reductions in China, (5) China's Climate Law, and (6) the policy choice and selection between carbon tax and carbon trading. These cases serve as windows to examine SPI and China's national climate policy at the stages of agenda-setting and policy formulation. Meanwhile, they vary in terms of the problem type. Setting the target for China's carbon emissions intensity reduction is a moderately structured problem (ends), allowing me to explain the implicit tensions among experts and how Chinese policymakers made a political decision. The adoption of China's Climate Law is an unstructured problem, given that the contestations exist not only in terms of the goals, principles and values but also in the discussion of policy instruments. Since China's Climate Law has not yet been passed as of June 2021, this case allows me to explain factors that hinder the science-policy interactions. Lastly, the policy choice between carbon taxation and carbon trading is a moderately structured (ends) problem. While there is an emerging consensus of curbing carbon emissions among China's domestic level, it was once contested regarding whether to adopt a carbon tax or a carbon trading system until the top Chinese policymakers made a decision in 2011. Chapter 6 explains the science-policy interactions and unpacks the black box of China's climate policymaking.

The third group of embedded cases serve as windows for analysing experts' engagement with three pilot programmes at China's local level, namely the provincial and prefectural levels: (7) the low-carbon province and city pilot programme, (8) the emissions inventory, and (9) the pilot emissions trading scheme (ETS). While the low-carbon province and city pilot programme present a moderately structured problem (means), the other two are moderately structured problems (ends). Additionally, compared to the previous six cases, the three allow me to explore the experts' involvement in not only agenda-setting and policy formulation, but also the stage of implementation. While Chapter 7 explains the science-policy interactions in carrying out the

three policy programmes at the provincial level, Chapter 8 tells the story of what happened at the prefectural level.

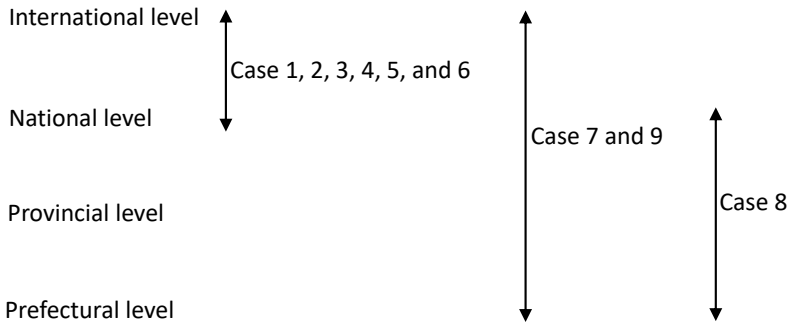
*Table 3.1 Explanation of nine embedded case studies*

Selected cases	Level of governance	Problem type	Stages of a policy cycle
1. The principle of counting cumulative emissions per capita	International	Unstructured	Agenda-setting; policy formulation
2. The carbon budget proposal		Unstructured	Agenda-setting; policy formulation
3. The negotiation on technology development and transfer		Moderately (ends)	Agenda-setting; policy formulation
4. National target-setting on CO <sub>2</sub> emissions reductions	National	Moderately structured (ends)	Agenda-setting; policy formulation
5. The Climate Law		Unstructured	Agenda-setting; policy formulation
6. Policy choices between carbon tax and carbon trading		Moderately structured (ends)	Agenda-setting; policy formulation
7. Low-carbon province and city pilot programme	Provincial / prefectural	Moderately structured (means)	Agenda-setting; policy formulation; implementation
8. The GHG emissions inventory		Moderately structured (ends)	Implementation
9. The pilot emissions trading scheme (ETS)		Moderately structured (ends)	Agenda-setting; policy formulation; implementation

Source: Author.

Regarding the science-policy interactions in cross-level dynamics of China's climate governance, the nine embedded cases also allow me to explain how experts at a given level influence policymakers at the upper and/or lower levels of climate governance (see *Figure 3.1*).

Figure 3.1 Nine cases that present the cross-level dynamics of SPI



Source: Author.

