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

Chen, L.-Y.

Publication date
2022

This thesis explores the ways in which experts engage in China's climate policies at four different administrative levels (i.e. international, national, provincial, and prefectural) and how politics simultaneously influences the science-policy interface (SPI) in an authoritarian context and a multi-level governance framework.

First, experts play an essential role in shaping China's foreign climate policy by loading science/politics co-constituted ammunition to negotiate with their counterparts in global climate politics. At the national level, the demand of Chinese policymakers is setting the related targets and developing the policy framework for both climate change mitigation and adaptation. While the experts provided sufficient scientific advice, policymakers tend to add some political considerations due to different timing and factors at the higher (international) and lower (subnational) governance levels before making the final decision. Given that local Chinese officials, in general, lack capacity and expertise for addressing climate change, experts engage not only in formulating low-carbon development-related plans but also in carrying out such policy programmes. Political performance and accomplishment, feasibility and achievability of policy goals, and regional competition are considerations regarding the uptake of experts' advice at the lower government levels.

While the past SPI literature focuses primarily on the scientification of policymaking, the political considerations and conditions for explaining SPI identified in the thesis can be a hypothesis to test in other countries to improve our understanding of the science-policy-politics nexus.

Universiteit van Amsterdam

Experts and the Science-policy Interface in China's Climate Policy Liang-Yu Chen

Experts and the Science-policy Interface in China's Climate Policy

Liang-Yu Chen

Experts and the Science-policy Interface in China's Climate Policy

Liang-Yu Chen

Cover design: Yun-An Olivia Dung
Printed by: ProefschriftMaken || www.proefschriftmaken.nl

Experts and the Science-policy Interface in China's Climate Policy

ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad van doctor
aan de Universiteit van Amsterdam
op gezag van de Rector Magnificus
prof. dr. ir. K.I.J. Maex
ten overstaan van een door het College voor Promoties ingestelde commissie,
in het openbaar te verdedigen in de Agnietenkapel
op dinsdag 28 juni 2022, te 15.00 uur

door Liang Yu Chen
geboren te Taipei City

Promotiecommissie

Promotor:	prof. dr. J. Gupta	Universiteit van Amsterdam
Copromotor:	dr. C.L. Vegelin	Universiteit van Amsterdam
Overige leden:	prof. dr. J. Grin	Universiteit van Amsterdam
	prof. dr. W.H.M. Leung	Universiteit van Amsterdam
	prof. dr. M.A. Schreurs	Technische Universität München
	dr. A.M.C. Loeber	Vrije Universiteit Amsterdam
	prof. dr. R.C. Kloosterman	Universiteit van Amsterdam

Faculteit der Maatschappij- en Gedragswetenschappe

Executive Summary

The Problem: Although a considerable amount of climate change related scientific knowledge and information has been provided to policymakers, there is a persistent gap between knowledge production and use in human response to climate change. Even after three decades of efforts to tackle climate change since 1990, the incremental progress of the international climate negotiations and the slow-moving policy implementation at the domestic level is unlikely to meet the long-term objective of the 2015 Paris Agreement on Climate Change. Understanding when, why, and how policymakers use scientific evidence and expert knowledge to tackle climate change is critical. Further, as international climate negotiations are moving from a top-down to a more bottom-up process where countries state what they are willing to do, bridging the gap between science and climate policy at multiple levels of governance in varied political environments becomes more challenging.

While there is growing knowledge on how science and policy interact in general and in the climate change field in particular, there are at least four knowledge gaps in the existing literature: (1) A lack of exploration of the science-policy interface (SPI) in the Global South context; (2) A lack of exploration of SPI from a multi-level or cross-level perspective; (3) A lack of theoretical discussion and concept definition of SPI; and (4) A lack of exploration of SPI and China's climate policy together.

Research questions: To address these knowledge gaps, this thesis studies China and addresses the overarching question: Under what conditions and in which ways do experts influence China's climate policy across multiple levels of governance, and what does this mean for the future of China's climate policy? Related sub-questions are: (1) Who are the experts that are engaging with the policy process?; Who are the policymakers? (2) What kinds of science do experts generate and what kinds of science do policymakers need in order to make decisions, and why? (3) What kinds of political considerations do policymakers take into account before making the decisions?

