Urban climate governance in China;

Policy networks, partnerships, and trends in participation

Author: Linda Westman
Degree: PhD Development Planning
Affiliation: University College London (UCL), Development Planning Unit
Thesis supervisors: Vanesa Castan Broto, Adriana Allen, Neil Strachan

DECLARATION

I, Linda Katrin Westman, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Abstract

This thesis situates China in the global shift from government to governance that has occurred in international environmental politics over the past decades. The thesis explores how this shift is expressed by studying the role of non-state actors in local climate action and how policy networks and partnerships are produced in this political system. The thesis employs a mixed methods approach to study this topic. The city of Rizhao serves as a case study on urban environmental policy making and governance modes involved in climate agenas. A comparative study of 150 urban climate initiatives provides insights into urban climate governance trends, including roles of actors and forms of climate partnerships.

The thesis contributes to academic debates on China's transition to a modern environmental state, argued to cause an increasing diversity of actors and strategies in environmental governance. This research highlights previously unexplored dimensions of network governance, such as conflict, balance of power, and the structure of the political economy. The thesis shows that urban planning processes are shaped by political-economic elites and that planning arrangements protect status quo, thereby reproducing trajectories of high carbon growth. The empirical material also demonstrates that local authorities use a mixture of governance modes to support emission reductions and that urban climate partnerships are common. Partnerships vary in form and function and can facilitate local climate action by introducing new technology and policy practices. However, partnerships and networks cannot be directly interpreted using theoretical perspectives developed in liberal democratic nations. The thesis demonstrates that participation is not open to all social groups, but only to those with access to political-economic resources or technical expertise. This is explained as a reproduction of enduring techno-economic rationalities that condition political practices in China. Thus, a rise in collaborative governance strategies does not equate democratization of environmental governance.

Acknowledgements

I wish to extend my sincere gratitude to my supervisors, Vanesa Castan Broto, Adriana Allen, and Neil Strachan, who have guided me, motivated me, inspired me, and provided critical and constructive advice on my work. Thank you for sharing your knowledge and for your patience throughout this process. Special thanks go out to Vanesa and her unusual capacity to light up obscure thoughts.

I thank the EPSRC for providing financial support that made this research possible. I also thank the UKNA for financial support during the field study and the CAUPD for hosting me in Beijing.

I wish to thank my examiners for their careful reading and thoughtful advice on this thesis. Your reflections helped me find new directions and improve as a researcher.

I extend my gratitude to all the respondents that took part of this study and thank them for taking the time to share their valuable insights, knowledge and ideas.

I thank my colleagues at the DPU for providing intellectually challenging discussions and for making my time at UCL interesting and productive.

Finally, I am thankful to Cristina and Jonas for always being there. I send my thoughts to my father, and gratefulness to my friends for their help and thoughtful revisions.

Table of contents

Lists of tables and figures

List of tables

List of figures

1 Introduction

On 15 May 2015, the nongovernmental organizations (NGOs) Friends of Nature and Fujian Green Home took four mining operators in China's Fujian Province to court. It marked the first time in China's history that NGOs pursued a legal path to pollution compensation in the name of public interest (Chen, 2015a). China's new Environmental Protection Law, passed in January 2015, introduced the possibility for registered civil society organizations to sue organizations on behalf of the public.

Earlier the same year, the companies Boeing, Hainan Airlines and Sinopec announced China's first commercial flight using biofuel. Restaurants collaborating in the project produce the biofuel from leftover cooking oil. The companies proclaimed that this breakthrough would contribute a 50% reduction of carbon emissions in comparison with traditional airplane fuel. It was announced as "a milestone in scientific and technological innovation" in China's climate mitigation action (Boeing, 2015).

A month later, thousands of people took to the streets in Shanghai to protest the plans of construction of a large chemical plant. Residents of the industrial working class suburb stated that they launched this protest to protect the younger generation from the impacts of further environmental degradation. "I bet everyone here has someone who has died of cancer", proclaimed one of the protesters living in an area surrounded by polluting factories (Ruwitch, 2015).

These three disparate incidents, occurring without direct connection to one another, illustrate a broader phenomenon in China. This phenomenon consists of a diversity of actors participating in environmental protection efforts. China's environmental challenges are complex, and it is impossible for the central government to shoulder all the social, economic, technical, political, and legal responsibilities involved in solving environmental problems. The examples above indicate that non-state actors are taking on different roles and responsibilities in creating sustainable development paths. Meanwhile, this raises questions about the nature of participation, forms of collaboration, and distribution of authority that these roles and responsibilities involve. First, what forms of decision making emerge? During what stages of agenda setting and planning does participation occur? Can participation in policy making improve environmental agendas, what conflicts of interest will arise, and how are conflicts solved? Second, what can and should local governments and non-state actors do to contribute to sustainable development on an urban level? Who initiates and leads initiatives? How are responsibilities for planning, financing and delivery distributed?

To shed light on these questions, this thesis studies participation in environmental policy making and climate action in cities during the period between China's 10th and 12th Five Year Plans (FYPs) (2001-2015). This involves looking into roles and responsibilities of local government authorities as well as actors from the private sector and civil society. The thesis also addresses the nature and function of collaboration across the public, private, and civil society divide. The focus is on decision making arrangements and partnerships that emerge in urban climate action, and how these affect climate mitigation efforts. To demonstrate the relevance of this focus, the following section discusses participation in environmental policy and climate agendas in China, highlighting the importance of local authorities and non-state actors.

1.1 Current climate governance in China

Through diversification of actors involved in environmental policy, representatives of different sectors take on new roles and gain new responsibilities in environmental agendas. In China, this involves new forms of participation of local authorities, companies, research organizations and think tanks, green NGOs, foreign organizations and the public. This section provides an overview of these new forms of participation and emerging channels of influence.

First, China's national policy encourages non-state actor involvement in climate change action. At the global climate change conference in Paris in 2015, China adopted Intended Nationally Determined Contributions (INDC) for carbon emission reductions. This document calls for exploration of diversified paths of low carbon growth. This involves enhancing the responsibility of enterprises for low carbon development and introducing a stronger role for the public and media in supervising and participating in low carbon development (NDRC, p.15, 2015). Furthermore, China's National Climate Change Program aims to "widen the channels" for public participation and encourages enterprises to contribute to climate change mitigation (NDRC, IV, 2007). China's recently revised Environmental Protection Law points to the importance of public participation in environmental action. It highlights the role of society in protecting public interest through monitoring environmental pollution, disseminating information, and taking legal action against environmental offenders (NPC, 2015).

The central government is also creating new roles in environmental protection for authorities both at a provincial and municipal level. As part of a long term process of decentralization, the central leadership is increasing the autonomy of local governments, while fiscal decentralization is creating stronger capacity for local action (Cai & Treisman, 2007). The national government expects local governments to shift their focus from pursuit of economic growth towards greater protection of local ecosystems (Wang, 2013a). Moreover, the central leadership calls for municipal governments to move beyond the task of implementation and take on responsibility for climate policy development. Local impacts of climate change, and increasing knowledge and awareness are contributing to the engagement of municipal authorities in independent climate action (Qi et al, 2008). Further, local Environmental Protection Bureaus (EPBs) are gaining independence in determining priorities and financing arrangements (Mol & Carter, 2006; Mol, 2009). Central environmental institutions are, simultaneously, developing stricter standards of accountability to evaluate the environmental performance of local authorities (Lo & Tang, 2006).

Further, the national government is involving an increasing number of stakeholders in national environmental policy making processes. This encompasses companies, research organizations, universities, think tanks, and foreign organizations interacting through rounds of consultations, provision of advice, and information sharing related to public policy (Rosen & Houser, 2007; Meidan et al, 2009; Tsang & Kolk, 2010; Francesch-Huidobro et al, 2012). Deliberative and consultative elements have been integrated into decision making processes on a national and local level, with the purpose of governing more effectively, maintaining social order, co-opting dissent, and increasing legitimacy of policy decisions (He, 2006; He & Warren, 2011).

At the same time, participation in environmental policy is emerging through bottom-up dynamics. As in other countries, Chinese corporations lobby for certain policy options and some companies (in particular large SOEs) have considerable leverage over environmental and energy-related decision making processes (Rosen & Houser, 2007; Tsang & Kolk, 2010). The private sector plays an important role in delivery of public service and infrastructure. A comprehensive "new-type" urbanization plan, adopted by the State Council in 2014, attaches importance to constructing sustainable cities (China State Council, 2014). As part of its urbanization strategies, the central government aims to leverage private funds into the construction and operation of public facilities, including sustainable infrastructure (Tian, 2015). The national leadership sees Public-Private Partnerships (PPPs) as a way to diversify financing arrangements of power assets, transport, water, and environmental services (Zhong et al, 2008; Lo, 2014, Xinhua, 2016a). In 2016, China's Vice Finance Minister announced that domestic

authorities planned to invest in around ten thousand public investment projects based on a PPP model (Xinhua, 2016a).

In parallel, actors from civil society are taking on new roles and seeking to influence environmental agendas. In China, civil society organizations need to be sanctioned by the state to be allowed to operate. This requirement places limits on social mobilization and opportunities of community groups to engage in environmental action (Zhan & Tang, 2013). Nevertheless, environmental groups have in recent years become more visible, well organized, and important in mobilizing public opinion (Ho, 2007; Tang & Zhan, 2008; Schroder, 2011). Some green NGOs are presenting policy options and aim to influence political decision making processes (Tang & Zhan, 2008; Zhan & Tang, 2013). Parastatal think tanks, or so called government owned NGOs (GONGOS) that operate within the political system, function as centres of knowledge that can have significant leverage over policy formulation (Francesch-Huidobro & Mai, 2012; Mai & Francesch-Huidobro, 2015).

Finally, international environmental policy trends influence China's climate policy, both directly and indirectly. The central leadership is trying to frame itself as a responsible superpower and is increasing its active participation in international institutions. The Silk Road Initiative ("One Belt One Road") and the Asian Infrastructure Investment Bank (AIIB) are major outreach projects that epitomize China's efforts to become an influential global player. The central government demonstrated a constructive attitude towards the international climate negotiations through the adoption of the INDCs in Paris, and through its resolve to shoulder global leadership in the face of US abandonment of the scheme (Emmott & Bartunek, 2017; Hilton, 2016). China's commitment to and active participation in the UN's recently launched South-South climate partnership illustrates a similar ambition (Xinhua, 2016b). Further, foreign environmental NGOs cooperate with their Chinese counterparts and engage in international and local projects in China (Yang, 2005; Schroeder, 2008; Schroder, 2011; CCAN, 2015). Finally, Chinese companies are gaining a strong representation in global markets, which creates pressures for their products and production processes to meet international environmental standards (Seymour et al, 2005; Mol & Carter, 2006).

These accounts demonstrate that non-state actors participate in environmental policy processes and environmental protection efforts in China. The central government recognizes that local authorities, companies, civil society and foreign partners can contribute to addressing the climate change challenge. However, some processes that are visible in central government institutions and processes may not unfold on an urban level. Also, some policy aims adopted by the central government may not be realized at all. This thesis attempts to clarify which of these processes are reproduced on an urban level and how they contribute to reconfiguration of agency and authority.

1.2 Trends in climate change governance

To understand participation of non-state actors in environmental policy and climate action in China, it is helpful to engage in the academic debate on the shift from "government" to "governance" (Pierre, 2000; Pierre & Peters, 2000). This thesis argues that current governance arrangements in China can be understood by situating them in global trends in environmental governance. This section explains the shift from a perception of national governments as the key actor addressing climate change, to a recognition of multiple actors formulating and realizing climate mitigation responses (Hoffmann, 2011; Bulkeley & Newell, 2015). The section also explains the central role of local authorities and non-state actors in this shift.

1.2.1 The shift from "government" to "governance"

Traditional conceptualizations of how governments manage society are linear and state centered. In these models, states are separated from society and bureaucracies implement

political decisions strictly according to laws and regulations[1]. Weber's theories of bureaucracy is the earliest and most well-known representation of this idealized form of government. His conceptualization is ordered by separation between decision making and implementation, hierarchy, and top-down lines of control (Weber, 1946).

In the period after the Second World War, governments across the Western world were to a large extent based on welfare states with substantial public spending and market control. Traditional state centric theories were relatively well applicable to these systems, where governments acted as leading planners and regulators, providers of public goods, and policy implementers (Pierre & Peters, 2000). A number of trends that emerged around the 1970s challenged this dominant model. This included stronger influence of local governments and transnational institutions, globalization, deregulation of financial markets, and declining faith in representational politics. These trends unfolded alongside internal weakening of national governments through perceived inability to deal with issues of inefficiency and poor economic performance of public administrations (Ibid). In response to these pressures, national governments began to explore new ways of steering which involved reliance on horizontal connections and collaboration across private-public divides. This represented new ways of formulating and implementing public policy, which were described with the concept of "governance" (Pierre, 2000). Empirically, the concept represents adaptation of national governments to circumstances of weakened authority. Conceptually, it represents a new form of steering through "co-ordination of social systems" (Ibid, p.3). Through governance, government authorities interact with and rely on actors outside the public realm, such as companies, civil society organizations and supranational organizations.

The shift described above refers to the role of national governments, but around the same time a shift from government to governance also occurred in studies of international politics. The literature on international relations traditionally focused on the roles and relations of and between nation states and international institutions. Two dominant directions in this literature are realism (Donnelly, 2000), which explains how nation states bargain in a context of anarchy, and (neoliberal) institutionalism, which focuses on how state action is shaped by institutions, in the form of international organizations, regimes, or conventions (Keohane, 1989). In the 1990s, Rosenau (1995) pointed to the inadequacy of these perspective to capture the obscure authorities and emergent systems of rule that characterize interdependent interactions in a globalized world. Rosenau (Ibid) observed that global governance is more than the formal institutions involved in international affairs. These processes and relations can be better understood as a myriad of control mechanisms aiming to influence interconnected issues. He raised examples such as an ever larger number of NGOs, social movements and cross-border city coalitions operating at multiple levels. Rosenau proposed to understand (global) governance as "systems of rule at all levels" (Ibid, p.13). This involves steering through non-hierarchical channels "through which 'commands' flow in the form of goals framed, directives issued, and policies pursued" (Ibid, p.14).

The shift from government to informal rule systems of governance is central to explanations of global responses to climate change. Stripple and Bulkeley (2014) observe that climate change became a topic in the literature on international relations at the moment when the climate change issue became part of international politics. The authors fix this moment to the international Toronto Conference on climate change in 1988 (Ibid). During the events that unfolded in the years after this conference, international institutions and nation states occupied central stage. The United Nations Framework Convention on Climate Change (UNFCCC), introduced at the Rio Earth Summit in 1992, was the first big step towards formal international recognition of the need to address climate change (UNFCCC, 2014a). The key component of the Kyoto Protocol, adopted by 160 nations in 1997, consisted of legally binding targets assigned to the signatories (Breidenich et al, 1998). Policy makers and researchers adopted a traditional international relations approach to explain these events. This implied analysis of

[1] An excellent overview and criticism of this separation is provided by Mitchell (1999).

international agreements, inter-state bargaining over emission reduction targets, and the interests of different nation states (e.g. Bodansky, 1993; Gupta, 1997). Up until this point, nation states (government) remained at the centre of international climate politics.

In the early 2000s, these debates changed. The climate change conference in Copenhagen in 2009 became emblematic of the inability of nation states to collaborate over the climate change issue. Media described the international negotiations as a "failure" while Greenpeace referred to the city as a crime scene (Vidal et al, 2009). The clashes of the Copenhagen conference dashed the hopes of creating a unified global climate change regime (Haug & Berkhout, 2010). An active search for strategies and solutions beyond formal institutions began. Hoffmann (2011) directed his attention towards experimentation with new climate change responses, ranging from a micro level (individuals imposing carbon rationing on themselves), to initiatives led by regions, cities, NGOs, corporations and hybrid networks experimenting with new solutions. In parallel with the breakdown of the Copenhagen treaty, Hoffmann (Ibid) discovered a dynamic universe of bottom-up experimentation populated by organizations such as the International Emissions Trading Association, the C40 Cities Climate Leadership Group, ICLEI, Climate Wise (representing a consortium of insurance corporations) and transnational movements.

The reorientation in focus from national governments and formal institutions towards multi-faceted, multi-actor dynamics of international climate politics represents a shift to global climate change *governance* (Stripple & Bulkeley, 2014). This shift involves recognition of new, non-hierarchical responses to climate change, such as transnational networks, partnerships, and carbon markets (Bulkeley et al, 2014). These forms of agency, along with associated norms, roles and responsibilities, make up a transnational arena of climate action rather than a traditional international regime (Pattberg & Stripple, p. 372-374, 2008). Attention is directed to new sources of power, blurred lines of division between private and public authority, and new dynamics between structures and agency (Okereke et al, 2009). This can be understood in terms of a "regime complex", in which autonomous spheres of authority and a diversity of measures are aimed at steering society towards climate mitigation (Bulkeley & Newell p. 13, 2015). Rosenau's (1995) notion of governance as systems of rule on all levels is a theoretical conceptualization of steering that is used to capture these informal sources of authority and agency (e.g. Pattberg & Stripple, 2008; Bulkeley & Newell, 2015).

In the coming years, informal attempts to address climate change will remain crucial in global efforts to prevent catastrophic impacts of global warming. The combined national contributions (INDCs) of the climate agreement in Paris together fail to meet the two degree target necessary to avoid "dangerous" climate change consequences (Knutti et al, 2016), even assuming that all countries are able to implement their planned emission reductions (Rogelj et al, 2016). Other actors must step up and respond to the challenge to bridge this gap. Efforts that emerge beyond formal state interventions are therefore crucial to the success of the global emission reduction challenge.

These discussions are relevant in China, where new forms of state society relations are emerging in environmental politics. The trends described above have led scholars to talk about new agency and relations in environmental governance. Zhang and Barr (2013) pose that environmental degradation in China is producing new actor strategies and increasing cross sector interactions that challenge static views of state-society relations. Mol and Carter (2006) suggest that China is experiencing a transition that is transforming a command-and-control system into new arrangements, approaches and instruments. Further, Mol and Carter (Mol & Carter, 2006; Mol, 2009; Carter & Mol, 2013) argue that these new approaches are reconfiguring relations between state, market and civil society, and represent a shift from government to governance.

This thesis argues that China is part of the global trend involving a shift from government to governance. At the same time, this shift is taking place in a political system very different from the Western liberal states where these theories were developed. This thesis attempts to make

sense of the notion of climate intervention beyond formal activities of the state by focusing on roles and responsibilities of local government authorities and non-state actors in environmental policy and urban climate action.

1.2.2 The rise of local action in sustainable development

As nation states were perceived to lose influence over increasingly complex, interconnected global issues around the 1990s, other actors became more important in the formulation and delivery of public policy. Authority was "shared" with supranational institutions (such as the EU and the UN) and sub-national authorities (such as regional and municipal government units) (Hooghe & Marks, 2001a). This section explains the importance of local government authorities in sustainability action and climate change governance.

Sustainable development was formulated as an issue of local action in the Brundtland Report *Our Common Future*, published 1987 (UNWECD, 1987). The United Nation's Agenda 21, adopted in 1992, integrated local action into sustainability agendas (UNDSD, 1992). Both documents explicitly frame sustainability as an issue of local action. Chapter 28 of Agenda 21 specifically addresses initiatives of local authorities, making the following introductory statement:

> *Because so many of the problems and solutions being addressed by Agenda 21 have their roots in local activities, the participation and cooperation of local authorities will be a determining factor in fulfilling its objectives. Local authorities construct, operate and maintain economic, social and environmental infrastructure, oversee planning processes, establish local environmental policies and regulations, and assist in implementing national and subnational environmental policies. As the level of governance closest to the people, they play a vital role in educating, mobilizing and responding to the public to promote sustainable development (UNDSD, 28.1, 1992)*

Local authorities, municipalities and regions across the world responded to this call for action by adopting local Agenda 21 schemes. The establishment of movements for sustainability led by local governments, such as Local Governments for Sustainability (ICLEI) founded in 1990, strengthened the position of municipalities and regions in the quest for sustainability. In relation to environmental politics and the effect of globalization and distribution of authority to sub-national units, Lipschutz (1997, p.83) observed:

> *What we see is political fragmentation and the emergence of a multilevel and very diffuse system of governance, within which "local' management, knowledge, and rule are of growing importance to coordination within domestic and international political 'hierarchies'*

Early international policy documents on sustainability framed cities as key arenas for action. Curiously enough, initial debates on climate change did not reflect this tendency. As discussed above, policy makers and researchers originally perceived climate change as a challenge to be addressed through international negotiations. As greenhouse gases mix in the atmosphere, local reductions of emissions are unlikely to result in reciprocal, local benefits in terms of reduced climate change impacts. Climate change can therefore be interpreted as an "inherently global issue" (US EPA, 2016). It has even been framed as a "non-local" issue more appropriate for national and state governments, in which cities can be expected to act as "policy takers" rather than policy makers (Sancton, 2006).

Nevertheless, there are reasons for framing climate change issue as "profoundly local" (Bulkeley & Betsill, p.2, 2003). One is that cities account for a large share of global resource consumption and the global carbon footprint. In 2011, the UN estimated that urban areas accounted for around 70% of harmful greenhouse gas emissions (UN HABITAT, 2011). Moreover, local authorities have considerable experience in and influence over decisions related to transport, infrastructure, energy management, and urban planning – all important aspects in local climate mitigation efforts (Bulkeley & Betsill, 2003). Further, cities are centres of technical and social development and arenas of experimentation, as the concentration of people, economic activities, social and technological capital allows for rapid spread and adoption of new ideas (Evans, 2011). Kern and Alber (p.172, 2008) observe that "linkages and synergies between climate policy and sustainable development become most obvious at the

local level." All these reasons allow climate change to be conceptualized as a global issue that requires local action – a "glocal" challenge (Gupta et al, 2007).

In *Cities and Low Carbon Transitions*, Bulkeley et al (2011) argue that addressing climate change will require fundamental transformations in urban infrastructure and urban society. Bulkeley et al (Ibid) also show that the need to respond to the climate change challenge is reflected in urban agendas across the world. Multiple studies of cities demonstrating leadership in the climate change issue confirm this suggestion (Betsill, 2001; Linsroth & Bell, 2007; Osofsky & Levit, 2007; Patton, 2007; Schreurs, 2008). In spite of conceptual and institutional barriers to action (e.g. Bai et al, 2009; Burch, 2010; Leck & Simon, 2013), there are incentives for municipalities to engage in climate change mitigation. This includes the political recognition of being seen as a forerunner, as well as co-benefits of potential cost savings and environmental protection (Betsill, 2001; Lindseth, 2004; Bai, 2007b; Kousky & Schneider, 2003).

Research on urban climate governance began around the middle of the 1990s, with studies of cities in North America and Europe (Bulkeley, 2010). The first of these focused on pioneering municipalities and often used case studies to illustrate strategies and motives of local authorities engaged in climate mitigation activities. A second area of research addressed the engagement of cities in multilevel governance systems. These studies showed how actors forge linkages across scales and levels to build knowledge, agendas and norms, and access resources as part of their climate mitigation strategies (Betsill & Bulkeley, 2004; Bulkeley & Betsill, 2005). This research flourished with the emergence of a number of municipal led movements, such as the C40, the Energie-Cités, ICLEI Cities for Climate Protection, and the Conference of Mayors. These transnational networks came to attract increasing interest when private actors, NGOs, grassroots movements, and international institutions joined their efforts. Interest in urban climate initiatives also stems from the way in which new arrangements of collaboration and communication across jurisdictional and geographical borders represent reconfigurations of state authority (Bulkeley, p. 239, 2010).

Today, it is widely recognized that cities play a significant role in global climate mitigation efforts. Studies that seek to contribute to new conceptualizations of governance in the context of global responses to climate change draw attention to the role of actors other than nation states, including sub-national authorities (Stripple & Bulkeley, 2014; Bulkeley & Newell, 2015). The continued establishment of transnational climate action networks led by cities testifies to the ongoing engagement of municipal authorities in the climate mitigation cause (Bulkeley et al, 2014). International institutions such as the World Bank and the United Nations embrace the urban dimension of climate action as an urgent agenda (World Bank, 2010; UN HABITAT, 2011). As mentioned in section 1.1, the rising importance of local action is also debated in the literature on environmental protection efforts in China. This debate in particular centers on rising autonomy due to decentralization, increasing knowledge and awareness of municipal authorities, and increasing independence of local environmental authorities (Mol & Carter, 2006; Lo & Tang, 2006; Cai & Treisman, 2007; Qi et al, 2008; Mol, 2009).

1.2.3 The importance of networks in environmental governance

Studies of urban responses to climate change illustrate how responses often involve collaboration across levels and scales, as well as across traditional public-private borders. This section discusses why network governance is a key concept used to explain such cross-cutting climate governance approaches.

The concept of "governance networks" emerged as an empirical observation of governance arrangements in Europe, but also as an analytical perspective for understanding policy processes in non-hierarchical contexts (Torfing & Sorensen, 2014). Early studies on network governance in Europe saw network arrangements as a response to declining state influence and an alternative to privatization (Kickert et al, 1997). The concept emerged in the context of disillusionment with "government" and its incapacity to solve complex problems, as well as similar failure of businesslike managerialism to address the same issues. Governing through

networks, through horizontal collaboration with the private sector and civil society, represented a novel approach to solve societal challenges. In studies of public policy in the EU, Kohler-Koch and Eising (1999) observe that the core idea of network governance is that political actors see problem solving as the essence of politics. As contemporary states are vertically and horizontally fragmented, their roles shift from one of authoritative allocation, towards "activation" and negotiator of public values. This is realized by engaging in constructive interaction with the various sub-systems that cluster around public policy issues. Network governance is especially important in dealing with complicated policy issues that public actors cannot solve on their own (Klijn & Koppenjan, 2004). Climate change is a typical example of a cross-sectoral, complex policy issue though to require horizontal problem solving.

On an international level, networks are central in describing climate responses produced outside traditional state borders. Transnational climate governance, or transnational climate governance networks, is a concept that captures non-state led global climate change responses. Bulkeley et al (p.18, 2014) see transnational climate governance initiatives as activities that explicitly seek to address climate change, that seek to govern, that operate across at least one nation state border, and involve at least one non-state actor. The authors portray the phenomenon as part of a larger trend of transnational governance and an alternative to traditional theories of the international relations literature. Transnational climate governance networks are populated by a diversity of actors unified by their common engagement in the public domain that revolves around climate change (Ibid).

Transnational networks range from formal initiatives involving collaboration between states, international organizations, businesses and NGOs (for example the Clean Development Mechanism (CDM)), to loosely coupled, bottom-up initiatives led by, for example, grassroots movements, communities or NGOs (Bulkeley et al, 2014). Ideas of transnational networks suggest that forms of climate governance travel internationally, with a potential of shaping governance in China, and making it more similar to climate policy in the West. Schroeder (2008) demonstrates this empirically by showing how organizations involved in transnational campaigns transfer elements of climate policy into Chinese environmental politics through a process of norm internalization.

The rise in importance of partnerships is part of the global shift from government to governance, and a greater affinity towards voluntary rather than regulatory agreements. This shift is illustrated by the change from the binding resolutions adopted through the UN Conference of Parties (CPOs) to the voluntary climate agreements of the Intended Nationally Determined Contributions (INDCs). It is demonstrated through the increasing number of transnational movements based on voluntary action and participation (Bulkeley et al, 2014). On a national and local level, a propensity to use persuasion, engagement based and collaborative approaches reflects the same tendency (Bulkeley & Kern, 2006). Given the interest in multiplication of efforts in Chinese climate governance, the concept of partnerships may help further our understanding of how actors work together to achieve common environmental objectives.

One of the conceptual roots of the literature of network governance is theories on policy networks. The policy network concept implies that interaction between a diversity of stakeholders creates public policy, rather than decisions taken by political leaders or deliberation in parliaments. The policy network literature demonstrates how policy grows out of continuous interaction between civil servants, committees, working groups, professionals, and experts (Marsh & Rhodes, 1992). Policy networks consist of "sets of formal and informal institutional linkages between governmental and other actors" that are structured around shared interests (Rhodes, p.1246, 2007). Networks regularize interactions between public actors and stakeholders, which results in semi-institutionalization of linkages (Smith, 1997). Key characteristics of decision making are bargaining, resource interdependence and continuing and game like interaction (Rhodes, p. 43-46, 1996).

Policy making in networks and in partnerships occurs outside formal decision making arrangements of liberal democratic systems. This can create concerns related to structures of

power, inclusion, legitimacy and accountability of decision making processes. Network governance challenges the basic principles of liberal democratic systems, as networks consist of layers of authority in which the political system "melts together" with society (Sorensen, p. 694, 2002). This means that the relationship between politics and administrations, as well as who "governs" and who is "governed", shifts through a horizontal transfer of authority. In informal policy networks, the influence of elites tends to be more powerful than that of other actors (Aars & Fimreite, 2005; Bogason & Musso, 2006; Khan, 2013). Outcomes of policy making in such settings run the risk of favouring economically or politically strong actors (Richardson & Jordan, 1983; Rhodes & Marsh, 1992; Levy, 2005; Khan, 2013). This suggests a need to closely examine shifts of inclusion in decision making in network settings and partnerships, which is part of the aim of this thesis.

The perspective of networks is a relevant framing for understanding climate change politics in China, as it offers an analytical lens that captures and explain the dynamics of interaction and interdependence of multi-actor policy processes. The literature of policy networks and partnerships offer established theories of the nature of and motivations behind policy interactions, as well as implications associated with pluralization in formulation and delivery of public policy.

1.3 Research questions

What does the global shift from government to governance mean for environmental agendas in China? Is this a shift that we can observe within this non-democratic system? If so, is it expressed in specific ways? In other words, is there a particular style of environmental governance that is endemic to China? This thesis explores the particularities of policy networks, urban climate governance modes, and climate partnerships produced in China's political system. This involves examination of how agency and authority in the realm of environmental policy making and climate action on a municipal level in China is distributed vertically to local authorities and horizontally to non-state actors. The key research question answered in this thesis is:

How have municipal authorities and non-state actors participated in climate mitigation action in cities in China during the period of the 10th to 12th FYPs?

This thesis argues that while local authorities in China search for strategies to construct low carbon growth, municipalities face various institutional constraints, including economic, technical and knowledge barriers. To overcome these barriers, municipal authorities draw on resources from higher levels of government as well as from companies and "expert" organizations in the formulation of plans as well as in delivery of projects. This results in new lines of influence over urban decision making processes, as well as over low carbon infrastructure investments and other sustainability projects.

The main research question is divided into three research sub-questions that map out the elements of this argument. A case study provides material for in-depth analysis of the first two sub-questions. The case study is the prefectural level city of Rizhao in Shandong Province, which illustrates environmental planning processes on a city level, urban climate governance strategies and the involvement of non-state actors in climate action. The case study is combined with comparative analysis of 150 climate initiatives carried out in 15 cities across China. The comparative study is used to answer the second and the third question, by mapping out actors and collaborative arrangements involved in climate action in a number of cases. The sections below present each sub-question, the theoretical perspective used to interrogate these, and a brief summary of the answers to the questions.

1.3.1 *Sub-question 1*

How have non-state actors participated in environmental planning processes in Rizhao during the 10th and 12th FYPs (2001-2015)?

The first research sub-question focuses on planning, as this is the main point of government intervention in environmental issues in China. China's planning system is a remnant of the communist planned economy based on comprehensive, quantitative production targets. In China's current political system, plans and policy documents, especially the Five Year Plans (FYPs), still outline key policy directions and function as the basis of the political evaluation system. Researchers in other contexts, such as Carmin et al (2012), also place planning at the heart of urban climate efforts and see plans as reflecting goals that officials and communities seek to advance. This thesis takes as point of departure the formal development objectives of government authorities and the way in which these are formulated.

Previous research in China shows that a range of stakeholders, including companies, think tanks and research organizations, participate in policy making processes on a national level in China (Meidan et al, 2009; Tsang & Kolk, 2010; He & Warren, 2011; Francesch-Huidobro et al, 2012). Local decision making similarly involves consultation and meetings with economic stakeholders, professional groups, and to some extent the public (He, 2006; He & Warren, 2011; Zhou, 2012). Zhou (2012) describes this as a nascent system of deliberation emerging within China's authoritarian system. Mai and Francesch-Huidobro (2015) use the perspective of collaborative municipal networks to show that local authorities create vertical and horizontal linkages with public and non-state actors to mobilize resources in the formulation of urban climate policy.

The contribution of this thesis is to add a new dimension to the literature on municipal environmental policy networks in China (e.g. Mai & Francesch-Huidobro, 2015). The thesis does so by applying traditional theoretical perspectives of policy networks to urban decision making dynamics. This perspective is used to highlight resource interdependence, conflict, negotiation, and structures of power as important factors determining policy making outcomes (Marsh & Rhodes, 1992; Dowding, 1995; Rhodes, 1996). It is also an approach that draws attention to insights of state-group dynamics in relation to the structure of political economies, and the considerable leverage that economic stakeholders often exercise over political decision makers (Levy & Newell, 2005; Newell, 2008).

In this thesis, these perspectives reveal previously unexplored aspects of mutual dependence of political and economic interests in urban planning in China. It also uncovers the way in which decision making arrangements cater to the priorities of local elites (Aars & Fimreite, 2005; Sorensen, 2006; Khan, 2013). The case study of Rizhao demonstrates that decision making interactions cannot simply be described as neutral spaces for deliberation where actors have equal opportunity to pursue environmental and social objectives. Rather, inclusion of stakeholders in urban planning consultations and meetings is structured by political and economic interests and the urban political economy. Further, a policy network perspective reveals how conflicts of interest and uneven structures of power influence decision making outcomes. The thesis shows that in urban planning processes, the interests of local economic stakeholders (such as large industrial units and developers) usually are aligned with those of the top leadership (the Mayor and the Mayor's Office). In case of conflict, these interests are prioritized while concerns of other actors (such as departments in charge of the environment, forestry or tourism, local academia, or residents) are overlooked. This tendency is illustrated in conflicts over land use, size of industrial activities, impacts of pollution, and concerns with ecological protection. The results also confirm the long-standing observation in the literature on state-group interactions that policy decisions dominated by economic and political elites are unlikely to generate radical change (Richardson & Jordan, 1983; Rhodes & Marsh, 1992). This thesis demonstrates that formation of political-economic alliances, in combination with an aim for consensus in planning negotiations, creates a bias in favor of protecting status quo. In this

context, this implies reproduction of planning decisions that allow for continuation of urban high carbon paths of growth (Khan, 2013).

Further, this thesis argues that policy discourse theory offers a perspective that explains why certain interests are more strongly articulated than others in China's energy policy. The policy discourse literature shows that narratives and framing play an important role in environmental policy by conditioning problem solutions and emphasizing specific aspects of environmental issues (Hajer, 1995; Dryzek, 1997; Marston, 2004; Feindt & Oels, 2006). Unpacking the way in which environmental policy is socially constructed can reveal how policy options are associated with political, social and economic agendas (Ibid). This thesis demonstrates that Chinese policy documents frame climate change issues an issue of industrial policy and technological development. Local decision makers reproduce these priorities by shaping climate agendas as industrial or technological programs. Moreover, this thesis argues that China's current climate policy narratives place industrial units and technology entrepreneurs as the mains agent delivering environmental protection solutions. As a result, other fundamental social or political issues that are interconnected with low carbon challenges are made invisible.

Beyond planning, there are many other ways in which government authorities and other actors seek to address climate change issues. Bulkeley and Castan Broto (2012) observe that while the number of municipalities that have used a planned approach to climate mitigation is limited, there is a rapidly proliferating number of urban climate initiatives carried out under less institutional forms. Municipal authorities are dealing with the climate change challenge by seeking answers outside the formal mechanisms of government administration, through informal forms of cooperation with other actors (Hoffmann, 2011). The second research sub-question moves beyond the formal structures of planning to recognize other forms of climate interventions emerging on an urban level in China.

1.3.2 *Sub-question 2*

How have different modes of urban climate governance contributed to climate mitigation in cities in China during the 10th to 12th FYPs (2001-2015)?

The second research question explores the various strategies that municipal authorities and other actors adopt to address the climate change challenge on an urban level in China. Bulkeley and Kern (2006) identify four modes of climate governance that are used by city governments: traditional governance approaches (governing through authority); emission control of activities in the public sector (self-governing); provision of low emission public services and infrastructure (governing through provision); and strategies that support low carbon activities of other actors (governing through enabling, through information dissemination, persuasion and partnerships). This thesis uses these categories as a framework to map out urban emission reduction strategies employed in China.

However, in identifying urban climate projects, measures other than government actions and policies are considered. The sample of initiatives considered in the comparative study includes non-public efforts, such as low carbon demonstration projects and campaigns led by companies and NGOs. This is a focus that recognizes the importance of informal responses to climate change (Hoffmann, 2011; Bulkeley & Castan Broto, 2012; Castan Broto & Bulkeley, 2013). Moreover, explicit focus is directed towards the way in which collaborative arrangements allow actors to reach across jurisdictions and geographical scales (Betsill & Bulkeley, 2004; Bulkeley, 2005; Bulkeley & Betsill, 2005).

This thesis demonstrates that Chinese municipal authorities engage in all four modes of governance to realize local climate action. Governing through authority – the adoption of local regulation, plans and standards – is relatively common. The case study of Rizhao shows that use of a local policy requirement for solar water heaters had a strong effect on adoption. The comparative study demonstrates that other municipal authorities have adopted similar construction requirements, as well as new spatial planning strategies, and sector-based emission reduction plans. Yet, numerous guidelines imposed by higher levels of government limit the

room for independent municipal policy making. Local authorities to a large extent focus on devising strategies for implementation of central targets and creating alternative versions of central level schemes. This can leave cities "tinkering on the margin" of national policy (Schreurs, p.344-346, 2008), rather than prioritizing independent policy development.

Further, this thesis shows that Chinese municipalities use delivery of public services as a way to support local energy saving and emission reductions. However, delivery of urban infrastructure is to a larger extent managed by companies. The comparative study of the thesis demonstrates that public and private companies often deliver projects such as waste-to-energy plants, large scale renewable energy projects, and eco-city development projects. At the same time, this trend makes it necessary to question the extent to which company investments are based on balanced considerations of long term environmental and social objectives (Hodge & Greve, 2010). The sample of initiatives considered in this thesis includes many projects described as "low carbon", which on closer scrutiny exhibit a limited use of renewables or energy efficient technologies, as well as construction of luxury environments.

The thesis also demonstrates that municipal authorities in China act as enablers of local climate action. The case study of Rizhao shows that this takes the form of energy management activities, demonstration projects, promotion of energy measuring and monitoring, benchmarking activities and improvement of energy evaluation and examination systems. Both the case study and the comparative study suggest that municipal authorities perform enabling functions played by civil society in other countries, such as spreading information and awareness through environmental campaigns. Information sharing strategies led by civil society are instead characterized by technology development or technology intense demonstration projects.

A key contribution of this thesis is to show that partnerships are common in local climate action in China. This is surprising, especially in the light of previous research predicting that sustainability partnerships in China are likely to be limited, due to the low level of pluralism in Chinese society and politics (Pattberg et al, 2012). The comparative study demonstrates that climate partnerships exist in a variety of forms, perform a range of functions, and are initiated by both public and non-state actors. Municipal authorities form partnerships with firms, academia and foreign organizations to facilitate technology or infrastructure delivery, access new ideas and planning designs, and create new funding arrangements. Companies form partnerships with other firms and with domestic and foreign academia to access information, skills and technology, to realize investments into large-scale energy infrastructure or demonstration projects such as low-emission buildings and eco-cities. Focusing on the links that are created through collaboration shifts attention from actors to networks where technology is developed, new designs are created, and climate policy evolves.

At the same time, these linkages allow non-state actors such as firms, parastatal think tanks, research institutes and foreign organizations to participate in the design and delivery of local projects. This thesis argues that not all types of actors are included in these networks, which in particular refers to the absence of NGOs, communities or other social movements. All civil society organizations represented in the sample are either research organizations, think tanks or NGOs with a predominantly technical character.

1.3.3 *Sub-question 3*

How have partnerships contributed to introduction of climate policy and technology on an urban level in China during the 10th to 12th FYPs (2001-2015)?

The third research question delves deeper into the dynamics of partnerships. This question investigates if and how collaborative arrangements contribute to introduction of new climate policy and technology on a local level in China.

The conceptual foundation of this question is based on the literatures on transnational climate networks and on sustainability partnerships, which identify dissemination of information and

knowledge sharing as key functions of partnerships (Betsill & Bulkeley, 2004; Glasbergen, 2007; Andonova et al, 2009; Pattberg et al, 2012; Bulkeley et al, 2012). Studies of sustainability partnerships also show that development of new technology is an important reason for firms, universities, public actors, NGOs to form partnerships (Davies, 1999; Kolk et al, 2010; Glasbergen & Groenenberg, 2001). Further, capacity building, technology assistance and technology transfers are explicit objectives in the global partnership agendas promoted by international institutions, such as the UN and World Bank (UNDSD, 2015).

The question also builds on research that explicitly link cross-sector and cross-border collaboration with climate policy innovation. Bauer and Steurer (2014) argue that climate partnerships contribute to policy innovation through diffusion of policy elements between actors and government levels. This thesis builds on their notion that collaboration and sharing of information through working groups and projects contributes to formulation of climate action strategies (Ibid). In the context of China, Schroeder (2008) shows that participation of Chinese NGOs in transnational networks contributes to absorption of elements of international climate policy into China's climate politics.

The contribution of thesis is to demonstrate that partnerships between local authorities and firms with foreign actors and academia facilitate introduction of climate policy and technology on an urban level in China. Introduction of technology is realized through two forms of interaction: technology transfers and joint research projects. This thesis shows that although technology transfers remains the most common mechanism for introducing new technology, research partnerships are becoming increasingly important. Technology development is taking place in networks made up of domestic research institutes, firms, universities and foreign partners. The rising level of skill and knowledge in these networks is making domestic research increasingly important in local adoption of emission reduction technologies. This is in line with the previous observation that sustainability innovation in Asia no longer simply aims to catch up with the "West", but is creating independent trajectories of change (Berkhout et al, 2010).

Finally, the thesis suggests that mechanisms through which policy practices are adopted on an urban level include multi-party demonstration projects, as well as collaborative problem solving that seeks solutions to urban issues. Through the former, policy practices are introduced through large-scale projects, such as eco-cities, which are designed by multiple actors. These projects allow for testing and sharing new ideas with the purpose of showcasing novel solutions. The thesis suggests that some of these new solutions are absorbed and replicated by companies through their efforts to be seen as high-tech pioneers. Through the latter mechanism, municipalities form partnerships with academic institutes, international organizations and foreign authorities in their pursuit for low carbon development solutions. Through dialogue, meetings and workshops, low carbon solutions are presented and debated, and in some cases pragmatically absorbed by local authorities.

Each of the three research questions explores a specific aspect of China's environmental policy and climate agendas, and the results illustrate different dynamics of each. However, the answers to the research questions are also used to draw conclusions regarding trends in China's climate change governance. This relates to the principles that allow some actors to participate in climate agendas while others are left out, and the rationalities that structure this participation. By systematically searching for trends in the empirical material that is used to answer the three research sub-questions of the thesis (formulated as "how"-questions), the conclusions also encompass a discussion on "why" certain actors are empowered in governance networks while others are permanently excluded.

1.4 Research design

The thesis adopts a mixed methods approach to match the competing needs of situating the processes of environmental governance in a specific case, while also making it possible to make generalisations in relation to environmental governance in China. The research strategy is to combine analysis of a sample of urban climate initiatives with an in-depth case study and member check interviews. This section provides an overview of the research design of the thesis (a full account of the research methodology is provided in Chapter 4).

1.4.1 Research methodology

Answering the first of the sub-questions (how non-state actors are included in environmental planning processes in Rizhao) requires information about local decision making processes in the case study city. Specifically, this includes data on what organizations have been involved in planning, how decisions have been made, what conflicts have emerged, and how these have been solved. This information was collected through interviews with urban planners, researchers and local officials who have been involved in Rizhao's planning and policy making processes. Quantitative data about urban environmental development trends complemented the interviews.

A second strategy to answer the first sub-question was to consider the framing of policy preferences in key planning documents and how policy discourse influences the inclusion of certain groups in urban environmental agendas. This was done by analysing and comparing the framing of low carbon development policy and energy policy in China's national 12th FYP and Rizhao 12th FYP. The language use in these two documents was compared with information collected through the interviews, to find how discourses differ between groups, and with what implications for urban environmental policy.

To answer the second sub-question (how modes of urban climate governance contribute to climate action), information from the case study and the comparative study was combined. The case study of Rizhao was used to identify modes of climate governance used in the city. This was done by mapping out energy saving and emission reduction strategies used in the city, policy instruments involved in these, key actors, and forms of collaboration involved in the initiatives. Energy programs were categorized according to the four modes of governance identified by Bulkeley and Kern (2006), with particular emphasis on how non-state actors have engaged in the programs. In the comparative analysis, information from 150 climate initiatives carried out in fifteen cities in China was collected. The initiatives were analysed to find what type of actors were leading initiatives, what form of collaboration was involved, and in what way leadership of initiatives was related to policy sector and governance approaches.

The third sub-question (how partnerships have contributed to introduction of policy and technology on an urban level in China) was answered by relying on information from the comparative study. The 150 initiatives were analysed to discover how many involved partnerships, and how many involved introduction of new emission reduction technology or policy practices. The initiatives were analysed to find if and how these two aspects correlate. In using this comparative approach, the thesis draws inspiration from previous research that used large-*n* samples to analyse sustainability partnerships (Andonova & Levy, 2003; Pattberg & Stripple, 2008; Andonova et al, 2009; Bulkeley et al, 2012; Pattberg et al, 2012; Castan Broto & Bulkeley, 2013). It responds to the call to use quantitative approaches in order to achieve systematic knowledge on the role of partnerships in sustainability governance (Pattberg et al, 2012).

The results of all three questions were evaluated through member check interviews. These were carried out with individuals who have worked with low carbon policy and planning in various cities in China. The interviews focused on validating the results from the comparative analysis and the case study, in particular with regards to which actors participate in environmental governance, how they participate, and how solutions and ideas are shared.

1.4.2 Case study selection and comparative analysis

The selection of the case study was based on identifying a city that in terms of development trends and environmental challenges is representative of the industrialized urban regions along China's East coast. Many of the cities in this area have passed through similar development paths: rapid economic expansion, shift from the primary to the secondary and tertiary sectors and urban expansion. A number of urban regions in this area are also confronting environmental challenges associated with rapid industrialization and urbanization: water and air pollution, resource scarcities, and rapid conversion of agricultural and forest land into built up areas. Therefore, it becomes important to examine the strategies used by a mid-sized, medium income city confronting this type of challenges.

A city likely to have experimented with new environmental governance arrangements was chosen as a case study. Rizhao has received a number of awards for its environmental efforts, including international recognition for its environmental governance through a UN-HABITAT award for green planning and a World Clean Energy Award for popularization of renewable energy. The city has been noted for its progress in international media (Biello, 2008), by international institutions (WWF, 2012) and in previous research on climate action in China (Bai, 2007a; Bai et al, 2010). The municipal leadership claims that its use of participatory models and innovative governance instruments contributed to its progress and to receiving this recognition (RMPG, 2009a). By choosing a city seen as an environmental best practice example, the aim was to identify how new roles for non-state actors and collaboration through partnerships is emerging on a municipal level in China.