First, six cases allow me to analyse two-level science-policy interactions, namely China's national level and the international level: (1) the principle of cumulative emissions per capita, (2) the carbon budget proposal, and (3) technology development and transfer, (4) target-setting of carbon emissions and energy intensity reductions, (5) the Climate Law, and (6) carbon tax vs. carbon trading. Second, two cases (7) the low-carbon province and city pilot programme, and (9) the pilot ETS provide opportunities for explaining the cross-level interactions of experts and policymakers among all the four levels of governance (i.e., international, national, provincial, and prefectural). Lastly, case 8 (emissions inventorying) allows me to look upon the SPI across China's domestic levels (national, provincial, and prefectural). While Chapters 5 to 8 focus primarily on SPI at one level of governance, Chapter 9 explains SPI in China's climate governance from a cross-level perspective. Adopting the five-level cumulative scale (see *Table 2.6*), I rate and compare experts' influence on the policy process from a multi-level and across-level perspective (see 9.4).

### 3.4 Units of analysis and units of observation

After presenting the nine policy issues and programmes which serve as embedded multiple case studies, this section explains the units of analysis and units of observations of this research. According to King, Keohane, and Verba (1994), 'unit' refers to the element that receives researchers' observation and analysis. Designing a rigorous study includes the simplification of the complex phenomenon and transforming the concept of researchers' interests into a series of observable categories (King, Keohane, and Verba, 1994: 47-48). To implement the process of transforming abstract theoretical questions to empirical studies, it is essential to determine the appropriate unit of analysis and unit of observation that leads to scientific inferences. Once the

unit of analysis is clear, researchers then determine whom or what to be observed—the unit of observation (Babbie, 2009: 99).

### 3.4.1 Defining units of analysis and units of observation

The units of analysis are the elements/variables that lead to causal inferences and theory building, helping researchers formulate an argument and make conclusions (King, Keohane, and Verba, 1994: 52-53, 116-117; Yin, 2018). They help to create summary descriptions of their characteristics and to explain the differences among them (Babbie, 2009: 99). In social science research, the most common units of analysis include individuals or groups of human beings, social interactions and relations, organisations, institutions, and social or cultural artifacts (Babbie, 2009: 103). To transform the abstract research theme—the science-policy-politics nexus—into analysable elements, my research consists of five units of analysis: knowledge, experts, policymakers, policy, and politics.

The units of observation are the objects in the data collection process that researchers actually investigate and classify to learn something about the units of analysis (King, Keohane, and Verba, 1994; Babbie, 2009; Yin, 2018). The difference among units of analysis and observation is not always clear-cut. While units of analysis in a study are usually also the units of observation, they need not be the same (Babbie, 2009). During data collection, the units of observation of this research consist of experts, research institutes, policymakers, and policy documents.

Table 3.2 shows the units of analysis and units of observation of this research. Each element will be discussed in the following sub-sections.

*Table 3.2 Units of analysis and units of observation in this study*

Key research concepts	Research elements	Unit of analysis	Unit of observation
Science	Knowledge	X	
	Experts	X	X
	Research institutes		X
Policy	Policy	X	
	Policymakers	X	X
	Policy documents		X
Politics	Political settings	X	
	Political considerations	X	

Source: Author.

### **3.4.2 Units of analysis/observation for studying ‘science’**

To empirically study ‘science’ in the science-policy-politics nexus, experts, research institutes, and knowledge are the three units of analysis/observation of this research.

#### **3.4.2.1 Knowledge**

Knowledge is the first unit of analysis which represents the form of ‘science.’ To differentiate the policy-relevant knowledge policymakers demand and experts provide in China’s climate policy processes, I propose four types of knowledge for examination: (1) Fundamental knowledge, (2) Applied knowledge, (3) Stakeholder knowledge, and (4) Discursive knowledge (see 2.3.1).

#### **3.4.2.2 Experts**

Experts are both units of analysis and units of observation in this research. I define experts as “policy actors who use their expertise to influence the decision-making process” (Zhu, 2013: 281). I exclude those scholars who primarily stay in academia without the intention and activities to influence policymaking. With the same purpose, those researchers employed at NGOs, consultancies, and other types of research institutes with climate-, environmental- and energy-related expertise will be recognised as experts if they have experience in undertaking policy-oriented research projects commissioned by government officials.

I collected data from individual experts across four levels of China’s climate governance. First, my observation targets include experts who participate in the international scientific communities (i.e., IPCC) or the international climate negotiations (Chapter 5). Second, I observed the experts who assisted the central officials with setting the GHG mitigation goals and drafting policy documents at the national level (Chapter 6). Third, I observed experts who helped provincial and prefectural officials carry out the low-carbon related pilot programmes (Chapters 7 and 8).

#### **3.4.2.3 Research institutes**

Research institutes in which experts are employed is another unit of observation that produces and transmits different types of knowledge to policymakers in China’s climate governance. I classified research institutes into four categories: semi-official think tanks, universities, civilian think tanks (including NGOs), and international scientific organisations.