Analytical Framework: This thesis reviews the scholarly literature on science-policy interface and problem solving in order to formulate an analytical framework to look upon SPI in China's climate policy across multiple levels of governance. It examines three elements of SPI: (1) the input of science, (2) the intersection process of science and politics, and (3) the output of SPI. First, it investigates four types of knowledge policymakers demand and experts provide as input for China's climate policy: (1) Fundamental knowledge that contains scholarly/technical information and scientific understanding of

an issue; (2) Applied knowledge for designing projects, policies, and laws for achieving social goals; (3) Stakeholder knowledge based on common sense and local practice; and (4) Discursive knowledge that presents a frame, narrative or discourse, indicating a certain way of dealing with the given issue. Second, it applies three models to explain the intersection process of science and politics in China's climate policy: (1) The science-push model focuses on the ways in which the experts influence policymaking; (2) The policy-pull model highlights how policymakers' demand for policy-relevant knowledge pulls experts to provide assistance; and (3) The co-production model stresses that rather than 'science speaking truth to power,' science and politics are 'making sense together' to co-generate a policy. While the three models of SPI may co-exist in a policy issue, they provide insightful lenses to examine the relationship between experts, policymakers, and policy. Lastly, regarding the output of SPI, I develop a five-level cumulative scale of policymakers' response to the experts' scientific input to evaluate science's impact on policy: (1) Policymakers are informed and have taken note of the input; (2) Policymakers put the suggested ideas on the policy agenda for debate; (3) Policymakers agree with the recognition of policy problems but are contesting regarding the solutions; (4) Policymakers accept the experts' advice and make decisions based on political considerations; and (5) Policymakers accept all advice and directly put it into policy practice. This thesis assumes to some extent that there is consensus among the scientists regarding what should happen at the respective governance levels. Concerning the theoretical lens for analysing SPI, the thesis builds on a typology of policy problems with four types of structures mapped out in two dimensions: (1) Structured, (2) Unstructured, and two kinds of moderately structured problems: (3) Moderately structured problem (means) and (4) Moderately structured problem (ends). A problem is termed structured when there is a high consensus on norms and values among policy stakeholders and can be solved by standardised techniques and procedures since there is a certainty on what kind of knowledge is relevant and the values that should underlie policy instruments. Meanwhile, a problem is labelled as unstructured when there is a disagreement on values and relevant knowledge among policy stakeholders. Further, a moderately structured problem (ends) occurs when there is consensus on relevant values but uncertainty or dissent on what kind of knowledge is relevant. Lastly, a moderately structured problem (means) indicates that there is a certainty of relevant knowledge, yet the norms and values remain contested.

Methods: This research assumes a constructivist ontology and a hermeneutic epistemology while employing an interpretive policy analysis (IPA) approach to examine SPI and China's climate policy. It adopts the single-country case study approach and the embedded multiple case study design. The People's Republic of China (PRC) is chosen as the case study since China is the largest greenhouse gas (GHG) emitter and is an

authoritarian regime; this allows me to investigate SPI in a non-democratic situation. Based on the analysis of nine selected policy issues, I examine the ways in which Chinese experts engage in climate policies at four different administrative levels (i.e., international, national, provincial, and prefectural levels) and the output of SPI. Research methods include an extensive review of varied sources of publications and academic literature, content analysis of policy documents, fieldwork, and 67 semi-structured in-depth interviews with experts and other categories of policy actors in Beijing and Guangzhou City (Guangdong Province). The research focused on 9 policy issues (see *Table*).