Another aspect that was important to the choice of case study is the delay between national level policy intentions and actual development in the vast and variegated regions of China. Descriptions of change in China often emphasize development in internationalized cities, which are leading in terms of policy development, integration into global markets and technological innovation (e.g. Lo & Leung, 2000; Lo & Tang, 2006; Baeumler et al, 2012; Mai & Francesch-Huidobro, 2015). This thesis instead focuses on development that has taken place in a mid-sized, industrialized city with a lower income level than the leading megacities, to shed light on what actions are possible for "average" urban regions in the country. The case study thus aims to make it more clear which policy guidelines are contributing to real change and which constitute empty policy rhetoric or single examples.

The case study focuses on the time period between the 10th and 12th FYPs. The time period of the 10th FYP is when Rizhao Municipality decided to adopt its Eco-City Construction Plan, which placed environmental issues on the political agenda. Focusing on the 11th and 12th plan allows the case study to include information on implementation and results of energy saving and emission reduction strategies. The 11th FYP is a time period in which energy efficiency issues became an important topic in Chinese policy agendas, whereas the 12th FYP is when climate change first appeared in China's policy documents.

Information about the case study city was collected from various sources. Interviews were held with local officials, researchers, companies, and planners from central level institutions who have been involved in Rizhao's environmental programs. Information was also collected through document review, which included local news articles, government websites, policy briefs, reports, and company websites. Quantitative data was collected from Rizhao Statistical Yearbooks and Shandong Provincial Yearbooks, including data on economic growth, social and environmental indicators, governmental spending, investment figures, and energy use trends.

For the comparative analysis, 150 climate initiatives were selected from fifteen cities in China. The cities were selected based on the following criteria: being places where significant climate action has been carried out; and being places where partnerships are likely to emerge. The selection includes seven cities that were selected for NDRCs first low carbon pilot project, five cities from NDRC's second round of selection, and three other cities that have gained the reputation of environmental forerunners. Ten climate initiatives from different sectors were

selected in each city. For each initiative, the following information was collected and filed in a database that was constructed as part of this study: (1) year the initiative was launched; (2) sector; (3) type of organization that led the initiative; (4) forms of cross-sector cooperation involved in managing the initiative; (5) functions performed by the initiative; and (6) new technologies or practices introduced through the initiative.

Member check interviews were held with respondents that have worked with climate issues in multiple cities in China. These were performed at three points during the study: around the same time as the collection of the case study material, two years later in Hong Kong, and three years later in Beijing during the finalization of the thesis. The second and third rounds of data collection were performed to check generalizability of outcomes and validity of the results of the case study. They were also used to make up for limitations in the data collection of the case study, such as complementing interviews with industrial companies and industry associations. Finally, the results of the case study, comparative study and the member check interviews were drawn together to produce a conclusion regarding principles of non-state actor participation in environmental policy in China.

1.5 Thesis structure

This thesis is constructed around the argument that climate governance is a complex phenomenon involving interaction between actors from different sectors. Even in China, a country characterized by a hierarchical, semi-authoritarian political system and strong top-down lines of control, the governance of climate change involves agency and authority of local authorities and non-state actors, as well as partnerships that facilitate horizontal mobilization of resources. This argument is presented in detail in the following eight chapters, which are organized as follows:

Chapter 2 presents a review of theories on environmental policy, urban climate governance and sustainability partnerships. The argument of the chapter is that governance through networks, and inclusion of local authorities and non-state actors in network arrangements, play an important role in responding to environmental challenges. The chapter elaborates on the introductory discussion on the shift from "government" to "governance", showing how a variety of actors participate in environmental governance and how that interaction shapes environmental policy. A network perspective explains how groups intervene in formulation of environmental policy making, while a discourse perspective explains how groups with different interests shape environmental policy options through discursive struggles. The chapter demonstrates the importance of local action in climate change responses and discusses how municipal governments engage in climate action through different governance modes.

Chapter 3 presents an overview of the literature on climate governance in China. The key argument of this chapter is that despite the continuing strong role of the central government in China, participation of a diversity of actors characterizes environmental policy making and climate action. The chapter shows that various actors take part in policy making and planning processes, on both a national and local level. It also demonstrates that research organizations and green NGOs engage in processes of discursive contestation that shape environmental policy. The chapter explains how scholars previously have interpreted these changes as a transition to environmental governance in China. Further, the chapter discusses the different types of strategies that municipal authorities develop in adopting independent low carbon agendas.

Chapter 4 presents the methodology of the thesis. The methodology is presented by discussing the information required to answer the research questions and how this information was collected. The chapter begins by explaining the philosophy behind the research, which has guided the methodology. The selection of case study is motivated, along with an introduction to the case study city, data collection methods and data analysis. The comparative study is

described, including sample selection, data collection methods and data analysis method, followed by a presentation of the method used in performing member check interviews. Finally, methodological challenges and ethical considerations involved in carrying out the research are discussed.

Chapter 5 presents results from the case study, showing how stakeholders and experts participate in decision making processes in Rizhao. In this chapter, a policy network perspective is used to explain urban planning dynamics in Rizhao. The chapter argues that planning arrangements in Rizhao favor priorities of economic stakeholders, which are aligned with those of the city's political leadership. The chapter also shows how conflict of interest and uneven access to decision making characterize environmental planning processes, and how decision making outcomes protect status quo. Secondly, a policy discourse perspective shows how the interests of some actors are more strongly represented than that of others in China's energy policy. The chapter demonstrates that national and municipal policy discourses strengthen the agency of industrial actors while making others marginalized. At the same time, through the involvement of external advisors in local planning, alternative narratives come to compete with local development priorities.

Chapter 6 presents results from the case study, demonstrating the mix of governance modes used in energy saving and emission reduction strategies in Rizhao. The argument of this chapter is that the municipal government in Rizhao has combined the governance strategies of regulation and provision with "soft" policy tools to realize local climate action. The chapter shows how regulation is used to promote renewable energy technology, and that public service provision, public led and through private sector collaboration, is another way in which municipal authorities can engage in climate action. The chapter demonstrates that municipal authorities combine traditional approaches with enabling strategies, such as information sharing, promotion of energy efficiency and partnerships with the function of demonstration and policy implementation. The case study also shows that energy saving targets in industrial units in the city have been realized through a diversity of strategies that involves bottom-up formation of inter-organizational linkages.

Chapter 7 presents results from the comparative analysis, illustrating the importance of partnerships in climate action in cities in China. The key argument of the chapter is that non-state actors play a key role in climate projects and that cross-sector partnerships perform a range of functions in local mitigation efforts. The chapter shows that municipalities use regulation as a tool to support local climate action, while provision of low emission services and infrastructure often is delegated to companies. The chapter indicates that climate partnerships are common in China, in particular partnerships with the purpose of technology development and demonstration. These partnerships create networks of cross-sector linkages through which actors mobilize information, funding and technology. The chapter also suggests that partnerships contribute to introduction of climate policy and technology. This is realized through technology transfers, research partnerships, large scale demonstration projects involving a multiplicity of actors, and joint problem solving efforts incorporating ideas of academic organizations and foreign partners.

Chapter 8 presents results from the member check interviews, tying together the insights from previous chapters by identifying a rationale behind participation in environmental policy in China. The chapter addresses the question of why certain groups are able to influence decision making processes and climate projects in China. Accounts from the member check interviews demonstrate that two key groups are seen as legitimate actors intervening in environmental issues: economic stakeholders and experts. The explanation for this tendency is sought in theories of technocracy as a fundamental ideology that has shaped China's political system. According to technocratic principles, professionalism and skill are characteristics that legitimize inclusion into China's political system. The thesis proposes that the concept of techno-economic rationality explains how participation in environmental policy is available for actors possessing economic resources and technical capacity.

Chapter 9 presents the conclusions of the thesis. In conclusion, participation of local authorities and non-state actors, as well horizontal interactions between sectors, contribute to urban climate mitigation efforts in China. However, participation in environmental policy is not open for all actors, but structured by techno-economic rationalities. This creates fundamental theoretical implications for the way in which policy networks and partnerships are produced in the political system in China. The thesis also identifies theoretical perspectives that merit further exploration, including legitimacy issues of current climate policy arrangements, and how rationalities of climate governance can be understood through the concept of governmentality.

2 Theories of climate governance

This chapter explains a broad change in global environmental politics, from a focus on government as the locus for climate change action, to consideration of the multiple forms of actors and processes that intervene in formulation and delivery of environmental policy. This shift from "government" to "governance" has shaped the last decade of climate change governance in China, but in unexpected ways. To understand the nature and impact of this change, this chapter provides an account of key changes implied in this shift, particularly through the rise of network governance, local action, and partnerships. The key argument of the chapter is that local authorities and non-state actors exert influence over formulation and implementation of climate policy, which creates new opportunities for action but also new channels for and distributions of authority.

The chapter begins by defining and discussing the concept of governance, starting from the conceptual shift that occurred around the 1980's when nation states were perceived to lose their monopoly over public policy (section 2.1). Theories that emphasized broader notions of societal steering incorporated activities taking place outside traditional state borders and encompassed non-state actor agency. Theories of environmental policy evolved in a similar manner, from a dominating emphasis of regulation and control measures, towards collaborative decision making strategies, partnerships, voluntary agreements (VAs), and participatory approaches. In responding to the climate change challenge, complexity arises out of the need to tackle the issue at multiple levels and across multiple policy sectors. Climate governance therefore involves activities that transcend scales, administrative boundaries, and borders.

Networked governance arrangements have important implications for the way in which public policy is created. Section 2.2 shows how influence over decision making in networks is exerted through a variety of channels. According to policy network theory, decision making takes place through interaction between civil servants, committees, working groups, professionals, and experts. Negotiation and bargaining, conflict of interest and structures of power are crucial elements explaining decision making interactions and outcomes. Top-down lines of control over environmental policy have also been questioned by studies based on a constructivist perspective. Theories of preference formation show that power over policy making lies in the ability to articulate issues in a way that make certain narratives dominant and others sidelined. In environmental policy making, the ability of certain groups to frame policy issues creates potential to make conflicts of interest invisible and empower some actors at the expense of others.

The perceived, relative erosion of state power is associated with growing importance of sub-governmental units (section 2.3). Municipalities can use different strategies to address climate change. This includes taking action through traditional authoritative strategies, by adopting local regulations, imposing guidelines for public activities or providing low emission alternatives in public service. However, the need to find more effective ways to engage non-state actors in local climate action has also made municipal authorities turn to enabling strategies that rely on "soft" policy tools, such as spreading information and promoting certain types of behavior. One important enabling strategy is partnerships (section 2.4). Partnerships is one specific manifestation of network governance and a concept which originally grew out of observations of policy arrangements in Europe. In governance through partnerships, cross-sector relationships are formed to pursue public objectives through horizontal cooperation. Partnerships exist in a number of forms, and can perform a range of functions, such as rule setting, sharing information and resources, developing or transferring technology that contribute to local climate action.

2.1 Environmental governance

The concept of governance implies that nation states have lost authority over formulation and implementation of public policy to local government agencies, private actors, NGOs, transnational organizations, and citizen groups (Pierre, 2000; Pierre & Peters, 2000). In this thesis, governance is defined as "the complex process through which a plurality of social and political actors with diverging interests interact in order to formulate, promote and realise common objectives" (Torfing et al, 2012, p. 14). This definition emphasizes that non-state actors contribute to the formulation and realization of public goals, even though government authorities often play a key role in these processes. The definition also highlights the importance of interaction in formulation and implementation of public policy, and the role of heterogeneous actors that represent different interests in these processes.

This section provides a detailed account of the shift from government to governance, which was introduced in Chapter 1, starting from a discussion on the concept of governance. The section shows how a shift from regulation to more interactive approaches has taken place in environmental policy. Finally, the section shows why concepts such networks, multi-level governance, and transnational governance explain the nature of emerging responses to the climate change challenge.

2.1.1 The concept of "governance"

As discussed in Chapter 1, global trends that emerged around the 1970s affected the ability of national governments to independently formulate and implement public policy. Apart from the factors already mentioned, a wave of privatization shifted responsibility over delivery of public goods to the private sector in the global North. In the 1980s, many OECD nations adopted market based reforms of public activities, such as "professional management" strategies, along with private sector tools that valued output over procedure, competition, and cost cuts (Hood, 1991).

In the 1990s, increasing complexity of governance arrangements in the European Union contributed to the establishment of new levels and sources of political authority. Debates emerged on how to understand policy making processes in the context of Europeanization, through which decision making powers originally fixed within nation states shifted to supranational authorities. A similar tendency occurred due to regionalization, a process through which the appropriate level of policy making was increasingly perceived to be located on a regional level – a phenomenon which some authors interpreted in terms of "denationalization" of space (e.g. Brenner, 1999; Newman, 2000). Rhodes (1994) described the erosion of central government power due to both privatization and loss of regulatory functions to supranational bodies as a "hollowing out of the state".

Around the same time, questions emerged on how the shift of authority from nation states to international institutions influenced democratic and legitimate decision making. This incited debates regarding what standards or rules of action should be set for governance processes of multilateral institutions. In the realm of environmental policy, these discussions culminated in the adoption of the Aarhus treaty in 1998. This framework spelled out guidelines for accountability, transparency, public participation and access to justice in international decision making processes (UNECE, 1998). Subsequently, these ideas came to be epitomized through the concept of "good governance", which represented the idea that governance processes within and beyond the state should meet certain criteria of transparence, adherence to rule of law, efficiency and effectiveness, access to participation and equity, and absence from corruption (UNESCAP, 2000).

These developments had important implications on a theoretical level, as they contributed to a reinterpretation of state power and of state-society relations. Conceptions of societal steering shifted from a focus of government activities towards ideas about "coordination of social systems", in which public actors collaborate with corporate organization, civil society and transnational organizations through partnerships and networks (Pierre, p.3, 2000). The concept

of governance came to represent these new processes of steering and conditions of ordered rule (Rhodes, 1997). In analyzing the meaning of the term, Stoker (p.17, 1999) defines "government" as the formal institutions of the state and its monopoly over coercive power. The activities of both government and governance aim towards creating conditions for ordered rule and collective action; the outputs of governance are therefore the same of those of government. The distinction lies in the new processes through which these outputs are realized (Ibid).

Since the 1990s, use of the governance concept became ubiquitous, leading to a divergence in definitions between different fields of literature. In an overview of governance definitions published in 1999, Kooiman finds that most definitions are based on rules or qualities of systems, cooperation to enhance legitimacy, as well as processes, arrangements and methods of steering (Kooiman, 1999). Kjaer (2004) builds on Kooiman's findings to identify definitions of governance in three fields of political science: public policy, international relations, and comparative politics. In the field of public policy, the emphasis is on a plurality of actors involved in shaping common goals, blurring boundaries between actors, and self-organizing networks (Ibid, p.5). Within the literature on international relations, governance describes how organizations respond to problems of a global nature (Ibid, p.5). In the field of comparative politics, the concept focuses on the nature of state-society relations of political systems in different nations (Ibid, p.6). In all three fields, definitions involve actors and processes outside "government" and "the role of networks in the pursuit of common goals" (Ibid, p.4-5). Notably, all three fields also underline the nature of relationships between the state and actors from other sectors and their efforts to define and realize common objectives.

As observed in Chapter 1, governance can also be interpreted as a broader concept that encompasses all forms of steering, on all levels of society. This conceptualization was important in theories of international politics and global governance. Rosenau and Czempiel refer to a phenomenon that incorporates informal and formal mechanisms on a micro and macro level: "governance is thus a system of rule that is as dependent on intersubjective meanings as on formally sanctioned constitutions" (1992, p.4). This is a constructivist view which recognizes that agency and power take a range of forms, and that rule systems emerge on both a micro and a macro level.

Empirical observations of development in Europe around the 1990s also contributed to the emergence of the concept of network governance. As with the conceptual and empirical shift from government to governance, network governance represented a new analytical paradigm used to "make sense of the new and emerging reality of pluricentric and interactive governance" (Torfing & Sorensen, p. 331, 2014). Once attention was directed to the phenomenon, it was found that Northern and Western Europe was "swamped" by governance networks that linked together public, private and civil society actors at a local, regional and transnational levels. The linkages were used to mobilize actors in different sectors in formulation and implementation of policy, spread information, and coordinate action (Ibid).

Network governance involves interdependent, autonomous actors, who interact through negotiations that facilitate self-regulation, and contribute to the production of public purpose (Sorensen & Torfing, 2007). A key assumption is that governments are dependent on other societal actors for resources and delivery of various activities. Steering of society is expressed as "directed influence of social processes", rather than as direct control of actor's behavior (Kickert et al, p.2, 1997). Network governance is seen as particularly effective in dealing with complex, conflict ridden policy problems, as it facilitates collaboration among public and private stakeholders. "Wicked problems", issues that are ill-defined and complex, are thought to be especially suited for cross-sector collaboration in problem solving efforts (Klijn & Koppenjan, 2004). This makes theories of network governance relevant in studies of environmental governance in general, and in studies of climate governance in particular.

Partnerships is one expression of network governance. Partnerships can be seen as a way of tackling legitimacy deficits and finding more effective ways to solve social problems and sustainability challenges (Pattberg et al, 2012). Partnerships are defined as "collaborative

arrangements in which actors from two or more spheres of society (state, market and civil society) are involved in a non-hierarchical process, and through which these actors strive for a sustainability goal" (Glasbergen et al, p. 2, 2007).[2] This type of governance strategy can contribute to solving sustainability issues that public actors on their own have difficulty to address. By drawing on the strengths of actors in different sectors, it is seen as a form of governance better suited to dealing with complex, cross-sector challenges, such as complicated environmental issues.

2.1.2 Evolving views on environmental policy

The shift from government to governance is reflected in studies of environmental policy and politics. In these literatures, the shift is expressed as increasing attention towards non-regulatory policy tools, voluntary or information based policy strategies, and involvement of the private sector and civil society in environmental issues. Meadowcroft (p.481, 2005) articulates this change in environmental politics as "new modes of governmental intervention, the role of institutions outside government in ordering social relations and the fragmented and multilayered character of contemporary authority". This process of change is described in this section.

In the 1970s, environmental issues were viewed as single problems of environmental deterioration. Typical interventions were environmental protection legislation and end-of-pipe measures in single sectors. The early literature on environmental policy asked the question of what national governments can do to deal with environmental challenges, such as deforestation and industrial pollution. Use of either regulation or market instruments was the answer to this question. For example, in a review of environmental policy from 1975, economic or regulative instruments are the two key alternatives available for policy makers (Oates & Baumol, 1975). This is a state-centric approach to environmental policy, in which non-state actors and sub-national authorities are objects of regulation rather than actors leading change. An observation in a review of environmental policy instruments performed in 1976 depicts this dichotomy, and the conflict between legislative and economic tools:

> *Although the box of policy tools has been significantly enriched by a number of clever techniques [e.g. effluent charges] proposed by economists and other policy analysts over the last fifteen years or so, legislators and administrators show little interest in the new instruments and continue to rely largely on methods (primarily of the regulation/enforcement variety) whose shortcomings have been repeatedly pointed out (Majone, p.589, 1976)*

Around the 1980s, a shift occurred towards preference of market based tools, referred to as New Environmental Policy Instruments (NEPIs) at their time of emergence. These tools represent a belief that environmental issues exist because of market failure, which economic instruments can solve. They include taxes, subsidies, property rights, tradeable permits (cap-and-trade/emission permits) and direct financial incentives (e.g. for providers of renewable energy). The use of market instruments continued to increase in the early 1990s due to various reasons, such as dissatisfaction with the effects of regulation, arguments about economic efficiency, and normative views of reduced state interference (Jordan et al, 2003). Another reason for their popularity was that these instruments should create flexibility for companies and cost effectiveness in addressing environmental concerns (Jeanrenaud, 1997).

Another environmental policy instrument introduced around the end of the 1980s was information tools, which aim to spread knowledge about environmental issues, new technologies and practices through education, training and campaigns. Other examples are labelling, billing and metering, which are related to market instruments in aiming to affect consumer choices. Environmental impact assessments were also introduced as a new instrument

[2] This means that collaboration between actors from the same sector do not fall under this collaboration (this specification can be made clear by using the term inter-sectoral partnerships) (Huijstee et al, 2007).

that creates a bridge between environmental policy and other policy sectors (e.g. industry and land use and infrastructure) (Knoepfel, 1997).

The increasing complexity of environmental challenges in the 1990s made issues difficult to either "regulate away" or delegate to market forces (Dryzek, 1997). There was a sense of "crisis" related to the inability of current policy approaches to curb pollution, mobilize sufficient resources into environmental protection and address problems of a global nature (Dente, 1995). Moreover, the emergence of contested and controversial environmental issues, such as genetically modified food, came to portray environmental challenges as fundamentally social agendas (Berkhout et al, 2003). This realization uncovered previously unquestioned uncertainties regarding facts and knowledge in environmental policy. It pointed to the inadequacy of economic and legal instruments to manage "technically defined environmental problems" (Ibid, p.6). Further, it demonstrated the need to frame environmental policy agendas through social and political processes involving not only bureaucrats and engineers, but also NGOs, social groups, and the broader public.

Around the same time, collaborative, inclusive and deliberative forms of environmental governance gained recognition, along with a higher emphasis on process and participation (Arts et al, 2006; Backstrand et al, 2010). Concepts introduced into environmental policy included collaborative decision making, partnerships, and voluntary agreements (VAs). Process oriented approaches became important in environmental policy making, such as focus groups, multi-criteria mapping, participatory budgeting, public inquiries and policy dialogues, area-based environmental policy, community based environmental planning, citizens' juries, and consensus conferences (e.g. Marchi & Ravetz, 2000; Kamieniecki & Kraft, 2012). Around the same time, linear approaches to environmental planning and the ability of administrators to create effective long-term policy based on forecasting and analysis, were questioned. Non-linear and open-ended processes for long-term environmental policy design were developed, based on interaction, learning, and awareness of risk and uncertainty. These approaches have also been described as "reflexive" environmental policy (Voss et al, 2009).

Policy instruments used specifically to address climate mitigation and adaptation have developed and diffused in recent years (Huitema & Jordan, 2014a; Massey et al, 2014). Examples include an emission trading system and new financing mechanisms to support development of carbon capture and storage (CCS) (Boasson & Wettestad, 2014), new energy taxes, feed-in tariffs for eco-plants, green certificates for trading in renewable energy, electricity bill labelling, and climate funds (Schaffrin et al, 2014). A survey of climate change programs adopted by UN members in between 2007 and 2012 suggested that countries in the global South have begun to adopt new climate change policy strategies, with the most rapid increase in adoption taking place in Latin America and Asia (Dubash et al, 2013). However, evaluation of emerging climate policy points to limited levels of innovativeness and effectiveness. Haug et al (2008) observe that most climate policy developed in Europe continues to be based on the traditional regulation/market dichotomy, which voluntary approaches have been ineffective, and that lack of monitoring is associated with weak implementation.

The development and adoption of climate policy is explored in the literature on policy innovation, which evolved out of studies on policy diffusion. One of the earliest studies in this area is that of Walker (1969), which observed that US states with similar socioeconomic contexts copy each other in adoption of new policy. Walker introduced the concept of "policy innovation", defined as the adoption of policy that is new in any particular constituency (Walker, 1969, p.881).[3] Recent studies have used these theoretical approaches to analyse

[3] There is some controversy related to this conceptualization, as a common understanding of innovation is the development of something that is entirely new to the world (e.g. Rogers, 2003). However, by this understanding, policy innovation would become so rare that the phenomenon could hardly be studied, and the literature on policy innovation thus often adheres to Walker's concept definition. Other researchers followed this direction of research by explaining the diffusion of policy elements between US states (Gray, 1973; Mintrom, 1997; Shipan & Volden, 2008) and between countries (e.g. Simmons & Elkins, 2004). Sophisticated theories explain how learning, economic

climate policy innovation (CPI) (Jordan & Huitema, 2014a; Massey et al, 2014). For example, the adoption of climate adaptation policies in Europe has been argued to be attributed to external drivers, such as extreme weather events (Massey et al, 2014) and CPI in American states is primarily caused by internal factors (Matisoff, 2008; Krause, 2010). In the global south, internal drivers such as energy security appear to be strong drivers of adoption of new climate policy approaches (Stadelman & Castro, 2014).

2.1.3 Climate governance: Multi-level responses and multi-actor processes

Theories of multi-level and transnational governance have a strong traction in studies of responses to the climate change challenge. This section explains why this is the case.

First, greenhouse gases mix equally in the atmosphere, while costs are socialized at the global level, and effects are felt at the local level. This makes global climate change the "quintessential multiscalar environmental problem" (Andonova et al, p. 2009). Further, greenhouse emission activities are embedded in consumption and production activities that cut across policy domains, geographical scales and administrative jurisdictions (Bulkeley & Newell, 2015). Responsibility for climate change is also distributed across groups, sectors, countries and generations (Bulkeley et al, 2014). As a result, responses to climate change require multiple levels of decision making (local, regional, national and supranational), as well as the engagement of actors from both the public sector and from the private sector and civil society (Bulkeley & Newell, 2015; Huitema et al, 2016).

Multi-level governance is a concept often used to explain how climate change governance stretches across jurisdictions and government levels (e.g. Bulkeley et al, 2003). According to Hooghe and Marks (2001b), multi-level governance is comprised of two related sets of processes. The first (Type I) is negotiation of authority and competencies between different levels of government. The second (Type II) consists of multiple overlapping and interconnected horizontal spheres of authority operating at multiple scales, within multiple jurisdictions. Climate change governance often involves both types, as it incorporates informal steering strategies dispersed across a variety of actors (Bulkeley & Kern, 2009). This includes parallel processes of policy making of international and supranational institutions, national and sub-national governments, and initiatives brought about by green movements (Andonova et al, 2009). It also involves public sector dependence on private actors for leadership and policy implementation, which creates hybrid governance arrangements and new divisions of roles and responsibilities (Bulkeley & Newell, 2015). The concept of multilevel governance indicates that no single level is dominant in determining policy outcomes (Bulkeley et al, 2003).

Actor collaboration in climate change strategies not only spans across government levels, but also across geographical scales. The conceptualization of global climate change governance involves recognition of new forms of spatial hierarchies that move beyond the dichotomy of national/international levels, and introduce the possibility to "jump" levels (Stripple & Bulkeley, 2014). One expression of this tendency is the way in which city engagement in climate action involves strategies to access information and resources and engage in policy processes located beyond the territorial bounds of the city (Betsill & Bulkeley, 2004; Bulkeley & Betsill, 2005). This includes vertical, intragovernmental interactions, in which struggles for competencies and discursive aspects that define urban challenges take place. It also includes political struggles carried out in coalitions and institutions that stretch across nested scales and involve not only public actors, but also other stakeholders (Bulkeley & Betsill, 2005).

Transnational governance, or transnational governance networks, is another concept used to understand global climate change responses. According to Betsill and Bulkeley (2004), transnational networks exist in at least three forms: epistemic communities, transnational

competition and imitation contribute to policy diffusion, while being influenced by, for example, geographical proximity or strong leadership (Simmons et al, 2007; Berry & Berry, 2007; Shipan & Volden, 2008). Another part of the literature focuses on assessing the probability that a jurisdiction will develop new policy practices, which is influenced by factors such as available resources and motivation of policy entrepreneurs (Berry & Berry, 2007).

advocacy coalitions, and global civil society. Epistemic communities are networks of experts creating policy discourses around scientific issues on an international level. Transnational advocacy networks are made up of policy makers, international NGOs and other actors that share information to alter values and debates in which policy is created. Global civil society is made up of international green movements clustering around the climate change issue. The formation of transnational networks can be explained by actors' need to access and exchange resources, gain recognition, promote interests, and create legitimacy of climate policy options through informal international connections (Ibid).

Transnational municipal networks (TMNs) is a form of transnational network led by city authorities. TNMs are made up of autonomous members (cities), cooperating in a non-hierarchal fashion, and adopting decisions that are implemented by members (Kern & Bulkeley, 2009). They carry out a number of functions, including information dissemination, project funding, benchmarking and certification activities, and seeking to influence other actors (Ibid). TMNs are used by cities to promote leadership in technology development, as well as to shape discursive aspects of climate policy through norm setting (Toly, 2008). TMNs allow cities to participate directly in the formulation of climate policy taking place on a supranational or international level by disseminating knowledge, lobbying national governments, facilitating implementation, and contributing to policy initiatives (Bulkeley et al, 2003). Transnational networks can also be led through a mixture of public, private and civil society actors. These range from formal initiatives involving collaboration between states, international organizations, businesses and NGOs, to loosely coupled, bottom-up initiatives led by, for example, grassroots movements, communities or NGOs (Bulkeley & Newell, 2015).

2.1.4 Concept definitions: Policy networks, governance modes, and partnerships

For the purpose of clarity, this section provides definitions of key concepts and relation between them: policy networks, governance modes and partnerships. While these concepts are used broadly in the governance literature, this thesis uses specific definitions of each concept in order to avoid conceptual confusion or overlaps.

Policy networks

Network governance is a concept that refers to both formulation and delivery of public policy in non-hierarchical, pluralistic settings (Torfing & Sorensen, 2014). As discussed above, this concept emerged through observations of the increasingly interactive nature of policy processes in the global North, in particular in the European Union. This thesis uses the concept of policy networks to refer to interactions involved in policy making processes. Governance networks is interpreted as a broader term, which encompasses policy implementation strategies led by non-state actors and formulation of informal, collective goals. The activities of policy networks, on the other hand, always involve public actors (although this involvement may be indirect, for example by setting the terms of a policy process), and result in some form of public policy. The understanding is derived from the early literature on policy networks, which focuses on the nature of state-group interactions in formulating public policy (see section 2.2).

The understanding of the concept of environmental policy discourse is based on Hajer's (1995) research on policy discourses and advocacy coalitions. Hajer (Ibid, p. 44) defines environmental discourse as "a specific ensemble of ideas, concepts, and categorizations that are produced, reproduced and transformed in a particular set of practices and through which meaning is given to physical and social realities". Hajer shows how groups of actors adhere to specific sets of problem definitions and assumptions, and how these groups use language to shape and mobilize certain policy options. In this thesis, analysis of how groups of actors use discourses to promote environmental policy agendas is understood as one way to reveal dynamics of policy networks. In the section below, the literature on environmental discourses and preference formation is presented as part of the policy network literature, as it is understood to represent one way of explaining group interactions that are part of policy making processes.

However, as is explained below, this perspective highlights other factors than those emphasized in the literature on state-group relations.

Governance modes

Modes of governance is a concept that captures steering strategies, constellations, interactions, and mixtures of participation of private, public or civil society actors in governance processes (Treib et al, 2007). The concept has a somewhat different meaning in different studies, but most understandings are based on steering constellations or processes, as well as instruments, that are used for governing.

For example, in Kohler-Koch and Eising's (1999) account of network governance in Europe at the end of the 1990s, modes of governance are used to distinguish between ideal type categories of state-groups interactions in policy making, such as corporatism and statism. In this account, networks are seen as an alternative mode to these ideal types, which can function as an extension of the more traditional governance modes. Backstrand et al (2010) links the emergence of new modes of environmental governance with a "deliberative turn" in environmental politics, and see modes as representing less hierarchical forms of steering that may contribute to more inclusive, and effective governance forms. New modes of environmental governance are in particular represented through multi-stake participation in decision making, networks, and partnerships (Ibid).

As observed by Huitema et al (2016), a number of "choices" shape climate change governance in different political contexts. These choices include: precisely what problems to address, at which level to tackle it, when to tackle it, what principles to base interventions on, and which governance mode to use. Here, governance mode refers to different instruments, such as regulation, market principles, or trust and collaboration, as well as engagement in climate issues using a hierarchical approach, bottom-up strategies, or networked arrangements (Ibid). Huitema et al (2016) also note that private action is a preferred mode of climate adaptation action, which is associated with issues of shared responsibilities between public and private actors. In a review of evaluations of climate policy, Haug et al (2008) use a similar understanding of the concept.

In this thesis, references to governance modes rely on the definition used by Bulkeley and Kern (2006), which is developed to capture complex interplays between actors on different levels, new power dynamics and institutional arrangements. The four modes identified by the authors are closely related to the ideal state types discussed above (in particular authority/hierarchical, and enabling/networks), but is different in its recognition of provision and self-governing as distinct steering strategies. This framework is discussed in detail in section 2.3.

(Sustainability) Partnerships

One expression of networked governance arrangements is partnerships. The concept of partnerships became influential after the World Summit on Sustainable Development (WSSD) in 2002. For institutional organizations, such as the World Bank and the UN, sustainability partnerships are conceived as initiatives led by states or international institutions that contribute to mobilize resources, transfer technology, build capacity, and share knowledge in the pursuit of sustainability (UNDSD, 2015). This conceptualization remains centered on traditional forms of government, as it assumes a central role of formal institutions. On the other hand, partnerships can be conceived as representing a shift towards less hierarchal modes of solving problems where non-state actors contribute to formulation and delivery of public policy (Glasbergen et al, 2007).

The UN conference on the environment in 1992 marked an emphasis on societal deliberation that was followed by emergence of cross-sector cooperation in policy making and delivery of sustainability goals (Glasbergen, 2007). This was followed by the World Summit on Sustainable Development in 2002, which explicitly placed partnerships on the sustainability agenda as a key implementation tool (Huijstee et al, 2007). Since then, partnerships have come to be seen as a mode of sustainability governance that draws on the strengths of actors from the

public, private and civil society sector. Sustainability partnerships have been perceived as a response to broad development trends – globalization, liberalization and privatization – resulting in new institutional arrangements (Huijstee et al, 2007). From this perspective, partnerships represent a hybrid governance mode that shifts authority over decision making or provision of collective goods to non-state actors.

This thesis uses Glasbergen's (2007) definition of sustainability partnerships: "collaborative arrangements in which actors from two or more spheres of society (state, market and civil society) are involved in a non-hierarchal process through which these actors strive for a sustainability goal" (Ibid, p. 2). Partnerships are understood as an enabling governance mode, according to Bulkeley and Kern's (2006) definition. The concept is distinctive from that of policy networks, as partnerships can be formed entirely without involvement of public actors, and activities of partnerships do not necessarily result in public policy. As a result, partnerships have a broader variety of functions that policy networks. Apart from setting formal rules (which is not a common function of partnerships), partnerships are also used to implement policy, to disseminate information, develop new technology and products, and build capacity. This is discussed in detail in section 2.4.

2.2 Policy networks

This section explains how theories of policy making have conceptualized the influence of organized interests over public policy, and the relevance of this influence for environmental policy. In the literature on policy networks, this influence is explained in terms of interdependent interactions and negotiations. However, negotiations over open conflict is not the only way in which different interests influence policy outcomes. This section also discusses how more subtle forms of authority over policy options is also exerted over environmental policy through contestation over discourses.

2.2.1 The roots of interaction based policy making

Below, a brief contextual background to the literature on policy networks is provided. This introduction explains the emphasis in policy network studies on bargaining and negotiations with organized interest groups, as well as their influence over public actors.

From linear to chaotic views of policy processes

Early models of policy processes usually included some version of the steps of setting an agenda, specifying policy alternatives, choosing between options, and implementing the decision. This is a view associated with Weberian (1946) top-down, linear, state centered steering models. Policy making was also perceived as rational and scientific (Easton, 1965). Hoppe (1999) refers to Lasswell (1971) as the first standard-bearer of scientific policy making and the idea that public policy should follow robust scientific principles.

However, linear policy models came under criticism as early as 1959, when Lindblom famously referred to policy making as the science of "muddling through". Lindblom saw the "rational" model as impossible to use due to complexity, lack of time, resources, and limited information of bureaucrats. Policy makers often instead decide that a policy approach is appropriate based on the feeling that it is normal, or "good" (p.81, 1959). Further, implementation always affects policy in some way, which means it cannot and should not be separated from policy making (Lindblom, 1980).

In the late 1970s and early 1980s many other researchers pointed to aspects of policy making and implementation that defy the idea of a linear process of events. Pressman and Wildavsky's (1984) *Implementation: How Great Expectations in Washington are Dashed in Oakland* shows how policy in the United States seldom is implemented as decision makers intended and that the design of policy cannot be separated from implementation. Bureaucrats and administrators resist policy goals and seek resources for self-invented policy directions (Bardach, 1977).

Through professional knowledge and long duration in the same position, administrations have substantial opportunity to influence policy making (Lipsky, 1980). Bureaucrats act as "policy entrepreneurs" with ability to take policy development in their own directions, independent of the political leadership (Kingdon, 1984). Policy making has thus come to be seen as a chaotic process influenced by various actors where the distinction between policy making and implementation is artificial.

State-group interactions

Interest group studies, the first body of literature directly focusing on state-group interactions in policy making, took off around the 1920s, flourished around the 1930s-40s and returned as a third wave of research around the 1970s (Almond, 1983). These studies are the precursors of policy network literature, and are based on similar assumptions about bargaining and structures of power.

Two dominant theoretical models were corporatism and pluralism. Corporatism is understood as systems in which organized interest groups are given mandate by the state to hold a monopoly position over negotiation with public actors. One of the most well-known definitions of corporatism is attributable to Schmitter (1979), who viewed these as based on compulsory, non-competitive participation of organizations with a monopoly on state interaction. Studies of corporatist systems aimed to find how state-group interactions respond to changes in the socioeconomic and political environment and produce policy strategies to cope with these (e.g. Katzenstein, 1985; Stewart, 1992).

In pluralist systems, social organizations are allowed to compete on a (supposed) equal basis for influence. The theoretical concept was developed at a time when free participation and multiple sources of information in policy making was seen as a preferable alternative to totalitarianism, and interest groups were seen as an intermediary between states and citizens. The pluralist model often proved difficult to apply in reality, in part because the assumption of competition based on an equal distribution of power was not met. Studies of public-interest group interactions in the United States showed that congressional sub-committees, interest associations and government bureaus often had mutually supportive relationships and that most decisions took place within this closed group, or "iron triangle". Rather than being characterized by open competition, iron triangles display difficulty of access, limited or no negotiations and conflict, and rigidity over time (Ripley & Franklin, 1984).

Similarly, decision making processes in the UK were shown to be based on interaction between departments and "clients" (Richardson & Jordan, 1982; Richardson & Jordan, 1983). Rather than being characterized by free competition, decision makers had a set of "go-to" interest groups – a phenomenon described as sectorization or clientilism. Departments fought for issues in alignment with clients against the rest of the "government machine", and some interest groups were powerful enough to veto policy options (Richardson & Jordan, p.257, 1983). Decision makers avoided radical, innovative policy options and aimed at seeking consensus, making it difficult to bring about reform (Ibid, p. 265). All these observation made the pluralist model an inappropriate explanatory tool for decision making processes.

2.2.2 Policy network theory

An alternative to seeing policy making as taking place through negotiations between public actors and a set number of interest groups is to view decision making as taking place in networks. This section presents the key components of the policy network literature, as well as its relation with environmental decision making in cities.

The literature on policy networks developed out of studies of the British political system, in parallel to theories of governance that emerged around the same time. Rhodes and Marsh (1992, p.198) trace the origin of policy network theory to the literature on sub-governments, which highlights power imbalances such as elitist interactions in iron triangles. The literature on policy networks sees public actors working through networks to steer society, looking specifically at

how policy is shaped through these. The concept of "networks" thus incorporates essentially all state-interest group relations and interactions involved in policy making.

The policy network literature grew out of the observation that rather than being shaped by political leaders or in parliament, policy grows out of continuous interaction between civil servants, committees, working groups, professionals and experts (Marsh & Rhodes, 1992). These actors and groups exist in all policy fields, from agriculture, environment and health issues to national security and economic policy (Ibid). Policy networks are made up of "sets of formal and informal institutional linkages between governmental and other actors" that are structured around shared interests (Rhodes, p.1246, 2007).

The idea of policy making taking place in networks is related to a number of concepts. One important term is the notion of "issue networks", which is based on observations of the American political system after the 1950s (Heclo, 1978). Issue networks consist of "masses of intermediary, issues-conscious groups" (Ibid, p.268), activities of local and sub-local government, private and semi-private organizations and their involvement in shaping policy debates. Issue networks are characterized by open access, a variety of societal actors, lack of central authority, and difficulties in reaching consensus. The concept points to the way in which policy issues are shaped by groups and debates that occur outside closed systems of power, such as iron triangles.

Another key concept in the policy network literature is "policy communities", which can be traced back to Richardson and Jordan (1979). Observations of policy making in the UK showed that decision making is carried out by interest groups that are closed off to the general public, which is characterized by fragmentation and interpersonal connections rather than formal structures (Richardson & Jordan, 1985). The concept of policy communities refers to sub-groups consisting of public actors and interest groups which share problem definitions and values. Conflicts that play out within these communities determine the direction of policy development.

A third key concept is "advocacy coalitions" (Sabatier, 1988). Advocacy coalitions are made up of coalitions of actors that adhere to a similar set of beliefs regarding a policy issue. Within an advocacy coalition, sets of values and assumptions are associated with certain policy options and these only change slowly over time. Policy coalitions may form either through bargaining or because of converging interests, and the influence of professional groups, or "epistemic communities", plays a central role in these (Haas, 1990).

Typologies and characteristics of policy networks

Sophisticated systems of classification and categorization have been developed to understand structures, dynamics and outcomes of policy networks (Jordan, 1981; Atkinson & Coleman, 1989; Knoke, 1990; Marsh & Rhodes, 1992; Jordan & Schubert, 1992; van Waarden, 1992; Knoke, 1996). One of the first systems focused on state capacity and degree of mobilization of interest groups to differentiate between different types of policy networks (Atkinson & Coleman, 1989). These two aspects were chosen to understand differences between reactive and anticipatory industrial policy, as well as their relationship with policy failure.

Subsequent typologies of policy networks have included structural characteristics, functions of network linkages and aspects such as conflict and balance of power. For example, Rhodes and Marsh (1992) created a system of classification based on number of participants, type of policy interest (professional/broader range), frequency of interaction, consensus/ conflict, and distribution of power and resources. This typology illustrates the difference between a policy community and an issue network, where the former is characterized by a smaller number of participants, narrower policy topics, consensus among members, hierarchies, and balance of power. Rather than seeing this as an all embracing typology (for example it was developed to fit the context of the UK), this points to the need to recognize the variety of inclusion and interaction in policy processes.

In a similar typology, Jordan and Schubert (p.12, 1992) point to three criteria that describe policy making interactions: degree of institutionalization or stability; scope of policy making (sectoral/trans-sectoral), and number of participants. At the same time, the authors argue that there are only two basic types of relationship between interest groups and the state that are of key relevance: competition or cooperation. Another ambitious model includes as much as seven dimensions: actors, function, structure, institutionalization, rules of conduct, power relations, and actor strategies (van Waarden, 1992). The most basic dimensions refer to the number and type of actors participating in policy making processes, commonly interest groups, professional associations and public actors. Function refers to the way in which state-group linkages are used, for example to channel information or exchange resources. Structure refers to size of the network, degree of centrality, intensity or interaction, clustering, and so on. The seven dimensions are used to categorize existing forms of policy networks (e.g. clientilism, pluralism, iron triangles). In recognition of the complexity of this model, three dimensions are pointed out as particularly important: number and type of actors, function of linkages and balance of power (Ibid, p.49).

Issues of power and legitimacy

The use of typologies to describe and understand network structures and functions has not convinced all scholars. It has been observed that the concept of policy networks originally evolved as a metaphor, and as such, is descriptive but not particularly useful to understand policy making processes or outcomes (Dowding, 1995). It has instead been argued that differences in policy outcome lies not in structural characteristics but in coalition and bargaining possibilities, power balance and resources, which condition ability to overrule interest groups. Analysis of network interactions should therefore be based in analysis of power resources (Ibid, p. 146).

Access to resources and power is a central theme in the policy network literature. According to studies in the UK, policy networks are created because actors in different sectors need to access resources, such as money, information and legitimacy. Semi-institutionalization of linkages occurs in order to regularize interactions and avoid conflict (Smith, 1997). Key characteristics of decision making in policy networks is bargaining, resource interdependence, and continuing, game like interaction (Rhodes, p.43-46, 1996). Negotiations in networks are thought to be based on exchange of authority on part of the government, and views of "legitimate spokespeople" from those in charge of service delivery. Power dependence is key to understanding network dynamics (Marsh & Rhodes, p.1245, 1992). Economic position and knowledge are identified as two resources that create access and influence in policy networks, that is, resources often held by producer groups and professionals with whom public actors frequently develop common interests (Rhodes & Marsh, p.199, 1992).

The idea that decision making processes are based on resources and power relations is not unproblematic. On the one hand, non-state actor participation in policy making is seen as normatively positive from a democratic perspective. This argument is made in relation to inclusive, participatory, or deliberative policy making processes. The principle of deliberative policy making derives from Habermas' idea of deliberative democracy.[4] The basic idea is as old as the concept of democracy itself, but experienced an upswing in Europe around the 1990s (Elster, 1998). Public participation in decision making can, according to such theory, increase the level of democracy and effectiveness of decision making in several ways, including openness and access (input criteria), deliberation (process), efficiency and effectiveness (output), and transparency (Papadopoulos & Warin, 2007). Public participation in environmental decision making can make "experts" more responsive to the public, make the public more environmentally "aware", anticipate and manage conflict and distribution of public

[4] Deliberative democracy has been defined as "collective decision making with the participation of all who will be affected by the decision or their representatives", characterized by rational and impartial debate (Elster, p.8, 1998).

"bads", and make policy more implementable (Ibid). Participatory environmental planning can also be better at addressing issues of equality and justice (Chu et al, 2015).

The debates on deliberative and participatory environmental governance make up a vast academic literature, the details of which are beyond the scope of this thesis. In short, it can be commented that there are problems associated with public participation in environmental policy making. For example, it is not clear how models of deliberation are to fit alongside existing institutions, in what way they will be more effective and democratic, and how manipulative and discursive power is handled in deliberative contexts (Hajer & Kesselring, 1999; Owens, 2000). It has also been shown that even in environmental policy settings where deliberative or participatory approaches have been used explicitly, issues of contestation and power are evident (Holmes & Scoones, 2001). Further, a key problem is that most policy processes in network settings aim to include stakeholders and organized interests, rather than ordinary citizens (Andersen & Burns, 1996).

The fundamental legitimacy issue of policy networks is that they shift decision making authority from democratic institutions and elected governments to administrators, professionals and experts, which raises questions relating to equity, accountability, and democratic legitimacy (Bogason & Musso, 2006). Actors that are included in decision making processes are likely to be groups with access to resources, sub-elites that can impose their own norms on the policy process (Ibid, p.8). Voters and parties are absent from the scene, whereas stakeholders, local politicians, planners and public employees suddenly take on roles of influence. Rhodes and Marsh (p.200, 1992) refer to Lowi in describing the impact of institutionalized interest group politics: "policy networks destroy political responsibility by shutting out the public; create privileged oligarchies; and are conservative in their impact because, for example, the rules of the game and access favor established interests". As stated by Rhodes & Marsh (p.200, 1992), "the legitimacy of networks is not political but resides in the claims to superior expertise and/or to increased effectiveness of service provision".

In particular, the private sector plays an active role in policy networks on a global, national or sub-national level, and enjoys material, organizational and discursive power over these. Companies often have strategic resources to affect agenda setting, policy formulation and implementation. Coen (p. 198, 2005) has referred to Europe's bargaining system as "elite pluralism" to describe the extensive influence that the private sector has over environmental decision making processes. The process through which non-state actors, in particular private organizations, have gained influence over policy making processes has also been referred to as "privatization of environmental governance" (Cashore, 2002). A critical political economy perspective suggests that political elites are influenced by interests in key economic sectors (Levy & Newell, 2005; Newell, 2008). Further, coalitions between political and economic elites actively influence policy in directions that protect high-carbon systems (Geels, 2014).