### **3.4.3 Unit of analysis/observation for studying ‘policy’**

To empirically study ‘policy’ in the science-policy-politics nexus, policy and policymakers are the two units of analysis of this research, while policymakers and policy documents are the units of observation of this research.

### 3.4.3.1 Policy

Policy is a unit of analysis in this research. I follow Dye's (1987: 1) definition to see policy as "anything governments choose to do or not to do" (see 2.3.2) to analyse both the decisions and non-decisions made by policymakers under China's climate governance. I adopt a broad definition of policy to include a (non-)decision, action, statement, discourse, instrument, programme, law, document, and so on released by policymakers, its process, and outcome (see *Table 3.1* for the explanation of nine case studies).

### 3.4.3.2 Policymakers

Policymakers are both units of analysis and units of observation in this research. As a unit of analysis, policymakers are the receivers and users of policy-relevant knowledge. In China's climate policy processes, policymakers can refer to two systems of positions: government officials and Party cadres (Heilmann, 2017). At the central level, examples of policymakers are the Director of a ministry/department/bureau/division, such as the Deputy Head of the National Development and Reform Commission (NDRC) and Director of the Department of Climate Change, NDRC. At the local level, provincial governors, municipal mayors, and Development and Reform Commissions (DRC) officials are examples of individual policymakers. Additionally, due to the prominent position of the Chinese Communist Party (CCP) in China's political system, the Party secretaries at the provincial and prefectural levels often hold substantial power as policymakers (Zhong, 2003; Eaton and Kostka, 2014).

### 3.4.3.3 Policy documents

In addition to policymakers, policy documents are another unit of observation that allows researchers to critically examine the 'written policies' in China's climate governance dynamics. I collected four categories of documents: China's National Communications that were submitted to the UNFCCC, China's Scientific Assessment Reports on Climate Change, China's National Programme, Strategy and Plan on Climate Change Mitigation and Adaptation, and the annual white paper released by the Chinese government: China's Policies and Actions for Addressing Climate Change (see *Table 3.3*).

### 3.4.4. Units of analysis and units of observation for studying 'politics'

Science and policy do not interact in a vacuum but in a political environment. Hence, politics at different governance levels and cross-level dynamics simultaneously influence the interactions between experts and policymakers. While politics seems invisible and intangible, I introduce 'political settings' and 'political considerations' as units of analysis of this research for explaining the science-policy-politics nexus in China's climate governance.

#### **3.4.4.1 Political settings**

The conception of political settings focuses on the spatial dimension of politics, namely, where politics occur that influence SPI and China's climate policy. Concerning the location of politics, the features of international politics (Chapter 5), Chinese domestic politics (Chapter 6) and local politics (Chapters 7 and 8), and the centre-local relations (Chapter 9) will be discussed as conditions to explain the policy output. To be specific, I draw on political institutions (e.g., the bureaucratic apparatus) and political activities (i.e., bargaining, negotiation, and compromise in pursuit of desired ends) (Pielke, 2007: 22) as influencing SPI and China's climate policy.

#### **3.4.4.2 Political considerations**

In addition to the spatial/institutional conceptions of politics, I address policymakers' political considerations that influence science and China's climate policy intersections. This research explains to what purpose (e.g., exercise of power, seeking for reaching some tangible objectives or creating new rules) and under what conditions (e.g., expert dissent) policymakers make a (non-)decision to achieve the political goal (Lasswell, 1958; Warren, 1999; Bogner and Menz, 2010; M. Brown, 2015).

### **3.5 Research methods and data collection**

This research is qualitative in nature. I adopted four methods to collect primary and secondary data to address the research questions: (1) literature review, (2) content analysis of policy documents, (3) fieldwork, and (4) in-depth interviews.

#### **3.5.1 Literature review**

The first research method I adopted is the extensive review of varied sources of publications and academic literature. As pointed out by researchers on China, it is imperative to scrutinise Chinese-language literature and documents in order to seriously study the development of Chinese politics (Heimer and Thøgersen, 2006; Heilmann, 2017). Hence, I reviewed both Chinese and English language academic publications and policy research on China's climate policy. Before the stage of fieldwork, the literature review helped me develop a basic understanding of SPI and China's climate policy and equipped me with some prior knowledge for collecting and analysing the primary data. For instance, it assisted me in identifying important policy programmes and research institutes for case studies and policy actors as potential interviewees.