Table. Nine policy issues analysed in this research

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 structured (ends)	Agenda-setting; policy formulation
4. National target-setting on CO_2 emissions reductions	National	Moderately structured (ends)	Agenda-setting; policy formulation
5. The Climate Law		Unstructured	Agenda-setting; policy formulation
6. Policy choice 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

Chapter 4 examines how Chinese politics and policymaking have been changing and what this implies for the distinctive features of China's climate politics and policymaking today. China's climate policy has evolved since 1990 in five phases: Phase 1 (before 1997) identified the international scientific and environmental aspects; Phase 2 (1998~2006) focused on how this issue became a domestic challenge focusing on economics and energy; Phase 3 (2007~2009) signified a big proactive change towards climate policy; Phase 4 (2010~2019) moved from central planning to local operationalisation; and Phase 5 (2020~) focuses on operating the domestic ETS to ensure that CO_2 emissions in China peak before 2030 and carbon neutrality is achieved by 2060. The features of current Chinese politics and policymaking are: (1) Fragmented authoritarianism and bureaucratic competition at the horizontal level; (2) Centre-local relations, implementation gaps, and vertical bargaining between different levels of government; (3) The use of policy experimentation/pilot projects before scaling up; and (4) The emphasis on scientific decision-making. When moving from Phase 1 to Phase 2, the National Development and Reform Commission (NDRC) and the Ministry of Foreign Affairs (MOFA) incrementally became the two dominant players that held the decision-making power during the progress of international climate negotiations. The two Ministries' dominant position was a result of bureaucratic competition where the economic development and energy ministry took control from the environmental and meteorological sector in steering China's climate policy. During Phase 3 and Phase 4, tackling climate change has been translated domestically by the Chinese government as 'energy-conservation and emissions-reduction' and 'low-carbon development' as the dominant discourse. Apart from bureaucratic competition, experts play a critical role in shaping China's climate policy as a repackaging of energy policy. From Phase 4 to Phase 5, China has launched a series of low-carbon related pilot programmes at the local levels and the nationwide emissions trading system, showing its ambition to peak its carbon emissions before 2030 and carbon neutrality by 2060.

Chapter 5 examines how Chinese experts engage in China's *foreign* climate policy, particularly how they participate in the Intergovernmental Panel on Climate Change (IPCC) Working Groups (WGs) as well as the international climate negotiations. The science-push and the co-production models can be applied to depict the feature of Chinese experts' involvement at this level. Concerning the Chinese experts' impact on IPCC, the experts in WGI (the physical science basis) are more influential than those in WGII (impacts, adaptation, and vulnerability) and WGIII (mitigation of climate change) in terms of the number of selected participants and the publications cited as references in the Assessment Reports (ARs). In order to gain influence in global climate politics, Chinese policymakers need not only fundamental but also discursive knowledge. Hence, the Chinese experts who

come from top universities and semi-official think tanks speak on behalf of China, not only as scientists but as political representatives, to other countries. Yet, the space for negotiation is based on what has been decided at China's domestic level, indicating that Chinese experts are putting forward views that have been internally negotiated in order to guide policy in international climate talks. The three case studies show that experts play a key role in shaping China's foreign climate policy by loading science/politics co-constituted ammunition to negotiate with their counterparts in global climate politics.

Chapter 6 analyses the experts' engagements with China's climate policy at the *national* level and the results show that the science-push and policy-pull model can best describe the science-policy intersection. The demand of Chinese policymakers at this level is setting the related targets and developing the policy framework of both climate change mitigation and adaptation. Concerning the input for policymaking, not only semi-official research institutes but also universities, NGOs, and other categories of expert institutes are involved in the policy process. Yet, while each research institute can undertake research, Chinese policymakers often listen to voices from some specific institutes. Among all, the Energy Research Institute (ERI), the National Centre for Climate Change Strategy and International Cooperation (NCSC), and Tsinghua University are the most influential knowledge suppliers for the central government. In terms of the output of SPI, my study shows that while the experts provided sufficient scientific advice, some political considerations influence the policymakers' final decision. First, timing matters. Different timing leads to different considerations (e.g., to set an ambitious goal and ensure the goal is achievable). Second, scale matters. While making a policy decision, not only the factors at the present governance level, but factors at the higher (international) and lower (subnational) governance levels will be considered by Chinese policymakers. Third, the features of China's political system (i.e., fragmented authority and bureaucratic competition) remains an obstacle that hinders policy uptake of experts' scientific input.