Local decision making through policy networks

On a municipal level, policy making and planning negotiations in networks occur outside the formal arrangements considered necessary for accomplishing democratic processes (Aars & Fimreite, p.240, 2005). In informal policy networks, participants tend to be self-selected, while participation often is exclusive and closed off to the general public. When policy with major social implications are worked out through such arrangements, "lines of accountability are stretched" (Ibid, p.241). A local decision making network must meet certain criteria to be assessed according to principles of accountability, such as publicity, transparency, and participation of popularly elected leaders or the network in some other way being granted authority by an elected leadership (Ibid, p.245). Case studies on a municipal level show that even in networks created by public actors, such conditions are not met and accountability is questionable. Even if urban planning networks are built around existing political organizations, the networks withdraw authority from democratic institutions. Further, politically strong or

resourceful actors tended to be included, potentially at a disadvantage to public actors and interests with weaker representation (Ibid; Sorensen, 2006).

In informal municipal policy networks where interests are competing on the basis of power rather than formal mechanisms of representation, outcomes are likely to favour certain stakeholders. Environmental decision making in such settings has a high risk of being marked by the influence of urban elites (Khan, 2013). Distribution of power in an informal policy making network is likely to reflect deeper distributions of power in society, which is often based on imbalances (Ibid). The choice of selection of participants is usually not based on a democratic process, but a perspective of what needs to be considered to reach consensus and for outcomes to be implementable. The interdependence of actors in networks and the search to reach consensus makes this form of policy making less able to seek out radical options, and more likely to protect status quo. This makes it more difficult to generate socio-environmental change required, for example, for low carbon development (Ibid).

The key implication of these theoretical observations is that inclusion of stakeholders in local policy processes with a bearing on the environment may influence decisions in favour of the interest of certain groups. Structure of power, the nature of conflicts, and interdependence of actors are important aspects to consider when trying to understand how policy making interactions influence decision making outcomes.

2.2.3 Environmental policy discourse

The view of conflicts of interest and negotiation in policy networks is based on an idea of openly competing, defined priorities. This is based on the assumption that actors have predefined interests which are negotiated based on relative positions of power. Another way to think about decision making processes is to consider the influences that shape the framing of policy problems. This section shows that power struggles also play out through contestation over construction of meaning and that mobilized interests affect environmental policy through problem formulations (Hajer, 1995; Dryzek, 1997).

Many policy debates focus on "what tools are there to attack better these problems" rather than considering whether policy questions have been correctly framed in the first place (Keeley & Scoones, p.3, 1999). An alternative approach to understanding policy processes is to assume that preferences are not fixed and that problem framing is a matter of debate. The literature of preference formation and policy discourse uses such an approach by assuming that structures of power are related to language use.

The theoretical foundation of the preference formation literature is social constructivist ideas about the construction of meaning. Language can be understood as a neutral medium that transfers knowledge between humans in a non-additive fashion. Most positivist research is based on this understanding (Wetherell, 2001). The understanding that underpins social constructivist literature is that discourses create reality in terms of shaping conventions and institutions (Ibid). Social constructions were introduced as a concept by Berger and Luckmann in 1966 with the publication of *The Social Construction of Reality*, in which the authors argue that individual conceptions over time are cemented into identities, which eventually translate into societal structures (Berger & Luckmann, 1966). It has similarly been argued that problems are socially constructed through definitional "claims making" activities (Spector & Kitsuse, 1977). These activities define the reality of problems, which conditions the nature of available solutions.

A common operationalization of power is based on identifying the prevailing side in a conflict related to decision making. A well-known definition is based on the idea that A has power over B to the extent that A can get B to do something that B would not otherwise do (Dah, 1957). In 1974, Lukes noted that actors might not know what their real interests are, as someone more powerful might be manipulating their preferences. Lukes suggested that actor A may be able to affect actor B by shaping preferences so that B cannot see alternatives in his/her interest. B's interests have been black boxed, whereas A's options are viewed as natural and unchangeable.

This definition of power is relevant to policy making processes, where power can be understood as ability to articulate problems in a way that makes certain narratives dominant and other issues sidelined (Marston, p.vi, 2004). Collective sense making can be understood as a struggle where different societal actors and groups aim to shape narratives to their own advantage (Hajer, 1995).

The "mobilization" of a discourse is key to making a policy option legitimate and normalized, which at the same time creates influence for certain groups of actors:

> *By seeing policy as discourse, analytical attention is turned to the webs of power underlying the practices of different actors in the policy process, as well as the discursive and non-discursive practices which are invested in policy negotiation and contestation. Thus linguistic and textual styles, classificatory systems and particular discursive formations can be seen to empower some and silence others (Keeley & Scoones, p.5, 1999)*

Discourses are important in environmental policy. This is, firstly, because environmental issues tend not to be self-evident. They reflect socio-cultural preoccupations, are characterized by complexity, and draw on multiple areas of knowledge (Hajer, 1995; Feindt & Oels, 2006). For this reason, environmental problems are socially constructed and represented with symbols, narratives, storylines and emblems. Secondly, changes in policy language conditions the approach towards problems and available solutions, and dominant discourses tend to become intertwined with practices and capacities that shape planning directions (Marston, 2004; Feindt & Oels, 2006). The preference formation literature shows that changes in belief systems is a primary force behind environmental policy change, rather than rational debates or sector-based power struggles. Belief systems are made up of sets of unchallenged core beliefs and associated policies believed to best protect these (Munro, 1993). Belief systems change only slowly and over time, as a result of changes in the external environment, for example deterioration of the natural environment. Groups with different interests negotiate options by adhering to these core beliefs in the mid to short term.

Environmental policy narratives are often related to "scientific" debates. These tend to occupy a major role in defining and neutralizing policy options, relying on the aid of metaphors and narratives that carry scientific authority (Keeley & Scoones, 1999). At the same time, perceptions of environmental issues are not developed through neutral processes, but grow out of struggles between coalitions that involve political authorities, science communities, businesses, media, and environmental organizations (Fischer & Forester, 1993; Hajer, 1995; Fischer, 2006; Allan & Hadden, 2017). In environmental policy, experts are often expected to identify "facts" that guide the policy process, and tackle problems with correct information, efficiency, "neutrality" and "objectivity" (Keeley & Scoones, p. 7, 1999). Networks of experts attach authority to knowledge, which in turn conditions policy making and make epistemic communities able to present environmental discourses as scientific fact (Litfin, 1994).

Policy responses to climate change are similarly shaped by knowledge and technology, where expert networks and scientific advice play a central role (Miller & Edwards, p.5, 2001). For example, in research on global climate change, modelling is used as basis of international policy dialogues where scientists and policy makers are engaged in mutual construction of knowledge (Shackley & Wynne, 1995). Construction of information is subject to negotiations that go in both directions, where scientists directly affect which data will be collected and thereby what information is available to policymakers (Ibid). At the same time, recent public debates on climate change are reconfiguring these positions. Increasing politicization of climate change issues and public scrutiny on scientific "facts" places pressure on the self-evident authority of scientific arguments, calling for a need to question the boundaries between science and society (Berkhout, 2010).

The extent to which scientific experts are able to exert direct authority over political decision makers is debated. Haas (2004) argues that there are specific conditions under which representatives of scientific communities can "speak truth to power". Experts must, first of all, provide "usable knowledge" – knowledge with credibility, legitimacy and political saliency.

Further, an epistemic community should produce knowledge in isolation, to make sure that scientific fact is not "tainted" by political processes. In these situations, "epistemic communities are the transmission belts by which new knowledge is developed and transmitted to decision-makers" (Ibid, p.587). Contrary to this observation, Juntte et al (2009) observe that scientific "evidence" is not powerful per se, but only when mobilized by powerful institutions or constellations of actors. For example, administrative factions make use of new scientific findings to defend pre-defined positions, or claims of uncertainty can be used to justify technocratic interventions on behalf of particular interests. Juntte et al (Ibid, p.211) state that "in order to understand the notion of power, and its role in the policy-evidence relationship, it should be understood as vested in interaction between certain actors and enacted, rather than allocated a priori". It has also been observed that decision makers draw on knowledge in different ways when creating environmental policy (Dunlop, 2014). This includes instrumental use, where expert knowledge is used in a direct fashion to inform policy decisions. It includes reliance on knowledge to inform conceptual debates, which shapes the policy environment and conditions available options. Further, knowledge can be used politically or symbolically, to legitimate pre-determined policy preferences. Dunlop (Ibid) observes that the first of these forms is most common in policy fields characterized by uncertainty, where epistemic communities play a particularly important role.

The concept of authoritative expertise is widely applicable to groups that exercise influence over policy making through their claim to knowledge - this goes beyond a narrow understanding of scientists that are active as policy advisors (Cross, 2013). In a globalized world, epistemic communities exercise considerable authority over not only public actors, but also non-state actors (such as transnational networks and multinational corporations) that are part of dominant science-policy configurations. Cross (Ibid) observes that epistemic communities are a major vehicle through which knowledge translates to power. Cross also identifies circumstances, observed in the literature, in which authority based on knowledge is likely to be especially persuasive. This includes political contexts of high uncertainty and limited knowledge, settings where experts have direct access to decision makers, involvement in technical decision making (rather than shaping political beliefs), issues involving natural systems, and policy objectives in alignment with existing goals. Further, it is important to notice that these groups are most effective when working in synergy with government actors; part of the epistemic community may even exist inside government authorities.

Gough and Shackley (2001) similarly demonstrate that green NGOs that are part of epistemic communities exercise authority over international environmental policy. This is realized through at least three strategies involving formulation of problems and solutions: by suggesting novel policy strategies (often an avenue preferred by think-tanks and NGOs with a research profile), contributing to knowledge building (often done in cooperation with purely academic organizations), and campaigning (usually chosen by traditional green movements). The success of such strategies hinges on the way in which NGOs are able to become part of epistemic communities clustered around international climate policy, such as the IPCC. Gough and Shackley (Ibid) observe that some of these green movements have reframed their agendas from overtly ethical or social framings, towards approaches more compatible with science-technical framings ("respectable politics"), which lend them greater leverage over policy framing processes.

This thesis addresses how professional organizations or NGOs are able to exercise influence over rule-setting activities, as well as local policy and project design, by drawing on epistemic authority. Haas (2017) proposes that the concept of "epistemic authority" captures why organizations (such as states) attach legitimacy to environmental solutions proposed by experts. Haas (Ibid, p.1) draws on Weber's conceptualization of rational-legal power to argue that scientific advisors enjoy a form of authority that rests on perceived legitimacy of expertise, impartiality, and reason. Taking this thought further, Alasuutari and Qadir (2013) suggest that the concept of "epistemic governance" describes societal steering in most modern societies.

Drawing on theories of framing and Foucauldian notions of governmentality, they explain how political processes regularly involve invoking knowledge and sources of expertise ("facts"), or shared norms as fundamental parts of building policy agendas. Epistemic communities can build authority and reinforce their own claims to knowledge by repeatedly presenting similar diagnoses and explanations for policy related phenomena. Not only are organizations representing scientific understanding of a policy issue placed in authoritative positions, but once a paradigmatic understanding of reality is created, it becomes very difficult for other groups or actors to propose policy directions that criticize these widely-embraced interpretations. This also allows widely accepted norms with a positive association (such as "sustainability") to become labels that can be used to justify any political agenda by appealing to paradigmatic understanding of what is "good". The authors propose that this conceptualization of power and steering provide a new layer of understanding to contemporary governance processes. This perspective can also be used to throw further light on network governance arrangements in relation to climate issues in China.

2.3 Urban climate governance

This section discusses the role of municipal authorities in climate mitigation policy and action. The section departs from the point of view of cities as sub-national unit with a main function of implementing central government policy. This is followed by an overview of incentives and barriers that municipalities face when attempting to address climate change. Finally, the concept of urban governance modes is introduced, along with a discussion of different strategies that cities employ in seeking to respond to the climate change challenge.

2.3.1 Cities as implementers or policy makers?

According to traditional views of political systems, sub-government units are part of a "cascade" model, in which national governments pass on goals and targets for local implementation. Municipal authorities carry the responsibility of realizing national policy goals and generating social support for these initiatives at a local level.

This traditional view of governance remains relevant, as various types of regulations and policy related to energy use and emission reductions are determined by national governments. This includes overall policy frameworks and legislation, energy pricing and taxation, policy and standards for energy efficiency and renewable energy, and R&D support frameworks (Colliers, 1997). On the other hand, the cascade model has been criticized for making invisible how local governments adopt their own initiatives and take a lead in climate action (Bulkeley & Betsill, 2003). Municipal authorities often generate and apply new climate policy approaches, which can diffuse to other locations (Schreurs, 2008). It has been demonstrated that climate policy and legislation is created through bottom-up processes through which practices become norms, and norms eventually are embedded in laws; a process described as lawmaking from "below" (Osofsky & Levit, 2007). The first emission reduction target to be adopted by a government entity was that of the city of Toronto, which a few years later was followed by thirty other cities (Patton, 2007). Municipal leadership in climate policy development is of particular importance where national or federal governments fail to shoulder this responsibility. Developing policy on a local level can also be a way to by-step complicated policy making processes on a national level and possibly realize more rapid implementation (Linsroth & Bell, 2007).

Nevertheless, Huitema et al (2016, p.13) observe that climate issues sometimes are "placed in the lap" of local governments, even when their capacity to address these issues are limited. This points to the continued need for national or federal governments to guide regulation and support diffusion of successful initiatives.

2.3.2 Drivers and barriers of urban climate action

As mentioned in Chapter 1, there are various barriers for municipal authorities to adopt climate change agendas. This section presents some of these obstacles, as well as the motivation for municipalities to engage in climate agendas.

Climate change tends to be seen as a global, rather than a local issue. Municipalities may feel that the issue does not fall under their jurisdiction ("not on my turf") or that the time frame for addressing the issue extends beyond their mandate ("not in my term") (Bai et al, 2009). Such attitudes can lock municipal authorities into inaction while more pressing local problems are dealt with. A number of institutional aspects may also act as barriers to climate action, such as lack of human resources, technical capacity or funding (Betsill, 2001). Other institutional aspects include inefficiency of bureaucratic procedures, policy clashes with higher levels of government and aversion towards radical policy options (Burch, 2010). Climate change tends to be seen as a marginal policy issue, and political will to adopt radical climate change programs can be limited (Collier & Lofstedt, 1997). Climate change issues usually fall under the jurisdiction of environmental departments, which tend to have a weaker influence over development policy than, for example, departments in charge of economic and industrial issues (Kern & Alber, 2008). Many cities have failed to form specific units to manage climate change and to adopt systematic emission reduction plans, and instead pursue projects on an ad-hoc basis (Ibid). Intragovernmental interactions may be characterized by conflicting priorities, lack of support from higher levels of government, slow progress, ineffective communication channels, limited information sharing, and unevenly distributed skills (Leck & Simon, 2013). Well-resourced larger urban regions tend to have better capacity and connections to pursue climate agendas, which is not effectively shared through horizontal or vertical linkages (Ibid).

Another crucial barrier is the perceived need for urban growth and the way in which emission reduction is seen as hampering economic development. Framing climate strategies from the perspective of generation of co-benefits is a way to localize the climate change issue and at the same time justify public spending to the public. "Issue bundling" is a strategic way to link climate policy with other local agendas, such as air pollution, waste management, transport development or infrastructure improvement, as well as aims of improving quality of life and "livability" (Betsill, 2001; Bai, 2007b). Local concerns function as "hooks" used to legitimize climate agendas (Betsill, 2001). It has also been noted that certain policy combination can create win-win outcomes, even when independent policy options on their own may not seem desirable (Viguie & Hallegatte, 2012).

A common co-benefit of climate action is generation of cost savings, which tends to be seen as "good business" (Kousky & Schneider, 2003). Energy saving is a critical motivation and interventions related to energy efficiency (especially in buildings) have been among the most common climate action strategies (Kern & Alber, 2008). Cities that have realized emission reduction through their participation in ICLEIs climate programs have often realized savings on energy fuel costs (Betsill, 2001; Kousky & Schneider, 2003). Somewhat surprisingly, municipal authorities tend to be more concerned with framing climate agendas as agendas with co-benefits, rather than to actually measure and assess these outcomes (Kousky & Schneider, 2003). This highlights the importance of framing climate change as a local issue in order to engage municipal leaderships (Lindseth, 2004).

One motivation for city leadership is the wish to "lead by example", which can be connected with personal interests or priorities of specific individuals in local government (Collier & Lofstedt, 1997; Betsill, 2001; Kousky & Schneider, 2003; Gustavsson et al, 2009; Bulekely & Betsill, 2013). A "race to the top" describes a trend where municipalities aim to be seen as leading in sustainability policy (Schreurs, 2008). "Policy entrepreneurship" was identified as an important factor behind placing climate issues on municipal agendas in pioneering cities. However, in order for urban climate agendas to become institutionalized and last beyond

individual mandate periods, institutionalization and a broader engagement within the political system is required (Bulkeley & Kern, 2006).

2.3.3 Modes of urban climate governance

This section lays outs the theoretical framework that is used to study urban climate governance modes in China. Bulkeley and Kern (2006) have identified four modes of urban governance used by city governments, which includes both traditional and new governance approaches. Bulkeley and Kern (Ibid) argue that the focus on *modes* of governance shifts the focus from formal roles of authorities to the multiple forms of action possible on a city level. The sections below present and discuss these four modes of urban climate governance, beginning with traditional governance through authority.

Governing through authority

Governing through authority means that municipal actors adopt binding plans and regulations to influence urban energy use and emission of greenhouse gases. This includes ordinances, targets, and standards (e.g. for adoption of renewables or fuel standards), procurement policy (e.g. green electricity), local carbon taxes, congestion charges, limits on car use, and strategic planning or zoning (e.g. for renewable energy or public transport) (Bulkeley & Kern, 2006; Kern & Alber, 2008).

The extent to which municipal governments can adopt binding plans and regulations is dependent on the degree of autonomy granted to them by the national government. Generally speaking, local governments often exercise influence over land use planning, transport planning and services and energy infrastructure, but competencies vary between countries (Colliers, 1997). For example, in Sweden, municipalities traditionally have a large influence over planning and a long history of urban energy management (Collier & Lofstedt, 1997). Governments of states in Germany similarly have a relatively high degree of autonomy and a broad range of responsibilities, whereas municipal governments in the UK traditionally have relatively limited autonomy (Bulkeley & Kern, 2006).

Bulkeley and Kern (Ibid) suggest that that use of regulation to support climate action cities in Europe is infrequent. They attribute this tendency to the difficulty to reach political consensus on "hard" decisions, concerns regarding public opinion, and that regulation may conflict high higher level regulation; "softer" forms of governing are therefore often preferred. Contrary to this observation, a review of policy evaluations of climate policy in 2008 demonstrated a preference for regulative approaches in Europe (Haug et al, 2008). This was explained in terms of perceived difficulties in adopting financial instruments and ineffectiveness of voluntary agreements (Ibid).

Climate action through self-governing

Self-governing is defined as the capacity of a municipal government to govern its own activities (Bulkeley & Kern, p.2242, 2006). Self-governing is in many countries in Europe and the US the most common mode of urban climate governance (Bulkeley & Kern, 2006; Kern & Alber, 2008). This can be explained by municipal governments having the greatest freedom to control its own activities, which does not require coordination or compliance of other actors. Many municipalities begin their climate action by looking at the public sector and considering how emissions can be reduced by altering day to day activities, such as switching to LED lighting in public buildings (Betsill, 2001).

Common strategies of self-governing include energy conservation in public buildings, demonstration projects or procurement of renewable energy and green fleets for public employees (Bulkeley & Kern, 2006; Kern & Alber, 2008). Self-regulation can be a way for municipal governments to demonstrate cost savings or feasibility of energy saving and emission reduction action to other actors. There are many examples of cities in which self-governing has contributed to considerable reduction of emissions, for example through improved energy efficiency in buildings, which at the same time contributes cost savings in municipal budgets

(Kern & Alber, 2008). At the same time, public sector energy consumption only accounts for a limited share of total energy consumption in most cities, so this type of strategy is on its own not enough to drastically reduce emissions (Bulkeley & Kern, 2006).

Climate governance through provision

Governing through provision refers to "the shaping of practice through the delivery of particular forms of service and resources" (Bulkeley & Kern, p.2242, 2006). This involves providing low emission and low energy consumption solutions as part of public service. As with adopting policy and regulation, the extent to which municipalities can provide infrastructure and services is determined by their autonomy. Investments in public services are relatively straightforward if a municipality has ownership in local utility companies. Municipal authorities in charge of provision of energy systems (heat, gas and power) and waste services can combine these systems to gain more efficient solutions through, for example, combination of waste incineration and district heating schemes. Common provision strategies includes provision of clean energy services, green public transport and waste services (Bulkeley & Kern, 2006; Kern & Alber, 2008).

A problem related to provision of urban infrastructure is that decisions regarding large projects often need to be approved by higher levels of government. The form and extent of collaboration as well as extent and type of funding that can be granted to cities from regional and central governments makes considerable difference to the possibility to adopt local strategies. Again, this is related to the problem of "fit", and the question regarding which level of government decisions are most appropriate (Bai et al, 2009). Further, collaborative relationships between different levels of government are crucial in ensuring effective implementation and preventing uncoordinated or mismatched action of infrastructure planning. This requires genuine collaboration and cooperation which unfortunately may be difficult to realize in practice (Leck and Simon, 2013).

Public investment into emission reduction infrastructure is particularly difficult to realize in developing countries. Municipal governments in developing countries often lack financial or technical resources or autonomy to invest in large scale solutions such as energy infrastructure (Holgate, 2007). Romero Lankao (p.532, 2007) describes this as a paradox of local climate governance, as "more responsibilities are delegated to local authorities, but they [the municipal government] lack the resources to undertake effective policies". In many cities in developing countries, investment into climate change adaptation is a much more pressing issue than mitigation. Urgent action is needed to improve conditions for large populations that are vulnerable to hazards such as storms, floods, droughts and landslides (Parnell et al, 2007; Satterthwaite, 2008).

Moreover, in many cities the provision of services and infrastructure has been privatized. This is associated with fragmentation of delivery, which makes it more difficult for municipalities to exercise influence over, for example, urban energy systems (Monstadt, 2007). In countries where local governments traditionally played a strong role in provision of public goods, control has slowly eroded (Wollmann, 2004). Further, urban infrastructure used to be seen as a public good provided for all – an invisible and taken for granted element of the urban fabric. The shift to provision by private actors has in many places lead to deepening lines of division between high quality systems catering to elite and limited access for the urban poor (Graham & Marvin, 2001). This creates new challenges that are related with issues of accessibility and equity.

Provision can also refer to distribution of incentives to non-state actors to encourage certain actions. For example, municipal authorities can provide grants (e.g. for investment into renewables), investment support (for large scale projects such as wind farms), and subsidies (e.g. for use of renewables or public transport) (Kern & Bulkeley, 2006; Kern & Alber, 2008; Bulkeley et al, 2009). National governments can also provide funding schemes to support local action and help municipalities that lack resources to follow the best practice of climate action

pioneers (Kern & Alber, 2008). Sweden, the Netherlands and Canada have developed national funding programs for climate investments and implementation of climate plans from which municipalities in need can apply for grants or loans (Ibid). Economic incentives used to incentivize energy efficiency upgrades or use of renewable energy in buildings is especially common and a type of support often provided by local government (e.g. Parker & Rowlands, 2007; WWU, 2016).

Climate governance through enabling

The governance mode of enabling refers to "the role of local government in facilitating, coordinating and encouraging action through partnership with private and voluntary sector agencies, and to various forms of community engagement" (Bulkeley & Kern, p.2242, 2006).

The use of enabling strategies become increasingly relevant when the three other governance modes are difficult to use. As mentioned above, municipalities are often reluctant to use regulatory tools to promote climate action, and not all municipalities are able to issue binding regulations. Self-regulation is straight forward, but not sufficient on its own due to the limited share of energy consumption attributable to public activities. Provision as a governance strategy is difficult or impossible to use in cities where service and infrastructure provision has been delegated to private actors. Enabling strategies based on promotion, voluntary participation and partnerships are therefore gaining momentum (Bulkeley & Kern, 2006).

Enabling schemes can be directed towards civil society and the broader public. Such schemes include education campaigns promoting, for example, renewable energy sources, sustainable lifestyles and recycling (Kern & Bulkeley, 2006; Kern & Alber, 2008; Bulkeley et al, 2009). Public information campaigns is a policy tool used by national governments since the 1940s, to varying degrees of effectiveness (Wess & Tschihart, 2007). Climate action campaign have also been launched by an extensive number of international organizations and local movements. As discussed further in the section on partnerships below, municipal authorities can collaborate with civil society to promote awareness and engagement in local climate action.

Some cities aim to engage stakeholders by setting up climate action committees and task forces (Anguelovski & Carmen, 2011). Committees are used to involve residents in planning processes, while task forces often are made up of representatives from industry and research organizations that contribute to formulation of emission reduction and adaptation strategies (Ibid). These engagement strategies sometimes explicitly target socially marginalized groups, aiming either to improve their conditions as part of climate agendas or to directly involve individuals from these groups in shaping and delivering climate programs (Ibid; Boyd & Ghosh, 2013). For example, community-based adaptation is a form of stakeholder engagement strategy that often aims to engage poor or socially marginalized populations in efforts to reduce vulnerability to climate impacts, while at the same time aligning development strategies with local priorities.

Enabling strategies can also be aimed explicitly towards the private sector. These often have the purpose of convincing companies to adopt energy saving and emission reduction activities. One way to do this is to spread information about sustainable production, for example by providing training, guidelines, benchmarks and best practice examples. An example is the Better Business Pack (BBP) toolkit used by the government in the UK, which uses a step-by-step guidance on key environment-related issues (purchasing and supply chain, waste, transport and utilities) to help companies SMEs reduce costs, increase revenue and improve their environmental performance (Friedman et al, 2000). Another example is the Toronto Region Sustainability Program (TRSP), in which municipal authorities provide technical assistance, risk evaluations and training on pollution prevention in companies, in combination with cost-sharing schemes (Granek & Hassalini, 2006).

Convincing the private sector to adopt climate friendly practices can be a question of framing emission reduction from a perspective of economic opportunity. Win-win perceptions of

sustainability action have gained ground in parallel with the diffusion of ecological modernization discourse and is been reflected in corporate efforts to create a positive environmental public image (Levy, 2005). Corporate social responsibility (CSR) programs with a focus on environmental performance are commonplace today and a basic requirement for most large firms. At the same time, it has been argued that CSR programs have inherent limits. Although they may help companies achieve environmental gains in terms of improved production processes or design, overall negative impact may increase due to rising sales and business growth as a result of an improved public image (Dauvergne & Lister, 2012). Many companies have developed products and services that appeal to climate-conscious costumers, but considerable barriers usually exist to scale-up emission reduction innovations, and CSR programs tend not to be radical (Kolk et al, 2010).

Instead of relying only on information sharing, persuasion and voluntary action of non-state actors, public authorities can engage organizations from the private sector or civil society in partnerships. This type of strategy is discussed in detail in the following section.

2.4 Climate action through partnerships

This section debates the way in which partnerships are understood as a new form of governance. Whether or not this is a development that contributes to benefits or risks is also briefly discussed. The section presents forms in which sustainability partnerships exist, as well as the range of functions they perform.

2.4.1 Partnerships as form of sustainability governance

Partnerships are to some extent seen as an empirical reflection of a reality where companies have emerged as centres of political power and green movements as centres of social and economic capital, which make them indispensable in public issues (Glasbergen et al, 2007). However, partnerships are also associated with positive normative connotations and risks related to legitimacy and accountability, as is discussed in this section.

Sustainability partnerships can be seen as a tool for solving environmental issues that public actors cannot solve on their own, by acting as "self-organizing and coordinating alliances" responding to societal problems (Glasbergen, p.2, 2011). They also represent governance based on consultation, collaboration and mutual adaptation, and constructive dialogues that exclude hierarchies (Glasbergen et al, 2007). The advantage of partnerships is understood as one of collaborative advantage: actors can access resources that they do not have on their own (Glasbergen et al, 2007). This refers broadly to political authority provided by public actors, moral authority by civil society, and market principles by the business community. Another advantage is that partnerships can address environmental issues where governments have failed, redefine dialogues and enlarge moral debates, thereby creating a larger space for certain sustainability discourses (Glasbergen, 2011). Forming partnerships with communities can empower socially excluded groups and highlight issues of justice and inclusion, while aligning climate agendas with local social and environmental development priorities (Castán Broto et al, 2015a; Castán Broto et al, 2015b). This makes partnerships an instrument that can further the drive for sustainable development.

The statements above also point to a normative perception, in which networked government arrangements such as partnerships are seen as filling a participatory deficit and constitute a step towards a more pluralistic, deliberative political system (Hajer & Wagenaar, 2003). There are three policy deficits that partnerships can address and improve (Forsyth, 2010). The first is a regulatory deficit, suggesting that non-state actors can provide norms about acceptable behaviour in formulation of policy. The second is an implementation deficit, pointing to how collaboration can be used as a way to tackle implementation failure. The third is a participation

deficit, which indicates that partnerships can improve opportunities for inclusion of otherwise marginalized stakeholders in policy making processes (Ibid).

On the other hand, it has been questioned whether the transfer of authority from elected officials to hybrid arrangement meets democratic criteria in terms of legitimacy and accountability, or whether they are accepted implicitly on basis of their output legitimacy (Peters & Pierre, 2010). A fundamental difficulty with partnerships is that they transfer authority over public issues to non-state actors. At the same time, partnerships are difficult to hold accountable. Backstrand (2008) proposes that three dimensions can be used as basis for evaluating accountability of climate partnerships formed in transnational networks: participation (representation of stakeholders), transparency, and monitoring mechanisms (Backstrand, 2008). According to these criteria, public-private partnerships (for example the CDM) display the most advanced accountability mechanisms. By contrast, governmental and private-private partnerships have accountability deficits in terms of availability of monitoring mechanisms, public information disclosure, and participation by societal stakeholders. Transgovernmental partnerships appear to pave the way for increased business influence, power inequalities and skewed representation of stakeholders, expressed through elitist and technocratic multilateral cooperation (Ibid).

Transnational partnerships have further been criticized for exhibiting participatory gaps and uneven access to decision making processes (Benner et al, 2004). A review of transnational sustainability partnerships suggested that participation of nation states was heavily overrepresented, businesses somewhat overrepresented and NGOs underrepresented, while participation often was exclusive (Pattberg & Stripple, 2008). Many of the climate partnerships formed through the CDM mechanism, for example, have failed to consider viewpoints of local communities and local NGOs, whereas priorities of international NGOs and firms have been dominating (Forsyth, 2010). Partnerships have been criticized for empowering businesses, increasing power imbalances and the influence of elites. When companies form alliances with NGOs and governmental agencies, they often have significant leverage over other actors (Levy, 2005). While there is space for civil society and consumers to shape programs in partnerships, there is a risk that NGOs become captured by states or private interests (Liverman, 2004). This makes it important to closely examine trends in participation in partnerships, which is part of the aim of this thesis.

2.4.2 Forms of sustainability partnerships

As mentioned above, partnerships consist of collaborative arrangements with actors from two or more spheres of society involved in a non-hierarchical process, with the purpose of striving for a sustainability goal (Huijstee et al, p. 77, 2007). Conditions that should be fulfilled for a governance arrangement to be considered a partnership includes cross-sector interaction, a public policy objective, and network structure, that is, a non-hierarchal organization rather than top-down steering (Pattberg et al, p.3, 2012). According to this definition, sustainability partnerships exist in various forms and constellations, involving collaboration between companies, public authorities, NGOs and research organizations, working with regional, national or global issues and operating under more or less institutionalized forms (Huijstee et al, 2007). Partnerships have been organized into different typologies based on varying criteria, such as degree of engagement, type of goal, type of function and type of participating actors (Ibid). Common constellations, based on types of participating actors, are discussed below.

Public-private partnerships

One common view of partnerships is of collaborative relationships between public and private actors for the purpose of provision of public goods. This can be seen as a natural continuation of, or alternative to, privatization trends and the habit of contracting out public services to the private sector. This has also, however, been described as a language game that transforms new public management into something more discursively appealing (Hodge & Greve, 2005). These observations refer to public-private partnerships (PPPs) as an organizational and financial model that allows the public sector to take advantage of private funding, for example in the

form of joint ventures or joint development projects (Ibid). In this thesis, PPPs refer to this type of public projects delivered on a contractual basis, such as long term infrastructure contracts (Hodge & Greve, 2007).

Glasbergen (2007) distinguishes between public-private partnerships initiated by public actors (usually extensions of public policy in which alliances with companies are sought to enforce agendas) and partnerships initiated by private actors (where public authorities may be one of many stakeholders). An example of the former are partnership schemes launched by either national or local governments with the purpose of involving companies in energy saving and emission reduction schemes. This may, for example, take the form of advisory boards and working groups made up of representatives from public and private sector that determine goals and priorities related to emission reductions. It may also tale the form of benchmarking activities, investment forums aimed to support renewable energy solutions, or joint promotional campaigns (Bulkeley & Kern, 2006; Kern & Alber, 2008). An example of the latter is the HSBC's Climate Change Partnership, initiated by a private banking and finance organization, which has enrolled a number of stakeholders from the public sector and civil society (The Climate Group, 2016).

Public-civil society

Public actors form sustainability partnerships with actors from civil society to, for example, set environmental agendas, collect expert opinions, develop policy directions, and engage in public education programs. Another example is environmental campaigns run in collaboration with NGOs (Bulkeley et al, 2009). Large environmental organizations, such as the WWF, often have multiple partnership programs involving collaboration with public agencies (WWF, 2016). Public actors working with environmental issues together with civil society can gain advantages of achieving closer contact with grassroots movement and communities. Further, participatory urban planning in relation to climate adaptation that involves collaboration with communities can tie adaptation efforts to local development needs (Castan Broto et al, 2015a, Castan Broto et al, 2015b). Environmental movements are particularly important in their higher ability to highlight aspects of equity or environmental justice in sustainability initiatives (Castan Broto & Westman, 2016).

Private-civil society

When actors from the private sector form partnerships with civil society, it can be seen as a supplement to government policy (Glasbergen et al, 2007). This constitutes a radical shift from green NGOs taking an antagonistic standpoint towards companies, to seeing them as a cooperation partner. This trend has been described as a new "social realism" (Glasbergen & Groenenberg, p.2, 2001) or a "market based environmentalism" (Hartman & Stafford, p. 185, 1997). These kinds of partnerships do usually not involve trading economic gains for ecological principles, but rather framing environmental issues as a business opportunity (Hartman & Stafford, 1997).

Greenpeace cooperating with the German company Foron in promoting GreenFreeze, an ozone safe hydrocarbon, is one example of this (Hartman & Stafford, 1997). McDonald's collaboration with the Environmental Defense Fund in improving ecological soundness of practices is another (Ibid). The advantage for the company lies in promotion, improved reputation and gaining a competitive advantage, while the NGO can gain greater impact in their campaigns (Glasbergen & Groenenberg, 2001). Private-civil society collaboration may involve licensing agreements, sponsorships, consultation or exchange of ideas, joint research or development, co-option of competitors, or promotion of new products and movement into new markets (Hartman & Stafford, 1997; Sagawa & Segal, 2000; Glasbergen & Groenenberg, 2001).

These "green alliances" may also have the purpose of influencing policy making in relation to sustainability issues, in particular by influencing sustainability standards (Arts, 2002; Pattberg,

2005). The Forest Stewardship Council, which emerged out of a WWF initiative directed towards companies, is one example of this. From a business perspective, this may result in more efficient regulation, while input from an NGO guarantees legitimacy in the eyes of the public (Ibid).

Transnational networks & hybrid arrangements

One important context in which climate partnerships have been studied is as part of transnational networks. Engagement in transnational climate networks took off after the signing of the Kyoto Protocol, when the three first transnational municipal networks were established in the global North. The networks originated in Europe and the US in the 1990s and were originally led by municipalities. By the 2000s, many of the networks had established national and regional campaigns, mobilized the private sector and grassroots movements, and spread to the global South (Bulkeley, 2010). A decade later, the movements had grown in number and size, spread into the global South, and gained support by national governments.

Partnerships formed through transnational networks can be categorized according to what types of actors initiate and participate in the network: public (for example networks led by sub-national governments), hybrid (networks where actors from multiple sectors participate) or private (for example company led movements that aim towards setting industrial standards) (Andonova et al, 2009; Bulkeley et al, 2012). A survey of transnational climate networks identified multiple forms of leadership and participation (Bulkeley et al, 2012). In this selection, initiatives were led by nonprofit organizations (44%), companies (18%), national authorities (17%), regional authorities (12%), local governments (7%) or international organization (12%) (Ibid). Initiatives led by non-state actors were more often private, whereas the majority of projects started by public actors were hybrid. The strategies for forming partnerships seemed associated with the type of legitimacy an organization aims to gain. For example, private companies are more likely to seek legitimacy from the public sector, thereby forming partnership with government organizations. The study also showed that hybrid initiatives were characterized by a higher level of institutionalization than those led by public actors or NGOs (Ibid).

As discussed above, climate initiatives carried out on an urban level often involve partnerships (Bulkeley & Kern, 2006; Kern & Alber, 2008). A survey of climate interventions carried out on basis of experimentation in cities across the global North and South found that about half involve some form of partnership, involving either vertical or horizontal collaboration (Castan Broto & Bulkeley, 2013). The majority of initiatives in this sample were led by local municipal authorities (66%), with a smaller share led by private actors, public actors on other levels, and civil society. The most common form of partnership was led by a government authority with participation of actors from either the private sector or civil society. Governments more often act independently, while it is more common for NGOs to seek partnerships with governments in order to access resources or institutional support. On the other hand, private actors are more likely to collaborate with other private actors, and overall, private initiatives were more common in Asia. The study also showed that traditional forms of steering, such as use of regulation, was less likely to be used in initiatives led through partnerships (Ibid).

Partnerships led by international institutions

The concept of partnerships that emerged out of the World Summit on Sustainable Development (WSSD) envisioned "new and positive partnerships between different stakeholder groups" to tackle critical global issues requiring an international response (Gardiner, 2002). This suggests a need for partnerships involving a variety of participants and constellations. However, research has shown that the sustainability partnerships that emerged out of the WSSD reflect rather than challenge patterns of authority (Andonova & Levy, 2003). The most common participants were traditional actors of global governance, such as secretariats of international institutions.

Initiatives in transnational networks are often "steered" by international institutions or national governments, in spite of being led by a multiplicity of actors. The concept of orchestration has been used to describe this phenomenon, defined as the "process whereby states or intergovernmental organizations initiate, guide, broaden, and strengthen transnational governance by non-state and/or sub-state actors" (Hale & Roger, p. 61, 2014). Two key forms of orchestrated partnerships are identified: intergovernmental institutions initiating schemes (e.g. UNEP Finance initiative now run by banks) or international institutions managing programs (e.g. the World Bank providing technical capacity for C40). According to this definition, around a third of all major transnational climate networks are orchestrated (Ibid). At the same time, partnerships initiated by international institutions may contribute to new governance arrangements emerging under the mandate of the leading organization, such as for example community based biodiversity management (Andonova et al, 2010).

2.4.3 Functions of sustainability partnerships

Partnerships can perform a range of functions, from "hard" rule making, to information dissemination, technology transfer and capacity building.[5] Some of these functions are more common than others, as is discussed below.

Agenda setting & policy making

It is relatively rare for partnerships to engage in "hard" rule-setting activities. This is a function that traditionally belonged to nation states and that to a large extent remains the realm of national or lower level governments. Rather than setting hard regulation through partnerships, it is more common to use collaborative decision making to agree on non-regulatory policy and voluntary measures (Pattberg et al, 2012).

Nevertheless, sustainability partnerships can be used to develop non-binding rules and to place sustainability issues on the political agenda. A study of transnational climate networks showed that most initiatives (around 70%) involved some form of rule setting function, such as setting targets, certifications and mandatory requirements (Bulkeley et al, 2012). These targets or rules are not backed up by the traditional type of authority associated with government, but instead, for example, with expertise, and they are often led by private actors or green NGOs. "Soft" policy tools such as information sharing also contribute to shaping practices and internalizing norms related to climate policy, which is an alternative form of steering (Ibid). Many private-led partnerships are formed with government actors with the aim to influence or supplement regulation. These "policy influencing partnerships" include broad coalitions used by firms to create a united front against policy makers (Kolk et al, 2010).[6]

[5] Bulkeley et al (2014) identify information sharing, agenda setting, implementation and capacity building, and rule setting (e.g. through standards and action programs as functions of transnational networks. Pattberg et al (2012) identify agenda setting, rule making and standard development, advocacy and lobbying, norm setting and information dissemination, knowledge production, implementation, planning, capacity-building and training, technology transfer, and service provision as functions of sustainability partnerships. Visseren-Hamakers & Glasbergen (2007) identify agenda setting, policy development, implementation, metagovernance (steering and coordination) and ensuring "good governance" (e.g. combating corruption). Andonova et al (2009) identify information sharing, capacity building and implementation, and rule setting. Backstrand (2008) identify advocacy, standard-setting and rule-making, implementation and service provision. Bulkeley et al, (2012) identify agenda setting, information sharing, capacity building, regulation, and forms of policy integration.

[6] Companies regularly engage in strategies to influence policy-making, though lobbying activities are normally not considered partnerships. This includes campaigning, participation in conferences and donation of funding to political action committees (Levy, 2005; Pinkse & Kolk, 2009; Kolk et al, 2008). A positive example is the active role played by the insurance industry in advocating for the use of precautionary principle (Jagers & Stripple, 2003). There are also less positive examples. For example, fossil fuel dependent sectors in the United States initially responded to the carbon emission challenge by forming lobbies to emphasize the uncertainty of climate change science and arguments against binding regulation (Levy, 2005; Pinkse & Kolk, 2009).

Policy innovation

According to Bauer and Steurer (2014), climate partnerships can contribute to policy innovation. In this context, policy innovation is defined as "new instruments that have not been applied before in a sector, region, or local authority and changes in existing instruments that take climate change adaptation into account" (Ibid, p. 821). There are three ways in which partnerships contribute to policy innovation: through partner collaboration, scaling up activities beyond the partnership and by supporting national adaptation efforts. Collaboration and sharing information through working groups and projects can contribute to adoption and formulation of action plans and strategies, including, for example, specific infrastructure projects for climate vulnerability reduction. Scaling-up occurs when out-reach activities or information communication with other decision makers contribute to mainstreaming of policy, as well as, importantly, uptake into national policy (Ibid).

Sustainable production and setting standards

Standard setting is a type of rule setting function relatively often associated with partnerships. The FSC standards for sustainability certified timber is an example of civil society-private sector collaboration in standard setting, which has contributed to set new "rules of the game", bringing a variety of stakeholders to the negotiation table, and creating consensus on technical issues (Pattberg, 2005). Private sector involvement in setting environmental standards may open up possibilities for adoption of new policy elements such as life-cycle assessments, green procurement or other supplier codes (Dauvergne & Lister, 2012).

On the other hand, sustainability-certified products remain a niche market, which points to the limited success of the approach (Visseren-Hamakers & Glasbergen, 2007; Dauvergne & Lister, 2012). Further, actors from the global North are overrepresented in international standard setting partnerships, such as the FSC (Dingwerth, 2008). In relation to sustainable coffee production, public-private partnerships have reproduced existing imbalances within the industry, for example by allowing consumer countries rather than producing countries to participate (Bitzer et al, 2008). While partnerships aim to promote sustainability aspects of production, some also focus on improving producer capacity or marketing for big brands, while benefits are unclear for producers (Ibid.).

Another example is the voluntary ISOs, which are environmental management system standards set by a mixed private-public organization. The ISOs were expected to make positive contributions in sustainability through encouraging clean production and contributing to effective environmental regulations. This process has been criticized for being dominated by private interests and excluding participation of developing countries (Clapp, 1998). The standards were also expensive to implement and did not include aims for clean technology transfers (Ibid). Clapp (2005) argues that externally imposed regulations based on sanctions, rather than industry led, voluntary agreements, are needed to control activities of powerful TNCs.

Dissemination of information & rising awareness

Partnerships often aim to disseminate information and build knowledge. An analysis of transnational sustainability partnerships showed that the majority perform functions of knowledge dissemination, followed by planning and institutional capacity building and training, and to a lesser extent knowledge production, implementation, technology transfer and campaigns (Pattberg & Stripple, 2008). A survey of transnational climate networks suggested that the most common function was awareness rising and capacity building (Bulkeley et al, 2012).

Partnerships can be started by companies or academic organizations as a means to facilitate uptake of clean production strategies in industrial firms. These partnerships often take the forms of networks used to jointly formulate problems and share experiences to generate new ideas and solutions (Lehmann, 2006; Halila, 2007). Such industrial networks can create "free" and

"safe" spaces where managers can deal with uncertainty related to management of complex environmental issues (Svendsen & Laberge, 2005; Halila, 2007). Firm-firm networks also contribute to overcoming barriers related to lack of experience, financial or technical resources, and capacity for innovation that are more easily dealt with when companies pool resources (Luken & Navratil 2004; Lehmann, 2006; Loorbach et al, 2010; Hansen & Klewitz, 2012; Klewitz et al, 2012). This kind of network may be initiated and/or maintained by a third party actor or intermediary, including government agencies or semi-private actors (Hansen & Klewitz, 2012).

Capacity building, technology assistance & research

Capacity building through partnerships is realized by providing resources, such as finance, expertise, labor or technology, or monitoring (Andonova et al, 2009; Bulkeley et al, 2012). Capacity building and technology assistance are key objectives in the global partnership agendas promoted by international institutions, such as the UN and World Bank. Their involvement in local climate projects often takes the form of provision of technical, financial or managerial competence in specific projects. This collaboration is typical in traditional development assistance, where partnerships can be used as a tool for capacity building (Eaking & Carmen Lemos, 2006). Research partnerships are also used as a tool for development of emission reduction technology. Davies (1999) takes the Industry Cooperative for Ozone Layer Protection (ICOLP) as an example of the electronics industry working with the US Environmental Protection Agency along with other stakeholders to find solutions to reduce the emission of CFCs. Another example is the Local Governments Climate Partnership, an R&D project funded by the German Federal Environmental Agency and managed by the Climate Alliance (Kern & Alber, 2008). Research partnerships led by the private sector are often formed with universities or NGOs to fill the function of a knowledge gap or search for new technical solutions or develop and promote sustainable products (Glasbergen & Groenenberg, 2001; Kolk et al, 2010).

2.5 Concluding remarks

A few points in this chapter are central in the next chapter on climate governance in China. First, a key tenet is that climate agendas are formulated and delivered by a multiplicity of actors that collaborate across sectors, jurisdictions, and borders. Further, a number of groups and interests are involved in shaping environmental policy, and these processes involve both open conflict and discursive struggles. Municipal authorities play an important role, but often have to collaborate with companies and civil society to realize local climate action. Through partnerships, agendas can be realized by relying on the strength of partners, but this at the same time shifts authority horizontally from public authorities to other actors. The following chapter situates these observations in the literature on environmental governance in China.

3 Climate governance in China

The kind of pressures that have contributed to changes in environmental policy interventions in the West, such as globalization and liberalization that shift authority up-ward, down-ward and horizontally, are also present in China. The argument of this chapter is that theories of governance networks and partnerships are relevant in this context and help explain ongoing processes of change.

To begin with, this chapter engages with the question of why a network perspective is useful and interesting in explaining climate governance in China. To some extent, there is a conceptual conflict between seeing China an authoritarian monolith, or viewing it as a fragmented system crisscrossed with horizontal and vertical interactions. Section 3.1 presents traditional views of China's hierarchical system, which have been challenged by contemporary studies of informal dynamics of policy interactions.

To explain the competing and conflicting challenges facing municipal governments in China today, the political and institutional context of China's climate efforts are presented in section 3.2. This involves a discussion on overlapping economic, social and environmental concerns and a brief explanation of China's political structure. To situate urban climate mitigation efforts, the section also outlines key energy policy and programs issued at a central level in China. Finally, the section discusses "new" environmental governance strategies and the components that these involve.