#### **3.5.2 Content analysis of policy documents**

Since interviewing relevant officials inside the political system has been hard, and government officials are often restricted and reluctant to be interviewed (Liu, 2013: 63), archives and documents are the main sources used to understand the intention and statements of Chinese

policy-makers at different government levels. Since 2004, the Chinese government has released plenty of policy documents to inscribe China's official discourses and main targets and measures of curbing climate change (see *Table 3.3*). Also, considering the timing of writing the thesis, I updated the information and data until 2020 by referring to the media and other sources of information.<sup>16</sup>

*Table 3.3 China's official documents on climate change*

Category	Key policy documents on climate change
National Communication	The Initial National Communication on Climate Change (2004) The Second National Communication on Climate Change (2013) The Third National Communication on Climate Change (2018)
Scientific Assessment Reports	The National Assessment Report on Climate Change (2007) The Second National Assessment Report on Climate Change (2011) The Third National Assessment Report on Climate Change (2015)
National Programme/ Plan/Strategy	China's National Climate Change Programme (2007) China's National Climate Change Adaptation Strategy (2013) China's National Climate Change Plan (2014-2020)
Annual white paper	China's Policies and Actions for Addressing Climate Change (2008) China's Policies and Actions for Addressing Climate Change (2009) China's Policies and Actions for Addressing Climate Change (2010) China's Policies and Actions for Addressing Climate Change (2011) China's Policies and Actions for Addressing Climate Change (2012) China's Policies and Actions for Addressing Climate Change (2013) China's Policies and Actions for Addressing Climate Change (2014) China's Policies and Actions for Addressing Climate Change (2015) China's Policies and Actions for Addressing Climate Change (2016) China's Policies and Actions for Addressing Climate Change (2017) China's Policies and Actions for Addressing Climate Change (2018) China's Policies and Actions for Addressing Climate Change (2019)

Source: Author.

While different official documents share some common elements (e.g., the impact of climate change in China and the climate change mitigation and adaptation strategies), there is a

<sup>16</sup> For instance, Section 4.4.5 is mainly based on secondary data, and I used Internet data sources to trace the latest status of the three policy cases discussed in Chapter 6.

slight difference between each document category in terms of its purpose and content. First, the National Communications (NCs) compiled by the Chinese government are to fulfil an obligation under the UNFCCC (NDRC, 2004). NCs are the only official documents which contain a description of GHG emissions inventory, namely China's GHG emissions by sector. According to Article 4.1 and 12, each country should routinely report its national GHG inventory and measures taken to implement the Convention. Second, since 2007, China has published three Scientific Assessment Reports (SARs) on Climate Change (2007, 2011, 2015). Imitating the design of the IPCC's Assessment Reports, the highlights of China's SARs are the Chinese version of scientific understandings of climate change, particularly the impact of climate change in China.

Third, while China's Climate Law has not been passed by the State Council as of August 2021, three National Programmes/Plans/Strategies provide the fundamental guidelines for China's overall climate policy and climate change mitigation and adaptation strategies.

Lastly, the annual white papers released by the Chinese government between 2008 and 2019—China's Policies and Actions for Addressing Climate change, provides the updated information about China's presented situation under climate change, the measures taken and the interim results.

### **3.5.3 Fieldwork**

The third research method I adopted to study SPI under China's climate governance is fieldwork. Scholars have emphasised the appropriateness and advantages of conducting fieldwork to acquire empirical data on China's environmental and climate-related issues (Hsu, 2000; Economy, 2010). Fieldwork-based studies form the foundation for our understandings of Chinese politics and society (Heimer and Thøgersen, 2006; Heilmann, 2017), particularly the underlying logic of the Chinese government (Hsu, 2000: 91). Furthermore, fieldwork allows researchers to focus on Chinese local actors' agency and varied perspectives, experiences, and response to the policy problem in varying contexts (Lora-Wainwright, 2013: 245). Moreover, through the observation in fieldwork (described below), I investigated how the experts present themselves as actors and contribute to the policy process at some or all of the different stages (Larner and Laurie, 2010; Prince, 2012: 197).

#### **3.5.3.1 Field sites: Beijing and Guangzhou (Guangdong Province)**

During 2014 and 2016, I travelled to China three times to conduct fieldwork in Beijing, the capital city of the People's Republic of China (PRC) and Guangzhou, the capital city of Guangdong Province (see *Map 3.1*). I made observations, took field notes, and conducted in-depth interviews (see 3.5.4) to investigate how experts engage in China's climate policy processes across varied levels of governance (see 3.5.3.2).