Taking Guangdong Province and three *prefecture-level* cities (Guiyang, Guangyuan, and Qingdao) in Western and Eastern regions of China as examples, **Chapter 7** and **Chapter 8** address the experts' engagement in China's provincial and local climate governance respectively. All the three models—the science-push, policy-pull, and co-production model can be found in policy practice. Instead of fundamental knowledge, local Chinese policymakers need primarily applied knowledge and stakeholder knowledge that help to carry out the climate-related policy projects and facilitate the compliance of local industries and enterprises. Considering that the officials at the lower government levels, in general, lack capacity and expertise for addressing climate change, experts have a higher degree of impact on both policymaking and implementation. In terms of who 'the' experts

are, the research centres for addressing climate change established by provincial and local governments, alongside local universities and expert institutes, provide key scientific input for local climate policy. Meanwhile, quite often local officials accept assistance provided by research institutes that come from the higher (i.e., provincial and national) levels. At the initial stage, experts play the role of 'policy entrepreneurs' that introduce the concept of low-carbon development (LCD) and low-carbon economy (LCE) to local officials through capacity building. Then, they act as advisors with expertise that assist local officials by generating plans and guidelines. When stepping to the stage of policy implementation, experts play the role of practitioners with an administrative professional that helps officials carry out the policy projects. In terms of the output of the SPI, the case studies showed that the experts have a substantial impact on China's local climate policy. Yet, the political environment at the local levels (characterised e.g., by parochialism and regional competition) and the priorities and considerations of local officials (e.g., achieving their target responsibilities set by the centre) are decisive to the policymakers' final policy decisions.

While Chapters 5 to 8 deal with experts' involvement in China's climate policy from the international, national, provincial to the prefectural level, respectively, **Chapter 9** explains how the experts and policymakers interact *across multiple levels* of governance. First, it shows that the international-domestic linkages between foreign and Chinese research institutes and the centre-local and provincial-municipal interactions among expert institutes jointly form the scientific input for China's climate policy. While foreign research institutes and international donors consistently provide scientific, technology and funding support, expert institutes in Beijing play an essential role in: (A) Lobbying the officials to experiment with pilot programmes; (B) Developing methodological instructions for capacity-building training; and (C) Reviewing policy documents submitted by the localities. Meanwhile, local experts facilitate bottom-up knowledge travel by sharing local experiences of low-carbon related pilot programmes. Apart from the division of labour (cooperation), there are also tensions between experts at different administrative levels regarding the core concerns of policy and the strategies for completing the work. For instance, while the Beijing experts develop a meticulous framework aiming to compile a comprehensive GHG emissions inventory, local experts adopt the strategy of 'grasping the large and releasing the small' to complete the work in a practical way. Second, all the three SPI models occur in cross-level dynamics of China's climate policy. Specifically, the science-push model is more appropriate to depict the experts' engagement with China's climate policy at the higher levels of governance, and the policy-pull model appears more often at the lower government levels. Third, in terms of the output of the SPI in China's climate policy, it is more likely that experts at the lower governmental levels successfully influence

policymaking and implementation than experts at the higher governmental levels.

Chapter 10 revisits the relationships between science and climate policy in China, and the theoretical reflections we can learn from the Chinese case study. The answers to the sub-questions are: (1a) Concerning who 'the' *experts* are, rather than only semi-official think tanks being dominant in the policy process, there are multiple scientific input providers (e.g., experts from universities, NGOs, and international organisations) into China's climate policy at different levels of governance; (1b) Regarding who 'the' *policymakers* are, the powerful ministry has evolved from the scientific and environmental protection administration (the CMA and NEPA) in the early 1990s to the energy and economic development ministry (the NDRC) ever since the 2000s. Recently, the distinctive institutional change of China's climate policy is that the Ministry of Environmental Protection (MEP) was reorganised as the Ministry of Ecology and Environment (MEE) and took over the NDRC's role in leading the planning and coordination for addressing climate change in 2018. The government restructuring indicates the Chinese government's dual attempts. First, China seeks to resolve the long-standing problem of fragmentation of authority—while the MEP is responsible for regulating carbon monoxide (CO), control of carbon dioxide (CO_2) falls under the NDRC. Second, highlighting the concept of ecological civilisation (EC) as the core doctrine of its global and national development strategy, China attempts to situate climate change with environmental governance and pollution control under the EC discourse; (2) Regarding the types of knowledge policymakers need in order to make decisions: (a) Policymakers at the higher levels of governance (i.e., international and national level) demand and accept more fundamental and discursive knowledge to gain influence in global climate politics and to guide domestic policy directives. For instance, a science-based proposal to negotiate with China's allies and opponents for fair burden sharing of GHG emissions reductions, and an understandable narrative with vision to convince domestic stakeholders to guide China's low-carbon development; (b) Policymakers at the lower governmental levels (i.e., provincial and prefectural levels) demand and accept more applied knowledge due to their limited capacity and expertise for policy planning and implementation. This includes, for instance, the toolkits for developing the low-carbon plan for provinces and cities and the administrative guidelines for emissions inventories and running the ETS; (3) Regarding SPI in cross-level dynamics of China's climate policy, the science-push model is more appropriate to depict the experts' engagement with China's climate policy at the higher governmental levels, and the policy-pull model appears more often at the lower levels.