As mentioned in Chapter 1, China's policy making processes involve a range of organizations, including expert organizations, companies, and green movements. These groups exert influence over agenda setting, policy development and decision making on both a national and local level, as is discussed in section 3.3. Moreover, green NGOs and semi-governmental think tanks working from within the system have begun to discursively contest dominating environmental policy directions by acting as advocacy coalitions. This is creating alternative policy options that sometimes undermine the decision making monopoly of the top leadership.

Municipal authorities are expected to take on an increasingly diverse range of responsibilities in relation to environmental protection and climate change mitigation (section 3.4). On the one hand, implementation of national energy programs falls on provincial and municipal government units. On the other hand, cities are expected to develop and experiment with new climate agendas. A range of urban low carbon plans and strategies adopted to date testify to the extent which this is already occurring. In section 3.4, low carbon agendas adopted by cities in China are discussed and the institutional framework for action on an urban level is presented.

3.1 Network governance in authoritarian settings

China is often described as a one-party, (semi-)authoritarian state with a powerful, central government that controls policy processes and a considerable share of society. If China represents almost an ideal type example of a top-down hierarchical state, it seems an unlikely context to study governance networks. This section demonstrates this paradox, as well as showing how it is resolved by network interactions that emerge within the authoritarian system.

Authoritarianism is in essence the antithesis of democracy. Studies of the authoritarian nature of China's political system therefore often point to the various factors that are seen to undermine democratic performance (Kalathi & Boas, 2003; Ambrosio, 2008; Stockmann & Gallagher, 2011). China's political apparatus is not only authoritarian, but also a remnant of a Leninist/Maoist communist system, which historically exercised a very high degree of political control over society (Oksenberg, 2001).

The top-down character of China's political system has implication for its environmental management. In describing China's response to climate change, Gilley (2012) resorts to the

concept of authoritarian environmentalism, which he defines as a system where authority is concentrated in few executive agencies seeking to improve environmental outcomes. Gilley (Ibid, p.289) states that "consistent with authoritarian environmentalism, the political response to climate change in China has been "centered on the top-down, regulatory powers of the central state". Gilley proceeds to describe the activities and guidelines issued by various leading groups and commissions, as well as the top-down system of implementation, as "decidedly authoritarian", and concludes that the merit of authoritarian systems is an ability to produce rapid, centralized responses to environmental pressures. In an article on environmental governance in China, Liu et al (2012) argue that current, mono-centric planning processes are a key weakness in China's efforts to tackle complex socio-ecological change. They describe the traditional core of China's environmental governance system as based on command-and-control regulation, which has derived from the planned economy and its hierarchical political system.

Nevertheless, previous research also shows that vertical and horizontal linkages between actors are crucial in sustainability agendas even in authoritarian settings. Bai et al (2009) argue that vertical and horizontal connections are essential in up-scaling successful sustainability innovations in Asa. The authors use the case study of Rizhao to highlight how vertical connections between city and provincial level government contributed to the success in mainstreaming solar water heaters. In studying sustainability experiments in Asia, Berkhout et al (2010) highlight that sustainability innovation activities are located both outside of developed countries and outside of leading firms. Relying on examples from Asia, the authors suggest that sustainability innovations are the result of interactions and learning taking place through collaboration between public and traditional actors, but also less expected actors, such as environmental movements, cooperatives, and consumer groups. These heterogeneous actor networks are important in introducing new social and technological solutions that contribute to broader trajectories of change. Further, the authors observe that local and global linkages are crucial in building capacities for innovation, and allowing centres of expertise to accumulate in the global South (Ibid).

Moreover, over the past decades China has shifted from a highly centralized, politically controlled government apparatus to a more decentralized system where resources and decision making power are distributed further from the political core. The concept of "fragmented authoritarianism" describes how bureaucratic units have gained influence over policy making processes, resulting in negotiation and bargaining within the political system (Lieberthal, 1992). Dumbaugh and Martin (2011) describes political power in China as diffuse, complex and competitive, and the party leadership cannot always dictate policy directions. Bureaucratic offices, local officials, research bodies and think tanks, universities and companies feed proposals into policy processes (Ibid).

These trends are reflected in environmental policy processes. This has led Mol and Carter (2006, 2007) to argue that China is experiencing a transition from environmental government to governance. Reliance on administrative approaches caused the type of criticism of inefficiency common in Western Democracies in the 1980s and 1990s, and produced similar responses in terms of diversification of actors and instruments involved in environmental policy processes. Yet, Mol (p.39, 2006) observes that "the state apparatus in China is of over-arching importance in environmental protection and reform. Its crucial role in this sphere is likely to be safeguarded for some time to come because of both the nature of the contemporary Chinese social order, and the characteristic of the environment as a public good".

Drawing on network governance studies in Europe, Mai and Francesch-Huidobro (2015) use a governance network perspective ("collaborative municipal networks", CMNs) to analyze public-interest group interactions in climate policy processes in Guangzhou in Southern China. CMNs are understood as complex processes of interaction among a plurality of state and non-state actors with the objective of achieving (environmental) goals through knowledge transfer

and resource exchange while maintaining municipal autonomy (Ibid, p.52). The interactions are manifested in collective decision making. This definition highlights aspects of interaction in environmental governance discussed in Chapter 2, such as a plurality of state and non-state actors involved in decision making. The authors argue that information is passed through webs of informal ties outside the aegis of state structures, and that non-governmental actors must be recognized in local governance processes. The underlying principle is that public actors participate in networks to access resources (funding, investment, information, access and political support) and enhance capacity (Ibid).

These studies demonstrate that a governance network perspective can capture informal interactions that occur in environmental policy making and implementation in China. Moreover, Mai and Francesch-Huidobro refer to this as a "grossly overlooked" and understudied topic, pointing to the need for further studies using this approach (Ibid, p.29). This thesis builds on this emergent field of literature, but emphasizes aspects that previously have not been explored. This includes structures of power and conflict in policy networks and their connection with the political economy, partnership constellations and the way in which these introduce new technology and policy elements in cities, and trends of participation relating to which actors are included in networks, and on the basis of which principles.

3.2 Political and institutional context

China is a vast country that embodies contrast and variety. To better understand contemporary climate change challenges of Chinese cities this section provides an overview of broad development issues and ongoing reform programs aiming to cope with these. The section also describes the institutional structure of the central government, as well as key energy policy issued by the central government. Finally, further detail on China's "new" environmental governance strategies are discussed.

3.1.1 Current development challenges

To situate urban development strategies in China, this section gives an overview of ongoing reform processes, energy and environmental trends, and the overlapping challenges that materialize in urbanizing regions.

Ongoing processes of reform

China's efforts to improve environmental management are taking place in a broader quest of ongoing reform. Since Deng Xiaoping introduced his opening up and reform policies in the late 1970s, China has gradually opened up its markets and transitioned towards a capitalist economy. Since then, incomes have increased rapidly, from $193 per capita in 1980 to $7,593 in 2014 (World Bank, 2015). The economy has shifted from the primary to the secondary and tertiary sector, the share of private enterprises in the economy has increased dramatically, the population has moved in to the cities from the countryside, and millions of Chinese citizens have enjoyed improvements in education, health care, and a higher quality of life.

In the publication *Governance of China* President Xi Jinping outlines his development vision of the country: China is to shift to a sustainable model of economic growth and a "moderately prosperous society" (Xi, 2015). The economy will steer away from heavy industries, infrastructure investments and exports, towards a growth model based on domestic consumption, an expanding tertiary sector, and innovation driven growth. *Governance of China* provides little information on President Xi's ideas about *governance* – what models of steering, tools, type of participation, institutions, or modes of collaboration will China need to realize these goals? However, some indications are provided. The publication recognizes that institutional reform is an integral part of the country's broader reform agendas (Xi, 2015). Constructing a system based on the rule of law, which involves checks and balances and enhanced supervision to make sure that power is "caged" by the system, is emphasized as

another important step. It is necessary to build a political system based on justice, equality, and democracy (Ibid).

The current direction of political, economic and social reform is outlined in a milestone document issued at the Third Plenum of the National People's Congress in 2013. This document points to overhauls of China's judiciary, financial and tax systems, land ownership and *hukou* (residence registration) system, as well as plans for improving social security, education and health and the environment. It is a document that recognizes the need for fundamental change in order to revitalize the economy, create a stable society and, ultimately, maintain the control of the Communist Party of China (CPC).

Most of the ideas of this reform program are not new. The plans echo the comprehensive agendas of political and economic reform launched and implemented under the leaderships of Jiang Zemin and Hu Jintao. Under the draconian leadership of Xi Jinping, the country's reform agenda has taken a new turn. While continued effort is directed towards opening up the economy and adjusting legislative and administrative systems to a more liberalized environment, political reforms have stalled, or even began to reverse (Shambaugh, 2016). In this environment, freedoms of civil society and media are becoming increasingly restricted, raising question marks regarding the possibilities of continued social reform.

Energy & emission trends

At the climate negotiations in Paris in 2015, China presented their Intended Nationally Determined Contributions (INDC), which aim for carbon dioxide emissions to peak by 2030, carbon dioxide emission intensity to be lowered by 60%-65% from the 2005 level, and the share of non-fossil fuels to increase to 20% (NDRC, 2015). The recently adopted 13th FYP (2016-2020), adopted in 2016, aims for the share of non-fossil fuels to reach 15%, a 15% reduction of energy intensity, an 18% reduction in carbon intensity, and an energy use cap equivalent of 5 billion tons of standard coal (NDRC, 2016).

The ambitious goals are in part related to the rise in energy use and emission trends in China over the past decades. In 2010, China claimed the position as the world's largest energy consumer (IEA, 2010). In between the years 1990 and 2010, total energy consumption tripled, from 863 million tons of oil equivalent (Mtoe) to 2634 Mtoe (IEA, 2011). This growth was primarily driven by economic restructuring towards heavy manufacturing industries, dominated by iron, steel and cement, and infrastructure investments (Rosen & Houser, 2007; UNDP, 2010). Out of China's increase in emissions between 2002 and 2007, around 60% was created through capital investments, with large construction projects acting as a key driver of emission growth (Li et al, 2012). Social and economic development will continue to fuel energy consumption, especially through rising power demand and an expanding transport sector (Baeumler, 2012; IEA, 2015). China's energy demand is expected to reach twice the size that of the United States by 2040 (IEA, 2015).

China's energy use continues to rely extensively on coal, which creates large carbon dioxide emissions. In 2006, China surpassed the United States and became the world's largest carbon dioxide emitter (NEAA, 2007). In between 2000 and 2006, 58% of the global increase in carbon dioxide emissions were attributable to China (IEA, 2007). By 2030, coal consumption will account for 80% of China's energy related carbon dioxide emissions (IEA, 2015). In the same year, energy related carbon dioxide emissions are expected to reach over 10 Gt – two and a half times the size of estimated emissions of the United States (IEA, 2015). This means that China is expected to account for three quarters of the growth of global emissions in the decades until 2030 (IEA, 2013). Generally speaking, the developed coastal regions of the country have higher per capita emission levels that the comparatively less developed inland, with the exception of fossil fuel exporting regions, such as Inner Mongolia and Ningxia (IEA, 2007; UNDP, 2010).

Abundant endowment of coal has been both bliss and curse to China's development. It has powered the country's economic and industrial expansion, and continues to account for a large share of national energy supply. It is, however, associated with many problems. Coal mining is

water intense, and many of the regions that are rich in coal are water scarce, placing high stress on water supplies. An increase in extreme weather would acerbate China's water dilemma: scarcity in the arid north and floods in the southern provinces (Zhai, 1999; Varis, 2001). Thermal production through coal combustion causes emissions of both carbon dioxide emissions and Sulphur dioxide, which cause air pollution and contribute to acid rain. Fossil fuel reliance is also a problem from the perspective of diminishing domestic resources. China became a net coal importer in 2007, and the share of imports is expected to continue rising (IEA, 2007). The same goes for oil, as most domestic fields in use have reached or passed peak production (IEA, 2007). China's government has attempted to diversify imported energy supply and seek preferential access to resources in exporting countries, a policy known as "Going Out". In line with this policy, Chinese oil companies are investing in foreign oil resources in an expanding row of countries (e.g. Sudan, Angola, Nigeria and Kazakhstan). Simultaneously, oil and gas import pipelines are being built from Central and South East Asia.

Contemporary urban challenges

China exhibits highly uneven patterns of development across its diverse regions. Economic growth, social change and technological innovation is to a large extent concentrated in urban areas, especially along the East coast, while the countryside and the Western inland experience slower development. Urban regions account for a large, and increasing, share of the population. By the end of 2012, the share of the Chinese population living in cities reached 52.6%, "marking a historic turning point in the nation's urban-rural population structure", as over half the population became city dwellers (Yang, 2013). By 2030, China's urban population is expected to increase to around one billion, making up around 70% of the population (World Bank, 2014).

China's cities are facing complex development challenges that involve balancing delicately between conflicting concerns. Urbanization is shaping new lifestyles, values and ideas, as well as new consumption patterns and new modes of housing and transport. Rapidly growing urban populations are placing heavy pressure on urban infrastructure and public services. Rising incomes have been followed by growing inequalities and a deepening rural-urban divide (Yao et al, 2004). Ageing populations contribute to rapidly climbing costs in the health care sector and social welfare systems (Flaherty et al, 2007). The provision of social services is especially problematic for the migrant worker population, which according to China's registration system ("hukou") only can access the social welfare system in their registered birthplace.

City regions in China are facing numerous environmental challenges. Urban expansion is intimately associated with urban sprawl and loss of agricultural land, which in combination with water and soil pollution poses threats to food security (Bai et al, 2012; Chen, 2007; World Bank, 2014). Formerly agrarian lands are being lost, fragmented and transformed into built up land at a rapid pace (Lin & Ho, 2003; Deng et al, 2009; Su et al, 2011). Many cities suffer from traffic congestion and severe air pollution (Wang & He, 2015). Polluted air has been cited as posed to become one of China's greatest health threats, with lung cancer and cardiovascular disease on the rise (Watts, 2012; Huang, 2013; Hu et al, 2015).

China's urban regions account for a large share of energy use and energy related carbon dioxide emissions (Baeumler et al, 2012; Oshita et al, 2015). Khanna et al (2016) and Oshita et al (2015) estimate that the share or carbon dioxide emission attributable to urban regions is 58% of the national total. Urban emissions are to a large extent emitted by the industry and power sectors, which account for an unusually large energy share in Chinese cities, followed by the built environment and the transport sector (Dhakal, 2009; Dhakal, 2011; Minx et al, 2011; Baeumler et al, 2012; Oshita et al, 2015). According to the China Urban Research Centre, by 2030, energy consumption attributable to cities is expected to reach around 80% of national total energy use (CURC, 2009a). Chinese planners and policy-makers have, as a result, placed cities at the heart of national low carbon efforts. A key reason for this is that much of the energy saving and emission reduction targets must be implemented by local governments: provinces and cities. Moreover, the central government has adopted a national low carbon pilot program in which

cities act as arenas of experimentation, where new policy and technological solutions may be identified and up-scaled.

3.2.1 Central government institutions

In spite of (and perhaps because of) it's geographic and population size, China has a centralized political system, with key policy making taking place at a national level. This structure is important as institutions of the central government are mirrored by provincial and municipal arrangements.

The highest legislative body of the Chinese State is the National People's Congress (NPC), authorized to formulize and revise the country's constitution, enact and revise basic laws, and annually development plans (NPC, 2004). When the NPC is not in session, legislation is enacted by the NPC Standing Committee, which exercises the power of the highest state organ. The political branch of the system consists of the Communist Party of China (CPC), which has been China's ruling party since the establishment of the People's Republic in 1949. China's highest executive power is the State Council, which exercises control of administrative legislation, economic management, and social administration (China State Council, 2005).

Operating under the State Council is a number of ministries and commissions responsible for different political, social and economic areas, including a range of institutions in charge of environmental and energy related issues. During the 2000's, most of the power to influence energy policy has resided with the National Development and Reform Commission (NDRC), a central commission with responsibility for macroeconomic management. The NDRC is in charge of formulation of China's national Five Year Plans (FYPs), which determine the goals of national development. The policy decisions of the NDRC have a major impact on energy and environmental issues, as socioeconomic development strategies tend to involve holistic approaches of economic restructuring that incorporate issues of sustainable development and resource conservation.

Various other ministries are involved in issues related to energy, which fall under their respective areas of jurisdiction. The Ministry of Industry and Information Technology is in charge of industrial development strategies, which includes energy conservation strategies and recycling economy programs. The Ministry of Housing and Urban Development (MoHUrD) is responsible for urban planning and energy conservation in the construction sector. The Ministry of Environmental Protection (MEP) is in charge of pollution control and environmental standards. The State Electricity Regulatory Commission (SERC) functions as a market regulator that oversees reform and competition in the power sector. Exploitation of fossil fuels is governed by the Ministry of Land and Resources and hydropower falls under the jurisdiction of the Ministry of Water. Energy taxes and fees are dealt with by the Ministry of Finance and the State Bureau of Taxation and energy trade is the responsibility of the Ministry of Commerce (MOFCOM). The Ministry of Agriculture is in charge of matters relating to rural energy and the Ministry of Science and Technology (MOST) is in charge of government led research and development.

Despite repeated efforts, China does not have a central unit responsible for energy issues.[7] In 2008, an attempt at streamlining energy management led to the creation of the National Energy Agency (NEA), replacing the NDRC Energy Bureau. The National Energy Council (NEC), a high level think tank, was formed at the same time. NEC holds responsibility for energy development plans and NEA for managing energy industries, drafting energy policy and negotiate international agreements (Tsang & Kolk, 2010). Although NEA's mandate exceeds that of the NDRC offices, issues related to authority, autonomy and resources inhibit the agency

[7] In the early 2000s, energy supply shortages, rising oil imports, and growing concern with environmental deterioration gained urgency, and the government established the Energy Bureau to operate under the NDRC and hold overall responsibility for energy policy making (Tsang & Kolk, 2010). However, due to its low administrative rank, the bureau lacked power and effectiveness. To counter this issue, the National Energy Leading Group (NELG), under direct control of the Premier Minister, was created in 2005 (IEA, 2007). Coordination issues persisted and powerful stakeholders continued to resist NELG's policy making efforts (Tsang & Kolk, 2010).

from fulfilling its responsibility, and the NDRC continues to hold the main power over energy policy (Ibid). The central government department of climate change, established in 2008, is also placed under the NDRC.

3.2.2 National energy policy

A brief overview of national energy policy and regulation is presented in this section, in order to understand the policy framework within which urban action takes place. A number of central government schemes are implemented by municipal authorities, making these programs important to local energy saving activities.

Environmental Legislation

After the establishment of the People's Republic in 1949, the expansion of environmental legislation occurred at a slow pace, due to the focus on reconstruction and growth and the priority attached to industrial progress (Chen, 2009). In 1973, the government held its first National Conference on Environmental Protection, which placed environmental issues higher on the agenda (Economy, 2004). With the reform processes introduced by Deng Xiaoping, the effects of economic expansion on the environment began to be seriously recognized in the late 1970s. This awareness has also been associated with global environmental debates and China's attendance at the UNEP 1972 Stockholm Conference (Beyer, 2006).

In 1978, the State's Responsibility for the Protection of the Environment was added to the PRC Constitution, making environmental protection a basic obligation of the state. In 1979, the National People's Congress enacted the Environmental Protection Law, through which government institutions at all levels were assigned responsibility to protect the environment (Ma & Ortolano, 2000). As environmental issues have grown in importance, environmental authorities have gained authority, while environmental laws and regulation have gained in sophistication (Jahiel, 1998).

In 2005, a Renewable Energy Law was adopted to promote the use of renewable energy, improve the energy structure and contribute to sustainable development. The adoption of a revised Law on Energy Conservation (2007) and a Circular Economy Law (2007) made energy conservation in the industrial and construction sectors key policy goals. An Environmental Impact Assessment Law with provisions on public participation was adopted in 2003. Mol (2009) sees these pieces of legislation as evidence of the rapid modernization of China's environmental policy.

In 2015, a strengthened Environmental Protection Law was issued, with a principal aim to strengthen control of industrial emissions and air pollution. This piece of legislation was followed by high expectations, as it among other provisions threatened polluting companies with considerably higher fines and posed that local government can be held accountable for environmental damage. Pressure on the industrial sector is thus increasing through stricter environmental legislation. During the 13th FYP, an expected 1.8 million workers will be laid off in the coal and steel sectors as China steer away from energy intense, emission intense industries. The central government has promised to allocate 100 billion RMB to help identify new work opportunities for laid-off labor and continue "unwaveringly" on the path to sustainable development (Hua, 2016).

FYPs and the cadre evaluation system

In 2004, the NDRC released China's Medium and Long term Plan for Energy Conservation, which detailed how energy targets were to be integrated into the FYPs. In the 11th FYP (2006-2010), energy intensity and emission reduction goals were for the first time made into binding targets (Yuan, 2011). Out of 22 targets, 8 were designated binding, out of which half were related to energy and the environment (Ibid). The 12th FYP (2011-2015) included 24 targets, out of which eight were related to resource use and environmental protection and seven were

binding (NDRC, 2011). The binding targets included a 16% reduction in energy intensity and a 17% decrease in carbon emission intensity below 2010 levels by 2015 (NDRC, 2011).

The FYP targets are enforced through China's cadre evaluation system. This assesses local leader performance through report cards with points for performance in different areas. Officials can be encouraged with promotion, bonuses and public recognition for meeting targets, or salary deductions and demotions at failure. The degree of priority is divided into three levels: soft, hard and veto (Wang, 2013b). Soft targets are low priority objectives, mainly contributing "bonus points". Hard targets are mandatory goals, and failing these may lead to career breaks. For veto targets, failure automatically results in some form of punishment (e.g. public criticism or legal punishment) and exclusion from promotions (Golding, 2011). The cadre assessment is carried out yearly, based on statistics collected by various government departments. Reaching 60% of the points is considered "passing" performance (Wang, 2013b).

Energy conservation has become a political issue through its upgrade to a "hard" performance evaluation target. In Shandong Province, a new point system was adopted in 2008 (China Knowledge Net, 2008). The criteria contained sixty indicators in eight groups comprising a total of 1000 points, where economic development remains the most important category. The category of "sustainable development" contains nine performance indicators, out of which some are related with energy and emissions issues: energy efficiency, energy use in relation with industrial expansion, and air quality. Failing to meet the energy efficiency requirement is considered a "serious" failure, leading to a deduction of 10 or 20 points from overall score (Shandong Government, 2008a).

Political promotions are still more strongly linked to meeting economic goals rather than reaching environmental targets. Research has shown that spending on environmental infrastructure does not contribute to promotions; increase in GDP growth rate raises the probability of promotion by for Party Secretaries and Mayors, while increase in GDP scaled by environmental investments lowers the probability (Wu et al, 2013). Another study confirms that the main factor behind mobility in political ranks is the ability to generate revenue and economic performance (Bo, 2002). Top political leaders do what they can to promote the local economy, as "economic growth and political promotion are closely related" (Qi et al, p.380, 2008).

Industrial restructuring

A central policy strategy with a large impact on energy use and emission reduction is structural reform. This have been a key goal China's recent and current FYPs and a strategy to reduce consumption of natural resources and decrease environmental deterioration. As part of this strategy, the service sector is expected to grow, while heavy manufacturing and infrastructure investment dependent growth is to decrease. The government supports this shift by supporting the service sector and strategic industrial sectors, such as new energy industries and "environmental friendly industries". Policy support includes preferential taxes and subsidies for strategic sectors, such as tax reductions for energy conservation projects (2008), and beneficial tax policies for energy service companies (ESCOs) (IEPD, 2013).

Energy efficiency programs & standards

A program supporting the implementation of the FYP targets is the Top 1,000/10,000 Energy Consuming Enterprises Program. This program was initially introduced as the Top 1,000 Program in the 11th FYP planning period. The aim was to improve the energy efficiency of the country's largest 1000 enterprises and shut-down small, inefficient coal plants (IEPD, 2013).[8]

[8] However, the continued need for coal power generation has required investments into new plants that will be active decades into the future. The operation of these coal plants over a normal economic lifetime accounts for locked-in carbon emissions of over 85 Gt until 2035 (IEA, 2013). This is an amount larger than the total locked-in emissions of the United States over the same period. The IEA estimates that around 44 Gt of carbon emissions is locked into industrial equipment until 2035 (IEA, 2013). This is approximately equivalent to the total size that global emissions are allowed to reach in 2020, for global temperatures not to rise above two degrees (UNEP, 2010).

Due to the success of the program (150 Mtce saved and 70GT of small, inefficient coal plants phased out), the program was expanded into the Top 10,000 Program in the 12th FYP (IEPD, 2013). Energy efficiency in China's largest energy consuming units has been improved by introducing energy saving quotas and mandatory energy audits. Implementation has been backed up by financial rewards for energy saving retrofits, managed by China's Ministry of Finance (MOF) and the NDRC. The effect of low carbon measures during the 12th FYP has been estimated as a reduction in the pace of growth of emissions to the lowest level of the decade (300 Mt), largely due to energy intensity improvements (Chai & Zhang, 2010; IEA, 2013).

China has also introduced energy efficiency standards in the construction sector. Codes for thermal design were introduced for the first time in 1986 (Yao et al, 2005). Minimum energy efficiency standards are set at a national level, but provinces and cities are allowed to set higher standards. According to law, energy conservation standards must be met for both residential and commercial buildings (Ibid). China has green building standards with higher requirements for resource use (energy, land, water, and materials), environmental protection and living environment. In comparison with Europe or the US, less effort is directed towards energy efficiency retrofits, and more on supporting green practices in new projects.

Renewable energy policy & clean coal technology

China's 12th FYP included a target to reach 11% of primary energy produced by non-fossil sources: hydropower to reach 260 GW, wind power 100 GW, and solar power 10 GW (NDRC, 2010). Large scale investments into hydropower capacity took place under the 12th FYP, but major hydropower projects have run into political difficulties related to the displacement of enormous amounts of people, severe ecological impacts, previous large scale disasters, water scarcity and potential regional tension related to impacts on downstream nations (Fish, 2013).

Major efforts have been directed towards increasing manufacturing capacity of solar cells and wind turbines, as well as to increase installed capacity. Many large scale projects have been completed in the Western and Northern provinces, but these are criticized for being poorly planned and not integrated into grids (Bloomberg, 2016). Research into bioenergy has proceeded rapidly, and a number of large scale biomass plants have been launched. Solar, wind, bio-power and thermal power have been supported by R&D support (e.g. innovation funds and low interest loans), guaranteed grid access, subsidies, tax benefits, beneficial terms of investment (e.g. preferential loans and low land costs), feed-in tariffs and promotion through rural electrification programs (Cherni & Kentish, 2007; Wang et al, 2010).

Effort to develop cleaner coal power technologies involves investment into supercritical and ultra-supercritical power plants that use less water and generate more power. China is at the same time becoming a world leader in the development and deployment of carbon capture and sequestration technologies. The GreenGen plant outside of Tianjin led by China Huaneng is China's first large scale integrated gasification combined cycle power plant. The second phase of this project aims to reach near zero emission power production (Hsu, 2010). During the 12th and 13th FYPs, research into clean power technologies is encouraged trough publicly financed research projects.

3.1.2 "New" environmental policy approaches

Mol and Carter (2006, 2007) argue that China is experiencing a transition to environmental governance, which is driven by the modernization of the political system. This is expressed through decentralization and a shift away from a hierarchical command-and-control system, greater independence of local authorities and SOEs, stronger rule of law, increased role of markets in allocation of resources, a strengthened civil society, and greater freedom for media to report environmental damage (Mol & Carter, 2006; Mol & Carter, 2007; Carter & Mol, 2013). Key environmental policy trends are presented in this section.

As illustrated by Table 1 below, China began introducing environmental impact assessments and economic instruments in the 1970s, followed by voluntary tools and information

instruments in the 1990s. The government is attempting to step back from its monopoly position in allocating resources while allowing markets to play a greater role. Market based tools are increasingly used to manage environmental problems, for example through subsidies on natural resource being removed and beneficial taxes for green industries being introduced (Mol, 2009). As shown by Table 1, a few policy tools based on information dissemination have been used since the 1990s, including environmental labelling and clean production standards, eco-industrial pilot park schemes, and rewards for companies with a high environmental performance.

Table 1: Key industrial environmental policies and programs in China

Name of program/instrument	Year	Instrument type
Concentration based pollution discharge limits	1979	Administrative/Regulatory
Environmental Impact Assessments	1979	EIA
"Three synchronization program" (pollution control)	1979	Administrative/Regulatory
Pollution Levy System	1979	Economic
Ecological damage compensation control	1989	Economic
Environmental labelling	1991	Information/Voluntary
Sulphur dioxide emission fee	1992	Economic
Cleaner production	1993	Information/Voluntary
ISO 14001	1997	Information/Voluntary
Emission trading	1999	Economic
Environmental information disclosure (selected firms)	2003	Administrative/Regulatory
Award of national environmental friendly enterprise	2003	Information/Voluntary
Eco-industrial park pilot program	2003	Information/Voluntary

Source: Shi & Zhang, p.285, 2006

Raising the capacity to domestically develop new technologies is another important new policy aim. China has adopted the target of becoming leading in innovation by the year 2049 (the hundredth anniversary of the establishment of the People's Republic) (MOST, 2006). Environmental protection and energy efficiency technology was identified as strategic research areas during the 11th and 12th FYPs, and policy has been adopted to support this development, such as megaprojects, tax cuts for R&D investments, and green innovation funds.

The central government has also begun to experiment with climate policy instruments. In 2015, plans to adopt a cap-and-trade system were announced. This was prefaced by piloting emission trading systems on a city level for a number of years and the nation-wide system is to be in place year 2017. There is an increased willingness to use market based tools such as tradeable discharge permit systems, green financing, and renewable energy funds. Other forms of low carbon policy support instruments, such as energy efficiency labelling in household appliances, have been in place since 2007 (Price et al, 2011). At the same time, in an international comparison of climate policy innovation, China stood out as an exception by being more prone to introduce legislation than other instruments (Dubash et al, 2013).

Another key policy objective is promotion of energy management in the industrial sector. In 2009, China published its first energy management standard, which was revised and improved in 2012 in order to be compatible with ISO standards (Oshita et al, 2015). Strategies such as development of guidelines, certification schemes, guidelines for audits and training programs were key policy strategies in the implementation of the Top 10,000 Enterprises Program. A new set of actors became relevant in applying these schemes, including energy service companies and national and provincial energy conservation centres (Price et al, 2011). Benchmarking and dissemination of information is also used as a strategy for improving energy efficiency in the construction sector (Ibid).

Climate action through partnerships

At China's Sixth National Environmental Conference in 2006, one of President Hu Jintao's key points was the need for a shift from administrative management towards new management

approaches (EPA, 2006). An international task force was assembled to evaluate China's progress in the development of environmental governance, which called for planning coherence, as well as increased participation of the business sector and civil society (Ibid). This emphasis on participation has not translated into an explicit support of sustainability partnerships. Nevertheless, this section raises a couple of examples that indicate that partnerships are relevant in sustainability agendas in China.

As mentioned in Chapter 1, PPPs formed for the purpose of delivering public service and infrastructure projects are encouraged. There are risks to this approach, however, such as lack of transparency, corruption, and failure to make partners follow contracts (Jong et al, 2010). There are also examples of private-state co-regulation in development of standards or business practices. For example, the Ministry of Science and Technology (MOST), China State Forest Administration and the Ministry of Environmental Protection (MEP) have signed agreements with Walmart to develop environmental policy and programs in cooperation with its 10,000 supplier units (Dauvergne & Listner, 2012). This involves shaping higher standards of product safety, transparency in the supply chain, promotion of forest management certificates, and development of green supermarkets.

A study of business supply chain partnerships in the Pearl Delta Region showed that many companies use private-private partnerships in order to meet environmental standards, revise environmental standards, provide training, develop sustainable products or provide data for environmental reporting (Cheung et al, 2009). These partnerships are formed between businesses, but many involve partners from government units or NGOs. Motivations to join these partnerships include aims to improve environmental performance, meet environmental guidelines, create dialogue and build trust, build a green image, as well as to reduce costs and increase revenues (Ibid). Similarly, Chinese companies that compete in global markets and cooperate with foreign firms need to meet international environmental standards. An example is the Chinese petrochemical firm Petrochina, which upgraded its environmental performance as a result of an international cooperation project (Seymour et al, 2005).

There are examples of international institutions cooperating with China, leading to the formation of local partnerships. For example, China is one of the founding members of the Global Environment Facility (GEF), which is the financial instrument under the UNFCCC providing technology transfers for climate action. Through the GEF, almost 150 sustainability projects have been sponsored in China (GEF, 2016). These projects are implemented through partnerships focusing on different policy areas, such as biodiversity, technology innovation or development of the legal system (Ibid). Another example is the CDM mechanism, through which partnerships for technology transfers for emission reduction are supported and funded (UNFCCC, 2014b). Another common form of partnership is international collaboration in eco-city projects. This is often required since experience in integrated design and management is lacking on a local level (Baeumler et al, 2012).

Partnerships are also forming between Chinese and foreign NGOs. A network of Chinese NGOs, China Civil Climate Action Network (CCAN) has been established to work with international NGOs on information sharing and policy development (CCAN, 2015). CCAN is, for example, cooperating with Green Peace, WWF and the Nature Conservancy. CCANs C+ Initiative builds on the WWF project to improve transparency of emission data and accounting. The Corporate Carbon Strategy Program is an example of a partnership between an international organization and Chinese academia. This program, initiated by The Climate Group and Chinese Society on Sustainable Development aims to engage manufacturing companies in awareness-raising related to emission reductions and function as a platform for communication about corporate strategies (AGI, 2009).

3.3 Policy making and planning

Over the past decades, decision making on a central and local level in China have acquired characteristics of consultation and deliberation. This change has contributed to an increasing level of influence of non-state stakeholders over national and regional policy making. This section explains mechanisms of participation in policy making of non-state actors on a central and local level. The section also shows how energy and environmental policy discourse have shifted throughout China's different leaderships and how advocacy coalitions promote or contest environmental policy options.

3.3.1 National policy making

The increased involvement of non-state actors in policy making in China can be traced back to former President Jiang Zemin's call for "consultative democracy" in 1991 and the 17th Party Congress (2007) specification that all national policies must be deliberated in the Chinese People's Political Consultative Conference (He & Warren, 2011). One explanation for this is that administrations in China do not have enough resources and information to rely on "command" and therefore have to resort to deliberation. Factors that drive this change include market based development, the increasing size of the middle class and their rising political demands, as well as social issues, such as inequalities. Deliberation can be used to manage rising social demands and it has therefore been describes as a tool to "co-opt dissent and maintain social order" (Ibid, p.281). He and Warren (Ibid, p.271) refer to this phenomenon as "authoritarian deliberation", defined a system in which "problems of governance in complex, multi-actor, high-information, high-resistance environments may provide elites with incentives to rely on deliberation in the absence of democratic empowerments".

The conversion of government departments into companies has been followed by a shift of power, knowledge and expertise from bureaucracies to enterprises, which has left many policy making institutions "paper tigers" (Rosen & Houser, 2007). Large corporations (in particular SOEs) have a pronounced influence over agenda setting and often have their own policy and research institutes that are regularly consulted (Meidan et al, 2009; Tsang & Kolk, 2010). At the same time, the state also maintains control over the SOEs. As ownership of SOEs is exercised by the State Owned Assets Supervision and Administration Commission (SASAC), top-positions within the SOEs are appointed by the Ministry of Personnel (MOP) that broadly represents the interests of the CPC (Rosen & Houser, 2007). For example, national oil firms have campaigned fiercely for protection from market based price setting, which removes their cost burdens and allows a high production to continue (Ibid). In 2008, an attempt to create a new energy ministry was resisted by a number of large energy SOEs, apparently because the centralization of power would have limited their scope of influence (Tsang & Kolk, 2010). Private business have gained power since they were accepted in the CPC and accepted as consultative bodies, although they have not moved far towards deliberate political mobilization (Tsai, 2007).

Key think tanks and research centres are regularly consulted in environmental policy making processes. Dumbaugh and Martin (2011) observe that these organizations in part were established to provide officials with professional advice, analysis and assessments in complex policy issues. Organizations that tend to be involved in energy policy are the Development Research Centre, operating under the State Council, and the NDRC Energy Research Institute (CAS) (Meidan et al, 2009). As these institutions are based directly under the State Council and the NDRC, they operate in line with the political inclination of the upper leadership. Academic institutes and universities (e.g. Tsinghua University and Beijing University) are often involved as well (Meidan et al, 2009). Although the universities are formally independent, CPC agendas influence their research by providing funding and guidance for their activities (Meidan et al, 2009).

The position of semi-independent research organizations and think tanks is debated. It has been argued that central level think tanks are in a strategic position to influence policy directions by

working from within the system (Francesch-Huidobro & Mai, 2012). For example, in the formulation of energy policy under the leadership of Hu Jintao and Wen Jiabao, the Development Research Centre of the State Council and the NDRC Energy Research Institute were instrumental (Median et al, 2009). Government owned NGOs (GONGOs) have, on the other hand, been described as social groups co-opted by the government in order to perform functions on behalf of the state (Wu, 2003). These groups have sometimes, unintentionally, gained positions of influence over environmental policy, as a form of stand in for green grassroots movements, but often remain vessels of the party (Ibid).

Green NGOs only emerged in the 1990s in China, but some environmental organizations are now important in mobilization of public opinion (Ho, 2007). Environmental NGOs are among the most powerful in China's emerging civil society and the number of environmental organizations registered as "social organizations" has grown quickly (Cui, 2008). A number of environmental NGOs have begun to take an active stance in policy processes. In recent years, some organizations have engaged in campaigns and lobbying, and in some instances, blocked policy options (Meidan et al, 2009). Other organizations have provided open letters calling for more stringent law enforcement, better information disclosure, and public participation, as well as openly opposed projects (Zhan & Tang, 2013). Green NGOs have contributed to climate campaigns, such as the Green Commuting Network program run by China Association for NGO Cooperation (CANGO) and Environmental Defense Fund (EDF), which have encouraged public transport and restricted car use (Schroder, 2011). As mentioned in Chapter 1, China's new Environmental Protection Law (2015) recognizes green NGOs as important actors, especially through their potential to protect public interest (Xinhua, 2014).

At the same time, activities of green organizations and media are tightly controlled by the government (Ho, 2007). Many green movements have a weak grassroots connection, poor organizational capacity, lack of local funding, difficulties related to legal registration, and avoid sensitive political issues such as consequences and victims of pollution (Lu, 2007; Zhan & Tang, 2013). Following on Diamond's categorization of types of activities that NGOs can engage in (express ideas; exchange information; achieve collective goals; make demands on the state; improve the functioning of the state; and hold state officials accountable), Tang and Zhan (2008) find that only the first three are usually available to Chinese environmental NGOs. The most common activities are educational programs and non-controversial nature conservation projects; NGOs operating with foreign funding are particularly careful of avoiding sensitive projects (Zhan & Tang, 2013). In recent years, the room to spread information through online forums has been limited and the websites of some environmental NGOs shut down (Zhan & Tang, 2013).

Pressure from the public is indirectly contributing to placing environmental issues higher on the political agenda (Lo & Leung, 2000). The unearthing of scandals, such as soil pollution that caused injury and death, creates anger and frustration in the population (He, 2014; China Daily, 2016). Environmental related "mass incidents" (which is how the communist party chooses to describe protests and demonstrations) have been increasing with about 30% every year since around 2005 (WCT, 2012; Zhang, 2014). Environmental issues are cited as the leading cause behind civil unrest and a main factor behind demonstrations and public uprisings. Growing environmental awareness of the expanding middle class is thought to contribute to this trend (Duggan, 2013; Bloomberg, 2014).

Finally, foreign organizations are involved in shaping policy on a national level. An example is capacity building for the establishment of China's emission trading scheme, which among other elements has involved bilateral cooperation between GIZ and the NDRC through knowledge and experience exchange, for example through workshops (GIZ, 2016). Chinese NGOs are participating in international conferences, which can function as platforms for information sharing in relation to policy development (Schroder, 2011). Chinese organizations participating in transnational networks can, moreover, introduce new climate policy elements into Chinese politics (Schroeder, 2008). Sharing of scientific information (knowledge and

arguments) between international and domestic epistemic communities, and informal information sharing with political decision makers, are mechanisms through which this is realized (Ibid).

3.3.2 Local policy making

Similar shifts towards deliberation and consultation have occurred in decision making processes on a local level. Reforms to introduce "deliberative" elements into China's political processes began already in the 1990s. One national initiative was the introduction of a public hearing system put into operation in 1996 (Zhou, 2012). In 2008, the State Council issued a regulation that requires all county and city governments to hold public hearings as part of the decision making process of key social policies (Ibid). National guidelines on public participation were issued by the State Council in 2010, which identifies processes for presenting arguments and encourages open debates. These guidelines have led to an increase in local elite deliberation as part of policy processes, citizen discussions on the internet, public consultations, limited experimentation with participatory budgeting and an increase in deliberation in village politics and elections (He & Warren, 2011). Mol (2009) argue that stipulations on public involvement in policy, such as public hearings, has resulted in greater awareness and influence of citizens over local environmental issues.

Three key forms of "deliberation" are often used in local planning (He, 2006). The most common element is consultative meetings between public authorities and different kinds of stakeholders. These meetings are normally based on a three-stage procedure: local leaders announce the function of the meeting, the participants express their opinion, and the local leaders answer questions. After these three steps, discussions ensue, which normally end up in a decision. This decision is normally not based on voting, but rather the discussion aims for consensus. This often requires multiple rounds of deliberation. Citizen evaluation meetings and residential/village representative assemblies are other channels through which deliberation can be used, although these are not as common. Finally, there are village or residential assemblies, which in some contexts can make collective decisions on issues such as land use (Ibid.).

Building on these observations, China has been described as an authoritative nation in which an "immature deliberative democracy" is taking shape (Zhou, 2012). Public hearings have been used to illicit public opinion on various policy issues, such as education fees, firework regulation and tax income thresholds (Ibid). Collaboration between citizens as part of public hearings can result in network formation, for example between public hearing participants, media representatives, local advocacy groups or activist lawyers, creating opportunities for more effective influence over local decision making processes (Ergenc, 2014). "Participation, networking and knowledge sharing enable participants to engage with local politics" (Ibid, p. 211). At the same time, these proceedings are inherently state led and non-transparent, allowing government actors to use deliberative "tools" to ensure legitimacy and social stability (Zhou, p.13, 2012).

Some scholars have taken this argument even further and ask if China can govern in a way "consistent with the values of deliberative democracy"? (Leib & He, p.2, 2006). Leib and He (Ibid) describe China as an authoritarian system at a macro level with democratizing practices at a micro level, for example in villages. They observe that the CPC has allowed historical consultative elements of local councils to remain and allowed them to continue developing. This functions as a mechanism to preserve local security and stability, support local problem solving, and act as a 'valve' to release pressure in China's fast moving economic machine; a form of moderate democracy which avoids radical and substantial political reform (Ibid, p.7). Emerging debates on social media, in particular blogs and microblogs, are also identified as new spaces where deliberative practices are emerging (Tang, 2014). Citizens are using media and social media as new communicative resources where social and political conflict is played out. In combination with deliberative practices of grassroots democracy, such as social protest and local elections, as well as improved "participatory capacity and reasoning competency", it has been argued that deliberative capacity and institutions are improving (Ibid).

Further, communication and cooperation between central and local levels of government is used in negotiation of energy related target setting, reporting and relation building ("guanxi") (Harrisson & Kostka, 2012). This is necessary in order to ensure that targets are possible to meet. For example, energy efficiency targets are set by the NDRC at differing levels for different provinces, as industries in different parts of the country have very different potential and capacity to improve their performance. This requires top-down negotiations and bottom-up feedback processes along with continuous communication and re-evaluation of goals and implementation (Ibid). However, these vertical negotiation processes tend to be marked by high levels of opacity and many are carried out outside formal administrative procedures. In an account of networking between government levels, Xia (2008) argues that local branches of the Provincial People's Congress (PPC) engage in network strategies to increase institutionalization and expand their power. Its structure has developed into complex institutional interlinkages, which mitigate pressures both for hierarchal control (by the state) and democratic reform (from society).

Mai and Francesch-Huidobro's (2015) account of climate agendas in Chinese cities shows that network connections exist both in horizontal and vertical *inter*governmental and *intra*governmental interactions. *Intra*governmental vertical networking is used as a tool to access climate incentives by securing national level support. Local leaders view pilot projects as strategies to make the city act as a testbed, and as projects associated with prestige that are valued by higher levels of government. Recognized pilot projects receive funding, which is an important aim for forging vertical linkages. *Intra*governmental horizontal networking is a strategy to coordinate government departments. Many authorities are networking within the space of the state apparatus to access information or resources, and there is considerable fragmentation and conflict between departments. Key elements for successful coordination are political significance of the problem, political will to address it, and political authority granted to leading authorities.

By mapping *inter*governmental networking within the nongovernmental space, Mai and Francesch-Huidobro (Ibid) show that local governments actively encourage participation of non-state actors, for example to generate legitimacy. Networking in the nongovernmental space can facilitate innovation transfers, awareness rising, and promote the use of green standards. In Hong Kong, interaction with non-state actors is an essential element in policy making, and the nongovernmental space makes up a "diversified platform for knowledge management" (Ibid, p.139). Innovation transfers, diffusion of information and mainstreaming of policy elements are recognized as important functions of collaboration with representatives of civil society.

3.3.3 Environmental policy discourse

Environmental development challenges have been understood and framed in different ways over the past decades of development in China. This section shows that energy issues primarily are perceived from the perspective of energy efficiency and energy saving, but also that semi-governmental think tanks and NGOs are engaging in discursive contests over construction of meaning in China's environmental policy.

Development themes used in Chinese policy documents vary with the political leadership. Some are attached to particular leaders, whereas some remain part of policy rhetoric for decades. One development slogan that has been central since the 6th FYP is that of "modernization" as a key path to development (Beyer, 2006). An example of a slogan attached to a specific leadership is the "three represents" (economic production, cultural development and political consensus) promoted by China's "Third Generation" leadership (1992-2003) headed by Jiang Zemin. Major discourses of the "Fourth Leadership" (2003-2012) under Hu Jintao include a "moderately prosperous society", a "harmonious society" and a "scientific outlook on development". The concept of a harmonious society points to the need to resolve economic and social challenges through non-confrontational measures, such as deepening regional disparities, poverty and unemployment, and environmental issues (Zheng & Tok,

2007). The policy rhetoric of the Hu Jintao administration has been described as more "reformist", through its focus on social equity and balanced growth (Meidan et al, 2009).

The concept of "sustainable development" was introduced into policymaking in China after the country's participation in the UN Conference on Environment and Development in 1992. Sustainability has since then featured prominently in the FYPs. The concept is often compounded with other political slogans in Chinese policy documents, such as harmonious development and scientific outlook on growth. During Hu Jintao's leadership, other related concepts were introduced, such as the promotion of a cyclic economy and a "conservation minded society", which are often compounded with the sustainability concept.

Policy targets related to environment and energy issues have been framed differently under different leaderships. Around the 1980's, Chinese planners started to realize that with the current speed of economic expansion, natural resources would not meet the demands of future growth (Zhiping, 2010). The government therefore adopted energy security as a key policy objective and began to target inefficient energy use, especially in the industrial sector (Meidan, 2009; Tsang & Kolk, 2010). A strategy of "equal treatment to development and conservation with immediate emphasis on the latter" was adopted, placing energy conservation and energy efficiency as parallel policy goals (Tsang & Kolk, 2010). Promotion of renewable energy sources first appeared as a policy goal in the 8th FYP (Cherni & Kentish, 2007).