Map 3.1 Two field sits: Beijing and Guangzhou (Guangdong Province)



Source: Author.

Beijing was selected for its importance in China's climate policymaking. First, Beijing is the political centre where key government bureaus are located. Most research institutes and international and domestic NGO actors who are proactive in China's climate governance are in Beijing. Second, concerning the level of governance at which experts in Beijing engage with China's climate policy, they not only participate in China's national climate policies but also China's local climate policies. Further, some of them have experiences of engaging in China's foreign and local climate policies, including the low-carbon pilot programmes in provinces or prefectural cities across mainland China. Therefore, during my fieldwork in Beijing, I also collected stories addressing the experts' engagement with China's local climate governance in Chengdu, Dujiangyan and Guangyuan (all in Sichuan Province), Qingdao (Shandong Province), Guiyang (Guizhou Province). The stories will be further discussed in Chapter 8.

In addition to Beijing, I selected Guangzhou, the capital city of Guangdong Province, as another field site to explore experts' engagement in China's local climate governance. This is because: first, Guangdong is the most economically developed province accounting for a significant percentage of national CO<sub>2</sub> emissions (see *Table 3.4*). Second, Guangdong Province is a pioneer in formulating and implementing climate policies among the Chinese localities

(Francesch-Huidobro and Mai, 2012; IGEA, 2015; Mai and Francesh-Huidobro, 2015; Chen, 2017; Chen et al., 2017; Gilley, 2017; Chen and Lo, 2020). It is the only province that was selected by the central government to experiment with all three of the national pilot programmes launched by the NDRC during 2010 and 2011: the low-carbon provinces and cities, the emissions inventory, and the pilot emissions trading scheme (ETS).

*Table 3.4 Key features of Beijing and Guangdong province*

	Beijing	Guangdong Province
Population (2019) (percentage of country)	21540000 (1.54%)	115210000 (8.24%)
GDP (2019) (percentage of country) (ranking among 31 provinces and regions)	US\$ 513.8 billion (3.57%) (No. 12)	US\$ 1565.3 billion (10.9%) (No.1)
Overall emissions (excluding LULUCF) (2012) (percentage of country)	188.1 MtCO <sub>2</sub> e (1.7%)	610.5 MtCO <sub>2</sub> e (5.6%)
GHG emissions reduction target	By 2020: 20.5% reduction in carbon intensity compared to 2015 levels. Pledge to peak CO <sub>2</sub> emissions by 2020	By 2020: 20.5% reduction in carbon intensity compared to 2015 levels By 2030: peak CO <sub>2</sub> sometime before 2030
<i>Note: The GDP originally in Chinese yuan were converted to US dollars at the rate of 6.8985 (USD/CNY).</i>		

Source: Author compiled the data from National Bureau of Statistics, 'National data' <https://data.stats.gov.cn/easyquery.htm?cn=E0103> (last accessed on 25 April 2021); International Carbon Action Partnership (ICAP) ([icapcarbonaction.com](http://icapcarbonaction.com)) (last accessed on 1 May 2021).

Third, Guangdong Province is the place where experts have a higher impact on local climate policies—this meets the selection and prioritisation criteria of my research. Among the 31 provinces and regions in China, experts in Guangdong Province have successfully developed their reputation of providing support to local officials in local climate governance (Han et al., 2012; Mai and Francesh-Huidobro, 2015; Chen, 2017; Chen and Lo, 2020). During my fieldwork in Beijing, many informants and interviewees recommended that I visit Guangdong, three of them even provided me some contact information for approaching the potential interviewees.

### 3.5.3.2 Observation and Field notes

In addition to conducting in-depth interviews (see 3.4.3), I made observations and took field notes when participating in forums, roundtable discussions, symposiums, and book launch events in relation to climate change policy and governance. These events allowed me to learn from multiple viewpoints from participants with different backgrounds. For instance, the organisers of such events can be experts in semi-official research institutes, scholars in universities, journalists and practitioners from media, international and grassroots NGOs, business associations, etc. More importantly, some government officials or leading experts were invited as speakers, moderators or discussants to join such events, which allowed me to meet the 'big names' and ascertain their positions directly. With this I was able to collect some opinions from the informal talks with the government officials, which adds more insights to this thesis.