To offer a comprehensive picture of SPI in China's authoritarian context, this thesis identified several political considerations of Chinese policymakers for the adjustment and

uptake of the experts' scientific advice and policy suggestions: (A) Timing: Chinese policymakers will not announce a decision when the time is not ripe; (B) National interests: Chinese policymakers will defend their perceived national interests in the international climate negotiations; (C) Scale: Policymakers consider not just factors at the present governance level but also factors at the higher and lower levels; (D) Political performance and accomplishment: When setting a target or deploying a policy instrument, policymakers are concerned more with political performance and accomplishment; (E) Feasibility and achievability: When setting a policy goal, it must be feasible and achievable; (F) The target responsibility system (TRS) set for assessing the performance of local officials and Party cadres; and (G) Regional competition: low-carbon development (LCD) and low-carbon economy (LCE) become local policymakers' leverages to promote their territories.

Based on the nine case studies, this research demonstrates that the typology of four policy problems could help illuminate the varied roles of experts and their policy impacts. While the experts' impact on unstructured problems is limited (CEPC, CBP, and the Climate Law), they have a significant effect on moderately structured problems (ends) (TD&T, Target-setting on CO_2 emissions reduction, carbon tax vs carbon trading, EI, and pilot ETS) and moderately structured problems (means) (LCPC). The nine case studies also echo the notion that experts can stimulate problem structuring by mediating SPI to reconstruct the present problem as a structured problem.

Theoretical implications: This thesis contributes to theorising SPI by employing an interpretive policy analysis (IPA) and a multiple/cross-level analysis of SPI in an authoritarian context. First, while the extant SPI literature primarily focuses on the role of science at the stage of policymaking, this thesis expands our understanding of the experts' engagement with virtually all phases of China's climate policy. It reveals that China's climate policy is not just about national policymaking/state regulation vs local implementation/compliance. Rather, local actors are learning and redefining policies based on local knowledge and trial-and-error in each stage of the policy process. Concerning the policy-relevant knowledge, while only high-level political decision-makers demand fundamental (scientific) knowledge, policymakers at all governance levels demand discursive and applied knowledge to make decisions and disseminate to the target groups and stakeholders.

Second, the multiple-/cross-level analysis of SPI shows that both top-down and bottom-up knowledge travel occurs in China's multi-level climate governance. Meanwhile, policymakers make decisions not just under the political settings at the given governance level; they also have to consider factors from the higher and lower governance levels (e.g.,

the policy choice between carbon taxation and carbon trading in Chapter 6). Additionally, I demonstrate that the same experts' engagement with the policy process could be interpreted through different SPI models. For instance, while one can adopt the science-push model to describe Beijing experts' contribution to developing guidelines and toolkits for local actors, it is also a policy-pull model since Chinese central policymakers demand that the experts do so (Chapter 9).