In the 1990s the country's energy intensity began to drop and China became a net oil importer, and the government shifted its policy focus to the question of energy supply (Meidan, 2009). Key energy related policy aims during the 11th and 12th FYPs have been identified as resource supply security, economic efficiency, social equity and environmental protection (Ibid). Throughout the 2000s, energy security has been an overarching concern, often coupled with strategies of energy efficiency and energy conservation (Qi et al, 2008). By contrast, climate change goals are a relatively recent addition in Chinese policy documents (Ibid). The concepts of "low carbon" and "climate" were only introduced into the 12th FYP, and have not yet been recognized as a key social issue or as norm. One expression of this situation is that green NGOs in China prefer to frame climate issues as one of energy saving rather than climate change, to make them more accessible (Schroeder, 2008).

As mentioned above, environmental NGOs in China have relatively limited interest in policy advocacy (Lu, 2007). As observed by Schroder (2008), green NGOs only engage in climate change strategies that they believe contribute to positive solutions, rather than engaging directly in criticism. Nevertheless, as GONGOs and environmental NGOs have gained legitimacy in China, they have increased their capacity to influence environmental policy discourse (Zhan & Tang, 2013). The central government apparatus is becoming increasingly fragmented, creating political opportunity and social space for environmental NGOs to contribute to policy phrasing (Ibid, p.11). Environmental NGOs can explore the spaces that opens up through conflict between levels of government, or between government and societal interests. Environmental NGOs with independent sources of funding and strong connections to the party have become more able to express policy demands – at the same time, association with the political system restricts the type of policy demands that can be raised (Ibid). In Hong Kong, environmental NGOs have created discursive legitimacy for contested policy options (e.g. electric vehicles) and professional organizations contribute to knowledge building as well as to promotion of innovative solutions (Mai & Francesch-Huidobro, 2015).

Semi-governmental think tanks that are working from within the political system – "embedded in the environmental state" – also act as advocacy coalitions that promote certain environmental discourses in a non-confrontational manner (Francesch-Huidobro & Mai, 2012). Coalitions working with climate issues have been identified in research in Guangdong Province. These GONGOs were originally formed out of affiliated government agencies that advised or assisted the formulation of climate policy. As such, the organizations are "expertise oriented professional associations" (Ibid, p.13) with core activities consisting of research on energy

conservation, low carbon development and the recycling economy. The organizations have gradually gained economic, political and organizational independence and broadened their role into information sharing, delivering services, and facilitating learning and supporting government-business collaboration. In their role as technical experts, their advice is considered reliable and necessary in realizing new policy targets. The GONGOs have been crucial in introducing the concept of a recycling economy into local policy discourse and in shifting attention from the narrow concept of energy efficiency to the broader concept of "low carbon development" (Ibid).

The advocacy coalition model has been used to explain policy contention related to economic benefits and environmental concern (Han et al, 2014). In the policy process related to a large hydropower project, contesting discourses were shaped not only by local and central public agencies, but also by corporations, media, environmental groups and academia. This account showed how coalitions were created around shared belief in a policy option, and how conflicting narratives came to shape policy decisions over a decade. Social entities without direct economic stakes in the project played an important role in debating potential environmental implications, and resorting to rule of law and rights based activism to appeal to the legitimacy of their cause. However, senior officials exercised disproportionate power over this discursive process, indicating that political leaders continue to hold strong influence over environmental policy objectives.

3.4 Urban climate governance

This section demonstrates that the broad responsibilities of municipal governments in China makes them relatively well placed to lead low carbon development (Liu & Salzberg, 2012). Systems of funding and institutional responsibilities in relation to environmental protection and public service provision of municipal governments are outlined. The section also presents ongoing experimentation with urban low carbon strategies and the results these have yielded so far.

3.4.1 Institutional divisions and responsibilities

This section contains a brief outline of the institutional divisions that structure activities of municipal authorities. This is followed by a short description of the municipal system of budgeting.

Institutional divisions in Chinese cities

The top leadership in Chinese cities consists of a Party Secretary and a Mayor. These two positions are generally reached by passing through a political promotion system. The Mayor is appointed through nomination, followed by election and confirmation by the local People's Congress, and the Party Secretary is appointed by a higher party organization. A cloudy overlap exists between the institutional responsibilities of local commissions and party affiliations, but it has been observed that where jurisdictions coincide, the CPC committees tend to be more influential (BBC, 2012). Officially, the functions of the local party congress include examining committee work reports, reporting to higher party levels and "passing resolutions on major issues in the region" (People's Daily, 2010).

Administrative divisions on a municipal level reflect those of the central government. Municipal branches of the NDRC (DRCs) are responsible for drafting development plans, approve major industrial and infrastructure projects, promote industrial restructuring and support technology development. The municipal Economy and Information Technology Commission (EITC) is in charge of enterprise support policies, the Bureau of Commerce for trade policy and the Bureau of Finance municipal tax collection. The Construction Committee (the local branch of MoHUrD) is responsible for spatial planning, resource use in the construction sector, and monitoring and promoting buildings standards. The Municipal Transport Bureau is in charge of providing public transport. The Municipal Environmental

Protection Bureaus (EPBs) are local branches of MEP that monitors pollution standards, ecological zones and promote environmental protection.

The central government encourages provincial and municipal governments to set up climate change leadership groups, usually made up of staff from departments working with related issues, such as energy conservation and environmental protection, often from DRCs and EITCs. Since the NDRC's adoption of a National Climate Change Programme in 2007, many local governments have set up this type of groups. Responsibilities of the groups include implementation of national climate change policy, as well as to design and coordinate province level action in the areas of energy saving and pollution reduction (Qi et al, 2008).

By placing climate policy under the remit of Development and Reform Commissions, the issue becomes associated with industrial energy consumption and economic structural reform, rather than environmental issues. In cities that have not yet adopted specific climate mitigation agendas, energy saving and renewable adoption policies are also frequently adopted by departments responsible for industry and construction policy. This means that local environmental protection bureaus (EPBs) often hold responsibility over eco-city building, but not climate action programs. In recent years, the administration of EPBs has shifted away from rigid, hierarchical systems towards greater independence in determining local priorities, strategies and financing arrangements (Lo & Tang, 2006; Mol & Carter, 2006; Mol, 2009). The government is attempting to further strengthen the authority of environmental units and improve coordination between authorities working with environmental issues. At the same time, the status of EPBs remains weak and implementation is affected by limited institutional capacity, in terms of both resources and authoritativeness in relation to other departments (Lo & Leung, 2000; Liu et al, 2012; Kostka, 2014; Mai & Francesch-Huidobro, 2015). Balme (2011) explains the difficulty of local implementation of climate related policy as one of conflicting priorities related to fundamental clashes of objectives.

Tax collection and municipal funding

Ongoing processes of political and fiscal decentralization have increased the autonomy of provincial and municipal governments (Caulfield, 2006; Cai & Treisman, 2007, Liu & Tao, 2008; Liu & Salzberg, 2012). Today, municipal authorities in China are in charge of urban spatial planning, economic development strategies, and provision and funding of public services and infrastructure: electricity, transport, water and wastewater, and waste management, education and health, and enforcement of environmental protection legislation (Saich, 2008).

Since 1994, China has a tax sharing system that divides authority of tax collection between government levels. Unfortunately, decentralization of responsibility has not been accompanied with equal capacity to raise funds, which has left municipalities with a low ratio of revenue to expenditures. The easiest way for cities to generate off-budget funds is through land concessions, which creates a disproportionate willingness of urban governments to invest into land development strategies (Liu & Salzberg, 2012). Liu and Salzberg (2012) estimate that through China's tax sharing systems, subnational governments receive approximately 50%, whereas the funding responsibilities are approximately 70% of the total burden.

This leaves municipal governments permanently underfunded and pressed to search for additional financial resources. A popular strategy of developing land to generate municipal revenues has contributed to rapid expansion of development of commercial property, also known as "construction binges", resulting in the emergence of ghost towns and inefficient and irregular land use (Caulfield, 2006; Qi et al, 2008). The need for off-budget funding also contributes to support of expansion of major enterprises that contribute to the local economy by increasing the tax base (Liu & Salzberg, 2012). According to previous studies, taxes, fees and dividends from SOEs are a primary source of local government revenue as well as source of funding for local projects, which means that it is in the interest of the authorities to maintain key businesses in the urban area (Qi et al, 2008; Mai & Francesch-Huidobro, 2015).

Many local authorities in China face large debts while migration into cities places considerable pressure on service and infrastructure provision (Wei, 2015). In response to this problem, the Chinese leadership introduced a new budget law in 2014, with the aim to improve transparency and efficiency of local government spending, and increase trade with bonds and debt (Yu, 2014). Another central government strategy to mobilize funding is to encourage new financing and cooperation models, such as public-private partnerships (PPPs) and build-operate-transfer schemes (BOTs). A fund of 180 billion RMB ($27 US billion) has been set up by the central government to encourage such projects, and in 2015 local governments planned to invest 8.7 trillion RMB ($1.3 US trillion) into 6,650 PPPs in the areas of transportation, environmental protection, public service and infrastructure (Zhong, 2015). Public-private partnerships is seen as a way to mobilize financing for public infrastructure investment, such as in the transport, water and waste sectors (Choi et al, 2010; Stewart et al, 2014; Zhong et al, 2008).

3.4.2 Cities as arenas of policy experimentation

This section discusses the space for municipal authorities to engage in climate action, and the way in which this space is used to develop low carbon agendas. The section touches on central government led approaches as well as bottom-up initiatives.

Environmental and low carbon model cities

In 2008, the Ministry of Construction in cooperation with the international NGO WWF launched a pilot low carbon city project in Shanghai and Baoding (IEPD, 2012). In 2010, the NDRC followed this up by launching a low carbon pilot province and cities program.[9] The pilot started out with five provinces and eight cities that were expected to prepare low carbon development plans and policies, restructure the economy, collect emission data, and promote low carbon lifestyles. In 2013, it was reported that some form of low carbon development had taken place in all the pilot cities as projects in different sectors (Xinhua, 2011).

This pilot based strategy was preceded by a number of similar initiatives. The central government has developed standards for environmental model cities, which are to represent models of transformation to "resource saving" and "environmental friendly" models of development. These schemes were first introduced in 1992, when the Ministry of Construction introduced the National Garden City program. In 2003, the Ministry of Environmental Protection launched a similar program for eco-counties, eco-cities and eco regions. This included a set of criteria, such as having an approved eco-city construction plan, independent environmental agencies, and exceeding energy saving targets (Zou et al, 2011). The Ministry of Construction initiated an Eco-Garden City program in 2004, which combined criteria from the model garden and model eco-city requirements (Zou et al, 2011). China's 12th FYP (2010-2015) set a goal of establishing 100 model cities, 200 model counties and 1000 model districts, under these green/new energy themes (Li et at, 2012).

A separation must be made between eco-city building plans, which are comprehensive plans to shift urban development in a more sustainable direction, and eco-city projects, which are spatially contained developments located within or outside a city. Regarding eco-city projects encompassing entire cities, the Chinese Society for Urban Studies (CSUS) found in 2011 that 276 out of China's 287 cities had adopted low carbon or eco-city goals, and that more than half had begun to implement these (Li et al, 2012). Shenzhen was approved as China's first low carbon demonstration city in 2010. The city was thus the first to adopt a low carbon development plan and an indicator system for low carbon projects (Baeumler et al, 2012).

[9] China's definition of a "low carbon city" is a city that has an energy consumption of up to 60% of the national average and display "low energy consumption, low carbon emissions and low pollution" (CURC, p.105, 2009a). The 60% energy consumption criteria is a measure that is relative against the average development levels of cities in China, rather than an absolute indicator of levels that need to be reached to be considered a low carbon city.

Urban low carbon schemes

Low carbon strategies of Chinese cities have varied greatly, depending on economic development level, geographical location, economic structure and other factors. For example, Hangzhou has adopted a low carbon development plan involving strategies in a number of sectors, including buildings, transportation, lifestyles and the environment. Guiyang has adopted a ten point plan, which includes low carbon industry, adjustment of the energy structure, low carbon transport, buildings and forestry. Baoding has created a profile as an eco-technology centre, which is leading in manufacturing of PV, wind, biomass, and solar thermal technology. Several municipal authorities, including Beijing, Shanghai, Tianjin and Chongqing, have adopted energy conservation standards in the construction sector that are more stringent than national policy (Yao et al, 2005).

A common strategy has been to move heavy industries out of central areas, which has occurred alongside a transition towards a modern service sector (Li et al, 2012). Implementation of energy efficiency targets in the industrial sector has contributed to a steady reduction of carbon emission intensities in many cities (Wang et al, p.6202, 2012). Many cities have launched eco-city projects, low carbon industrial parks, low carbon transport programs, tree planning campaigns, green construction schemes and large scale renewable energy projects. A broad trend is a shift from regulation and single sector energy policy towards more complex and integrated strategies and use of emission accounting (Mai & Francesch-Huidobro, 2015). Examples of municipal low carbon strategies are listed in Table 2 below.

Table 2: Examples of climate strategies and policy adopted at a municipal level in China

City	Low carbon programs
Tianjin	Collaboration with Singapore and Japan in developing low carbon demonstration zones, for example Sino-Singapore Tianjin Eco-city SSTEC. Increased deployment of clean energy (e.g. waste-to-energy), increased afforestation and support of environmental industries. Acknowledged by the UNEP for its low-carbon economy development centre.
Hangzhou	Adopted a low-carbon plan under the 12th FYP that focused on buildings, transportation (public transport expansion and bicycle sharing), lifestyles, environment and society. High commitment to retrofitting. Establishment of an industrial park for clean energy and renewable energy business.
Chongqing	Large scale adoption of wind power, waste-to-energy technology, use of biomass in rural areas, and investments into hybrid vehicles. Establishment of a financial service centre (in order to shift economic structure towards services) and a renewable energy hub.
Baoding	Shift from textile and automobile manufacturing to a hub for renewable energy use and production (solar PV, biomass, solar thermal and energy efficiency). Establishment of Baoding Industry High Tech Development Zone in 1992 and adoption of an industrial cluster model similar to Silicon Valley ("Power Valley").
Shenyang	Adoption of a low carbon plan extending from industrial makeup to buildings, transport, land use and lifestyles. Expansion of public transport and support of low emission vehicles.
Kunming	Local policies for renewables, such as regulation, funding mechanisms, low-interest loans, tax exemptions, municipal investments, and support for R&D and education. 50% of all buildings to have solar water heaters and solar PV.

Sources: Baeumler et al (2012) and municipality websites

Many Chinese cities have adopted plans for provision of low carbon public service and infrastructure. After decades of shifting from bicycling to motor vehicle transport, some municipalities have developed non-motorized transport plans as part of their low carbon strategies, and aimed to improve conditions and safety for pedestrians (Mehndiratta, 2012). Cities have adopted integrated transport plans, improved BRT systems and combined these with bicycle schemes, and restricted car use (Oshita et al, 2015). There has been a rapid growth of investment into municipal waste-to-energy plants, in spite of environmental issues associated with these (Zhang et al, 2010).

Energy sector investments is a challenge for municipalities, as cities tend to have limited control over electricity systems. Large SOEs are in charge of more or less all of China's power grids and pricing policies are primarily set by the central government (Oshita et al, 2015). Alternative pricing policies, contracting and allowing for competitions with electricity providers have been piloted to a limited extent on a local level (Ibid). On the other hand, the use of systems such as district heating systems and combined heat and power systems have increased rapidly in urban regions (Gong & Werner, 2014).

A common way to promote the development of a circular economy and clean production is through the local establishment of eco-industrial parks (Fang et al, 2007). China's Circular Economy Promotion Law supports use of industrial by-products as well as other industrial resource conservation strategies (Ibid). The MEP (at that time SEPA) has supported eco-industrial parks since the 19900, and in the early 2000s around a thousand enterprises had launched industrial recycling projects (Ibid). Local governments play a key role in these projects in planning and providing industrial development parks.

One way of experimenting with low carbon growth is to use eco-city projects to test and demonstrate alternative technologies and designs. Eco-city projects in China have attracted considerable attention, in particular because of the many high-profile, ambitious projects that have been launched (e.g. Sino-United Kingdom Dongtan Eco-City in Shanghai, Caofeidian International Eco-City in Tangshan, Sino-Swedish Wuxi Low Carbon Eco-City, Sino-Finland Mentougou Eco-Valley in Beijing, and the Sino-Singapore Tianjin Eco-City (SSTEC) (Baeumler et al, 2012). China's most famous eco-city project is probably the Sino-Singapore Tianjin Eco-City Project (SSTEC). The project is an international collaboration project between China and Singapore and features a long list of KPIs for indicators such as carbon emission intensity, proportion of green buildings, waste generation and recycling, green transport and renewable energy use. Another famous example is Wuxi Taihu Lake New City, a low carbon, eco-city developed by the municipality under a framework agreement with MoHUrD. The eco-city project is based on 62 KPIs, covering land use planning, green transport, energy and resource efficiency, ecological environment and green construction (Baeumler et al, 2012).

The eco-city projects aim to exhibit progressive urban planning, infrastructure and technologies, such as zero-emission buildings, organic farms, and complete waste and water recycling. However, the projects have been criticized on various grounds. One issue is that many projects have been launched with tremendous fanfare, and eventually been abandoned before much development has taken place (Kaiman, 2014; Shepard, 2015). Dongtan eco-city in Shanghai, Caofeidian eco-city in Tangshan and Mentougou in Beijing are examples of this. Tianjin eco-city still stands mostly empty, and currently does not live up to eco-standards much higher than a regular European city in terms of energy sources, public transport or green space (Shepard, 2015).

Other weaknesses are a focus on city-greening rather than integrated planning solutions, lack of comprehensive management systems, lack of awareness, and public participation (Baeumler et al, 2012). It has been argued that eco-cities in China are used by local authorities to attract investment and government funding (Shepard, 2015). These large scale technological intense projects are also criticized for representing "eco-topias", in which lifestyles, habits, routines and citizens are completely ignored (Sze, 2014). Sze (Ibid) argues that power, politics and people are forgotten in techno-fetishist quests where sustainability is left in the hands of engineers.

Caprotti (2014) questions the potential of Chinese eco-cities to act as frontiers of sustainability innovation and paths to a low carbon future. This argument relates to the spatial delimitation of these projects and the inherent limits of creating ecological enclaves situated outside heavily polluting, resource consuming industrial clusters. Chinese eco-cities are also spatially exclusive in being locations that promise ecological soundness for its inhabitants only (Capriotti et al, 2015). Caprotti (2014) criticizes the definition of "eco" in eco-cities in China, which usually communicates potential of GDP generation and sophisticated technologies to local

governments, high-end developers and high-tech corporations. Not only do most eco-cities in China fail to live up these fancy expectations, but they are based on indicators that exclude social considerations (and often built by poor, socially excluded migrant workers). Moreover, the ideal of man-nature harmony on which Chinese eco-cities is based refers to settlements that are "stable, quiet and politically disengaged" (Ibid, p.15); Capriotti doubts whether these constructions create spaces where communities can flourish or even form at all.

3.5 Concluding remarks

This chapter has provided insights into dynamics of environmental policy in China, which provides the foundation for the methodology and analysis of this thesis. The key premise that is central in the coming chapters is that within China's fragmented authoritarian system, informal interactions contribute to formulation and delivery of environmental policy. Apart from central government institutions, these interactions predominantly involve local authorities, think tanks, businesses and foreign actors. Further, local authorities draw on these interactions to intervene in policy processes or projects related to local climate action. Questions that emerge from this literature review and that guide the coming chapters are: how are these interactions affecting urban policy processes? In which particular urban climate programs are non-state actors involved, and what responsibilities do they take on? How common are partnership arrangements in climate action, and what roles are transferred to non-state actors through these arrangements? Finally, what do these observations tell us about principles of participation in environmental policy in China?

4 Methodology

This chapter presents an overview of the methodology underpinning this thesis and the specific methods used in the research. The thesis adopts a mixed methods approach to answer to the requirement of providing detailed information about governance mechanisms on an urban level, as well as creating a broader understanding of urban climate governance in China.

Building on the insights from Chapter 2, the methodology adopts the following understanding of environmental governance. Public intervention in environmental issues has evolved from a focus on traditional tools of government, towards voluntary and collaborative approaches (Glasbergen, 2007; Backstrand et al, 2010). This shift is associated with public policy being created through horizontal interactions in networks that span across the public-private-civil society divide (Marsh & Rhodes, 1992; Kickert et al, 1997; Pierre & Peters, 2000; Torfing & Sorensen, 2014). Climate governance involves multiple actors interacting across sectors, as well as across jurisdictions, scales and borders (Bulkeley, 2005; Bulkeley & Betsill, 2005; Bulkeley & Kern, 2009; Bulkeley & Newell, 2015). This indicates a need for the methodology to focus explicitly on activities of both public and non-state actors, as well as dynamics of interaction, in both formulation and delivery of climate policy.

In accordance with the literature presented in Chapter 3, the methodology recognizes the following specifics of environmental policy in China's political system. The central government plays a key role in formulating overarching policy guidelines, but a diversity of actors are involved in policy making processes (Lieberthal, 1992; He & Warren, 2011; Meidan et al, 2009; Tsang & Kolk, 2010). Policy discourses are shaped and contested by actors other than the central government (Zhan & Tang, 2013; Francesch-Huidobro & Mai, 2012; Han et al, 2014; Mai & Francesch-Huidobro, 2015). Although traditional environmental policy instruments remain important, central and local authorities are experimenting with new policy strategies, and to some extent, collaborative approaches are emerging (EPA, 2006; Mol & Carter, 2006; Mol, 2009; Cheung et al, 2009; Dauvergne & Listner, 2012). These trends suggest that to capture current climate governance strategies in China, it is necessary to focus on how authorities, companies, academic organizations, and green movements approach the climate issue and produce different types of initiatives and responses.

This chapter explains how the methodology of the thesis is based on these theoretical considerations. The first section (4.1) presents the philosophy behind the research strategy and explains how this connects with the overall research design. Section 4.2 explains the rationale of the case study selection, data collection methods, and data analysis used for the case study material. Section 4.3 presents the methods used in the comparative analysis of the thesis, the selection of cities and climate initiatives, collection of data and method of analysis. Section 4.4 presents the strategy and data collection method of the member check interviews used in the thesis. Finally, section 4.5 discusses issues related to validity and generalization, and 4.6 raises ethics considerations involved in the research.

4.1 Research strategy

The research question of this thesis is: *How have municipal authorities and non-state actors participated in climate mitigation action in cities in China during the period of the 10th to 12th FYPs (2001-2015)?*

The literature review indicates that this question requires an understanding of processes of governance that extend across sectors, jurisdictions, and scales. To answer the question, it is necessary to delve into mechanisms of planning, as well as processes of policy implementation, and capture a variety of cross-cutting activities and interactions. This requires in-depth study of strategies and discourses related to policy processes, and information on climate interventions and programs in a specific case. At the same time, to build a broad understanding

of which aspects best explain current climate governance trends in China it is necessary to gain insight into the dynamics of multiple cases.

The thesis therefore uses a multi-method approach that combines the strengths of qualitative and quantitative research. The reason for this is that qualitative methods enable insights into how governance processes unfold in particular contexts of urban development. At the same time, systematic comparison of categorical data in a database allows for an overview of governance trends. Within the social sciences, use of mixed method approaches is a common strategy used to achieve benefits of both qualitative and quantitative designs (Tashakkori & Teddlie, 2003). Mixed method approaches are particularly common in inter-disciplinary research, such as sustainability studies, which deal with multiple processes and dimensions; these tend to best be captured by combining different forms of data (Kemper et al, 2002).

The qualitative research of this thesis builds on a case study approach that relies to a large extent on data collection through interviews. The justification for this strategy is that qualitative data collection is considered appropriate for studies that aim to understand complex phenomena, while interviews are a suitable method for creating rich descriptions (Tashakkori & Teddlie, 2003). The advantage of case studies is that they provide rich sources of qualitative information and are suitable for providing descriptions of mechanisms and processes (Gerring, 2006). Further, case studies are useful where the purpose of research is to grasp how activities on a micro level tie in to broader perspectives, such as global networks or structures and actions of and in nation states (Ibid). Yin (2003) proposes that case studies are useful for research that requires thick descriptions and detailed exploration of phenomena such as actor perceptions, motivations, or interactions. Therefore, case studies are an appropriate strategy for research based on "how" questions, which is the case in this thesis. Further, case studies are appropriate for studies where the purpose is to produce generalizable theories (analytic generalizations), rather than empirical results that needs to be transferable to other settings. This makes case studies a suitable research design for this thesis, which aims to contribute to the theoretical understanding of governance processes in China.

Flyvjberg (2006) elaborates how case studies can be used as a suitable research strategy both to test and develop hypotheses and theories. He points out, firstly, that knowledge in the social sciences is inherently context-bound. The context-dependent nature of case studies can be seen as a strength of the approach, rather than a weakness, as it helps create more nuanced understandings of reality. Social research tends not to be neither predictive, universal, nor context-independent. This makes the strengths in producing practical, in-depth, context-related knowledge particularly important. Flyvjberg (Ibid) explains, secondly, that case studies can be an appropriate research strategy for both testing and producing theories. That is the case as one in-depth, well executed case study can be used to "falsify" paradigmatic theories, but also because entirely new insights frequently are generated through case study based research. For example, generalizable theories can be produced through case studies that are selected on a particular logic (for example, extreme cases, critical cases, or paradigmatic cases).

Finally, Flyvjberg (2006) observes that the purpose of case studies is not to reduce all findings to one universal framework or theory, but to allow the findings to encompass both conflicting and ambiguous views and angles. This allows case studies to represent multi-faceted insights of complex processes and dynamics. In his words (Ibid, p.238), the narrative is the result, rather than "conceptual closure" pointing to a clear-cut set of variables. The question of whether a case study is an appropriate research strategy for a project is fundamentally problem-driven: what type of information is required to answer the research question. In this thesis, the research questions emphasize "how" governance processes are realized in cities in China. Conflictual, ambiguous, context-based narratives are an essential part of the answer to such a question. As a result, this thesis is to a large extent based on an in-depth case study and exploratory, semi-structured interviews.

Many previous studies of urban climate action have used case studies to generate detailed accounts of governance modes, network interactions and partnerships (Collier & Lofstedt,

1997; Bulkeley & Kern, 2006; Bulkeley & Betsill, 2005; Holgate, 2007; Romero Lankao, 2007; Gustavsson et al, 2009; Simon & Leck, 2013; Mai and Fracesch-Huidobro, 2015). Bulkeley and Kern's (2005; 2009) research on transnational climate networks draw on information collected in six case study cities in the UK and Germany to generate thick accounts of modes of urban governance. Bulkeley & Betsill (2005) use the case studies of Newcastle upon Tyne and Cambridgeshire to show how actors work through linkages across scales and levels in attempts to shape local climate discourses. Holgate (2007) uses two case study cities in South Africa to identify drivers of and barriers to local action, including partnerships and relationships between government levels. Simon and Leck (2013) similarly use two case study cities in South Africa to illustrate the role of intra-governmental collaboration in municipal climate efforts. Romero Lankao (2007) use a case study to identify institutional barriers to action in Mexico City.

Nevertheless, numerous studies of climate partnerships and governance networks use a large-*n* design to systematically explain patterns of governance, including interaction in transnational networks and in climate partnerships (Andonova & Levy, 2003; Backstrand, 2008; Pattberg & Stripple, 2008; Pattberg et al, 2012; Andonova et al, 2009; Bulkeley et al, 2012, Castan Broto & Bulkeley, 2013). A quantitative approach allows for greater possibilities of generalization and insights into trends. Pattberg et al (p.7, 2012) state that large-*n* studies and database research on sustainability partnerships can "put into perspective individual, intensively studied cases, thus making sense of the relevance of particular partnerships within the overall universe of partnerships". Previous large-*n* studies on sustainability partnerships and climate networks clarify trends of participation and leadership, partnership function, association between partnership type and accountability, or partnerships and innovation. As stressed by Gerring (2006), in-depth analysis can be complemented with database research as a strategy to explain trends and patterns beyond mechanisms in a single case.

The large-*n* approach in this thesis employs a database to explore climate governance trends across multiple cities in China. Although the database contains 150 initiatives, it contains almost exclusively qualitative data; it can therefore be seen as a hybrid between a purely qualitative and quantitative approach. Nevertheless, some of the benefits of quantitative research are gained by using a qualitative database to complement the results of the case study. As noted by Tashakkori and Teddlie (p.33, 2003), one of the fundamental benefits of using a mixed methods research design is that it allows the researcher to ask a greater variety of questions. That is, while qualitative research tends to be better at exploring an unknown topic, quantitative research is better at testing and confirming theoretical propositions. In this thesis, the case study of Rizhao is used in an exploratory way, to generate thick descriptions of policy making processes and climate governance modes. In the case study, it is possible to ask questions about how and why certain processes occur the way they do. Subsequently, the trends that were indicated by the case study are tested by investigating governance patterns in 15 cities in China. Moreover, mechanisms that were indicated by the database analysis were explored further by relying on information collected through member check interviews. This allowed for analysis of, for example, actor motivations or perceptions that normally would be difficult to capture using a purely quantitative database research design. In this way, the case study, qualitative database and member check interviews provide complementary methodological strengths.

Each research sub-question emphasizes one aspect of the phenomenon that is explored. Each question also requires different forms of data, and these needs have guided the development of the methodology. The sections below discuss the specific research strategy of each sub-question.

4.1.1 Research sub-question 1

The first sub-questions is: *How have non-state actors participated in environmental planning processes in Rizhao during the 10th and 12th FYPs (2001-2015)?*

The focus of the first question is on processes and mechanisms involved in urban decision making arrangements. The primary research strategy has been to hold interviews with individuals involved in planning and policy making in the city. This approach draws inspiration from studies that use interviews as a data collection method to create insights into processes of urban planning related to climate issues. For example, Burch (2010) uses interviews as a data collection method in order to identify how actors in Canadian cities shape local environmental policy, as well as the institutional and conceptual barriers that arise in this process. Holgate's (2007) study of policy making interactions in cities in South Africa uses interviews with officials and non-state actors to determine which factors influence formation of local climate policy. Another example is Tang and Zhang's (2006) exploration of NGO involvement in environmental policy processes in China, which employs interviews as the key method of data collection.

Interviews in this study were held with urban planners, researchers and local officials who have been involved in the city's planning and policy making (further detail is provided in section 4.2.3). The process of identifying these individuals involved contacting the central level planning and research institutes involved in drafting plans in the city (CAUPD and CAS), as well as reviewing key planning documents to identify which local organizations were in charge of key planning documents. The first respondents were questioned about other organizations and individuals involved in planning processes to make sure all relevant organizations were contacted (this strategy draws inspiration from the logic of snowball sampling). The interviews aimed to identify who participates in planning processes, what conflicts are encountered in planning, how conflicts are resolved and how decisions are reached. The interviews were complemented with document review of the city's policy statements, local media websites, government websites, and previous research on environmental policy in Rizhao. The interviews were also complemented with quantitative data collection from Rizhao and Shandong Provincial Yearbooks (on urban environmental development trends, including data on pollution emissions, green space and built up land) to support (or contrast) the information shared by the respondents.

A second strategy used to answer the first sub-question was to consider how policy preferences are framed in key planning documents, and how environmental discourses influence the inclusion of certain groups in urban climate action. As discussed in Chapter 2, metaphors, storylines, and narratives are important elements of environmental policy discourse (Hajer, 1995; Dryzek, 1997). Revealing how environmental narratives are built on belief systems, and how certain narratives are promoted by discourse coalitions, helps to indicate how policy language is connected with social and political interests.

Discourse analysis connects detailed analysis of text with broader ideologies and environmental development trends. In this thesis, the analysis aims to show how "neutral" policy objectives in China are associated with socio-political priorities, drawing inspiration from theories of critical discourse analysis (CDA). CDA is a theory and method used to study relations between discourse and social developments (Jorgensson & Phillips, p.60, 2002). According to Jorgensson and Phillips (2002), CDA builds on a number of assumptions. The first is that discourse is an important social practice that contributes to the constitution of the social world (p.61, Ibid). Secondly, discourse is a form of social practice that constitutes the social world and at the same time is constituted by other social practices (p.62, Ibid). Third, CDA "engages in concrete, linguistic textual analysis of language use in social interaction (p.62-63, Ibid). This allows the theory to also be used as a method of analysis for social relations. Fourth, CDA assumes that discursive practices "contribute to the creation and reproduction of unequal power relations between social groups" (p.63, Ibid). This means that discourses can be used by groups to further particular interests, and that discourse analysis can reveal patterns of power relations.

As pointed out by Dijk (1993), a key principle of CDA (which he also refers to as socio-political discourse analysis) is that it can reveal relations between dominance of elite groups, power, and inequalities by understanding how these are produced in text and spoken language. In particular, CDA focuses on "the role of discourse in the (re)production and challenge of dominance", where dominance is defined as the "exercise of social power by elites, institutions or groups, that results in social inequality" (Ibid, p.238). The purpose of CDA is to find how structures and properties (style, rhetoric, and meaning) of text and talk contribute to this reproduction. A central form of power that is revealed through such analysis is "power over minds", rather than direct power over actions. That is, by reproducing discourses, groups can use text and speech to make certain social orders appear natural and self-evident. This is achieved by continuously shaping knowledge, beliefs, norms and understandings of social issues (Ibid).

Access to discourse can be expressed by, for example, certain groups having monopoly of formulation over text. Dijk (Ibid) raises the example of company managers being in charge of executive board meetings and business reports, but also over broader news and media, and political discussions. Through such access, groups or actors are able to reproduce discourses, thereby cementing power relations. In this thesis, this type of access to discourses is studied by considering which actors have access to decision making processes and policy formulation in Rizhao. Dijk (Ibid) observes that access to discourse also is expressed as control over context. In this thesis, this dimension is explored by considering how existing problem formulations are reproduced in formal policy documents by being transferred across government levels. The underlying assumption is that reproduction of energy policy formulation in municipal planning documents is strengthening the role of certain groups of actors. Analysis of policy documents is used as a means to deconstruct how policy formulations associate energy challenges with agency of a certain group of actors. Moreover, the analysis of interview transcripts aims to reveal whether groups and actors use alternative discourses to challenge these power relations.

In this thesis, China's 12th FYP and Rizhao's 12th FYP were subjected to textual analysis to find how energy policy goals are related to environmental and energy narratives. The language use in these two documents was compared with information about green development agendas shared by respondents in the interviews, to find how the discourses differed between groups and with what implications for environmental policy. The strategy of combining thematic analysis of text with detailed study of word use in interviews builds on the systematic approaches used by Dryzek (1997) and Hajer (1995), who have deconstructed language use of politicians, media, scientists, and green movements to understand how these groups create representations of environmental issues. The thematic analysis in particular builds in Dryzek's categorization of environmental narratives and policy framing, which he connects with broader belief systems. More recently, the discourse analysis approach has been applied in studies of environmental policy in China. This thesis draws inspiration from such studies, for example Francesch-Huidobro and Mai's (2012) deconstruction of environmental policy framing of GONGOs in Guangzhou. Also, it builds on the recognition that economic and social narratives are used by discourse coalitions in China to dispute and debate contested issues (Han et al, 2014).

Thematic analysis of policy documents fills the function of complementing data collection through interviews. The interviews with respondents in Rizhao aim to reveal actions, as well as overt motives and conflicts between actors and groups in the city. The analysis of interview transcripts allows to build an understanding of interactions between actors in planning processes, including details on strategies and actor interests. By contract, the analysis of formal documents provides insights into other dimensions of policy making on an urban level. The deconstruction of language use in national policy documents is performed in order to reveal that certain power relations between groups are determined even before urban planning processes begin. Therefore, the way in which policy preferences are formulated in formal documents dictates the room for manoeuvre of groups and actors on a city level.

Governance trends identified in the case study and the comparative analysis were evaluated using member check interviews with individuals who have worked with climate action in a number of cities in China. Member check interviews are performed by returning to the participants of a study and asking them to evaluate the conclusions of the research. This can be realized through focus group or repeated interviews. Lincoln and Guba (1985) describe this method as a crucial strategy for ensuring credibility of research results. Gerring (2006) describes it as a strategy of testing generalizability and validity of case study conclusions through interviews with key respondents ("experts"). In this study, the second and third rounds of interviews extended beyond the original respondents to include individuals involved in urban environmental planning in other cities China. These interviews aimed to assess information relating to the nature of involvement of local stakeholders and external "experts", green development motives and environmental planning conflicts in environmental policy in China. The insights were used to tie together the results of the case study and the comparative analysis into a broader conclusion regarding principles of participation of non-state actors in environmental policy in China, which is discussed in Chapter 8.

4.1.2 Research sub-question 2

The second sub-question is: *How have different modes of urban climate governance contributed to climate mitigation in cities in China during the 10th to 12th FYPs (2001-2015)?*

To answer this question, information from the case study and the comparative study was combined. The first approach used in the case study builds on the studies of Bulkeley and Kern (2006) and Kern and Alber (2008), which are used as the theoretical basis for the concept of governance modes. Bulkeley and Kern's (2006) study uses six case study cities in Germany and the UK, where interviews were conducted with local officials. In this study, the focus was on strategies used by local authorities in addressing climate change and how these can be categorized into four different governance modes. Kern and Alber's (2008) article uses the same framework to discuss and categorize urban climate programs and initiatives that have been carried out in OECD nations.

Building on this theoretical approach, the case study of Rizhao was used to identify modes of climate governance in the city's low carbon development programs. This included mapping out the city's energy saving and emission reduction schemes and identifying actors involved in each of these, as well as forms of collaboration and policy instruments used in each. However, in order to progress beyond initiatives introduced by local authorities, projects led by other actors were also included. The identification of informal climate initiatives builds on the studies of Bulkeley and Castan Broto (2012) and of Castan Broto and Bulkeley (2013), which consider any purposive intervention with an explicit purpose to reduce greenhouse gases or adapt to climate change. Building on this strategy, the case study in this thesis also considers initiatives led by private organizations, civil society, or through partnerships that aim towards energy saving or increased adoption of renewables (for example development of energy saving technology led by companies or low carbon campaigns led by semi-governmental organizations).

As in Bulkeley and Kern's study (2006), information about Rizhao's energy saving and emission reduction activities was collected using interviews conducted with officials of municipal departments, local companies, and local researchers (further detail is provided in section 4.2.3). The interviews explored the involvement of different actors in local energy programs, as well as strategies and instruments involved in these programs. This information was complemented with a document review of Rizhao's policy and planning documents, websites of local government and of local companies, government reports, and previous research. Quantitative information was also collected from Rizhao and Shandong Provincial Yearbooks, including data on energy use, energy sources and energy efficiency, public transport, investment figures, and government spending on environmental investments.

Further information about which actors initiate and manage climate projects in cities in China was collected in the comparative study. The research strategy of the comparative study builds

on the abovementioned research of Bulkeley and Castan Broto (2012) and Castan Broto and Bulkeley (2013), which use a database design to explore what actors are leading climate experiments in cities, as well as what partnerships constellations are being employed. This quantitative approach to analysing forms and functions of climate partnerships has also been used by Andonova et al (2009) to create a typology of collaborative arrangements in climate networks, and of Backstrand (2008) to assess legitimacy and accountability of different partnership arrangements. Pattberg et al (2012) use a similar strategy to create a categorization of forms and functions of sustainability partnerships.

In this thesis, the comparative analysis was based on information from 150 climate initiatives carried out in fifteen cities in China. Data about these initiatives was collected through an online search of local government websites, local media websites, company websites, and websites of international organizations. The information was used to construct a database of initiatives including systematic information in the type of actor leading initiatives, forms of collaboration were involved, policy instruments used, and how type of actor initiating and leading project was related with policy sector. This data was analysed to find how different forms of leadership and collaborative arrangements are related with type of initiative, sector, and initiative function.

4.1.3 Research sub-question 3

The third sub-question is: *How have partnerships contributed to introduction of climate policy and technology on an urban level in China during the 10th to 12th FYPs (2001-2015)?*

Inspiration behind the development of this question was in particular drawn from Bauer and Steurer's (2014) study of climate policy innovation through partnerships. This study shows how partnerships can contribute to diffusion of climate policy, as horizontal and vertical collaboration leads to sharing of policy elements.

The research approach of the last sub-question is intimately connected with that of the second question. The database approach described above was the key strategy to answer this question. The database on climate initiatives include information about introduction of new policy or technology. The 150 climate initiatives were analysed to find how many of these involved partnerships, what forms of collaboration was used, and what function was performed by initiatives involving partnerships (rule setting, public service provision, technology transfer and technology development, information sharing and demonstration). The initiatives were also analysed to find if and how partnerships contribute to adoption of new emission reduction or energy saving technology and policy elements, and in which way innovation is related to partnership constellation.

Data from the member check interviews was used to evaluate the results of this question, as well as to provide further information about the mechanisms suggested by the result. This included, for instance, examples that explain how policy is diffused through problem solving dialogues and technology that is developed in multi-stake demonstration projects. This qualitative approach allowed for comparison with the diffusion mechanisms suggested by the study of Bauer and Steurer (2014), which included collaboration, up-scaling and support by the national government.

4.2 Case study

This section presents the research methods used for the case study of the thesis. The logic behind the case study selection is explained, a brief introduction of the case study city is provided, and data collection methods and the procedure used for the data analysis are presented.

4.2.1 Case study selection

The prefectural city of Rizhao, located in Shandong Province, is a mid-sized, medium-income city that has followed the development trajectories typical of cities in Eastern China, such as

rapid population growth, GPD expansion, and economic restructuring towards the secondary sector (see Figure 1 and 2). Rizhao was selected for two reasons: as a case representing the processes of urbanization in the East coast of China, and as a city pioneering environmental action.

The cities along the heavily industrialized coast represent a particular style of urban low carbon development in China.[10] These urban areas have experienced rapid economic growth, urbanization and industrialization, and now confront serious environmental degradation, such as air and water pollution, increase in built up land and loss of agricultural and forest land, and resource shortages. These cities are still undergoing relatively strong economic development and are tasked with the challenge of shifting this growth away from heavy, polluting industries towards clean, hi-tech and service industries. Many of the cities are still experiencing high rates of urbanization and are grappling with strategies to redirect infrastructure investment and urban planning towards models that place less pressure on environmental systems. Cities in other parts of the country are facing different types of challenges. For example, urban areas in the far west have only recently embarked on paths of industrialization, while areas in the north are stagnating rapidly. This thesis singles out the urban areas of the East coast, and chooses Rizhao to represent the development trajectories experienced in this region.

In terms of demographic and economic development, Rizhao is representative of trends of the rapidly growing urban region in Eastern China. Figure 1 and 2 below illustrate Rizhao's rapid GDP growth since the 1980s and a population growth that picked up between the 1970s and evened out in the 1990s.

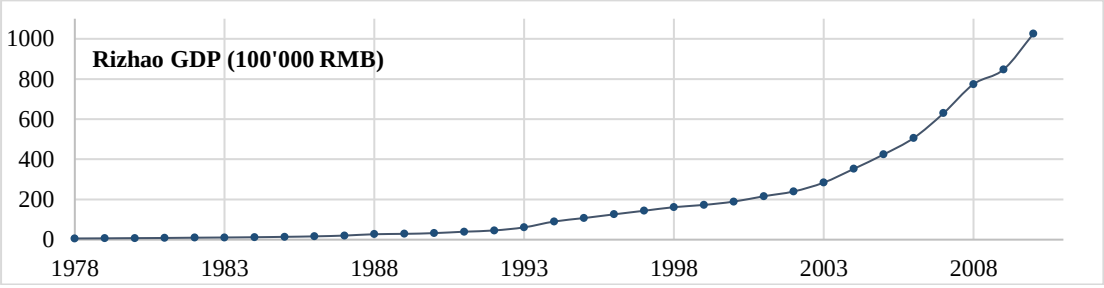

Figure 1: Rizhao GDP (100'000 RMB)
Source: Rizhao Municipal Yearbooks

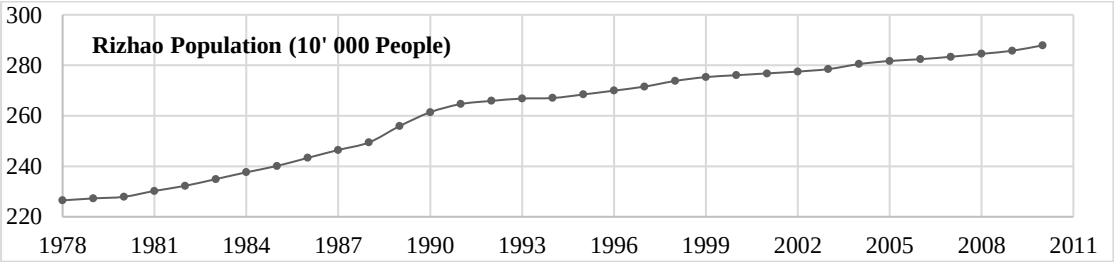

Figure 2: Rizhao total population (10'000 people)
Source: Rizhao Municipal Yearbook

An aspect that is important to the choice of case study is the delay between national level policy intentions and actual development in the vast and variegated regions of China. Descriptions of change in China often emphasize development in relatively internationalized cities, which are

[10] Within China's political and administrative system, cities are ranked according to four different levels: cities directly under the central government, sub-provincial cities, prefecture-level cities and county-level cities. Out of these categories, most academic research referring to "cities" includes the three higher levels, collectively referred to as prefecture-level and above cities (PL&A cities). In 2012, China had 656 cities, out of which 290 were PL&A cities. The cities of the two top categories are often loosely referred to as Tier I cities, while provincial capitals are referred to as Tier II cities, and other PL&A cities as Tier III cities. The tiers are a colloquial term not based on the administrative divisions.

leading in terms of policy development, integration into global markets and technological innovation. Accounts of progress based on observations of development in cities like Beijing, Shanghai, and Guangzhou overlooks the extent to which these arenas are used as the country's face of progress. Mai and Francesh-Huidobro's (2015) study of Guangzhou, Shenzhen and Hong Kong, suggests that an expanding nongovernmental space contributes actively to local climate action, through transferring information and innovations, and in building legitimacy around policy options. However, the engagement of green NGOs in climate policy in Hong Kong cannot be used as indication that civil society is becoming a political force in small cities on the mainland.

To grasp the roles of and interaction between local authorities and non-state actors in urban climate governance, this thesis focuses on development in a medium sized, industrialized city with a lower income level than China's leading megacities. Through this strategy, the aim is to make it clear which policy guidelines are contributing to real change on a city level and which constitute empty policy rhetoric, as well as which changes are being realized through activities taking place outside leading megacities. This thesis proposes that studying climate strategies in a mid-sized urban region provides more information about the way in which municipal authorities in "normal" cities engage in climate action under conditions of limited connections and resources.

The second reason for choosing Rizhao as a case study is that it has actively engaged in environmental protection, eco-city construction and pursued low carbon development. Rizhao has received a number of awards based on its environmental performance, including the 2007 World Clean Energy Award (WCEA) in "Policy and Law-making", making it the only city in China to have received this recognition (RMPG, 2009a). In 2008, the municipality joined the Climate Neutral Network and was recognized as a "trailblazer" on route to zero emissions (UNEP, 2008). Rizhao received the UN-HABITAT award in 2009 for green planning. The municipal leadership claims that its use of participatory planning models and innovative governance instruments contributed to its progress and to receiving this recognition. After receiving the award, the city leadership stated the goal of becoming a carbon-neutral city (RMPG, 2009a).