Another opportunity to make observations of experts' engagement with China's climate policymaking was at the Nineteenth Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP19), which was held in Warsaw, Poland during 11-22 November 2013. I attended the conference from 18 to 22 November and participated in the workshops, side-events and lectures that relate to China's climate policy or were organised by Chinese officials, NGOs, or research institutes.

Lastly, the timing of my third fieldwork period (from March to July 2016) gave me opportunities to observe experts' involvements with multiple policy stages in China's local climate governance. For instance, by 2016, the first batch of the low-carbon province and city pilot programme in thirteen provinces and cities was about to end. Meanwhile, the second batch of the programme (twenty-eight cities) was being undertaken by local stakeholders. The Chinese central government was organising workshops to assess the progress and performance of the two batches of pilot provinces and cities. The officials were reviewing the proposals submitted by local governments in order to launch the third batch of low-carbon city pilots. Therefore, there were several conferences or workshops organised to present the results of the low-carbon city pilots, and guidelines for compiling the low-carbon plans. Attending these events allowed me not only to explore how Chinese experts engage with China's climate policymaking but also the local implementation of such policy projects. Therefore, the conferences and workshops organised by central and local Chinese officials, research institutes, and NGOs provided me with great opportunities to observe the cross-level science-policy interactions under China's domestic climate governance.

### 3.5.4 In-depth interviews

In addition to the literature review, the semi-structured in-depth interviews conducted during fieldwork in China provide the key source of primary data for analysing the role of experts and

the science-policy interactions under China's climate governance (see *Table 3.5* and Appendix II for the list of interviews of this study). As scholars have argued, it is through the interviews with informants that researchers get the opportunity to 'see like an expert' (Larner and Laurie, 2010; Prince, 2012: 197).

#### **3.5.4.1 Purposive and snowball sampling of interviewees**

I selected the interviewees based on purposive sampling and snowball sampling. Purposive sampling means that the interviewees are selected on the basis of the researchers' judgement in order to acquire the most valuable information to address the research questions. Meanwhile, snowball sampling refers to expanding the interview possibilities by asking the interviewees to suggest additional people for interviewing to accumulate more data of the observed population (Babbie, 2009: 193).

In terms of the criteria for selecting interviewees, research performance and academic reputation of the experts, and their engagement with China's climate policy was the primary consideration. My priority was to interview a person who has experiences in being a negotiator in the international climate negotiation conferences. If I could not reach the person or she/he rejected the interview request, I approached her/his colleagues or assistants to collect their observations. Another consideration was whether the experts have engaged with multiple level dynamics of China's climate policy. The third selection criterion is balancing between experts from different disciplines or policy projects in which they were involved. For instance, in addition to approaching experts who are from the natural sciences disciplines such as energy systems, environmental science and engineering, I also contacted experts with a background of environmental economics, and public administration and public policy.

In terms of the process of snowball sampling in Beijing, I initiated this based on the informal contacts and personal network which I have built up since 2009<sup>17</sup>—informants employed at the Chinese Academy of Social Sciences (CASS), Renmin University of China (RUC), and Tsinghua University. Experts from these three institutes have built up a reputation both domestically and internationally, and are well-known as key players in China's climate policy. After each interview was finished, I asked if my interviewees would be able to recommend someone for me to contact. Also, I asked if the informants recommended any province or city to visit for studying the role of experts in China's local climate governance. Lastly, I selected potential candidates from the relevant literature and sent my interview request via emails.

Regarding the process of snowball sampling in Guangzhou (Guangdong Province), I first visited the Guangzhou Institute of Energy Conversion (GIEC), Chinese Academy of Sciences, the

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<sup>17</sup> Before this PhD project, I visited Beijing and conducted interviews with environmental NGOs and climate policy-related experts in December 2009 and November 2011.

Guangdong Low Carbon and Sustainable Research Institute (Jinan University), and the Guangdong Academy of Social Sciences (GDASS). Compared with the larger scale of climate governance and the vast number of experts who participated in climate-related policy research in Beijing, the network formed by the Guangdong experts is relatively small and close in Guangdong's climate governance. Therefore, the experts who engage with Guangdong's climate policies know each other quite well. It made it much easier for me to acquire further recommended contacts from the informants. More than once, the interviewee made a phone call in front of me to help me request a visit to a research institute for conducting an interview. Also worth noting is that these interviewees are involved not only in Guangdong's climate policy at the provincial level but also at the prefectural or county levels.