Lastly, while the existing literature has accumulated limited knowledge about SPI in an illiberal and authoritarian context, this research presented the political considerations and conditions for explaining the policymakers' uptake of experts' scientific input in China's authoritarian regime. While the past SPI literature focuses primarily on the scientification of politics and policymaking, this research also contributes to understanding the politics/politicisation of science/knowledge. I argue that the political considerations and conditions for explaining SPI identified in this research (e.g., horizontal/vertical power relations and concerns of timing and political performance) could be a hypothesis to test in other countries, not just authoritarian regimes. Further, I hypothesise on the basis of this thesis that while in authoritarian countries local governments will be satisfied with applied knowledge once the central government has accepted the fundamental and discursive knowledge. This may not be the case in democratic countries where even local governments may need convincing about the fundamental and discursive aspects of the program. To sum up, researchers should consider the nature of politics to better understand the interplay between science and policy.

Contents

List of Tables

List of Figures

List of Maps

Abbreviation

ADB	Asian Development Bank
AR	Assessment Report
AWG-ADP	The Ad Hoc Working Group on the Durban Platform for Enhanced Action
AWG-KP	The Ad Hoc Working Group on Kyoto Protocol
AWG-LCA	The Ad Hoc Working Group on Long-term Cooperative Action
BASIC countries	Brazil, South Africa, India, and China
CA	Contributing Author
CAAS	Chinese Academy of Agricultural Sciences
CAEP	Chinese Academy of Environmental Planning
CAFS	Chinese Academy of Fiscal Science
CAMS	Chinese Academy of Meteorological Sciences
CANGO	China Association for NGO Cooperation
CAS	Chinese Academy of Sciences
CAS-IAP	Institute of Atmospheric Physics, Chinese Academy of Sciences
CAS-IPM	Institute of Policy and Management, Chinese Academy of Sciences
CASS	Chinese Academy of Social Sciences
CASS-IUE	Institute for Urban and Environmental Studies, Chinese Academy of Social Sciences
CASS-RCSD	Research Centre for Sustainable Development, Chinese Academy of Social Sciences
CBA	Carbon Budget Account
CBAP	Caron Budget Account Proposal
CBDR	Common but differentiated responsibilities
CBEEX	China Beijing Environment Exchange
CBP	Carbon budget proposal
CCCPC	Central Committee of Communist Party of China
CCI	Clinton Climate Initiative
CCICED	China Council for International Cooperation on Environment and Development
CCP	Chinese Communist Party
CDM	Clean Development Mechanism
CEEX	China Emissions Exchange at Guangzhou
CEPC	Cumulated Emissions Per Capita

CEPREI	The CEPREI Calibration & Testing Centre
CER	Certified Emissions Reduction
CJFD	China Academic Journals Full-text Database
CLA	Coordinating Lead Author
CLEMF	China Low-carbon Economy Media Federation
CMA	China Meteorological Administration
CNCCP	China's National Climate Change Programme
CNKI	China National Knowledge Infrastructure
CO	Carbon monoxide
CO_2	Carbon dioxide
COP	Conference of the Parties
CQC	China Quality Certification Centre
CRELE	Credibility, relevance, and legitimacy
CTC	The Climate Technology Centre
CTCN	The Climate Technology Centre and Network
CUPL	China University of Political Science and Law
DCC	Department of Climate Change (central government) / Division of Climate Change (provincial government)
DRC	Development and Reform Commission
DRC	Development Research Centre under the State Council
EC	Ecological civilisation
ECA	Epistemic community approach
EDF	Environmental Defense Fund
EI	Emissions inventory
ENGO	Environmental non-governmental organisation
ERI	Energy Research Institute
ETS	Emissions Trading Scheme
EU	European Union
FA	Fragmented authoritarianism
FYP	Five-Year Plan
G-77	Group of 77
GCB	Global carbon budget
GCF	Green Climate Fund
GD-DRC	Guangdong Provincial Development and Reform Commission
GD-DST	Guangdong Provincial Department of Science and Technology
GDAAS	Guangdong Academy of Agricultural Sciences
GDAES	Guangdong Academy of Environmental Sciences
GDAF	Guangdong Academy of Forestry