Media has noted the greening credentials of the city (Biello, 2008). Similar observations are expressed by international institutions (WWF, 2012) and in previous research on popularization of renewable energy sources in China (Bai, 2007a). Domestic awards include the China Human Habitat Environment Award, Top Ten Green City of China, National Model City for Environmental Protection, National Ecological Model City, National Garden City, National Sustainable Development Experimental Zone, National Sanitary City, National Pilot City of Circular Economy and National Ecological Demonstration Zone (RMPG, 2009a). Rizhao ranked first among the prefecture-level cities of Shandong Province in the assessment of urban environment comprehensive treatment for six years in a row and has been listed among the ten best cities in China for air quality (Feng & Xi, 2009; RMPG, 2009a).

These achievements suggest that Rizhao engages in development of urban climate policy and programs and that the case study should provide information about roles and strategies of public and non-state actors and configurations of collaboration in these activities. The municipality's adoption of climate programs and low carbon development goals suggest that public authorities are developing independent strategies for climate action. The case study aims to clarify the nature of these agendas and the strategies used to reach these goals.

4.2.2 City introduction

Rizhao is situated on the East coast of Shandong Province, China's third largest province in terms of population and GDP. It is located in a coastal area which functions as a national centre for heavy industry and manufacturing. The region has allegedly been home to the prehistoric cultures of Dawenkou and Longshan, and has passed under the rule of the Dynasties of Xia, Shang, Qin, Han and Tang (RMPG, 2011a). The municipal government claims that the town

Liangcheng, situated in Rizhao prefectural area, is one of the oldest city regions in the Asia, dating back to 3500-2500 B.C. (RMPG, 2011a).

After the establishment of China's People's Republic in 1949, Rizhao was placed under the administrative offices of the cities of Yishui, Jiaozhou and Linyi. Rizhao was awarded county city status in 1985, recognized as a prefectural level city in 1989, and divided into districts and counties in 1992. As a prefectural level city, Rizhao administrates four county-level divisions, made up of two districts and two counties: Donggang District, Lanshan District, Ju County and Wulian County, further subdivided into 54 administrative offices and 3014 villages (RMPG, 2010).

Figure 3: Map over Rizhao prefectural area
Source: Rizhao Municipal Government (2010)

At the time of the upgrade to prefectural status in 1989, Rizhao was facing various development challenges, such as lack of urban infrastructure and service provision and increasing environmental deterioration. The municipal government described the situation as follows:

> *Rizhao was under-performing in comparison to most other neighbouring cities in China. Characterized by low per capita incomes and poor living conditions, the city lacked planning capacity and sufficient infrastructure and services. For example, in the entire city… there existed only 49 km of road, public green space per person was less than 3m², and waste and sewage treatment plants and other pollution controls were almost non-existent (RMPG, p.4, 2009a)*

As many other cities in China, Rizhao's leadership responded to these issues by adopting of a set of urban development strategies in line with national growth policies, emphasizing industrialization as the foundation for socioeconomic improvement. Over the past decades the city experienced robust economic expansion, especially since the early 1990s. Rizhao relied on the primary sector until the introduction of Deng Xiaoping's so called "opening up and reform" programs at the end of the decade. The share of production within agriculture dropped consistently since the 1980's, along with expansion of both the secondary and tertiary sector, although the increase in service industries declined in the last decade at the expense of industrial growth (Figure 4).

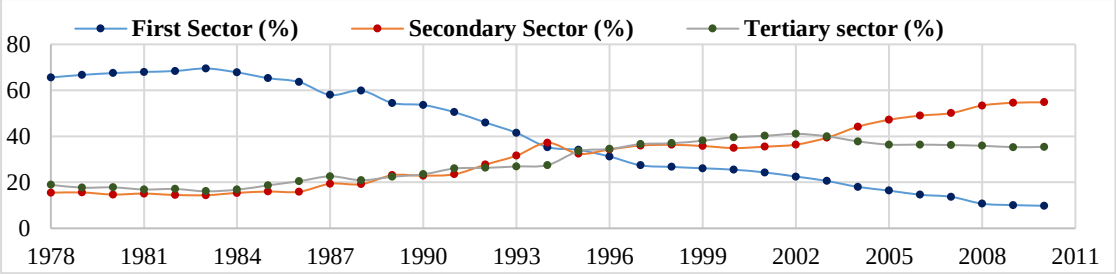

Figure 4: Rizhao Economic Structure
Source: Rizhao Municipal Yearbooks

Rizhao's seaside location played an important role in its economic development strategies. There are two harbours in Rizhao, the central port and the port in Lanshan district, both strategically located for imports. The importance of the ports were noted as early as in Rizhao's 6th FYP (1980-1985) and the central port was put into operation in 1986 (Chinaports, 2010). Figure 5 illustrates the rapid growth of the city's industrial sector, which took off in the early 1990s and gained speed in the early 2000s.

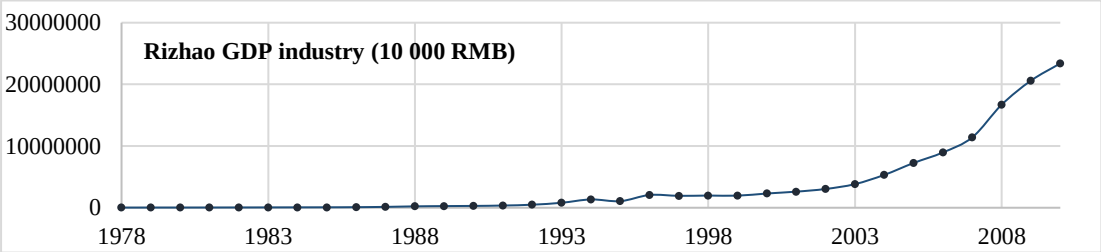

Figure 5: Rizhao industrial GDP (10'000 RMB)
Source: Rizhao Municipal Yearbooks

Rizhao's industry makes up an essential part of the urban economy, especially the heavy industry located around the two ports. In 2006, twenty years after its construction, the loading capacity of Rizhao's central port reached 100 million tons, and in 2010, the capacity had expanded to 200 million tons (RMPG, 2010; IMIW, 2013). The central port is listed as one of China's major sites for handling imports of ore, nickel, wood-chips, soybean, grain, and cement (Chinaports, 2010). Rizhao is endowed with one of China's largest ore berths and the city has become a base for national steel production, as well as for pulp and paper and petrochemical products (Ibid). Other major industries include the power sector, mechanical industry and metallurgy, building materials and electronics, textiles, biological pharmaceuticals and soybean products (CCPITRZ, 2010). By 2008, there were 38 major industrial enterprises by the port, accounting for 53% of the industry in the city (Chinadaily, 2009).

Over the past decade, by far the largest share of investments in the city have been directed towards the manufacturing sector, as shown by Figure 6. Although the second largest sector, real estate, has expanded sharply in recent years, it still made up less than a fourth of the size of the manufacturing sector in 2010. Within the manufacturing sector, the largest investments have been directed towards a number of high-resource consuming industries, including paper and pulp, petroleum processing, transport equipment manufacturing, metallic product manufacturing and chemical industry.

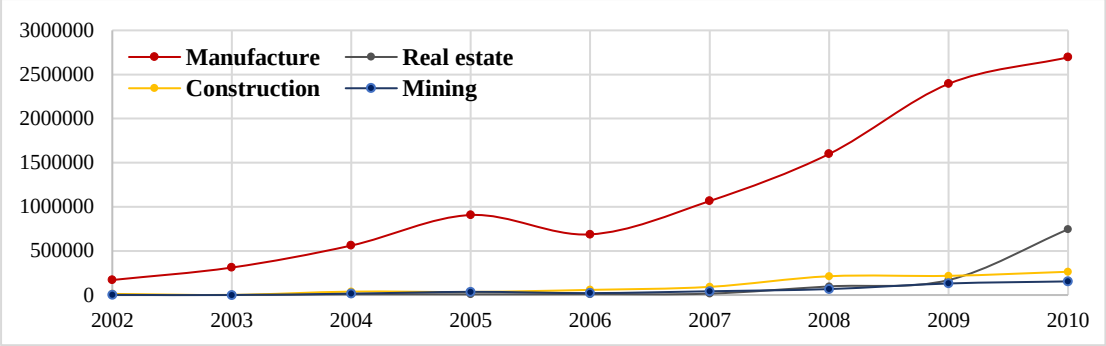

Figure 6: Rizhao total fixed asset investment by sector (2002-2010) (10,000 RMB)
Source: Rizhao Municipal Yearbooks

As a result, a substantial share of Rizhao's GDP, tax generation and employment is attributable to large industrial units. In 2013, Rizhao Steel Company reported sales income of 45 billion RMB and paid over one billion RMB in taxes (Rizhao Steel, 2013). In 2012, Rizhao Huaneng Coal Plant (the fourth largest plant in the province) had a production income of almost 50 billion RMB and paid profit tax of almost three billion RMB (Zhang, 2012a). The economic clout of these companies dwarf the economic capacity of the local government, which in 2010 reported total revenues of 5.5 billion RMB (Rizhao Municipal Yearbook, 2010).

Over the past three decades, Rizhao Municipal Government has invested in infrastructural improvements, including upgrades of roads, water infrastructure, waste and sewage management, piping for natural gas and heating, and parks and market squares. The municipal government cites that in 2010, urban sewage treatment rate reached 91% and domestic waste treatment rate 98% (RPM, 2011). Average disposable income has expanded steadily along with GDP growth, as shown by Figure 7.

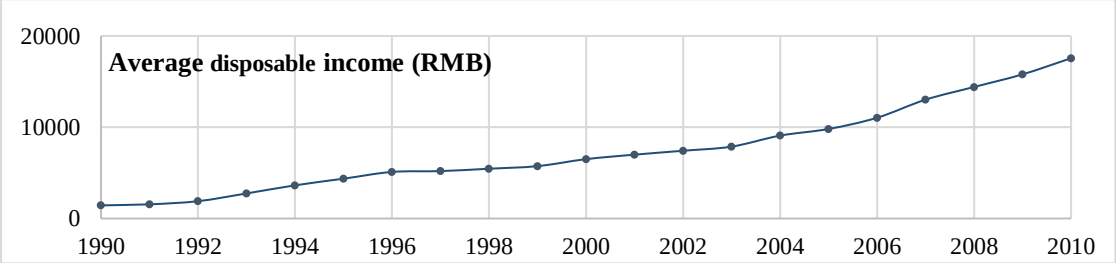

Figure 7: Rizhao average disposable income (RMB)
Source: Rizhao Municipal Yearbooks

At the same time, many of the economic activities in the city have had a negative effect on the urban environment. As described in an interview with a local academic, Rizhao was established as a prefectural level city in 1989, at this time the ecological basis was "healthy" (Interview with local policy advisor, Rizhao, 2013.05.22). In 2000, the power plant was established, followed in 2002 by the pulp mill and other large industrial projects Consequently, the quality of air and sea water was affected, and the local environment "perceptibly deteriorated" (Ibid). Air and water pollution is caused by the industrial sector, which is both resource-intense and emission-intense (Wang et al, 2009). Expansion of built up land, especially residential and industrial zones, caused arable land and forest areas to decline, contributing to loss and fragmentation of natural habitats and biodiversity, primarily in the urban fringes (Wang et al, 2009). Data from Rizhao Municipal Yearbooks shows that since the early 2000s, the area of built up land in the urban region has approximately doubled (Figure 8).

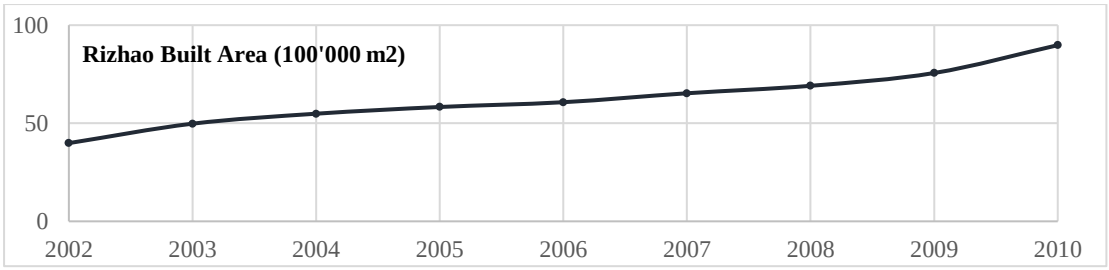

Figure 8: Rizhao growth of built up land
Source: Rizhao Municipal Yearbooks

4.2.3 Data collection

The main method for data collection were semi-structured interviews. The interviews were complemented with review of media and policy documents and quantitative data collection from Rizhao and Shandong Statistical Yearbooks. Using semi-structured interviews as a key method for data collection is common in case study research. It was used as method for data collection in most of the case studies on urban climate action listed in the introduction of this section. It is also common to combine semi-structured interviews with other data collection methods. For example, Mai and Fracesch-Huidobro's (2015) study of municipal governance networks in China uses three case study cities in China to illustrate mechanisms of municipal collaborative networks in climate action. This study combines interviews with analysis of quantitative data.

Interviews: Selection of respondents and data collection strategies

The interviews in Rizhao were carried out between January and July 2013. They included sixteen respondents from the public and private sector and academia. The aim was to speak with individuals with insight into the city's energy saving and emission reduction policies, as well as into the city's environmental decision making processes. This includes representatives of municipal authorities (the environmental protection bureau, development and reform commission, construction committee and economic and information technology commission), researchers at local universities, representatives of private companies (a paper and pulp company, chemical factory and solar technology firms), and researchers and planners who have participated in drafting plans and policy in Rizhao but are based in institutions in other locations.

The interview questions were tied to key factors explored in the study, such as the nature of participation in policy making and planning, the nature and implementation of energy programs, participation in energy policy, key environmental and energy challenges. The reason for using semi-structure interviews was to allow respondents to elaborate freely and encourage descriptions based on their respective experience and knowledge about development in the city. The semi-structures format allowed the interviews to be tailored to the different roles of the respondents. Follow-up questions were used to explore questions were the respondents demonstrated particular insight. Questions proceeded from general to specific, and from less sensitive to more sensitive topics. Information about the respondents are listed in Table 3.

Table 3: List of interviews in Rizhao

	Date	Sector	Position	Organization	Knowledge of topic
1	2013.03.13	Acad.	Local academics (Group interview)	Local university	Working with research and teaching into environmental issues at university in Rizhao
2	2013.03.13	Acad.	Teacher/researcher	Local university	Working with industrial recycling research in Rizhao
3	2013.05.22	Acad.	Senior engineer	Local university	Working with environmental research and teaching, policy advisor in Rizhao
4	2013.05.08	Gov.	Manager	Rizhao EPB	Working for Rizhao's municipal department responsible for environmental issues
5	2013.05.14	Gov.	Engineer/Planner	Rizhao DRC	Working as planner for a municipal department in Rizhao

6	2013.05.13	Gov.	Dept. Director	Rizhao CC	Working with energy saving in buildings at a municipal department in Rizhao
7	2013.05.09	Gov.	Dept. Director	Rizhao EITC	Working with promotion of recycling economy at a municipal department in Rizhao
8	2013.03.11	Private	Company Director	Paper/pulp company	Working as director at a company that has adopted large scale industrial recycling systems
9	2013.03.12	Private	Company Manager	Chemical factory	Working as manager at a factory that has adopted large scale industrial recycling systems
10	2013.05.19	Private	General Manager	PV company	Working as manager at a company producing PV products in Rizhao
11	2013.05.21	Private	Sales Manager	Solar heater company	Working as manager at a company producing solar water heaters in Rizhao
12	2013.04.19	Acad.	Assistant Professor	University (Beijing)	Working as researcher, lecturer, planner, involved in Rizhao's planning
13	2013.03.22	Gov./ Acad.	Urban planner	Planning institute	Working as urban planner involved in Rizhao's planning (CAUPD)
14	2013.05.08	Acad.	Researcher	University (Beijing)	Working as researcher involved in Rizhao's transport and spatial planning
15	2013.05.17	Acad.	Professor	University (Nanjing) / Research org.	Working with environmental research, was involved in drafting Rizhao's eco-city plan (CAS)
16	2013.05.17	Gov./ Acad.	Dept. Director	University (Jilin)	Working as research into Rizhao's urban development and ecological protection

Collection of complementary data

Complementary quantitative data was collected from Rizhao Statistical Yearbooks and Shandong Provincial Yearbooks, as well as from company websites and websites run by industry organizations and industrial alliances. This information was collected to support information collected through interviews, and included socioeconomic data (population, GDP, income, etc.), data on municipal environmental and energy trends (pollution, energy use, size of green space), infrastructure (transport, water), government budget (income and spending per sector), and (fragmented) company information (e.g. year of establishment, sales income, investment, taxes, registered number of staff energy consumption, economic savings through energy retrofits, awards for energy conservation). The quantitative data is summarized in Tables 4 to 6 below.

Table 4: Quantitative data collected from Rizhao Statistical Yearbooks

Data	**Availability**
Socioeconomic: Population	1978-2010
Socioeconomic: GDP	1978-2010
Socioeconomic: GDP growth (cap)	1978-2010
Socioeconomic: Average disposable income	1989-2010
Socioeconomic: Economic income/sector	1978-2010
Socioeconomic: Economic size/sector	1978-2010
Socioeconomic: GDP industry	1978-2010
Socioeconomic: Total exports/imports	1978-2010
Socioeconomic: Total FDI	1990-2010
Socioeconomic: Fixed asset investment/sector	Varying
Infrastructure: Length of highways	1978-2010
Infrastructure: Length of water-pipes	1993-2010
Transport: Public transport (passenger total)	1993-2010
Transport: Public transport vehicles	1993-2010
Transport: Private vehicles	2002-2010
Energy: Total energy consumption/sector	2007-2010
Energy: Total industrial energy consumption/sector	2005-2010
Energy: Total industrial energy consumption/source	2006-2010
Environmental: Population density	1993-2010
Environmental: Water use/cap/day	1993-2010
Environmental: Green area/cap	1993-2010
Environmental: Urban built up area	2002-2010
Environmental: Polluted water emissions	2002-2010
Environmental: COD emissions	2002-2010

Environmental: Sulphur dioxide emissions	2002-2010
Environmental: Dust emissions	2002-2010
Government income per source	2002-2010
Government spending per sector	2002-2010

Table 5: Quantitative data collected from Shandong Provincial Yearbooks

Data	**Availability**
Energy: Electricity consumption/10'000 RMB	2005-2010
Energy: Total industrial energy consumption of enterprises over designated size/10'000 RMB	2005-2010
Energy: Household electricity consumption	2009-2010
Energy: Industry electricity consumption	2009-2010

Table 6: Quantitative data from websites of companies and industrial alliances

Information
Registered assets of major industrial units
Year of establishment of major industrial units
Production income of major industrial units
Amount tax paid by major industrial units
Energy consumed by major industrial units
Energy savings through retrofits realized by major industrial units
Size of state support (subsidies and awards) for retrofits
Size of investments into green technology by major industrial units
Registered assets of major green-tech units
No. staff employed by major green-tech units
Year of establishment of major green-tech units

Further information was collected from government websites and news websites. The municipal government website (Rizhao.gov.cn) contains information (in Chinese) on news, local policy guidelines and implementation, websites of municipal government departments (EPB, EITC, DRC, etc.), environmental and energy achievements and projects. Key news websites include Rizhao News Web (the official news-site of the CPC committee of Rizhao Daily), Rizhao News (the online version of Rizhao TV and Radio Station), Dazhong Web (a Shandong-based site established under the State Council Information Office) and Qilu Network (the online version Shandong's TV and Radio Stations).

4.2.4 Data analysis

To find how non-state actors have been included in environmental planning processes and how planning arrangements influenced environmental development, the information from the interviews was analyzed. The structure of the analysis followed the aspects identified as important in influencing policy outcomes in policy network studies. This refers to number and type of participants, consensus/conflict, and structures of power (Jordan & Schubert, 1992; Rhodes & Marsh, 1992; van Waarden, 1992; Dowding, 1995; Aars & Fimreite, 2005; Khan, 2013).

The analysis proceeded according to the following steps. The first step consisted of going through the interview transcrips to identify the key planning documents with an influence over the environment in Rizhao. This was followed by identifying which actors have been involved in drafting key policy documents, and determining what principle has been used in including these actors. The interview transcripts were then studied in detail to identify any planning conflict related to the urban environment, which actors were involved in these, and what their views were. The next steps consisted of determining how planning conflicts were resolved, what interests and development agendas influenced decision making, and which actors are able to pursue their interests in case of planning conflict. The last step consisted of considering how planning processes influence environmental development in Rizhao, for example in terms of resource use, environmental protection and spatial planning.

To find how new modes of urban climate governance have contributed to urban climate action in Rizhao, the collected information was analyzed as follows:

- Identification of key energy saving and emission reduction policy and programs in Rizhao in relation to environmental protection, energy conservation and use of renewables in the industrial and construction sector, and emission reduction schemes in the transport and waste sectors. Climate programs are defined as projects with an explicit goal of energy conservation, increased use of renewables, enhanced carbon sinks or carbon fossil management (Solow et al, 2004).
- Identification of the role of actors from the public, private and civil society sector in each scheme, as well as nature of collaboration with other actors.
- Identification of policy instruments used in each program, as well as roles of actors, to identify mode of governance (authority, provision or enabling).
- Determine (wherever possible) energy use and environmental trends associated with climate schemes, as well as establishment of new companies, development of environmental technology and expansion of the new energy sector.

To find how partnerships have contributed to climate action in Rizhao, the collected case study information was analyzed as follows:

- Identification of whether energy saving and emission reduction schemes involved cross-sector collaboration and the actors involved in these.
- For schemes involving partnerships, form (actor constellation) and function (rule setting, service provision, demonstration, and information sharing and technology development) was determined.
- To find whether partnerships contribute to innovation, each initiative was studied to find whether it had resulted in technology or policy development, as well as the mechanisms involved.

Policy discourse analysis

To answer the second aspect of the first sub-question, the language use in national and municipal policy documents was analyzed and compared with key environmental policy priorities presented through interviews. The textual analysis focused on China's 12th FYP and Rizhao's 12th FYP, which are the main documents outlining the development agendas and policy guidelines on a national and municipal level. These documents were selected because they are comprehensive planning documents that determine overall development direction of the city in terms of economic structure, urban form, resource consumption, and environmental protection efforts.

The aim of the textual analysis was to find how environmental policy preferences are related with broader policy priorities. The assumption was that by deconstructing language use and framing of energy and environmental agendas in key policy documents, it would be possible to reveal how these agendas build on certain problem definitions and assumptions (Dryzek, 1997). Dryzek (1997) studied such belief systems by analyzing how different environmental policy discourses have been advocated by groups with diverging interests and underlying assumptions about problems and solutions over the past decades. To capture the essence of these different narratives, Dryzek created a taxonomy of environmental discourses, where "environmental problem solving" is a dominating narrative based on dealing with environmental issues through pragmatic public policy (Ibid, p.15). Three forms of problem solving are widely applied: administrative rationalism, democratic rationalism and economic rationalism. Another narrative that has gained enormous traction is the sustainability discourse. This concept was introduced through the 1987 UN Report *Our Common Future*, which combines traditional development concerns with environmental protection. The sustainability

concept has been hugely popular, because of its promise that economic development can be achieved while maintaining a healthy natural environment.

Another influential environmental discourse is ecological modernization. The theory of ecological modernization explains how industrialized nations cope with ecological deterioration by perceiving science, technology and market forces as key solutions to environmental issues (Mol, 1997). The concept represents the idea that capitalist society can transcend into an environmentally sustainable future through reliance on far sighted leaders and firms that profit on environmental friendly technology (Dryzek, 1997). The discourse portrays environmental issues as positive-sum games in which economic growth and environmental solutions may be reconciled (Hajer, p.26, 1995). The ecological modernization discourse was widely embraced because it allows societies to have it all: continued industrialization and social progress without harm to the natural environment (Gibbs, p.10, 2000). In 2005, Meadowcroft referred to ecological modernization as the strongest claim to a "general theory" in contemporary environmental politics (p.482). Although the concept now is used to a lesser extent, this thesis argues that the concept is relevant in explaining current technology centered energy policy in China.

Drawing inspiration from theories of CDA, it was assumed in this thesis that analysis of language could be used to reveal how some groups are empowered, while others are marginalized (Jorgensson and Phillips, 2002). The method used for textual analysis of the two policy documents was thematic analysis. The qualitative data analysis and research software *Atlas.ti* was used to perform co-occurrence runs of codes in the documents. The process of analysis followed the steps proposed by Braun and Clarke (2006), as is explained below.

The first step consisted of familiarization with data. The two FYPs and interviews carried out in Rizhao were read multiple times and initial ideas were noted down and compared with ideas from previous studies of environmental policy discourses. The second step consisted of generating initial codes and applying these to the FYPs and the interview transcripts. The theory guiding these creation of these initial codes were Dryzek's (1997) environmental narratives (administrative rationalities, carrying capacity, environmental protection, market rationalities, ecological limits), political slogans in China (beautification, circular economy, environmental industry development, harmonious development, livable city, resource conservation, resource efficiency, scientific development, technology and innovation, three represents), and previous studies of environmental and energy policy in China that have identified specific discourses as especially important (energy security, modernization, energy efficiency, conservation, sustainable development) (Beyer, 2006; Cherni & Kentish, 2007; Zheng & Tok, 2007; Qi et al, 2008; Meidan et al, 2009; Tsang & Kolk, 2010).

The next step consisted of refining the codes into themes. The most commonly appearing codes were clustered together and arranged into themes. When creating themes, adjustments had to be made to adjust codes based on Dryzek's environmental discourse theory to the political and language context. In particular, it turned out that discourses such as "sustainable development" or "ecological modernization" were interwoven with Chinese policy slogans (such as "scientific outlook on development"). To tackle this issue, complex concepts were broken down into components, such as "industrial upgrading", "resource conservation", "technology innovation" and "resource efficiency". After repeated reviews of the policy documents and transcripts, the large number of codes was narrowed down to a smaller number of themes that were most commonly used in the policy documents: market measures for resource saving/environmental protection, administrative measures for environmental protection, industrial upgrading for resource saving and environmental protection, technology and innovation, and ecological and environmental protection.

Next, specific searches were made to find connections behind themes. Using *Atlas.ti*, the themes were analyzed by using a code co-occurrence explorer. A co-occurrence explorer analyses to what extent codes are occurring in proximity to each other in the documents, for example by being mentioned in the same sentence or paragraph. The explorer calculates how

often different codes are mentioned in proximity to each other and represents the occurrence as a fraction (for example, out of all the references to "energy", a third are made in relation to "technology and innovation"). The co-occurrence explorer was used to find to what extent references to "energy", "environment", "ecology", "low carbon" and "climate" policy connected with the coded themes. In particular, the co-occurrence explorer was used assess connection between "low carbon" and "energy" with the themes "industrial upgrading", "technology innovation", and "ecological protection".

Finally, co-occurrence between themes in the municipal and national FYPs were compared with interview transcripts. The last step of the analysis consisted of finding how language use in the formal policy documents differed from language use in the interview transcripts. The themes in the policy documents were, in particular, compared with the way in which planners from central research institutes presented environmental issues and solutions. Any systematic differences in the way that environmental issues were framed was identified. For example, this includes tendencies of different actors to refer to environmental agendas as policy issue associated with economic development strategies, industrial policy, technology innovation, or ecological protection.

4.2.5 Case study limitations

Several challenges emerged in the research process of this thesis, especially in the first data collection phase. This includes limited access to data, including both qualitative and quantitative sources. It also includes sources of bias in the data collection, as presented in this section.

Participation in interviews

In the case study, a crucial barrier was the difficulty of securing participation of key respondents in interviews. This problem was most pronounced in Rizhao's private sector, as most companies did not agree to participate in interviews. Upon being contacted, the companies asked about permission from the top level of the municipal government, required in order to certify that the questions asked were approved by the local authorities. This issue is common in China. In a political climate where information is not shared freely and trust depends on personal connections, it is often difficult to ensure participation in research projects.

In the interviews that were carried out, there was a tendency of unwillingness of local officials and company representatives to share information. In absence of this information, a bias was created through a larger share of the information collected from planners and academics. Further first-hand information from industrial units and other firms would have been helpful in order to completely understand their role in planning and realization of local climate programs.

To handle these issues, one strategy was to employ the thesis author's position at China Academy of Urban Planning and Design (CAUPD) during the course of the data collection. As CAUPD were involved in the city's planning, the institute had personal contacts in Rizhao and were used as a reference to gain trust from respondents. This was helpful in acquiring interviews from planners, researchers and government representatives. It was not, however, enough to convince industrial units to participate in the study. As a result, none of the city's high energy consuming units (e.g. the power plant and the steel factory) participated in the interviews.

To deal with this shortcoming, information about the private sector was collected from other respondents, news articles and company websites. Another strategy to deal with this problem was to carry out member check interviews with representatives of the private sector in Shandong Province. Interviews with a steel company, two paper and pulp firms, Shandong Iron and Steel Industry Alliance and an industrial paper research institute were held in 2016. During the interviews held in 2016, the author of this thesis worked at the Science and Innovation Office of the Embassy of Sweden in Beijing, which by many actors is seen as a legitimate point of contact and collaboration. This helped to create access to the type of respondents that declined to participate in the study during the data collection in 2013.

Lack of quantitative data

Regarding quantitative data, the case study lacks information that would have been useful, such as urban energy use (over a longer time span), emission data (none was available) and energy use and emissions of sectors other than industry (e.g. energy use of buildings and residential energy consumption). Other quantitative data that would have been useful is information of the green technology sector in Rizhao (number of firms, size of profit and incomes). The data obtained in China's statistical yearbooks has been suggested by previous researchers and in interviews in this study to be unreliable. To deal with this problem, the quantitative data was not used in this study as basis for the analysis, but primarily as supportive information to indicate environmental development. The focus of the analysis is planning processes, governance mode and partnerships, where energy data would have been of much use but is not crucial to uncovering mechanisms involved in policy processes.

The difficulties in use of ethnographic observation

At the outset of the field study, the methodology of the case study was to include interviews with "the public" and ethnographic observation to get an understanding of how residents in Rizhao are involved in environmental programs in the city. One plan was to perform surveys with households to investigate drivers behind adoption of solar water heaters on buildings. These methodological approaches were abandoned during the time spent in Rizhao. The researcher spent several months in the city, speaking to people in shops, taxis, public transport, restaurants, tourist destinations, and on the streets. These discussions involved the purpose of the research project: Rizhao's environmental agendas. Broadly speaking, nobody was aware of these efforts. Several individuals suggested that perhaps the wrong city had been chosen ("perhaps you should go to Zibo instead")? Most people had no idea about the widespread use of solar heaters. Almost nobody had heard of the concept low carbon ("you mean coal? The pollution here is terrible"). Perhaps the most discouraging moment was a focus group with a number of local environmental researchers, out of which nobody was aware of the city's climate projects.

This discovery was interesting in itself, as it points to the dominant top-down approaches used in Rizhao's environmental policy. Even though municipal policy documents (RMPG, 2009a) emphasize participatory approaches, this was not reflected on the ground. This does not prove that such strategies were not used at all, but at least their traction in the population is low. While many individuals express interest in the environment, and concern with local environmental degradation, there is no sense of opportunity to affect these trends or recognition of government effort in this area.

4.3 Large-n study

This section presents the methodology of the comparative study of the thesis. This involves rational behind the selection of cities and initiatives, the method of data collection, as well as the method for data analysis.

4.3.1 City selection

For the comparative analysis, 150 climate initiatives were selected from fifteen cities in China. The cities were selected based on the criteria of being places where significant climate action has been carried out, and being places where new models of cross-sector cooperation are likely to emerge. The sample was chosen with the aim of representing leading examples, or flagship projects, of climate action on a city level.

The selection includes seven cities that were selected for NDRCs first low carbon pilot project (Baoding, Chongqing, Hangzhou, Guiyang, Shenzhen, Tianjin, and Xiamen). In 2010, the NDRC launched a low carbon pilot province and cities program, with the purpose of finding and supporting practical experiences of low carbon development that may be up-scaled in other cities (NDRC, 2013). The pilot cities were expected to prepare low carbon development plans,

formulate new policies, introduce systems for collection of GHG emission data and promote low carbon lifestyles. Since these seven cities have been part of the low carbon pilot scheme since it was launched, they can be expected to be at the forefront of experimentation with urban low carbon solutions in China.

Five cities were also selected from the NDRCs second batch of pilot cities, which were added to the program in 2012 (Beijing, Guangzhou, Kunming, Shanghai, and Qingdao). This includes Beijing, Shanghai and Guangzhou: cities that are leading in economic growth and that have been included in China's emission trading pilot scheme. For geographical variation, Kunming from the southern Yunnan Province was selected from the second batch, along with Qingdao, located in Shandong Province on China's east coast. Finally, three cities that are not included in the pilot program, but that have been described as forerunners in terms of climate agendas, have been included in the sample (Rizhao, Shenyang and Wuxi). The idea was to include cities that have pursued low carbon agendas (seemingly) independent from the central government pilot program. Rizhao has received UN-HABITAT's award for green planning in 2009 and a World Clean Energy Award for the popularization of renewable energy sources in 2007. Wuxi is engaged in an international Low Carbon Future Cities (LCFC) project, is known as a centre for clean-tech production and has launched several ambitious low-carbon, eco-city projects. Shenyang is engaged in the ICLEI network, through which it as adopted a four-step program for realizing low carbon development.

The selection displays variation in terms of socio-economic performance, economic structure and geographical location. A limitation is that Western China is not represented. The reason for this is that the relatively well-known climate projects in China are concentrated along the densely populated, high income East coast. Figure 9 shows the locations of the ten cities selected for this study, and Table 7 provides a summary of the cities included in the study.

Figure 9: Map showing selection of cities used for comparative analysis

Table 7: List of cities selected for comparative analysis

City	Province	Population[1] (2013, million)	GDP / capita (2013, CNY)	Primary / secondary / tertiary sector (%)
Chongqing	Chongqing	30	42 167	8 / 50 / 42
Shanghai	Shanghai	24	90 000	1 / 37 / 62
Beijing	Beijing	21	92 857	1 / 22 / 77
Tianjin	Tianjin	14	102 642	1 / 51 / 48
Guangzhou	Guangdong	13	118 615	2 / 34 / 64

Shenzhen	Guangdong	11	131 818	0 / 43 / 57
Baoding	Hebei	10	29 000	13 / 55 / 32
Qingdao	Shandong	9	89 000	4 / 46 / 50
Hangzhou	Zhejiang	9	92 666	3 / 43 / 52
Shenyang	Liaoning	8	89 500	5 / 52 / 43
Kunming	Yunnan	7	48 857	5 / 45 / 50
Wuxi	Jiangsu	6	134 500	2 / 52 / 46
Guiyang	Guizhou	5	41 800	4 / 41 / 55
Xiamen	Fujian	4	75 500	1 / 48 / 51
Rizhao	Shandong	3	50 000	9 / 52 / 39

[1] CK, 2014

4.3.2 Initiative selection

From each city, ten climate initiatives were selected. Climate initiatives are defined as projects with an explicit goal of either of the following: energy conservation, increased use of renewables, enhanced carbon sinks or carbon fossil management (e.g. CCS). This is based on five categories for climate mitigation strategies identified by Solow et al (2004).

The process of selecting the initiatives consisted of two steps. The first was to identify initiatives described as successful "climate" or "low carbon" projects through a systematic search of municipality websites, municipal or provincial news websites, websites of companies or local organizations, and international media. If less than ten such projects could be identified (which was the case for most cities), the second step was to identify projects that are described as having the aim of energy conservation, increased use of renewables, enhanced carbon sinks or other carbon fossil management. This was done by systematically searching the same websites as above. The initiatives have been carried out within the administrative boundaries of the cities included in this study, although a couple of initiatives are broader projects that have been implemented in multiple geographical locations.

Certain types of climate efforts are centred outside of city regions, while others are more likely to be located in cities. China's investments into large scale renewable projects, for example, are to a large extent occurring outside urban areas. This includes large hydropower projects, as well as wind farms and solar power generation projects in the Western regions. China's investments into bio-power is to a large extent based on use of agricultural and forest waste, which is collected and used outside of cities. Energy efficiency schemes in the industrial and construction sectors are, on the other hand, to a large extent concentrated in urban regions, as are most eco-city construction projects, retrofit schemes, waste-to-energy plants, and energy technology research centres. This means that there is a certain bias related to what type of initiatives are included in the selection, and that patterns of leadership and partnership are likely to differ in energy projects located in rural regions.

4.3.3 Data collection method and materials

The initiatives were collected as records in an Excel database. For each initiative, the following information was collected and filed: (1) year the initiative was launched; (2) sector; (3) type(s) of organization that led the initiative; (4) partnerships involved in the initiative; (5) functions performed by the initiative, and (6) new technologies or policy/planning practices introduced through the initiative.

Year of launch

Most of the selected initiatives have taken place in the 2000s, with the majority launched between year 2005 and 2015. In this sample, the largest amount of initiatives per year was introduced between the years 2010 and 2011. This peak may be associated with the launch of NDRSs low carbon pilot scheme in 2010. The earliest project selected in this study was launched in 1998 (a waste-to-energy plant in Hangzhou) and the latest in 2015. The year of launch of the initiatives is shown by Figure 10.

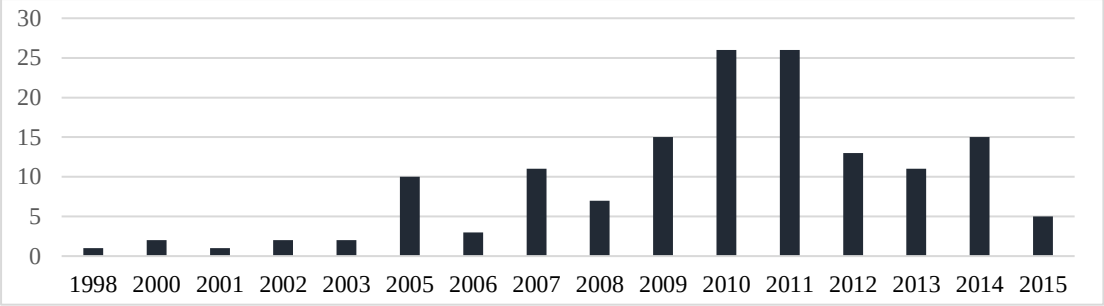

Figure 10: Year of launch of urban climate initiatives selected for comparative analysis

Sector

The initiatives were categorized into the following sectors: industry, energy, construction, transport, land use/forestry, eco-city/eco-community projects, and waste. The division is based on the categorization of climate projects used by the World Bank (2010), with the additional category of climate change information dissemination projects, understood as projects specifically aiming to spread information about climate change issues and low carbon development. The initiatives were selected with the aim of identifying initiatives from different sectors in each city. Most of the initiatives were carried out in the industrial and energy sectors, with the least number of cases in the waste sector and related to low carbon information dissemination (Table 8).

Table 8: Share of initiatives per sector of selected initiatives

Sector	Number of initiatives (%)
Industry	32 (21%)
Energy	27 (18%)
Construction	20 (13%)
Transport	19 (13%)
Land use/Forestry	19 (13%)
Eco-City	14 (9%)
Dissemination	10 (7%)
Waste	9 (6%)

Leadership

Type of actor leading the initiative was organized according to the following categories: municipal authority, company, civil society (local academia/local NGO), national or provincial authority, and foreign/international organization, and PPP. When determining leadership of the initiatives, the first step was to determine actor in charge of initiation and management of an initiative. As is discussed further in the Chapter 7, the question of leadership involves multiple aspects. Many of the initiatives that are initiated and managed by companies or local authorities are often in some way directed by higher level government policy guidelines. The issue of leadership becomes more complicated by the fact that many initiatives are managed by more than one actor, where actors take on different roles (e.g. financing, contracting, managing, designing or planning). Type of cooperation involved in the management of the initiatives, as well as a detailed account of different roles of different actors, is discussed in Chapter 7. Apart from "leading" actors, any other actors involved in the initiative were also listed in the database.

The most common actor in charge of initiatives in this sample is municipal authorities. As shown by Table 9, just over half of the initiatives (52%) in this sample are led primarily by a

municipal authority, with the second largest group being companies (36%) and the third largest civil society (10%).[11]

Table 9: Actor type leading selected climate initiatives

Actor type	Number of initiatives (%)
City authority	77 (51%)
Company	53 (36%)
Local Academia/NGO	11 (7%)
International organization	5 (3%)
National or provincial authority	2 (1%)
PPP	2 (1%)

Municipal authorities include Planning Bureaus, Construction Committees, Development and Reform Commissions, Transport Bureaus, Environmental Protection Bureaus, Industry and Information Technology Commissions or Science and Technology Commissions. The municipal departments are in charge of projects within their respective areas of jurisdiction, such as planning bureaus being in charge of spatial plans and urban form, construction committees in charge of energy saving schemes in buildings and development and reform commissions in charge of broad emission reduction schemes.

Companies in the sample include state-owned enterprises (SOEs) (58%), private companies (36%) and a few companies registered as public-private hybrids (6%).[12] SOEs include municipal firms formed out of previous departments, as well as large units that operate on a provincial level, in all of China and overseas. Private companies are primarily companies specialized in environmental technologies.

Initiatives led by local academic organizations or NGOs are heavily dominated by semi-governmental research institutes and think tanks. This includes local branches of China Academy of Sciences or China Academy of Science and Technology, as well as municipal research and design institutes. There is one university-led initiative, and only one initiative led by an organization listed as an NGO (China Sustainable Transport Centre). However, both of these organizations participate in these initiatives in role of researcher/technical advisor. In Chapter 7, this category of leadership is referred to as domestic academia, as all of the actors in this category have a research/technical profile. None of the initiatives is led by local communities. This confirms the weak role of independent civil society in China and the way in which "expert" organizations have a much stronger representation than community-led organizations or political movements in urban environmental projects.

In this sample, 4% of the initiatives are primarily led by foreign or international organizations, which include foreign firms and research institutes, international NGOs, multilateral institutions and bilateral cooperation partners. This indicates that in spite of China's increasing participation in global forums and cooperation with international organizations, the influence of international organizations on a municipal level remains limited. The cities selected for this study were chosen because they were likely to have a higher degree of internationalization than the average in China. This means that if international organizations have a weak representation here, it is probably even smaller in other urban areas. However, as will be further discussed in Chapter 7, participation of foreign organizations through partnerships is relatively common.

Only one per cent of the initiatives is directly managed by national or provincial authorities. This seems to indicate that higher level government authorities rarely are directly in charge of

[11] This share is similar, but lower, than that which was found in a study of climate experiments carried out in one hundred global cities (66%)(Castan Broto & Bulkeley, 2013).

[12] These are companies based on private and public ownership. Initiatives led by such companies are listed as company-led. The initiatives that are listed in the study as PPPs are initiatives that are led by a company and a municipality.

municipal climate projects in China, and that municipal authorities play a strong role in local action. Yet, consideration of the way in which local initiatives are shaped by higher level guidelines points to the strong influence of central and provincial government over local action.

Function

Defining the function performed through the climate initiatives follows on research of sustainability partnerships discussed in Chapter 2. A range of functions have been listed in previous research, out of which many studies conclude that "soft" functions (e.g. raising awareness, sharing information and knowledge) are most common. Glasbergen et al (2007) identify common functions as raising awareness, dissemination of information, providing technology assistance, and developing sustainable products. Pattberg et al (2012) identify a longer list: agenda setting, rule making and standard development, advocacy and lobbying, norm setting and information dissemination, knowledge production, implementation, planning, capacity-building and training, technology transfer, and service provision. Backstrand (2008) identifies advocacy, standard-setting and rule-making, implementation and service provision. Andonova et al (2009) identify information sharing, capacity building and implementation, and rule setting. This thesis categorizes initiatives into the categories of rule setting, provision of services/infrastructure, provision of incentives, information/ demonstration, technology development/capacity building, and clean production.

Bulkeley and Kern (2006) define rule setting as introduction of some sort of binding rule, including local policy, regulations and spatial plans. Rules are contrasted with what in the governance literature is referred to as "soft tools", that is, non-binding policy that influences actors in other ways than binding regulation. In the comparative analysis, the category of rule setting includes both hard and soft tools: construction requirement, emission control zones, emission reduction plans, such as comprehensive industrial emission reduction action plans, or low carbon transport plans. Provision of public service and infrastructure includes public transport, waste and energy infrastructure. Infrastructure in the form of single or multiple buildings through low carbon construction projects is not included in this category. Information dissemination includes exhibitions, campaigns or similar awareness-raising activities. Demonstration projects include low carbon buildings and districts. Eco-city projects involve spatial planning, provision of infrastructure, technology development, information dissemination and demonstration. In this study, these projects are categorized as demonstration projects, as a key function of eco-cities often is to try out and show-case new planning and technology solutions.

The principle of "technology transfer" builds on the logic that developing countries need to access technology in developed countries in order to speed up sustainable development trajectories and achieve leap-frog development. The UN and the World Bank (2015) sees technology transfers as an important aspect of sustainability partnerships. It is also an aspect that has been raised in the academic literature (e.g. Pattberg et al, 2012). Capacity building is defined as initiatives that explicitly aim to improve knowledge or tools, for example through staff training or development of new policy toolkits.

Introduction of new policy and technology

To investigate if and how partnerships contribute to new technology or policy, any "new" energy saving and emission reduction technology or policy practice was listed in the database. Deciding whether a technology or policy is new is inherently difficult, as it requires comparisons of both time and place. The literature on policy innovation generally accepts that adoption of "new" policy is a result of diffusion of policy elements from other administrative jurisdictions or other policy domains, and rarely something entirely new. This study relies on this understanding and uses Bauer and Steurer's (2014) definition of new climate policy. This was developed in the context of finding how climate partnerships contribute to policy innovation. This definition is "new instruments that have not been applied before in a sector, region, or local authority and changes in existing instruments that take climate-change adaptation into account" (p. 821, Ibid). Technology is similarly accepted as new if it is adopted

for the first time introduced in a city. Initiatives that may be expected to eventually produce new technologies or practices (e.g. research centres) are not counted below, as the outcome of such efforts is unknown.

In this study, a technology or policy is accepted as new if it is self-reported in a city as introduced for the first time, according to available information and the best knowledge of the researcher. This is a generous approach to innovation, in part adopted out of necessity. Determining if and where the technology or policy really has been used in a city before is a task that is outside the scope of time and resources of this thesis. It is possible, therefore, that technologies or policies are promoted as new in the name of promotion. There is a risk that the results over-estimate the number of new technologies or policy elements, which is taken into account in the discussion of the results.

4.3.4 Data analysis

The data analysis was carried out in the following steps:

- Determine how many of the initiatives were carried out by each type of actor.
- Determine how many initiatives in each sector were carried out per type of actor, by creating a cross tabulation table. Correlation between actor type and sector was tested using Pearson's Chi-square test.
- Determine function of the initiatives. Determine correlation between leadership and initiative function, by cross-tabulation of initiative function per type of leading actor. Correlation between actor type and function was tested using Pearson's Chi-square test.
- Determine how many initiatives involved partnerships, as well as form of partnership (actor constellation and roles of different actors), and function of these initiatives.
- Determine which initiatives involved policy or technology innovation, as well as how many of these involved partnerships. This was followed by testing correlation between partnership form and introduction of new technology and policy or planning practices using Pearson's Chi-square test.

4.4 Member check interviews

To validate the information about trends indicated by the case study and comparative analysis, interviews were held with twenty individuals with experience from working with climate issues in other cities in China, and with twenty individuals working with environmental policy in Hong Kong.

Eleven of the interviews were carried out in Beijing during the same time period as the case study. The information collected during these interviews used similar questions are those used in the case study. The questions focused on the role of cities in climate action, barriers and drivers of action, conflicting interests of different groups involved in climate action, and the role of policy instruments and planning in supporting low carbon development in cities. Information about the respondents are summarized in Table 10.