#### **3.5.4.2 Composition of interviewees**

In all, I interviewed 67 people. I interviewed 53 informants in Beijing, some of them multiple times; and 14 interviewees in Guangzhou (See *Table 3.5*).

Regarding the education level of the interviewees, over ninety percent of them have obtained a Master (28%) or PhD degree (65%). This indicates a high level of expertise and competence of the interviewees, particularly of the experts and other types of actors in China's climate policy. Concerning the interviewees' affiliation, a majority of informants are experts employed at semi-official think tanks (21%) and university scholars (43%). Meanwhile, one-third of the interviewees work at international organisations (3%), international non-governmental organisations (INGOs) (12%), domestic non-governmental organisations (NGOs) (9%), and private sector or third-party organisations (9%). Lastly, 3% of the interviewees hold positions in government bodies, presenting viewpoints from the government.

In terms of the interviewees' discipline, about half of the interviewees are with a professional background in Science (e.g., Physics and Meteorology), Technology, and Engineering (e.g., Chemical and Environmental Engineering) (27%), and Energy Systems Engineering (21%). Meanwhile, 22% of the interviewees studied Economics, particularly Environmental Economics. Lastly, I also interviewed informants who are trained in Political Science, Public Administration, and Law (20%), Journalism and Mass Communication (7%), and Business and Management (3%).

Table 3.5 Composition of interviewees

Item	Category	Number of interviewees (percentage)
Gender	Female	32 (48%)
	Male	35 (52%)
Age	20–40	32 (48%)
	41–60	32 (48%)
	60 +	3 (4%)
Education	Bachelor	5 (7%)
	Master	19 (28%)
	PhD	43 (65%)
Affiliations	Government bodies	2 (3%)
	Semi-official think tanks	14 (21%)
	Universities	29 (43%)
	International organisations	2 (3%)
	International non-governmental organisations (INGOs)	8 (12%)
	Non-governmental organisations (NGOs)	6 (9%)
	Private sectors/third-party organisations	6 (9%)
Discipline	Political Science, Public Administration, and Law	13 (20%)
	Journalism and Mass Communication	5 (7%)
	Business and Management	2 (3%)
	(Environmental) Economics	15 (22%)
	Science (e.g., Physics and Meteorology), Technology, and Engineering (e.g., Chemical and Environmental Engineering)	18 (27%)
	Energy Systems Engineering	14 (21%)

Source: Author.

While most interviewees are experts rather than policymakers, many of them have experienced playing the role of delegates or officials. For instance, some of them have experiences of being Chinese delegates or representatives participating in the UN climate negotiations and the international scientific communities (i.e., the IPCC). Additionally, some interviewees have experienced a ‘temporary transfer’ (借調 *jie diao*)<sup>18</sup> or were ‘hanging on a

<sup>18</sup> Temporary transfer means a person (e.g., a scholar/expert in this thesis) is appointed to take a position in a government department for a specified period.

position' (掛職 *gua zhi*)<sup>19</sup> to government departments to work alongside government officials to deal with climate-related policies. These interviews allowed access to the knowledge-oriented actors who are actually involved in formulating and implementing China's domestic climate policy as an expert-bureaucrat. Hence, the interview data can further validate the accuracy of the document data and develop deeper insights into China's climate policy dynamics.

### 3.5.4.3 Forms and structure of interview

All in-depth interviews were semi-structured, face-to-face, and conducted in Mandarin Chinese. Most interviews lasted between one hour and one and a half hour. I informed all the interviews that the interview would be recorded, transcribed, and used anonymously for academic research and acquired all interviews' consent in accordance with the ethics requirements of the European Union and of the University of Amsterdam.

To establish some familiarity in the interviews, I often started the interview by introducing myself and my research project, and what knowledge I was seeking. Then, I mentioned some names of the policy-oriented research projects or other related work accomplished by the interviewees or their institutes. To gain the interviewee's trust, I often mentioned the experts or institutes I have already visited and interviewed, or who recommended that I approach the interviewee. While interviewing informants who are primarily in the same knowledge network in a given issue area, most interviewees have some mutual acquaintance with my informants. The interviewees often became less cautious when they realised that I have some basic knowledge about both China's climate policy and their work, and share some mutual acquaintances with them. After it felt that some trust had been built, I started asking my open-ended questions.