GDCC	Guangdong Climate Centre
GDP	Gross Domestic Product
GDRCCC	Guangdong Research Centre for Climate Change
GDTE	Guangdong Techno-economy Research and Development Centre
GEEE	Guizhou Environment and Energy Exchange
GEF	Global Environmental Facility
GEI	Global Environmental Institute
GHG	Greenhous gas
GIEC	Guangzhou Institute of Energy Conversion, Chinese Academy of Science
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GLCDPA	Guangdong Low-Carbon Development Promotion Association
GONGO	Government-organised non-governmental organisation
ICCSD	Institute for Climate Change and Sustainable Development
ICLEI	International Council for Local Environmental Initiatives
iGDP	Innovative Green Development Programme
INDC	Intended Nationally Determined Contribution
INGO	International non-governmental organisation
IPA	Interpretive policy analysis
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
IR	International Relations
KP	Kyoto Protocol
KU	Knowledge utilisation
LA	Lead Author
LCB	Low-carbon Bureau
LCC	Low-carbon city
LCD	Low-carbon development
LCE	Low-carbon economy
LCEC	Low-carbon eco-city
LDC	Least developed countries
LDCF	Least Developed Countries Fund
LNG	Liquefied natural gas
LPG	Liquid petroleum gas
LCCP	Low-carbon city pilot
LCPC	Low-carbon province and city pilot

LCPPP	Low-carbon province pilot programme
MEE	Ministry of Ecology and Environment
MEP	Ministry of Environmental Protection
MICE	Meetings, incentives, conferences, and exhibitions
MLG	Multi-level governance
MOA	Ministry of Agriculture
MOF	Ministry of Finance
MOHURD	Ministry of Housing and Urban-Rural Development
MOST	Ministry of Science and Technology
MOU	Memorandum of Understanding
NDRC	National Development and Reform Commission
NCC	National Climate Centre
NCGCC	National Coordination Group on Climate Change
NCGCCS	National Coordination Group on Climate Change Strategy
NCSC	National Centre for Climate Change Strategy and International Cooperation
NDC	Nationally Determined Contribution
NECCC	National Expert Committee on Climate Change
NEA	National emissions account
NEA	National Energy Administration
NEPA	National Environmental Protection Agency
NGO	Non-governmental organisation
NLGACC	The National Leading Group for Addressing Climate Change
NLGACCECER	The National Leading Group for Addressing Climate Change and Energy Conservation and Emissions Reduction
NO_x	Nitrogen oxide
NPC	National People's Congress
ODS	Ozone depleting substances
PAC	Policy package of China
PNS	Post-normal science
QDECI	Qingdao Engineering Consulting Institute
QIBEBT	Qingdao Institute of Bioenergy and Bioprocess Technology, Chinese Academy of Sciences
QUST	Qingdao University of Science and Technology
RC	Respective capabilities
RE	Review Editor
RIFS	Research Institute for Fiscal Science
PECE	Programme of Energy & Climate Economics

PHCER	Tan Pu Hui certified emissions reduction
PRC	People's Republic of China
RUC	Renmin University of China
SAR	Scientific Assessment Report
SBSTA	Subsidiary Body for Scientific and Technological Advice
SCCF	Special Climate Change Fund
SCLGECER	The State Council Leading Group on Energy Conservation and Emissions Reduction
SDPC	The State Development Planning Commission
SEI	Stockholm Environment Institute
SO_2	Sulphur dioxide
SOE	State-owned enterprise
SPF	Strategic Programme Fund
SPI	Science-policy interface
SSTC	State Science and Technology Commission
STS	Science and technology studies or the study of science, technology and society
SYSU	Sun Yat-sen University
TA	Technical assistance
TD&T	Technology development and transfer
TEC	Technology Executive Committee
TM	Technology Mechanism
TRM	The Technology Roadmap
TRS	Target responsibility system
TWN	Third World Network
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
US	United States of America
UK	United Kingdom
UNFCCC	United Nations Framework Convention on Climate Change
WBGU	German Advisory Council on Global Change
WCP	World Climate Programme
WG	Working Group
WOS	Web of Science
WMO	World Meteorological Organisation
WRI	World Resources Institute
WWF	World Wild Fund for Nature

Note on Publications

Chapter 7 is written on the basis of the author's published peer-reviewed article:

Chen, Liang-Yu. 2017. "How do Experts Engage in China's Local Climate Governance? A Case Study of Guangdong Province." *Journal of Chinese Governance*, Vol. 2, No. 4, pp. 360-384.