A further eleven interviews were carried out in between January and July 2016. These respondents were selected from different sectors: academia, national government authorities, international development organizations and NGOs, industrial units, consultancy firms and industry alliances. All respondents had several years of experience in working with environmental and climate issues in cities in China. The questions in these interviews aimed to check the validity of the results from the case study and comparative study of the thesis, and to provide further information about participation in policy making and planning and the role of non-state actors in these processes. Information about the respondents is summarized in Table 10.

Table 10: List of member-check interviews

	Date	Sector	Position	Organization	Knowledge of topic
	PILOT 2012.12.06	Acad.	Lecturer/Researcher	University	Research on urban development in China
17	2013.01.08	Gov.	Science Councellor	Embassy	Work with energy policy and innovation in cities in China
18	2013.01.25	Gov.	Project manager	Int. Environmental org	Work with urban low carbon policy in China
19	2013.01.29	Acad.	Research Scholar	Int. research org.	Research into energy development in China
20	2013.03.06	Gov./ Acad.	Low carbon planner	National planning institute	Drafting low carbon plans in China
21	2013.03.07	Acad.	Director of Energy/ Climate Change Research	Int. environmental org.	Working with climate change policy in cities in China
22	2013.03.08	Gov.	Senior Research Fellow	National policy research org.	Central government research into climate change policy
23	2013.04.10	Private	Eco-city planner/ Consultant	International planning/ consultancy firm	Involved in drafting low carbon and eco-city plans in cities in China
24	2013.04.18	NGO	Research Assistant	Int. environmental org.	Involved in working with low carbon policy and programs in cities in China
25	2013.04.24	Gov./ Acad.	City Planner	National eco-/low carbon city research centre	Drafting municipal low carbon and eco-city plans
26	2013.05.24	Gov./ Acad.	Urban Planner	National Planning Institute	Involved in drafting the low carbon plan of Tianjin
27	2013.05.27	Private	Eco-city planner	Semi-governmental planning/consultancy firm	Involved in drafting the low carbon plan of Wuxi
28	2016.03.04	Gov./ Acad.	Program officer	Provincial industry alliance	Representative of interests of the iron and steel industry
29	2016.04.17	Acad.	Researcher	Research organization	Research into environmental policy
30	2016.04.19	Private	Director	Steel company	Director of leading steel company
31	2016.05.02	Gov./ Acad.	Eco-city planner	Central government institute	Insight into central government environmental policy
32	2016.05.05	NGO	Project leader	Domestic NGO	Activist working with environmental issues
33	2016.05.22	Gov./ Acad.	Researcher	Industrial research institute	Representative of industrial paper research institute
34	2016.05.28	Gov.	Program officer	Central government department	Insight into central government environmental policy
35	2016.06.13	Private	Consultant/Planner	Planner	Insight into eco-city planning
36	2016.06.13	Private	Manager	Paper and pulp company	Manager of leading paper company
37	2016.06.18	Private	Vice Director	Paper and pulp company	Vice director of leading paper company
38	2016.06.20	Gov.	Director	Local EPB	Director of municipal environmental office in Shandong

In addition, twenty interviews were held in Hong Kong in June 2014. Information from these interviews was used to throw further light on the findings of the thesis. The benefit of performing interviews in Hong Kong is that researchers, policy makers, company managers and activists operate in an environment with a higher degree of freedom than on the mainland. The respondents are able to talk more freely about political issues to an extent that is impossible in Beijing. The respondents in Hong Kong provided information about environmental planning and policy and energy challenges in Hong Kong that also were used as a contrast to the mainland. Information about the interviews is summarized in Table 11.

Table 11: Information on interviews in Hong Kong

Number of interviews	20			
Dates	2104.06.01-2014.06.27			
Respondents per sector	Academia: 9	Government: 3	Companies: 3	NGOs: 5
Respondents per gender	Male: 15		Female: 5	

4.5 Generalizability and internal validity

The case study and the comparative analysis of this thesis are associated with different issues in terms of generalizability and validity. These issues are discussed in this section, addressing the qualitative and quantitative approach in turn.

In research based on case studies, generalizability to a larger population is usually difficult. As observed by Gerring (2006), case studies trade the advantages of thick descriptions for limitations in terms of generalizability of results, and they are in general not so good for providing information about a broader trends, structures and phenomena. Nevertheless, Gerring (2006) notes that in the intensive study of one case, the purpose remains to shed light on a larger number of cases, that is, the population to which the case study belongs. Even though only one example is selected, it is part of a population, which is the focus of what the case study aims to understand. The selection of a case study should therefore be based on striving for some level of generalizability.

In this case the results of the case study only aim to be representative of industrialized cities along China's East coast, as Rizhao is chosen as a "typical case" of this population of cities. The extent to which results from the case study of this thesis (the city of Rizhao) apply to these depend on how homogenous this population is with regards to the aspects under study – that is planning processes and modes of climate governance. China's centralized political system replicates administrative divisions and responsibilities across government levels and the influence of the central government is exerted in a similar manner. From this perspective it can be assumed that planning and policy making processes, as well as implementation strategies for central level guidelines, are likely to be similar to other cities in the region. At the same time, individual motives and bottom-up strategies in planning processes and partnerships can be expected to differ between cities, as well as the particular forms of linkages that are formed with actors in other jurisdictions.

This concept of internal validity derives from quantitative research where it refers to causal validity - that is - assuring the identified effect of the independent variable on the dependent variable (Kemper et al, 2002). For qualitative research, this is interpreted as ability to produce believable descriptions, convincing accounts or explanations of what is observed and a high likeliness of these being true to real life (Curtis et al, 2000). One common strategy for securing validity is to use triangulation, that is, multiple types of evidence in the form of multiple sources of data, as well as multiple forms of data, which may be either qualitative or quantitative (Creswell & Miller, 2000; Gerring, 2006). In the case study of Rizhao, this is done by combining interviews with document review and quantitative data collection. Another way strategy to improve validity of results is to use member checks (Ibid), which is also used in this study.

Finally, a key strategy for realizing greater generalizability of the case study was to combine it with a quantitative approach. This allows for trends indicated by the case study to be tested systematically. However, the database study in itself needs to deal with issues of generalizability and validity. Regarding generalizing the results of the comparative analysis, there are limitations in the extent to which the results can apply to other cities in China. To begin with, the cities are chosen to be flagship cases, suggesting that the amount of activity, multiplicity of actors and forms of collaboration in climate action is likely to be less in other cities. Also, the West and South of China are not included in the sample, and the results are probably not applicable to the contexts of this region. Further, groups with poor online visibility (e.g. NGOs) may be underrepresented in the study, as the information was collected online. Organizations without an online presence were thereby left out of the sample. As green NGOs in China often are blocked from the internet, their activities are naturally under-represented in the sample. International NGOs do not suffer from this issue, but domestic organizations might be more active in climate action than is suggested by this study. Community organizations are not represented in the same, and it is not clear if this is because lack of online presence or an actual lack of initiatives. Some actors (e.g. municipal authorities) probably also have more

interest than others in reporting their achievements online. This problem is recognized and further discussed in the conclusions of the thesis.

Another issue related to generalizability is that not all actors report initiatives in terms of "climate action". This makes the search for climate initiatives fragmented, as initiatives with other key purposes, such as energy conservation, are included in the sample. For example, eco-city initiatives do not have the primary purpose of emission reduction, although they do have the explicit purpose of resource conservation, increased use of renewables and increased size of carbon sinks (green space). If most actors had explicitly launched initiatives in the name of climate action, the sample would probably be more homogenous. The problem with this fragmentation is that the analysis of the initiatives adopted a broader focus on environmental or sustainability agendas, and that leadership and partnership models naturally vary between different forms of projects. It becomes more difficult to reach conclusions about "climate action", as trends tend to be sector-based.

Regarding the validity of the comparative study, this relates to the strength of correlations or causal relationships between variables. A key problem in establishing correlations in the comparative study is that adoption of new technology and policy is likely to be over-estimated due to the reliance on self-reported data. It is unclear whether the correlation between different forms of partnership and adoption of new solutions is affected by this. Another issue is that the small number of initiatives performed by civil society and foreign actors makes it difficult to draw conclusions about these groups. For example, there are not enough observations to tell if initiatives launched by this type of actor is associated with initiative sector or function.

4.6 Research ethics

The key data collection method of this thesis was interviews. As in all research involving information collection through interaction with individuals, research ethics were considered. The key aspects in this study were consent, voluntary participation and participation under anonymity.

Each respondent that was invited to take part of this project was first contacted via email or telephone. The aim of the research was explained to the respondent and they were asked if they wanted to participate in the project. Any respondent that did not wish to participate was excluded from the data collection process. All interviews except one were conducted through face-to-face meetings. At the beginning of these meetings, the purpose of the project was explained to the respondent in further detail. The respondents were informed that participation was voluntary and that all information would be anonymized. This information was shared through a written consent form, which the respondents signed before the interview. One interview was held over the telephone, in which case all information was shared orally. This respondent agreed over the telephone to participate in the project.

All of the interviews in this study were performed by the author of the thesis. As a young, female, Western researcher, the positionality in relation to the respondents is important. Age, gender and ethnicity of the researcher probably influenced the interview responses (this is known as "interviewer effect"). The respondents most likely understand that a researcher from a Western country asking for information about environmental performance is interested in a certain type of information, and respond accordingly. For example, positive examples may be highlighted (e.g. strong environmental performance) and negative examples glossed over (e.g. planning conflicts or the impact of company activities on the environment). In a political and social culture where sensitive information normally is not shared with strangers, respondents probably only share what he or she feels is "politically correct". In China, the relationship-culture ("guanxi"), in which collaboration and communication builds on personal relation, strengthens this tendency. The way to deal with this issue was to collect information from representatives of different sectors (triangulation of sources) and from different sources

(complementing interview information with information from documents and quantitative data).

Another issue related to positionality of the researcher is that the first round of interviews were performed when the researcher represented a Western university (UCL) and during the second round of interviews, the researcher was working for the Embassy of Sweden in Beijing. Both these organizations are associated with status and "scientific" legitimacy. The way in which this affected the research process is unclear. It is possible that it was easier (than for a Chinese researcher) to access information due to positive connotations. It is also possible that it was harder, due to being seen as an outsider. It also may be that respondents felt obliged to share information due to associations with authority. The way to handle this issue was to highlight the voluntary nature of participation.

5 Participation in planning processes in Rizhao

> *China has a saying: 'Out of two bad things, choose the one which is less bad'. We cannot please all the industries in the South area and also protect the environment and develop the tourism industry … (Interview with central planner, Beijing, 2013.04.19)*

Rizhao is trying to establish itself as a tourist destination. Central to its promotional strategy is a long stretch of white beach in the centre of the city, part of which has been developed into a water sports area. The city waterfront is an attractive site. Unfortunately, it is located next to a gigantic industrial zone with a large steel plant and paper mill. When the ocean winds blow inland, the city centre is suffocated by industrial emissions. The activities of the industrial cluster effectively ruin the city's efforts to create a beautiful holiday resort. Shutting the factories down would, on the other hand, undermine the urban economy. The dilemma epitomizes Rizhao's balancing act between reducing its reliance on heavy industries and creating alternative paths of growth. Inevitably, conflicts of interest arise in this process.

This chapter focuses on environmental planning processes in Rizhao with the purpose of understanding how stakeholders, local and external experts, and the public are involved in decision making processes. The chapter aims to answer research sub-question 1:

How have non-state actors participated in environmental planning processes in Rizhao during the 10th and 12th FYPs (2001-2015)?

Two theoretical perspectives are used to investigate the research question. The first looks at decision making from a policy network perspective (section 5.1). This approach assumes that policy making and planning can be explained by considering (resource) interdependencies, conflicts of interest, and structures of power. Using this theoretical perspective, this chapter argues that groups with access to economic resources have significant leverage over decision makers, as the leadership relies on these actors to provide continued economic expansion. Although other voices are heard during the planning process, priorities of actors representing growth agendas are much more likely to be considered. This also means that decision making is tilted in favour of local elites and that decision making arrangements contribute to protection of status quo. In making this argument, the discussion ties into studies that show how decision making in informal policy networks build on structures of power and favour economically and politically strong actors (Aars & Fimreite, 2005; Khan, 2013).

The second perspective used in this chapter is a policy discourse approach (section 5.2). This approach assumes that the way in which policy preferences are formulated conditions low carbon policy options available in planning processes. Further, policy discourses are not neutral, but favour agency of certain groups over others – in this case industrial units and clean-tech entrepreneurs. Alternative low carbon development paths are rendered invisible through the dominating focus on industrial upgrading and technology innovation. Local decision makers use the decision making space set through central level discourse to pursue win-win agendas that can be linked to low carbon development. At the same time, the inclusion of planners from central level research organization in local planning processes creates opportunities to introduce elements of alternative policy discourses on an urban level. In this way, policy targets such as long term sustainability and ecological protection gain stronger recognition of local decision makers.

5.1 Planning from a policy network perspective

This section argues that a policy network perspective explains the dynamics of policy making and planning processes in Rizhao. It demonstrates that decision making processes are characterized by conflict, uneven ability to influence decision making, and interdependence between economic and political interests. This has key implication for policy outcomes and the possibility to incorporate low carbon development aims into local planning objectives.

5.1.1 Key planning documents

Three key planning documents are studied in this chapter. As on a national level, the most important urban planning document is the municipal five-year plan (FYP). The municipal FYP contains detailed socioeconomic development goals and strategies, as well as environmental goals and guidelines. This includes targets for resource conservation and ecological protection, as well as pollution emission, and energy saving targets for industry, transport and construction. Since the 12th FYP, this document also contains guidelines for climate mitigation activities. The department in charge of the FYP is Rizhao Development and Reform Commission (DRC).

Another important planning document is Rizhao Master Plan, which determines urban spatial planning. Rizhao Planning Bureau, an authority under Rizhao Construction Committee (CC) (the local branch of MoHUrD) is responsible for Rizhao's spatial plan. Rizhao Construction Committee is also in charge of resource use in the construction sector, as well as monitoring and promoting buildings standards.

Rizhao Eco-City Construction Plan (2001-2020) is a document that details a long list of socioeconomic and environmental targets in various policy sectors. The eco-city plan is the responsibility of Rizhao Environmental Protection Bureau (EPB), the local arm of MEP. As explained in Chapter 3, eco-cities recognized by MoHUrD are built according to certain standards and central guidelines. If a city meets the targets, it can receive the label "Eco-City" and receive centrally distributed economic incentives as a demonstration city. While Rizhao's Eco-City Construction Plan contains performance indicators related to resource use (such as water consumption and popularization of "clean" energy sources"), the document emphasizes traditional environmental protection strategies, such as pollution prevention and clean-up of polluted areas. Due to the relatively early date of adoption, the document does not include a climate change mitigation or adaptation strategy.

In creating an international profile, Rizhao Municipality has drawn considerable attention to the early adoption of an eco-city building plan and the way in which this document placed environmental issues on the political agenda. However, the empirical material demonstrated in this chapter suggests that key decisions with a bearing on Rizhao's environmental and energy profile are made when drafting the FYP and the municipal Master Plan, rather than the comprehensive environmental planning document. This chapter addresses the decision making processes involved in drafting all three documents in order to capture how emission reduction agendas are influenced by broader planning strategies.

The FYP, Master Plan and Eco-City Construction Plan are city-wide, trans-sectoral plans spanning a number of policy fields (sector-based energy policy schemes are discussed in depth in the following previous chapter). These plans have considerable impact on the city's ability to pursue energy saving or emission reduction targets as decisions about the size and structure of urban industry, special lay-out and environmental targets are key factors determining urban energy use and emission profile.

5.1.2 Policy network structure

Building on studies of policy networks (Rhodes & Marsh, 1992; van Waarden, 1992; Richardson & Jordan, 1992) as well as more recent studies using an informal policy network perspective to understand local planning processes (Aars & Fimreite, 2005; Sorensen, 2006; Khan, 2013; Mai & Francesch-Huidobro, 2015), this section considers the number and type of actors involved in policy making and principles of inclusion in decision making processes.

Number and type of actors involved in planning

When drafting municipal FYPs, there is a strong top-down influence through the transfer of guidelines from higher levels of government. This transfer occurs through adoption of goals and quantitative targets into key policy documents, which are delegated to municipal departments by their provincial counterparts. This process ensures that overall planning directions are determined by higher level government authorities.

Apart from the direct transfer of targets and policy guidelines from higher levels of government, the provincial government affects decision making in other ways. One way is to make decisions in areas of strategic importance. An example relates to expansion of the port industries. Because Rizhao's port is of logistic and economic importance to the entire province, expansion of the port was demanded by the provincial government: "the port serves the entire region, so the development path had been decided on a higher level. The water way is a much cheaper transport than by land, so therefore it is needed, logistically, for the region" (Interview with central planner, Beijing, 2013.05.22). Another example relates to the development of the tourism industry. This agenda is not only a municipal priority, but a development strategy that has been promoted by Shandong Provincial Government based on the fact that few cities in the region have beaches (Interview with local official, Rizhao, 2013.05.13).

Many of the details of municipal plans are left in the hands of municipal authorities. In drafting Rizhao's 11th FYP, a number of organizations were involved in the planning process. One set of organizations participated in "consultative meetings", which included key authorities and industrial units (e.g. Rizhao DRC, Rizhao Planning Bureau, REITC, Rizhao Steel, Yatai Senbo, Rizhao Port)(Interview with local policy advisor, Rizhao, 2013.05.22). The consultative meetings involve discussions between primarily departments and stakeholders. The procedure follow the process described by He (2006): local leaders announce the function of the meeting, the participants express their opinion, and the local leaders answer questions. Discussions ensue with the aim of reaching consensus. Other organizations were asked to provide written advice, which primarily included departments not directly in charge of planning, as well as relevant academic organizations (Ibid).

Rizhao's two most recent Master Plans (1992, 2006), were drafted by the central planning institute China Academy of Urban Planning and Design (CAUPD). CAUPD is a semi-governmental planning institute that works with developing urban spatial plans, infrastructural and engineering plans for authorities on a provincial and local level. The organization carries out independent academic research, but is administratively operating under MoHUrD. The formal function of the organization is to carry out research, oversee local urban development and provide advice to local planning bureaus. CAUPD was invited by Rizhao municipal government to provide planning advice for Rizhao as early as 1992, because the leadership felt they needed external expertise to create a good spatial plan (Interview with urban planner, Beijing, 2013.03.22). The organization was invited again in 2006, because of its previous experience in Rizhao's local conditions.

When CAUPD is asked to provide a municipal master plan, the organization is delegated responsibility by the municipal Planning Bureau. In drafting Rizhao 2006 Master Plan, CAUPD cooperated with Beijing Forest University and Tsinghua University during the planning process. The process involved rounds of meetings as well as consultations with a number of organizations, including local authorities, companies, and local academia. The organizations were invited to provide opinions, and in the case of companies, provide information about their planned economic and physical expansion (Interview with central planner, Beijing, 2013.03.22). As explained by two of the urban planners from CAUPD involved in drafting Rizhao's 2006 Master Plan:

> *The government will find universities and research institutes to take part of this planning. They will normally delegate the actual planning to experts, who will point out where all the main locations of different land functions will be (e.g. industry, treatment plants, accommodation, tourist areas, etc.). After there is a lay-out of the plan, the government will convene a meeting to get opinions from local*

bodies, such as universities, research organizations, industry, the heads of different government departments, etc., and they will say what their opinions are
(Interview with central planner, Beijing, 2013.03.22)

[The planning process] included companies from the ports, from the development zones, also together with the planning team, representatives from different government sectors such as water, transport, environment, etc. The main purpose of this was to share everyone's views on the plan, and to learn about the economic situation of the companies and their projected expansion. This is necessary in order to know how much more space they are going to need if they grow, if they will attract more companies; it is a questions of industrial development (Interview with central planner, Beijing, 2013.05.08)

The meetings are also used to resolve issues of planning overlaps where responsibilities are blurred, incorporate demands of local stakeholders, and solve conflicts that arise in the planning process (Interview with local policy advisor, Rizhao, 2013.05.09). In case of overlaps between the plans, departments cooperate to make sure the documents are streamlined. As explained by one of the CAUPD planners involved in drafting Rizhao 2006 Master Plan:

We have to consider each other's plans and provide ideas if they clash. Normally they won't clash too much, as they are different areas; the FYPs are mainly economy and growth, we are urban spatial planning. The eco-city plan and the master plan do have common ground, but they are fairly streamlined (Interview with central planner, Beijing, 2013.03.22)

The recreational area along the coast in Rizhao was designed by foreign firms. International design institutes were invited to participate in a process of competition for the best design through online applications. American EDSA Design and German TZ Design participated in creating the final design of the coastal area. Their involvement was limited to the design of this specific area, and they did not take part in deciding on location and function of other parts of the city.

The drafting of Rizhao eco-city plan was delegated by Rizhao EPB to the research organization China Academy of Science (CAS). CAS is a national, semi-governmental institution that conducts research and national surveys, and functions as a think tank that provides policy advice for the central government. CAS is headquartered in Beijing, but has over thirteen branches and a hundred research institutes across China. It is an important organization in technological research and development in various scientific disciplines. CAS was invited to participate in Rizhao's eco-city planning for the same reason as CAUPD: to provide "expert" advice in the planning process (Interview with eco-city planner, Beijing, 2013.05.17).

The drafting of Rizhao's eco-city plan was carried out by Rizhao EPB and CAS, with input provided from various local stakeholders. A planner from CAS involved in drafting the document describes the process as follows:

We worked mostly with the EPB, since they were the ones we had signed the contract with. But during the planning process, we visited many other departments. We spoke with the agricultural department, the urban planning department, industrial representatives, the fisheries, etc., to find out what their thinking is, their viewpoints about the situation, and also to find out about the advantages and disadvantages about the development about Rizhao. They know a lot more than us, so we wanted the first-hand material. Also, after the plan came out, we also asked many times for their comments and tried to work out amendments according to their views (Interview with central planner, Beijing, 2013.05.17)

Table 12 below lists Rizhao's key planning documents, organization responsible for drafting the document, organization that actually drafted the document, and the organizations involved in meetings and consultations that were part of the planning process.

Table 12: Key planning documents and planning organizations in Rizhao

Name	Year	Responsible	Drafting	Meetings and Consultation
Rizhao 11th FYP	2006-2010	Rizhao DRC	Rizhao DRC	Rizhao DRC, Rizhao Planning Bureau, Rizhao EBP, Rizhao Environmental Monitoring Station, Rizhao Statistical Bureau, Rizhao

				Marine Economy Office, economic stakeholders (Rizhao Steel Co, Yatai Senbo Co, Rizhao Port Co., etc.) Local universities
Rizhao 2nd Master Plan	2006	CC Planning Dept.	CAUPD, Beijing Forest U., Tsinghua U.	Relevant government departments (Water Bureau, EPB, Transport Bureau, etc.), stakeholders (primarily companies from ports and development zones)
Rizhao Eco-City Plan	2001-2020	EPB	CAS	Relevant departments (agricultural department, the urban planning department, etc.), economic stakeholders (industrial representatives, fisheries, etc.)

The mechanism for determining which organizations participate in planning meetings of the FYP, Master Plan and eco-city plan is described as informal, but relatively predictable. It is informal in the sense that no official rule exists to determine which organizations should be included. It is predictable in the sense that key departments and large companies tend to always participate in meetings, and a number of government authorities and academic organizations are usually consulted but will not normally participate directly. The planning process is closed, as only selected organizations are invited to meetings. Although organizations from different sectors were consulted during the process in Rizhao, many were only asked to provide an opinion when documents were already drafted. This gives a comparatively large influence to planning experts who are in charge of outlining the document drafts, as well as to the organizations present during meetings.

Building on Mai and Fran Mai & Francesch-Huidobro's approach (2015), the structure of decision making networks are represented diagrammatically below. To illustrate decision making interactions in Rizhao, the decision making space within the city is represented as a circle made up of the public, private and nongovernmental space (Figure 11).

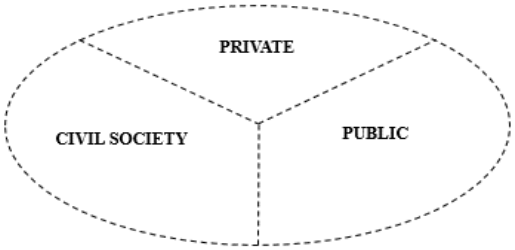

Figure 11: Decision making space on a municipal level in Rizhao

The decision making space is distributed over three administrative levels (municipal, provincial and central government), which allows the decision making space to be represented as a diagram of a cone shape (see Figure 12). Organizations (authorities, companies, institutes) are represented as boxes in the diagram. Figure 12 outlines interactions in the decision making processes of Rizhao 11th FYP, Master Plan and Eco-City Construction Plan.

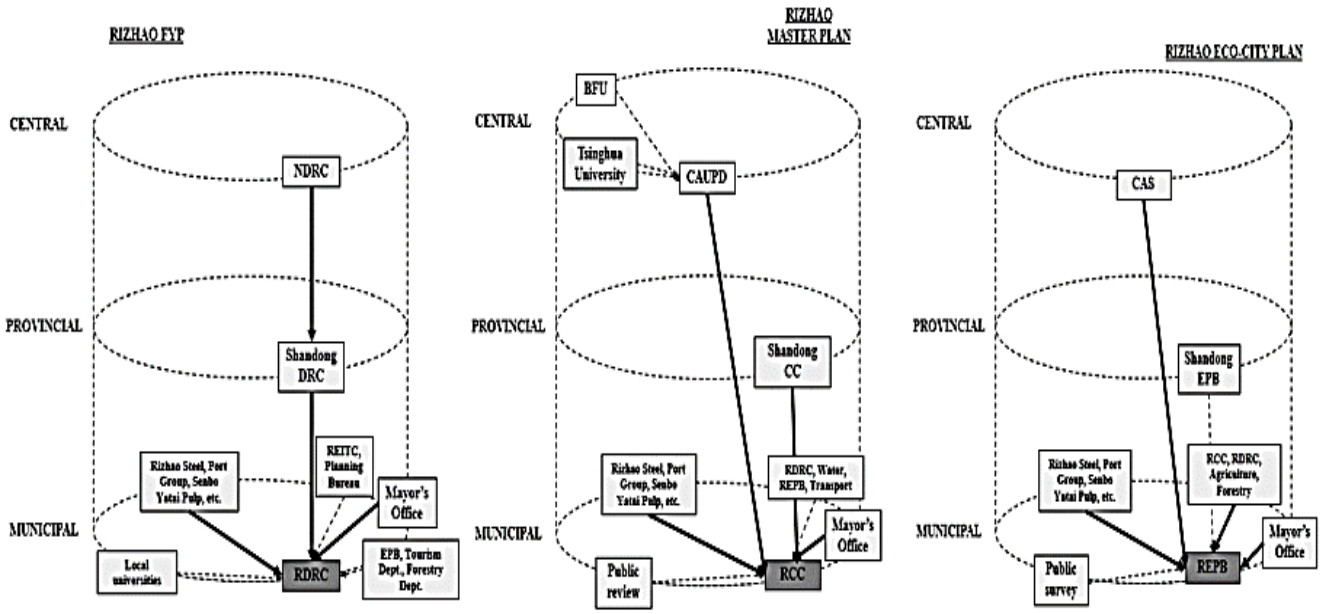

Figure 12: Decision making interaction in Rizhao 11th FYP, Master Plan & Eco-City Construction Plan

Figure 12 shows that policy making and planning processes in Rizhao involve interaction between authorities on a municipal, provincial and central level. In the drafting of all three plans, a provincial authority provided either direct or indirect guidelines. In the formulation of the master plan and the eco-city plan, research organizations based in Beijing played a key role. These interactions are illustrated by vertical lines in the diagram. Horizontal linkages have also been created, to access information or opinions. The process of formulating all three plans involved consultation with local authorities and economic stakeholders, and to different degrees, input from academic organizations and the public. These interactions are illustrated by vertical lines in Figure 12.

According to Mai and Francesch-Huidobro (2015), accessing information is an important motivation for municipal authorities to form links across levels and sectors. This case study corroborates their research. In Rizhao, two of three key plans involved the creation of *intra*governmental linkages to access expert advice. In one case, a higher level planning unit also created horizontal linkages with academic institutions to access further expertise. Local policy makers also draw on expertise from higher levels of government. For example, the formulation of Rizhao's second eco-city plan is based on its provincial counterpart. An official at Rizhao EPB states that they are waiting for the provincial unit to complete their plan so that they can receive support and guidelines when it is done (Interview with local official, Rizhao, 2013.05.08).

As in Mai and Francesch-Huidobro's (2015) study, considerable effort is directed to coordinate policy making through horizontal, intra-governmental communication. Opinions and standpoints of various municipal units were considered in all three plans examined in this case study. However, the network structure differs from their study in a couple of significant ways. Mai and Francesch-Huidobro's (Ibid) research of Southern Chinese cities points to a greater representation of professional and civil society organizations in municipal networks. The case study of this thesis highlights participation of economic stakeholders and a complete absence of NGOs. An explanation is that the studies conducted in Hong Kong, Shenzhen and Guangzhou focused on networks in specific sectors (construction and transport). As the documents in Rizhao are transsectoral plans, it is natural that they involve a greater number of general rather than specific policy interests. Formation of specific *climate* policy may have a higher representation of professional and civil society groups and a weaker representation of economic stakeholders. Another plausible reason is that civil society have a stronger

representation in Hong Kong, Shenzhen and Guangzhou than in this comparatively small city in Shandong Province.

Public participation

Regarding public pressure and the influence of citizen participation on decision making in Rizhao, the interviews suggest that this influence is very limited. Where it is expressed at all, it is either in an indirect fashion, or introduced into planning processes in a way that has little impact. A couple of respondents suggest that public pressure was one of the reasons that the local government adopted green development agendas. A local academic states that "the strong demand of the citizens was an important factor that pushed the government to pay attention to the [pollution] issues" (Interview with local researcher, Rizhao, 2013.05.17). A policy-maker believes that [the government] started introducing the recycling economy systems because the people of Rizhao were opposed to the pollution and "people were putting big pressure on the government to solve this issue" (Interview with local researcher, Rizhao, 2013.03.13). Another local researcher similarly states that "the public is becoming increasingly able to influence the government. The public pressure to handle pollution is growing" (Interview with local academic, Rizhao, 2013.03.13). Other respondents observe that the municipal leadership began to tackle pollution issues because they are themselves local residents who care about the environment, and because they want the local population to stay and work in the city.

On the other hand, neither of the respondents clarifies how public demand is articulated, and how pressure is exerted by the public towards the government. There is a lack of formal mechanisms for the public to translate their opinion into consequences for the local leadership. Limited measures exist to incorporate public opinion into environmental planning. There have been no public consultations or similar elements of direct participation. The main strategy is to allow selected individuals to express their opinion on existing drafts. The researcher from CAS that was involved in drafting the eco-city plan describes the process as follows:

> *Not so much public participation. We asked some people some questions and went to some schools to ask questions, but this in uncommon in China. It is not like in Western countries where this is common - it is not so popular here… a plan of a smaller city is likely to have more ability to take into account people's ideas, but it was not really possible in this case*
> *(Interview with central planner, Beijing, 2013.05.17)*

Similarly, the CAUPD planners confirm that the public was involved to a limited extent in drafting the spatial plans. One of the planners states that "there are not really any people involved. We did a survey but it didn't really include a lot of people or affect the process much" (Interview with central planner, Beijing, 2013.04.19). Another planner describes the procedure for public involvement as follows:

> *The public participated at three key points. The first was a survey period where surveys were used; the second was meetings between key enterprises and government departments; the third was in the planning stage, when results were presented to the public on the internet and a planning department under the construction committee used the ideas in project groups. Looking practically at these three strategies, the first one did not have that much impact, because the sample was too small. The second and third were comparatively effective (Interview with central planner, Beijing, 2013.03.22)*

The method of submitting drafts on the Internet for public reflection allows some input, but in the form of comments on existing drafts. Key debate takes place in meetings between enterprises, government departments and external advisors, where the public is not represented.

5.1.3 Environmental planning conflicts

Understanding whether policy making processes are marked by cooperation or conflict is seen as important in the policy network literature (Rhodes & Marsh, 1992; van Waarden, 1992; Richardson & Jordan, 1992). Aligned or clashing interests can produce coalitions or bargaining possibilities, which influence decision making outcomes.

This case study shows that a number of conflicts between environmental and economic priorities emerged during planning processes in Rizhao, namely in relation to pollution and land

use. Industrial activity is the main source of air and water pollution in Rizhao. There are differences in opinion between municipal authorities, economic stakeholders, external planners and citizens on this issue. Many of these conflicting opinions have been raised during the planning process.

A point of contention is the location of heavy industries in the urban area. Several large factories, including the steel plant and the pulp mill, are located in the central port zone. The activities of the factories create considerable pollution that affect the entire urban region. Planners from CAUPD suggested to move these industries out of the central city:

> *There are two key issues with the location of the central port: The first is that their key products are coal and steel. In the summer the winds are normally blowing inland and this means that the pollution from the shipping will blow in directly over the city centre. The second is related to wood imports/wood-made products. These industries use up a lot of air and water and also create a lot of pollution. For both these reasons it would be better if the port was located in the south of the city, in one cluster (Interview with central planner, Beijing, 2013.04.19)*

In spite of the impact on air and water quality in the city centre, the steel plant has refused to move, arguing that their equipment cannot be shipped to another location, that contracts of operation give them right to stay, and that the company contributes to local employment (Interview with local academic, Rizhao, 2013.03.11). The same planner from CAUPD explains that the steel factory probably won't move within a ten-year time frame, at which point the current planning period has already ended. According to the planner, "the local government will do what they can in this area, but it's hard. The industrial areas have very serious pollution. The main one is the steel industry, and they have a lot of influence (Interview with central planner, Beijing, 2013.04.19).

Another issue related to industrial pollution is the impact on water quality, which among other things affects the city's tourism industry. The same planner explains:

> *The last few years the blooming has been massive, the entire ocean is green and if you go swimming, you will become green. There is a big connection between this and industrial pollution. When the water has become like that it cannot be used for tourist purposes anymore*
> *(Interview with central planner, Beijing, 2013.04.19)*

The CAUPD planners state that a meeting will, in theory, be arranged to invite groups that are opposed to planning suggestions. This particularly relates to populations who live right next to polluting factories. Possibly, this also includes farmers who live on land designated for development. Rizhao was a fishing and farming society not long ago and may have populations that lost their livelihoods due to industrial expansion. In practice, these opinions will normally not be seriously considered when making planning decisions:

> *There are also people who do not want the factories, like the people (ex-villagers) who have to live right next to the factory. Maybe the government can deal with some pollution for the sake of the city development, but the people who live next to it don't want it. This is an inequality issue. The government will have a meeting to allow for opposing opinions, but often these voices will not be considered (Interview with central planner, Beijing, 2013.03.22)*

One example concerns health impacts of the waste-to-energy plant. In a website used for communication with local leaders ("message board for local leaders" on People's Net.com), a citizen expresses anxiety about the environmental and health impacts of the plant. The message points to villages near the projects, to the risk of emissions, and potential pollution of ground water. It notes that the location of the plant will lead to less settlement in the area, and as a result, lower value of houses and declining competitiveness of the industrial park. Nearby villages that rely on farming (of wheat, peanuts, corn, and apples) may be affected, and villagers have expressed a strong negative public opinion against the plans (RMW, 2015). The public response on the website is that the plant meets "current international most advanced environmental treatment technology standards" (RMW, 2015). There will be no polluted water discharge into water streams, and strict anti-seepage measures will be used to prevent leaching. Shandong Province Department of Environmental Protection is to make sure the project meets

all standards before and during operations, and monitoring is to be carried out in line with EIA documents (RMW, 2015).

Another issue is scarcity of water. Shandong Province is water-scarce, and access to water is becoming problematic in the entire region. Previous studies have shown that Rizhao's industrial sector is highly water consuming (Wang et al, 2009). One of the planners from CAUPD states that what Rizhao only has one main source of water, and that if the city continues expanding it will be necessary to ship water from a distant inland source (Interview with central planner, Beijing, 2013.03.22). The same planner explains that the pulp factory is a main problem – "there just isn't enough ecological capacity to support a factory that uses this much water" (Interview with central planner, Beijing, 2013.03.22). The researcher from CAS involved in drafting Rizhao's eco-city plan explains that the demand from different development interests directly conflicted both with each other and with available natural resources. From an ecological perspective, water shortages were identified as particularly problematic and was a focus area in the eco-city plan.

Land use and protection of ecologically sensitive areas, such as wetlands and mountain areas is another contested point. The main planning conflict is the question of whether to protect land areas, use them for agriculture or forestry, convert them for tourism purposes, or designate them for complete development into industrial, commercial or residential zones. As explained in Chapter 3, many urban regions in China are expanding rapidly and converting agricultural land into built up land at a fast rate. A key reason is that conversion of undeveloped land into developed areas is a quick way to generate income for municipal governments.

It is common for municipal authorities to be in disagreement on these planning issues. There is a division of opinion between bureaus that promote economic issues and bureaus in charge of the environment, tourism, forestry and agriculture. The municipal tourism department and environmental protection bureau (EPB) have argued for the importance of improved pollution control, while industrial stakeholders and economically oriented authorities argue for the importance of continued industrial expansion.

In particular, the priorities of municipal EPB and the development and reform commission (DRC) are seldom aligned. The EPB has ideas about enterprises, such as which ones pollute too much and use too much resources, and it is common for the EPB and the DRC to not be in agreement. Different municipal authorities (such as the forest department, the agricultural department, the tourism bureau, and the DRC), tend to have different opinions for "each piece of land" (Interview with central planner, Beijing, 2013.03.22). The same respondent states that "in cases where industry expands into protected zones, it should be the EPB that stops the expansion. But in cases where they have suggested that some coastal areas should be protected, the growth could still happen" (Ibid). The situation is described by the researcher from CAS as follows:

> *There were a lot of contradictions. For example, industrial departments wanted to develop the chemical industries, the power plant and the manufacturing industry in Rizhao. So there were a lot of industries and we thought they were too heavy. The agricultural department wanted to expand their activity, but we thought that would not be simple because of the water shortages. The tourist department wanted to develop the area around a lake by the coast, but we thought that it was not ready for this (Interview with central planner, Beijing, 2013.05.17)*

5.1.4 Balance of power

Balance of power in decision making networks is an important aspect affecting decision making outcomes in the policy network literature (Marsh & Rhodes, 1992; Rhodes & Marsh, 1992; Dowding, 1995). This case study shows that in Rizhao, ability to affect planning outcomes is not evenly distributed among stakeholders. Actors representing economic growth agendas have better opportunity to influence decisions of the top leadership.

According to several respondents in Rizhao, the Mayor and the Mayor's Office has the strongest influence over planning directions. Input from several organizations is considered during

consultative meetings, but the final decisions in case of conflict depend on the priorities of the municipal leadership. An academic from a university in Rizhao expresses that "if there are any contradictions between different units, the government is likely to spend more time researching the problem - they will try to find consensus and to consider as many ideas as possible, but in the end the plan is under the Mayor's Office" (Interview with local academic, Rizhao, 2013.03.13). One of the planners from CAUPD describes the situation as follows:

> *When [planning conflicts] arise we will have a meeting and discuss the options. The planners will normally present a proposal and then the issue will be discussed until an agreement is reached… In the end, it is difficult to come to an agreement, we have to discuss for a long time. Planning decisions should be based on the opinion of the majority of stakeholders involved, but the Mayor's Office has more influence over final decisions (Interview with urban planner, Beijing, 2013.04.19)*

Large industrial units play a key role in decision making due to their importance to the local economy. A planner from CAUPD states that the steel factory uses a lot of resources and is very bad for the environment "but it is still there because the economy needs it" (Interview with central planner, Beijing, 2013.03.22). The same respondent points out that the income from the steel factory has a large impact on the local government's potential to pursue environmental agendas. The share of municipal revenue that it generates is so large that when the income of the steel factory decreases, the municipal government's ability to spend money on environmental agendas is reduced:

> *In the financial downturn when the price of steel dropped, the entire economy in the city was affected. The government lost a lot of income, so they also did not have the budget room to spend on low-carbon solutions. In times of economic growth, the steel factory is doing well, the government has budgetary space, and then they think "now we can do some low-carbon spending" (Ibid)*

A local academic expresses that the consideration of environmental impacts is an important part of planning consultations. However, when it comes to actual decision making, economic arguments determine planning outcomes:

> *When they do the plan, they do consider the environment. For example with water, they have to consider all areas of water use and resources: agricultural use, industry, and all sources of pollution. There should normally be research done in all these areas as a basis for the plan. But in my experience this will be a process of 'in the day-time we research, in the night-time we vote'. Because in the end, even if there may be pollution, the government still needs to consider GDP, economic growth, factories (Interview with local academic, Rizhao, 2013.03.13)*

A group of actors with strong influence on planning processes are land or property developers. These firms have major leverage over land use decisions, as the large income that can be generated through investments into development of land systematically prevails in land use conflicts. One of the planners from CAUPD describes that regarding the decision to use an inland area for tourism or industrial purposes, the larger income that would be generated by industrial activities led to a decision in favour of industrial expansion:

> *I had an idea that they begin to develop tourism projects in the inland, in an area in Wulian. This would allow for the tourist industry to spread from the coast and to the less developed inland. But instead, this area was developed for industry and used for industries related to those in the port industrial zone. The income from the industrial activities would be much bigger than that from tourism so it was hard to push this point. In the planning process… it was the government's decision, but it might have been suggested by industrial interests (Interview with central planner, Beijing, 2013.04.19)*

The same issue is mentioned in relation to decisions of whether to protect ecologically sensitive zones. As expressed by one of the CAUPD planners, "the steel industry is developing at a very fast pace and in Lanshan we suggested to keep some environmental zones, but the industry is developing too fast so we ended up losing them" (Interview with central planner, Beijing, 2013.04.19). A similar development process is unfolding in Rizhao's northern coastal zones, suggested to be protected due to ecological sensitivity. The same respondent states that "it started out as empty space a short time ago, so it is developing very quickly ... A lot of investors

are applying to develop there, so there is a lot of development pressure" (Ibid). Development interests and generation of GDP are key factors determining if the areas will remain protected. Although the decision to protect ecologically sensitive areas should be based on environmental considerations, the department in charge of spatial planning may receive instructions from more influential parts of the government that in charge of economic issues:

> *Whether or not [the ecologically sensitive areas] will be developed will be decided by the Planning Bureau. So their position is very dangerous, ha-ha! The planning people also have people above them who will sometimes have guidelines. It is hard to say. They may say the GDP is very important, so we cannot keep the mountains. In the north, they already kept the mountains for a long time. But the industrial areas develop so fast, they are like a virus… (Ibid)*

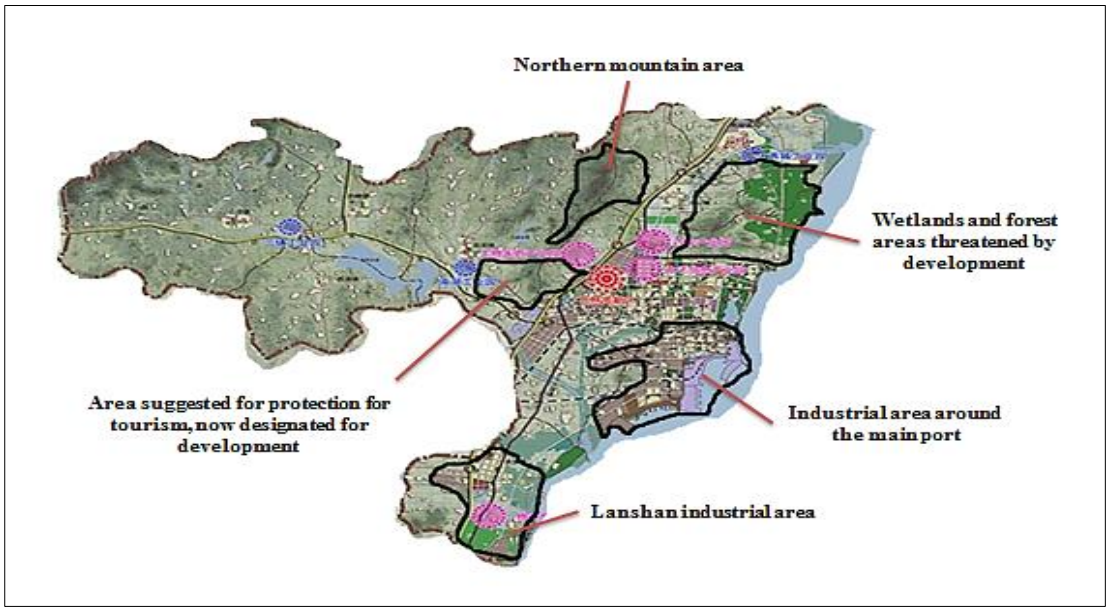

Figure 13: Rizhao zones of industrial development and areas suggested for ecological protection (based on information shared by respondents)

5.1.5 Insights derived from policy network theory

Returning to the research sub-question of this chapter: what has been the effect of including non-state actors in municipal planning processes? First, local stakeholders and external advisors play important roles in shaping municipal plans, which in turn has considerable impact on urban environmental development. Second, conflict and balance of power, aspects highlighted in the policy network literature, explain dynamics of municipal planning processes.

In Rizhao, a number of environmental planning conflicts have emerged. In order to deal with these, meetings are held with the purpose of reaching consensus, according to procedures described in previous research (He, 2006). However, final decisions are not necessarily so much a result of majority opinion, deliberation or collective agreement, as of certain organizations overruling others. There are a couple of reasons for this. Organizations directly involved in planning negotiations (key economic stakeholders and municipal departments) have a much stronger position than organizations only able to provide their opinion on existing plans (e.g. local academia and "the public").

Two network characteristics explain this situation: decision making interactions being closed or exclusive (rather than open for all) and inclusion in decision making being informal (rather than based on a formal principle of representation). A second aspect is the uneven ability to succeed in pursuing an opinion in case of planning conflicts. The Mayor's Office overrules other municipal authorities, while economically strong departments and economic stakeholders (industrial units and developers) push their priorities ahead of departments in charge of, for example, environment and tourism. The tendency for the top leadership to form alliances with economic interests is illustrated in relation to conflicts about whether to protect or develop

sensitive land areas. In these conflicts, respondents describe the priorities of the Mayor's Office and development interests as indistinguishable from each other.

These observations suggest that this decision making context produces particular ways of dealing with conflict and consensus. On the one hand, the empirical material presented in the interviews demonstrate that a multiplicity of conflicts emerge in urban planning processes. In conflicts related to pollution, resource consumption and land use, different groups have diametrically different opinions. Lines of division exist between municipal departments, as well as between departments, economic stakeholders, external planners, and citizens. On the other hand, these conflicts are not equally represented in the decision making phase of planning processes. In the meetings where planning decisions are made, only some actors are able to participate (key departments and stakeholders), and during these meetings the emphasis is on reaching consensus. Rather than to seek ways to reconcile conflicting interests, consensus is reached by allowing dominating actors with aligned interests to exercise a disproportional influence over decision making. As a result, planning conflicts are not resolved, but rather glossed over and made invisible.

The policy network literature provides further explanation to these phenomena. When actors are involved in a decision making processes without using a formal mechanism of inclusion, the choice of selection is not based on a democratic process, but on what needs to be considered to reach consensus and for outcomes to be implementable. As the distribution of power in informal decision making networks reflects deeper distributions of power in society, economically and politically powerful groups dominate planning processes, which allows for bargaining on uneven terms and outcomes that favour urban elites (Khan, 2013). Economic and political interests are interdependent on each other, implying that decision making is likely to reach results that are mutually beneficial for both groups. This explains the strong representation of economic interests in Rizhao's planning processes, as well as decision outcomes in favour of these actors. He and Warren (p. 281, 2011) argue that deliberation in China is used as a tool to "co-opt dissent and maintain social order". The observations of this case study suggests that this statement may equally be turned around to argue that deliberation is used by local interests as a tool to co-opt political decision making.