Although interview questions varied according to the attributes of the interviewees (e.g., working for the government or employed by an NGO), every interview focused on some basic questions (see Appendix III for the list of interview questions):

- A. The experiences of the interviewee's engagement with China's climate policies (at either the international, national, or local level);
- B. The interviewee's relationship between other research institutes and government officials when undertaking policy-oriented research or carrying out a policy project;
- C. The interviewee's experiences of communicating with governmental actors;

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<sup>19</sup> Hanging on a position means a Chinese Communist Party member temporarily moves to a new place to take a position for at least one year, often in a less-developed region. In most cases, the person will get a promotion after she returns to the previous institution.

- D. The 'policy-relevance' issue: for instance, whether their work is policy-relevant, how to create a research project which is policy-relevant, or how to make their research results policy-relevant?
- E. Their self-evaluation of their work and interpretation of their role in China's climate governance or even in global climate governance; and
- F. The interviewees' observation on the relationships between science and policy/politics.

Worth noting is that it is somewhat politically sensitive to directly ask questions regarding the interviewees' comments on China's policy and politics due to the atmosphere and restrictions in the centralised political system (Interviews 21, 49, and 67). Therefore, I did not ask directly what the interviewees knew about policy, their assessment of government policy, or their thoughts on politics. Instead, I guided them to describe scenes and moments of their work that have something to do with policy and tell stories about how their provision of knowledge has figured into policy. For experts who engaged in drafting or reviewing official documents, I asked them which sections they wrote, which parts seemed important to them, the meaning of the terms they used in writing, their implications for China's climate change policy, and so on.

#### **3.5.4.4 Reflections**

As mentioned above, in terms of access to the field sites and interviewees, almost all the interviews were conducted through snowball sampling based on the network I have built up since 2009. Through the informal network, I had more autonomy in the field, but it is at the cost of higher uncertainty since I had to approach potential interviewees by myself. Without a position at any domestic institute and without a 'gatekeeper' in the field, I faced some difficulties in conducting in-depth interviews in China.

Meanwhile, one critical issue is the political sensitivity of being a foreign PhD student who comes from Taiwan. This unique status seemed to be a double-edged sword regarding the advantages and disadvantages when conducting in-depth interviews in China. On the one hand, all interviewees welcomed me as a special guest from Taiwan. If they accepted the interview request, the political sensitivity of my status was not a problem. During the interview, the informants were more willing to explain what they called 'Chinese logic,' 'Chinese characteristics,' or the way to interpret a given issue based on the governing features of Chinese bureaucracy, centre-local relations, and most importantly, the characteristics of the Chinese Communist Party (CCP). When I asked questions that are related to how the Chinese government thinks of a policy project, most of the interviewees patiently explained not only the explicit but also the unspoken rules in the Chinese political context.

On the other hand, the status of an international PhD student who comes from Taiwan can increase the likelihood of receiving a refusal from a potential interviewee. For some interviewees

who are highly involved in China's climate policy at the national or international level, I could sense that they became more cautious than other interviewees when answering the questions regarding China's policy and political issues. Lastly, my status increased the difficulty of snowball sampling. For instance, since some interviewees demonstrated their rich experience in cooperating with Chinese localities on low-carbon city projects, I asked if the interviewee could refer me to someone else at the local level. However, most interviewees tended to refuse the request, explaining that in fact they were not that close with local actors, or due to the political sensitivity of my status. (However, it is also possible that the interviewees were inclined to refuse all requests for referring people to their acquaintances).

Concerning how to avoid or deal with biases, triangulation of different sources of data is used to enhance the validity and credibility of the data collected by an in-depth interview. During the interviews, I also raised questions generated from the literature or opinions expressed by other interviewees to consult the interviewed informants. Since I often interviewed more than one informant within a given issue, the diversity of interviewees and the multiple sources of information also allowed me to double check if there are biases in the interviewees' opinions. Meanwhile, another way to avoid biases is to triangulate the interview data with other empirical data, such as the field notes.

### **3.6 Conclusion**

This chapter explains how I empirically studied science-policy interactions at four levels of China's climate governance. First, I adopted the single case study on China with the analysis of nine policy issues and programmes as embedded cases. Second, the units of analysis (i.e., experts, knowledge, policymakers, policy, political settings, and political considerations) and units of observation (i.e., experts, research institutes, policymakers, and policy documents) were defined to turn research questions into empirical studies. Third, the research methods of this study include a literature review of relevant publications and policy documents and fieldwork and observations in Beijing and Guangzhou (Guangdong Province) with 67 in-depth interviews. In the following chapters, the cases analysed and inferences I make are based on the triangulation of the multiple sources of primary and secondary data to increase the validity and reliability of this research.