A crucial implication in terms of environmental development is that this type of decision making arrangement displays limitations in producing radical change. One risk is of decisions being trapped in status quo, which in this case implies locking municipal development trajectories into current paths of growth (Khan, 2013). There is a long standing insight in the policy network literature that in settings where the influence of interest groups is strong and the aim is to reach consensus, it is difficult to bring about reform. As stated by Richardson & Jordan (p. 265, 1983), "when consensus is still the objective (which generally it is), then it is singularly difficult to build a consensus around radical policy change". Or, as stated by Rhodes and Marsh (p.200, 1992), policy networks "are conservative in their impact because, for example, the rules of the game and access favor established interests". These conclusions are not promising in relation to opportunities of creating socio-environmental change required for low carbon development.

5.2 Planning from a policy discourse perspective

The previous section discussed how insights into conflict and balance of power explain municipal policy making interactions. It is also possible to understand the dominant position of economic interests from a perspective of policy language and problem framing. This section shows how policy discourses of industrial upgrading and technology development are intimately associated with energy and environmental policy in Chinese policy documents. As a result, low carbon policy is framed as an issue of industrial development.

5.2.1 Climate policy as industrial development

As was discussed in Chapter 3, Chinese policy documents contain multiple policy slogans introduced by several consecutive generations of political leadership. Most of these are stated as development goals at the beginning of the FYPs along with general declarations of development aims. For example, the document introductions of China's 12th FYP and Rizhao's 12th FYP, refer to "three represents", "harmonious development", "modernization" and building a "moderately prosperous society". To some extent, Rizhao's 12th FYP contain terminology of social stability and harmony in relation to environmental protection. For example, the section on industrial development refers to "promotion of the harmonious development of man and nature" (Rizhao DRC, Ch.6, 2006). However, the salience of these political slogans in the rest of the documents is low.

By contrast, references to the theme of "scientific outlook on development" are made continuously throughout both FYPs. These references are connected with a tendency to associate economic, social and environmental progress with industrial restructuring and upgrading, as well as with technological development and innovation. In Rizhao 12th FYP, it is stated in the beginning of the plan that a key expectation is a "significant change in development mode", to be realized through "rapid technological innovation enhancing and accelerating the development of the green economy" (RDRC, Ch.1, 2011). This goal calls for "efforts to achieve the coordinated development of prominent industrial development to a modern industry … from high energy consumption, and resource-use to a clean, low carbon and circular economy mode of development" (RDRC, Ch.1, 2011). This statement shows how low carbon goals are phrased as an issue of industrial restructuring and upgrading, a perspective that is apparent throughout the remainder of the document.

To gain further understanding of the association between energy and environmental policy priorities and industrial development objectives, the relationship between these concepts was assessed by measuring co-occurrence of the terms in the two FYPs (see section 4.3.5 for an explanation of the method of analysis). There are in total 115 references to energy, 98 references to environment and 70 to ecology/ecological issues in the two documents. Energy saving is a relatively mainstreamed policy issue that is integrated into various policy areas, such as industry, construction and traffic. However, by far the largest number of references to energy issues are made in relation to industrial restructuring/upgrading or technological innovation.

As shown by Table 13, a fourth of the references to energy issues in the FYPs are made in relation to industrial restructuring and upgrading issues (Table 13 shows that out of all of the times that "energy" is mentioned in the FYPs, 26% are mentioned in the same sentences or paragraphs as discussions on industrial improvement programs). Another fourth of the references to energy issues are made in relation to technology development (Table 13 shows that out of all of the times that "energy" is mentioned in the FYPs, 24% are mentioned in the same sentences or paragraphs as discussions on renewable technology research or clean tech industry development).

Table 13 illustrates how often references to "energy", "environment" and "ecology" co-occur with references to in China's 12th FYP and Rizhao's 12th FYP Together, the themes of industrial upgrading and technology innovation account for half of the references to energy issues in the two documents (highlighted in red font in Table 13). The third most common theme, "ecological protection", only occurs in 7% of the references to energy issues. References to market measures or administrative measures in relation to energy issues occurs in 5% each of the references to energy issues.

Table 13: Co-variation between energy/environmental narratives in China's and Rizhao's 12th FYPs

Theme	Energy	Environment	Ecology
Ecological protection	0.07	0.10	0.07
Market measures	0.05	0.09	0.05

Administrative measures	0.05	0.14	0.09
Industrial restructuring/upgrading	**0.26**	**0.18**	0.09
Technology & innovation	**0.24**	0.07	0.05

The reason that references to energy issues occur so often in discussions on industrial policy and technology innovation is that most of the references are concentrated in a couple of chapters of the FYPs. The chapters on optimization of industrial structure contain by far the largest number. In the national FYP, energy conservation is mentioned as an element of progress in various industrial sectors, such as the automobile industry, building materials, iron and steel, and light manufacturing industries. As part of "strengthening the technical improvement of enterprises", improving equipment and optimizing production processes, companies should "accelerate the elimination of backward technologies and equipment, and improve the overall level of integrated utilization of energy resources" (NDRC, Ch. 9, 2011). The chapter on development of a circular economy emphasizes technology upgrading, focusing on development and implementation of circular production methods and reduction of industries using backwards capacity (NDRC, Ch. 23, 2011).

The national FYP also aims for the popularization of energy-saving technology and support of R&D in relation to new energy development and new energy industries. This is associated with new energy being identified as a strategic industry under the 12th FYP. The section on fostering and developing "strategic emerging sectors" speaks of promotion of leapfrog development of key industrial fields, which includes energy-saving and environment-friendly industries, new energy sources, new materials and new energy automobiles (NDRC, Ch. 10, 2011).

In Rizhao's 12th FYP, the largest amount of references to energy issues similarly appears in the chapter on building a modern industrial system, which aims to create a resource saving society through adoption of energy efficient equipment in strategic industrial sectors (RDRC, Ch.2, 2011; RDRC). This chapter focuses in particular on the industries of steel, energy, chemical, petrochemicals, pulp and paper, and grain processing industries. Emission control is mentioned in relation to these industries, as well as the development of a circular economy and other types of industrial recycling projects. Investment into high energy consuming industries is to be restricted (RDRC, Ch.9, 2011). There is an overall emphasis on the construction of low consumption, low emission, and low pollution industries, expressed both in this chapter and in the chapter on building a "resource-saving, environment-friendly society" (RDRC, Ch.2, 2011; RDRC, Ch.9, 2011).

As in the national FYP, Rizhao 12th FYP also contains many references to energy issues in relation to supporting the emergence of strategic industries, such as new energy vehicles, new materials and "smart" energy saving products. The city is to actively support the development of clean energy, such as wind, solar, biomass, geothermal and ocean energy, as well as support investments into hybrid and electric vehicles (RDRC, Ch.2, 2011). The city also actively promotes the development of "energy efficient, environmentally advanced technologies and equipment", and the document presents plans to set up a marine energy research centre and the aim of becoming a renewable energy pilot city.

References to low carbon, climate and emission reduction goals in the 12th national and municipal FYPs confirm that these policy goals are not established as mainstreamed policy targets. In total there are 26 references to climate change, ten to low carbon (development), and 27 to greenhouse and carbon emissions. Most of the references are in the document introductions, where emission reductions are compounded with issues such as energy security, resource saving and sustainable development:

> *Global issues such as climate change, energy security and food safety are becoming protruding… In transforming the economic development mode, the importance of building a resource-saving and environment-friendly society should be stressed to save energy, reduce greenhouse emissions and*

actively tackle global climate change… through striking a balance between economic development and population growth, sustainable development will be enhanced (NDRC, Ch. I, 2011)

The only other section where climate change and low carbon development are mentioned in relation to concrete policy goals is in the chapter on climate change in the national FYP. This chapter lists a number of ambitions, such as establishing binding emission targets, improving statistical monitoring, standardization and accounting procedures, establishing an emission trading system, low carbon product standardization, introduction of a product labeling system and improving international cooperation (NDRC, Ch. 21, 2011).

The high level of similarity between municipal and national document illustrates the extent to which urban planning documents are based on their central government counterparts (as also discussed in section 5.1.2 above). There are some discrepancies in policy phrasing that point to the possibility for local planners to maneuver within the existing policy preference space. One divergence is a larger emphasis in Rizhao's FYP on eco-city building as a political achievement, and of energy issues in relation to strengthening local infrastructure (e.g. improvement of power grids in rural areas).

Another divergence is a stronger tendency in the municipal FYP to refer to the natural environment as a development asset, related to the aim of developing the tourism industry and marine economy. Rizhao's FYP describes the city's environmental conditions as an "ecological advantage" (RDRC, Ch.1, 2006). This notion becomes explicit in the section on "shaping the city brand", which aims to "give full play to 'blue sky, blue sea, golden beach' and excellent environmental advantages to develop the waterfront … driving the development and construction of the city's tourism resources …so Rizhao can become a famous seaside tourism and leisure destination" (RDRC, Ch.4, 2006). The sections relating to development of park areas similarly refer to ecological advantages and development of the tourism industry. Interviews with respondents in Rizhao reflect that the municipal leadership adopted environmental protection agendas for the sake of the tourism agenda. Tourism is one of Rizhao's economic development strategies and as part of building an attractive tourism destination, efforts to protect the natural environment have been improved (Interview with local official, Beijing, 2013.03.22). An underlying trend in these policy strategies is to frame environmental agendas as part of economic development strategies, either in relation to industrial development or city branding.

5.2.2 Ecological protection

In parallel with the emphasis on economic opportunity, the FYPs contain references to environmental agendas from the perspective of ecological constraints. The emphasis on these issues is considerably weaker. There are in total 19 references to ecological carrying capacities and ecological limits in the national and municipal FYP, most of these in the central government document.

The key problem formulation is that China is confronting increasing "resource and environmental restrictions" incompatible with the current mode of development (NDRC, VI, 2011). Chapter 18 ("Regional Development") of the national 12th FYP emphasizes the need to concentrate urban migration, industrial development and economic development in areas that are suitable to development, with consideration of the resource environment. For example, it is necessary for "key development to take place in regions where resource capacities are relatively strong" (NDRC, Ch. 18, 2011).

Rizhao's 12th FYP does recognize the conflict between economic growth and a limited amount of environmental resources. This is pointed out in the document introduction as a key development issue:

The city still has some contradictions and problems in economic and social development … due to economic growth, constraints in environment and resources will increase, there is contradiction between emission reduction targets and the goal to maintain rapid economic development; in

implementing a stringent land policy there is a contradiction between land supply and demand (RDRC, Ch. I, 2011)

In the rest of the municipal plan, environmental capacity is mentioned only once, in relation to optimizing resource use between the prefectural area's urban and rural regions and optimizing resource allocation by adjusting the industrial structure. Improving the capacity of technological innovation is thereby recognized in the same statement as the key solution for this development conflict, emphasizing the discourse discussed above.

At the same time, the interviews of the case study suggest that the involvement of planners from central planning organizations and research institutes in municipal planning has shifted development narratives in this direction. Experts from organizations like CAUPD and CAS have a high status attributed to the "scientific" nature of their advice. In some circumstances, this lends greater consideration to issues such as ecological protection and resource conservation. A couple of examples from Rizhao illustrates this point.

As part of drafting Rizhao Master Plan and Rizhao Eco-City Construction Plan, both CAS and CAUPD engaged in independent data collection related to urban pollution and resource consumption levels, and based planning suggestions in part on these outcomes. As described above, the planners from CAUPD found that their suggestion to move the steel factory out of the city centre was overruled by industrial stakeholders. The researchers from CAS were able introduce some environmental considerations into planning decisions. As mentioned above, CAS drafted the eco-city plan in cooperation with EPB and in dialogue with a number of stakeholders. Negotiations led to a number of compromises between CAS and EPB on the one hand, and the private sector and other municipal departments on the other hand. One was that the coal plant was allowed to continue operations but not to expand, and was asked to install pollution control equipment. Further, environmental standards of emissions from the steel plant and the pulp mill were raised (Interview with central planner, Beijing, 2013.05.17).

Protection against land development is an area where CAUPD has had some success. The conservation of Rizhao's coastline was originally suggested by an individual from this organization during the drafting Rizhao's 1993 Master Plan. A local official describes that a few decades ago, there was nothing along the coastline and government had no idea what to do with it (Interview with local official, Rizhao, 2013.05.13). One of the CAUPD planners states that the local government originally wanted to develop the entire area, but the "expert advice" was to keep the coast (Interview with central planner, Beijing, 2013.05.24). The beach was protected and is now key to municipal city branding schemes. The expert advice allegedly contributed to long-time preservation of the coastal area, in spite of development pressure from local stakeholders.

A local official confirms this account of events. He states that while "a lot of people" wanted to develop this zone, the government didn't "fall for the pressure of the profit of individuals" (Interview with local official, Rizhao, 2013.05.13). The CAUPD planner explains that their rationale for preserving the area, as well as mountain areas and wetland in the city, is for the sake of ecological sustainability and long term planning considerations. The contestation between these principles and local development interests are described as follows:

We actually did an ecological study of the city, where we pointed out that some parts have to be preserved… We suggested that the wetlands in the north and the nearby mountain range should be protected from further development… There are some of the ecological areas that just must be preserved, both for the sake of ecological sustainability and for tourism purposes. This includes the wetland and mountain areas in the north of the municipal area. Keeping these areas is a 30-40 year planning consideration. But there is a lot of pressure to develop them now. I'm hoping we will be able to keep them in the next 20 years period (Interview with central planner, Beijing, 2013.04.19)

Another example is the planning of a transport system that over a long term perspective may contribute to a lower emission profile. According to the CAUPD planners, this has been one of the considerations when trying to plan for the expansion of the city. Currently, Rizhao is experiencing relatively rapid spatial expansion, and the planners have considered how to

accommodate this growth in a way that allows for future transport solutions. The city is growing in a plus-shape, primarily towards the north and in the inland. This spatial lay-out will eventually cause a rise in energy consumption in the transport sector, as the population grows and private vehicle use increases. The CAUPD planner explains that the city currently is too small for BRT systems, subway or intercity railway, but the current spatial plan has been laid out so that space has been left for future construction of low carbon public transport solutions (Interview with central planner, Beijing, 2013.03.22).

5.2.3 Black-boxing low carbon agendas

Returning again to the research question of this chapter: what does a policy discourse perspective suggest about inclusion of stakeholders in environmental policy? The first insight relates to thinking of policy making processes from the perspective of dominant belief systems. An overarching tendency in China's 11th and 12th FYP is to consider development issues through the perspective of backward technological development and over-reliance on heavy industry. The key solution to these problems is perceived to be industrial restructuring and technological innovation. These strategies are expected to redeem declining economic growth rates and allow China to become a leading nation in innovation. They also represent a broader faith in economic and scientific development as unquestionable paths to progress.

The perspective of dominant belief systems explains why some policy options are seen as natural and self-evident, whereas others are removed from the policy agenda. As phrased by Owens and Cowell (p.15, 2011), "policies come wrapped in necessity", making it appear that there are no alternative low carbon options, while obscuring how the government has mobilized one particular policy preference. However, the concept of sustainability is inherently vague, and the formulation of sustainability policy always involves making priorities and choosing between development visions (Meadowcroft, 2011). In the case of China's energy policy, this priority is to support clean-up of heavy industries, development of new industries, and innovative activities of clean-tech entrepreneurs.

Another insight relates to interpretations of Chinese environmental policy in accordance with Dryzek's environmental discourse theory. While his framework guided the generation of codes and analysis of these policy documents, the results reveal how certain underlying assumptions and priorities are endemic to China's political context. Some of the Chinese discourses are very similar to those in the "West". For example, the notion of "sustainability" is deeply interwoven with economic development aims. Win-win policy options in relation to environmental agendas are emphasized in the national FYP, and even more so in Rizhao's development agendas. Where the municipal development plan diverges from the national counterpart, it is mainly in the formulation of local economic growth strategies. Although the FYPs display similar dominating policy themes, the municipal documents have a greater tendency to view the environmental issues from a perspective of development assets.

However, Chinese documents express a particular version of the "ecological modernization" discourse. Powerful narratives that emerge are those of "scientific outlook on development" and "harmonious development". The first of these two embraces the notion that economic growth and environmental protection can and should be pursued in parallel, and that technological progress and continued industrial expansion are the ultimate solutions to both backward economic development and environmental deterioration. Development options that are encouraged under this banner include renewable energy technology development, clean-tech industries, circular economy projects, and energy efficiency investments. The concept of "scientific outlook on development" implies that new paths of economic growth, based on technological improvement, are a viable solution to social, economic and environmental problems. The focus of energy policy in China's and Rizhao's 12th FYPs reflects these beliefs. Energy agendas are predominantly expressed as industrial upgrading schemes (such as encouragement of new technologies in iron and steel industries and promotion of strategic industries and industrial recycling projects), or as technology development programs (such as

development of renewable energy sources). Rizhao's energy policy is heavily influenced by this tendency. Municipal energy strategies are to a large extent based on industrial energy conservation, support of emerging industries (eco-industries), and development of renewables (these programs are described in depth in Chapter 6).

When combined with the discourse of "harmonious development", the language use diverges from Dryzek's ecological modernization terminology. The harmonious development discourse emphasizes well-being of natural and social systems, as well as social stability. At the same time, this is a discourse that undermines agency of social actors, by highlighting conformity rather than diversity in opinion and action. This tendency is reflected in the unilateral emphasis on technical and industrial issues in both policy documents. Mol (2006) has applied the ecological modernization concept in China and points to ongoing environmental protection efforts as political modernization strategies. He argues that it makes sense to think of these efforts in terms of ecological modernization. However, ecological modernization discourse in a "Western" context implies efforts of multiple institutions to respond to modern environmental problems. In Chinese policy documents, society largely remains a receiver of the state's effort to build an environmentally and socially stable system.

An important implication of these discursive practices is that the strong association between low carbon development and industrial modernization places some groups as leaders of low carbon development, in this case notably industries and technology developers. Communities, NGOs, media, citizens are made invisible ("black-boxed") because they are not part of dominating industrial improvement schemes. A comparison with urban climate action in India serves as a thought experiment that illustrates this tendency. In an account of climate initiatives in Mumbai, Boyd and Ghosh (2013) show how a range of actors are mobilized in diverse forms of collaboration in climate action. Rag pickers, a poor and socially excluded group, are engaged in waste management with the parallel aim of reducing vulnerability to flooding. Fishermen in areas threatened by impacts of climate change are organized into a collaborative body aiming to find alternative livelihood opportunities. Environmental movements and local communities work together to develop rainwater harvesting systems. An individual is collaborating with local government agencies to improve energy conservation in buildings. These examples illustrate that alternative climate action, led by actors other than industry and technology developers, is possible. Policy preferences are not pre-existing, but contextually embedded and based on economic and political priorities and dominant belief systems.

Another crucial consequence of these industrial-technical discourses is that they allows policy makers to opt for non-threatening, traditional1` approaches, rather than considering dramatic changes in social systems required to tackle socio-environmental concerns (While et al, 2004). The risk in uncritical application of ecological modernization discourse and related narratives lies in disproportional focus on technological innovation and industrial progress, while overlooking complex social and political contexts and the barriers to reconstructing institutions (Romero Lankao, 2007). Policy making and planning under the banner of ecological modernization – or in this case scientific outlook on development - may "legitimize the continuing instrumental dominion and destruction of the environment" and support undemocratic forms of government (Christo, p.228, 2000).

The empirical evidence presented also provides further understanding of how external research institutes shape local policy discourses. Previous research in China has shown that GONGOs act as advocacy coalitions that introduce new concepts into policy discourse and build public recognition of certain environmental policy options (Francesch-Huidobro & Mai, 2012). This case study illustrates that inclusion of such organizations in local planning processes can shift debates in a direction that places stronger emphasis on long term sustainability concerns and ecological limits. The contribution is to show how policy preferences that are promoted by central advocacy coalitions travel across government levels and are reproduced in urban planning processes.

6 Modes of climate governance in Rizhao

Rizhao has adopted the aim of becoming a carbon-neutral city. That is an ambitious goal. It is especially likely to be a challenge for an urban region with an economy heavily reliant on the industrial sector, which in turn depends on coal. As was demonstrated by the previous chapter, there are fundamental conflicts between the aim to protect the environment and to continue industrial development activities. This chapter investigates what has been done to place Rizhao on a low carbon development path. In doing so, the chapter aims to answer research sub-question 2:

How have different modes of urban climate governance contributed to climate mitigation in cities in China during the 10th to 12th FYPs (2001-2015)?

This chapter presents the emission reduction and energy saving schemes adopted by Rizhao's municipal government, and demonstrates that these involved a mixture of climate governance modes (6.1). Environmental regulation plays an important role and Rizhao Municipality used a regulatory approach to achieve popularization of renewable energy in the construction sector. This points to the continued importance of traditional modes of steering, as well as the potential for Chinese cities to use local binding requirements to generate change. Provision as a climate action strategy is illustrated by Rizhao's investment into low carbon public transport. In delivery of major infrastructure projects, the municipality relied on partnerships with external SOEs. These companies provide economic and technical capacity that may be lacking within municipal institutions. To complement administrative schemes in the industrial and construction sectors, Rizhao has resorted to the governance mode of enabling. This involves training, audits and benchmarking, as well of promotion of energy conservation as "good business". In interviews with local officials, respondents refer to the use of information based tools as crucial for companies to adopt green practices.

Further, this chapter shows that formal partnerships as a governance mode is limited in Rizhao (6.2). The municipality has established partnerships with bilateral partners and "expert" organizations to access technology and information in demonstration projects in the construction sector. Public authorities also attempt to engage "owners' representative groups" in retrofits of residential buildings. Nevertheless, an area in which partnerships play an important role is in development of energy saving and emission reduction technology. This involves top-down initiatives consisting of establishment of collaborative innovation platforms. It also involves bottom-up formation of collaborative arrangements that facilitate technology transfers and technology development.

6.1 Climate action through regulation, provision & enabling

This section demonstrates that Rizhao Municipality has relied on a mix of governance modes to deliver energy saving and emission reduction schemes. The city's most well-known achievement – popularization of renewable energy in the construction sector – was realized through introduction of local regulation. However, the city used provision and a combination of incentives and information-based instruments to support energy saving in the industrial and construction sectors.

6.1.1 Environmental regulation

During the time period between the 10th and 11th FYPs, Rizhao did not have a specific policy strategy for controlling emission of greenhouse gases. Instead, the municipality focused on energy saving, promotion of renewable energy sources, and reduction of pollutant emissions (such as SO_x and $NO_{x)}$ as separate policy strategies.

Control of pollution emissions in Rizhao is a typical example of traditional environmental management. Emission control is regulated using maximum air and water pollution emission

levels set by the central Ministry of Environment and monitored by local EPBs. Units that exceed pollution standards are fined, and can be listed as transgressors on the municipal government website. In cases of repeated transgressions, heavily polluting companies can be denied expansion or be forced to shut down. In spite of increasing industrial activity, levels of air and water pollution were kept at a steady level or somewhat declined over the past five years, as shown by Figure 14:

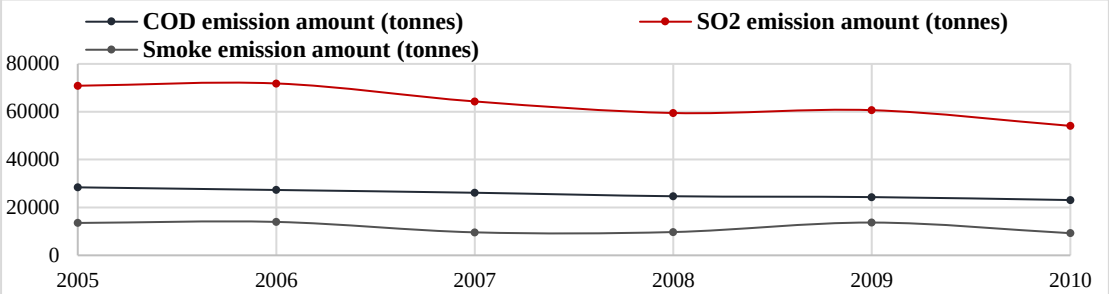

Figure 14: Rizhao pollution emissions (tonnes)
Source: Rizhao Municipal Yearbooks
COD: Chemical oxygen demand, a proxy indicator for organic materials in water
Smoke emission: An indicator for air pollution

The enforcement of environmental legislation is associated with problems commonly encountered in traditional management of environmental issues. A local academic explains that Rizhao EPB has limited funding, which causes difficulties in monitoring due to lack of personnel, technical capacity and ability to collect reliable statistics (Interview with local academic, Rizhao, 2013.05.22). The same respondent makes the following statement:

> *[The EPB] should know how much pollution is in the water and check how much every business is polluting. But actually, this doesn't really work because they don't have a way of controlling the individual pipes. There are a number of reasons why the water pollution control fails, and this is one of them. Another reason is that the EPB doesn't have enough influence or funding to control all the factories… and another issue is that polluting factories should be fined, but the fines are often too small, and since the cost of new equipment is much higher, the factories often don't care about the punishments (interview with local academic, Rizhao, 2013.05.22)*

The EPB fines are too low to incentivize factory upgrades, as investment into pollution control systems are expensive. A company manager in Rizhao notes that large scale systems such as water recycling equipment are very costly: "in order for other companies to adopt this kind of systems, they firstly need to reach a certain size. Secondly they must have a certain level of investment capacity" (Interview with company manager, Rizhao, 2013.03.19). Smaller units that exceed emission limits but cannot fund investment into new equipment thus continue polluting and pay the fines, or eventually shut down. In this sense, regulation is a rather blunt tool that does little to help industrial units innovate or adopt new practices.

6.1.2 Solar water heater program

The wide-spread adoption of solar water heaters is the Rizhao's most well-known sustainability achievement. In 2007, the municipality estimated that up to 99% of households in the city centre and 30% in the suburbs used solar water heaters (RMPG, 2009a). The efforts to promote solar heaters in Rizhao began as early as 1992, making the city one of the first in China to engage in the issue. One reason for this is that the Rizhao Environmental Protection Bureau (EPB) took part of an international training program in the early 1990s. This highlighted promotion of renewable energy technology and environmental protection (Interview with policy advisor, Rizhao, 2013.03.13)

In the early 1990s, solar technology products were not produced locally. The Mayor chose to support the local solar panel industry by providing subsidies to firms engaged in solar technology research:

The technological level of enterprises in Rizhao was comparatively low-end. We needed better technology in order to carry out the widespread adoption of solar energy here, and the technology was available on the international market. But, the international companies were not allowed on the domestic market, so we could not access it. So, the government instead decided to financially support the local market, so that they would reach a higher level of technological production (Interview with local official, Rizhao, 2013.03.15)

The research support contributed to technological breakthroughs through reduced price levels and development of a simple model that can be attached to the top of buildings (Bai, 2007a). With a purchase price at the same level as electric heaters but operating for free, households save money by adopting solar heaters (up to 14,000 RMB over a period of 15 years) (Ibid). As a further economic incentive, solar heater installations are supported by the municipal government with a subsidy of 8 RMB/m^2 (Interview with local official, Rizhao, 2013.03.15).

However, according to a local official at Rizhao Construction Committee, administrative instruments were more important than cost considerations in the mainstreaming of solar heaters in the city. Rizhao Municipality has adopted a local policy requirement through which any building blueprints that lack solar heaters fail to pass approval (Interview with local official, Rizhao, 2013.03.15). According to the official, most buildings had solar heaters installed as a result of these design requirements. The same respondent attributes the successful implementation to "a unique construction management system for hot water. In this system, the design, planning, and construction are all handled by the same department. This gives more power to the sector and we can enforce it on our own" (Interview with local official, Rizhao, 2013.05.15). Other reasons for the mainstreaming success include political support. Increased use of renewable energy is viewed as a political achievement, and the Mayor's Office strongly supports the policy. Officials in the outskirts of the prefectural area are less prone to prioritize this goal, leading to lower levels of adoption in the rural regions. Another reason is that the cost of houses in the outskirts of the city is lower and life-span shorter, making the addition of solar equipment proportionately more expensive relative to construction costs (Ibid).

6.1.3 Transport & waste management

Low carbon public transport and waste infrastructure in Rizhao has been provided both by municipal authorities and through public-private partnerships. Since the 1990s, Rizhao Municipality has increased the number of buses, leading to a steady increase in the number of total public transport trips (Figure 15). In 2014, the municipality invested in bus stops and bus cards operated through an electronic system, to make the ticketing and use more convenient (TBGJXW, 2014a).

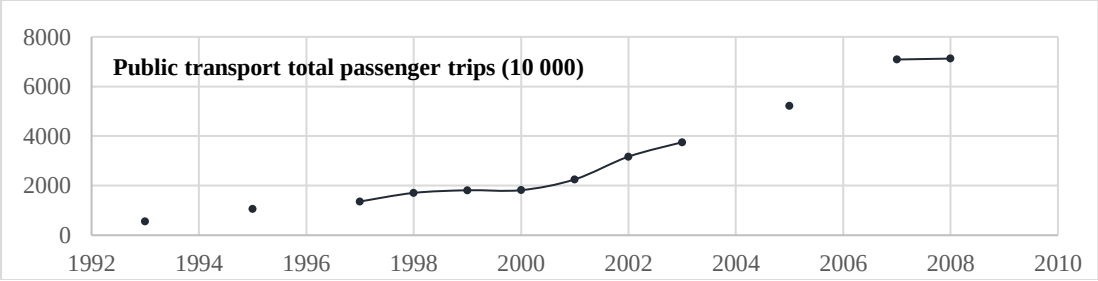

Figure 15: Rizhao public transport total passenger trips (10'000)
Source: Rizhao Municipal Yearbooks

In 2012, Rizhao Municipality invested in 40 new energy buses, followed in 2013 by the retirement of 50 polluting vehicles (TBGJXW, 2013). In 2014, municipal authorities invested one hundred million RMB into 150 new energy buses and electric charging stations (TBGJXW, 2014b). This included hybrids (gas-electricity), pure electric buses, and buses running on gas. The total number of new energy buses in 2014 reached 290, accounting for half of the buses in the city (QLW, 2014). The motivation behind the investment was to improve air quality and reduce pollution, ease traffic congestion, reduce energy consumption, and contribute towards the long term protection of the urban environment (Ibid). The transport program was publicly

funded and managed. The decision to invest in new energy buses was made by the Municipal People's Congress, Rizhao Financial Bureau provided funding, and management is handled by Rizhao Transportation Bureau (Ibid).

In 2015, Rizhao Municipal Government signed a cooperation contract with China State Construction Engineering Corporation (CSCEC) to implement 15 major infrastructure projects to a value of 36 billion RMB through a Public-Private Partnership (PPP). CSCEC is one of the largest infrastructure companies in the world, a Chinese SOE with extensive overseas operations. According to a media statement, the cooperation project between Rizhao Municipality and CSCEC aims to "broaden financing channels, improve infrastructure and the quality and efficiency of public service delivery … and enhance the city's comprehensive competitiveness" (People's Net, 2015). The project will expand public transport infrastructure through construction of a rail line to the north of the prefectural area (People's Net, 2015).

In the waste sector, a waste-to-energy went into operation in 2015. The total investment reached 350 million RMB, the plant has an incineration capacity of 600 tons, electricity generation capacity of 12 MW, and annual generation capacity of 72 million kWh (power for 40,000 households) (QLW, 2015). The project is a Build-Operate-Transfer (BOT) project between Everbright International and Rizhao Municipality. BOT-schemes are projects in which a company is granted a concession from another actor to finance, construct and manage a project. This project will be transferred to the municipality at the end of the concession period, at which point the company is to have recovered its investment and operating expenses. Everbright International is another gigantic SOE specialized in "environmental technology", such as waste treatment (Everbright International, 2016). The project feasibility study and design work was undertaken by the Chinese Academy of Building Construction, and approved through an EIA conducted by the Environmental Science Research Institute in Shandong Province (RMW, 2014).

6.1.4 Energy conservation programs

Energy conservation standards and targets in the industrial and construction sectors are administrative policy schemes adopted by China's central government. However, this case study shows that local enforcement relies on enabling: training, benchmarking, auditing, activities and developing energy saving strategies in collaboration with companies. This section presents and discusses these strategies.

Industrial energy consumption

As already mentioned, central binding energy conservation targets were integrated into China's national 11th FYP and raised in the 12th FYP. According to a "veto" system adopted by Shandong Province in 2006, failure of districts and enterprises to meet energy targets result in immediate exclusion from promotions, potential bans on company expansion, and dismissal of leading cadres (Shandong Government, 2008b). In 2012, Rizhao began to sign energy target liability contracts with all enterprises with an energy use above 5,000 tons standard coal (Tsc) (TPYY, 2012). 26 enterprises (24 industrial units and 2 transport companies) signed agreements to meet energy saving targets before 2014 (Ibid). The allocation of quotas was handled by Rizhao Development and Reform Commission (DRC) and monitoring was carried out by the DRC and Rizhao Quality Supervision Bureau (QSB). A municipal Energy Conservation Office under Rizhao Economic and Information Technology Commission (EITC) has the responsibility to promote clean production, enforce energy legislation and monitor key energy consuming enterprises, implement a statistical system and distribute energy saving funds (REITC, 2012).

Industrial energy use accounts for around 70% of Rizhao's urban energy consumption (Rizhao Municipal Yearbooks, 2007-2011). In 2009, industrial consumption of raw coal and coke

flattened out and even decreased slightly (Figure 16).[13] This trend is explained by introduction of one million tons of bio-waste into the energy mix, efficiency upgrades and adoption of industrial recycling systems in the city's key energy consuming units.

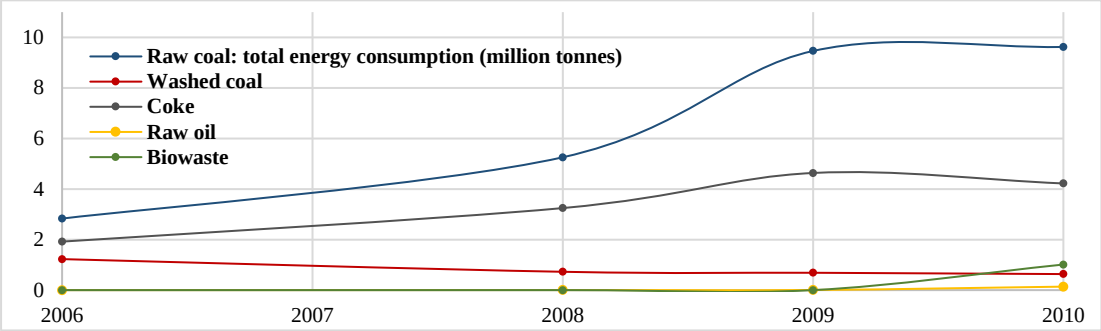

Figure 16: Rizhao industrial energy use by source 2006-2010 (million tonnes standard coal)
Source: Rizhao Municipal Yearbooks

As industrial energy use accounts for a large share of total consumption, energy efficiency upgrades of key industrial units have a large impact on the urban energy profile. As illustrated by Figure 17, the energy efficiency of Rizhao's key industrial enterprises displays the same inflection point as that of total urban energy consumption in 2009. In 2006-2007, Rizhao was one out of only three cities in Shandong province that failed to meet industrial energy efficiency targets (energy use per 10,000 RMB increased by 5.7% from the previous year) (CCG, 2007). However, in 2013 all key enterprises were on track to meet the targets, and four companies exceeded the required levels (Rizhao Steel, Rizhao Power Plant, Rizhao Port Group and Shandong Wuzheng Group) (SEITC, 2014).

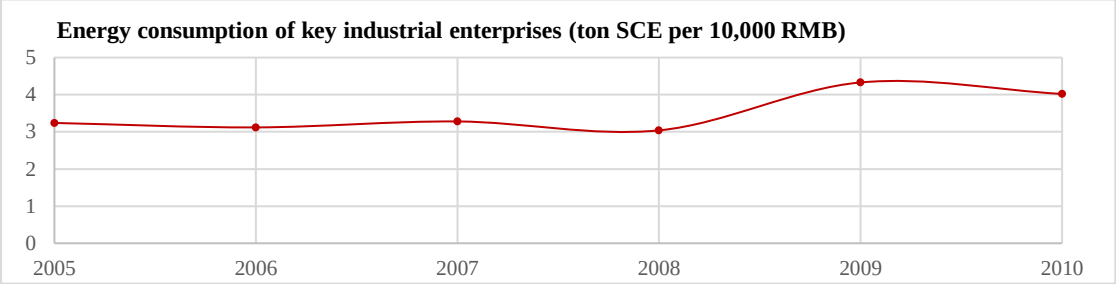

Figure 17: Rizhao energy efficiency of key industrial enterprises (Tsc/10,000 RMB)
Source: Rizhao Municipal Yearbooks

Data reported in Rizhao Municipal Yearbooks indicate that the economic resources of Rizhao Municipal Government are limited. It is impossible for municipal authorities to fund energy saving investments of local firms, which involve high initial capital costs (Interview with planner, Beijing, 2013.03.22). Figure 18 demonstrates the size of Rizhao Steel's investment into environmental technology in relation to municipal spending on basic services and on the environment (Rizhao Municipal Statistical Yearbook; Rizhao Steel, 2011). The figure shows that in 2010, Rizhao Steel spent around ten times more on green technology than the total size of municipal spending on environmental investments.

[13]Data on energy consumption in Rizhao's municipal statistical yearbooks is available from 2005. Other than the industrial sector, there is no disaggregated data on energy or electricity consumption available at an urban level. There are no (publicly available) data for carbon emissions for any sector.

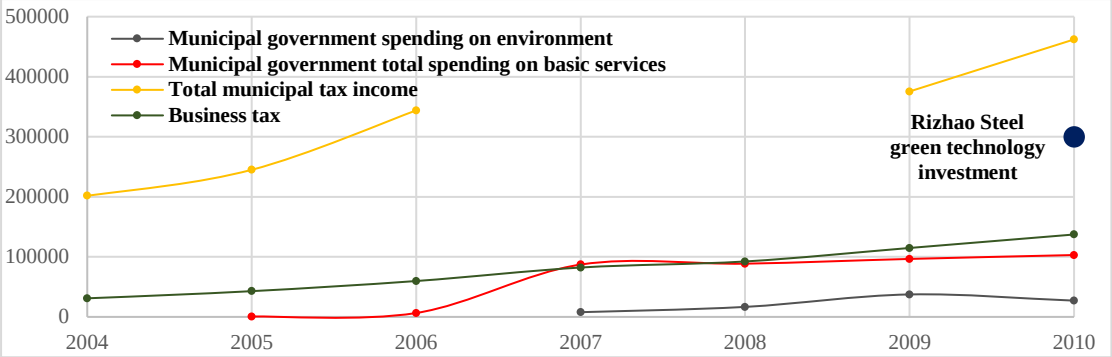

Figure 18: Rizhao relative size of municipal spending and private investments into green technology (10'000 RMB)

Due to the limited budget of the municipal government, economic incentives for industrial upgrading have instead been provided by higher levels of government. In 2011 Rizhao Port Group received funding from the Ministry of Transport for a number of energy saving projects (GLINFO, 2012). In 2011, China's Ministry of Finance distributed 17 million RMB to Rizhao for the purpose of eliminating "backward production capacity" in the cement, alcohol, printing and dyeing industries (REITC, 2011c). In 2010, Shandong Government distributed Special Awards and Excellence Awards consisting of one million RMB or 50,000 RMB for units with outstanding energy saving contributions (REITC, 2011a; REITC, 2011b). In 2011, nine enterprises in Rizhao received this funding for investments with a potential of contributing an annual saving of 89,000 tons of coal (REITC, 2011c).

Rather than setting rules or providing incentives, the role of the municipal government in implementing energy conservation policy has been to act as an enabler. Part of the liability energy contracts involves establishment of energy management systems, energy conservation audits and regular training sessions held by Rizhao EITC and Rizhao QSB. An official at Rizhao EITC states that their work involves energy management activities, demonstration projects of energy management, introduction of energy measuring and monitoring systems, and efficiency benchmarking activities. The office also helps companies improve energy evaluation and examination systems, organize and implement energy conservation projects, improve efficiency supervision systems, while supporting public awareness (Interview with REITC official, Rizhao, 2013.05.09). Regular interaction and collaboration around strategies to meet the targets is essential to implementation, according to the same official (Ibid).

A factor that enhances effectiveness of energy efficiency programs is pressure from the market to step up competitiveness. Market pressures are an important motivation for companies to adopt energy saving and emission reduction equipment. An official at Rizhao EITC explains that companies "make money by switching to these technologies; as far as I know, most enterprises are following this development path" (Ibid). As explained by a company manager at a paper and pulp plant in Rizhao:

> *The energy system was adopted primarily for economic reasons. For example, when the company chose to install the tree transportation line [which saves fossil fuels], that was because it is better than using trains or cars, based on economic considerations. Our type of factory cannot continue existing on a high-carbon model; it is too expensive (Interview with company manager, Rizhao, 2013.03.11)*

In a media interview, a manager at Rizhao Steel similarly points to market pressures as a key motive behind adoption of energy conservation technologies:

> *The steel industry has entered an era of limited profit… The implementation of energy conservation… is related to the company's future survival and development strategic choice and is the only way… the circular economy will undoubtedly open another door, which also helps the company to get rid of energy shortages (Rizhao Steel, second paragraph, 2011)*

This citation shows how Rizhao Steel frames energy conservation as an economic opportunity and a necessary measure in the current context of high market pressures.

Construction sector

Energy saving standards is a key instrument used to control energy use in the built environment. Detailed requirements for energy saving in buildings were introduced by China's Ministry of Housing and Urban Development's (MoHUrD) regulations on energy conservation in the construction sector, adopted in 2005. These include financial punishments and denial of building licenses or blocking of funding for units that fail to meet standards (MoHUrD, 2005). These regulations were followed by a list of requirements issued by Shandong Provincial Government, which detail energy saving standards in buildings and implementation guidelines, such as denying licenses to projects that fail to meet minimum energy conservation requirements.[14]

Energy saving standards enforced by Rizhao Construction Committee are set by Shandong Provincial Government. According to local guidelines, any construction that does not meet energy efficiency standards is considered a "failed project" and will not be granted building approval (RMPG, 2009c). Projects can be blocked by refusing to issue certificates or asking banks to block funding (Interview with local official, Rizhao, 2013.05.13).[15] In 2010, 40% of the buildings in Rizhao were reported to reach provincial energy use standards, contributing an annual energy saving of 207'000 Tsc (RPM, 2011).

In 2012, Shandong Province adopted a target to reach over 50 million m^2 of green buildings (Rizhao Fangdichang Wang, 2013). In response to the provincial target, Rizhao Construction Committee issued a guideline stating that real estate development projects above 80,000 m^2 and single constructions over 10,000 m^2 have to meet green building standards. The government estimated that by 2015, 30% of buildings would meet green building standards (RMPG, 2012b). Economic incentives from higher levels of government is provided in this sector as well. The central government rewards two-star and three-star green construction standard projects with a 45 RMB/m^2 and 80/m^2 subsidy (RMPG, 2012b). On a provincial level, three-star green construction standard projects are provided a 50 RMB/m^2 subsidy, two-star standards a 30 RMB/m^2 subsidy and one star projects with 15 RMB/m^2 subsidy (Interview with local official, Rizhao, 2013.05.13).

Introduction of green building standards places higher requirements on construction companies. In particular, high cost is a main barrier to green construction. An official at Rizhao Construction Committee concludes that regulation is not enough to support increased use of green building practices. The office therefore works with companies in developing green construction methods:

> *When [real estate companies] try to build green, they have to use too much money; they don't have the experience to do this in a cheap way yet. But this is a process… we are working on it. We do training and promotion, including training for all the big developers here. We need to do this for them to be aware of green construction and know how it is done (Interview with local official, Rizhao, 2013.05.13)*

The same official concludes that lacking knowledge and lacking funding are the two main barriers that need to be overcome for local developers to increase the use of green construction:

[14] Shandong Auditing and Supervision Management of Energy Conservation in Construction (2005), the Application of New Wall Materials and Energy Conservation in Construction Management Regulation (2005), and New Standards of Energy Efficiency in Public Buildings (2005)

[15] Certification involves three steps: (1) Design stage. The RCC design department make sure it meets a number of standards, out of which energy savings is one; (2) Energy auditing to make sure that energy saving requirements are met by approving the building plans (3) Engineering plan converted to construction plans. This includes consideration of wall material, flooring, roofs, etc., and a report on construction (Interview with local official, Rizhao, 2013.05.13)

We all think that green construction is a good thing, but it is not that easy to do. It involves a large system that needs to change. Everyone needs to be aware of these issues, but the engagement of the developers is not high, for two main reasons. One is that they are not really able to do green construction, they still lack the knowledge. The other is investment. Doing green construction becomes too expensive, so we need to research how the developers can do this at a reasonable cost (Interview with local official, Rizhao, 2013.05.13)

6.1.5 Supporting the growth of eco-industries

As mentioned in Chapter 3, China's central government encourages eco-industries through preferential taxes for "environmental friendly" enterprises. In line with national guidelines, Rizhao Tax Bureau introduced preferential policies for these industries. This includes preferential taxes and land policy for industrial recycling and "environmental friendly" projects (2007) and for investment into R&D projects (2011) (XHHJ, 2007; RMPG, 2011a, RMPG, 2012a)[16].

Since the adoption of these policies, the high-tech sector in Rizhao has expanded. In between 2010 and 2013, GDP generated from high-tech firms increased from 32 billion RMB to 48 billion RMB (an annual average of 15% - about twice as fast as the provincial average) (Shandong Net, 2014). Rizhao currently hosts a large number of companies specialized in energy saving and environmental protection technology (see Annex A for a list of thirty environmental technology firms established in recent years). A few large firms were established in the early 2000s, but most companies formed after the introduction of preferential policies in 2007. Many of these companies provide equipment and services related to industrial energy conservation, such as heat recovery and waste air/water recycling. For example, Kelin Shier Environmental Technology works with development, production and sales of 'smart' water boilers and other resource conservation equipment. Rizhao Haida Automatic Technology develops and provides computer controlled energy saving equipment, applications of Internet of Things and intelligent building designs. Many companies also work with solar power technology and the establishment of solar-tech firms has increased since the 2000s (Annex A lists the thirty largest companies involved in manufacturing and research into solar technology).

Since 1991, Rizhao Municipal Government has also established one national-level and four provincial-level economic development zones to attract investment (RMPG, 2010).[17] Rizhao witnessed a continual increase in FDI since the early 2000's, almost doubling in between 2007 and 2010, while exports and imports grew even faster (Rizhao Municipal Yearbooks, 2007-2010). This growth is concentrated in the development zones, where a hundred international enterprises invested over the past decade (RCB, 2013). Exports and imports are to a large extent made up of energy-intense products like steel, auto-related products, chemical products and coal (Ibid).[18] Nevertheless, Rizhao also received investments from high-tech companies in the fields of new energy and environmental technology. In an interview with a high-tech unit, a company manager cites preferential policies as a major reason why they established a branch in Rizhao:

We decided to be located here because of preferential taxes. For the first three years there are no taxes, and then only half. They have also used land policy to support this direction of development. This works by judging the environmental performance of companies that apply for land use; a

[16] The tax department has established rules to "ensure implementation of preferential policies … such as environmental friendly enterprises … For land policy, economic development planning for industrial recycling projects is carried out by ensuring that the cost of land shall be reduced for projects that meet policy priorities" (XHHJ, 2007).

[17] These include Rizhao Economic Development Zone, Lanshan Economic and Technological Development Zone, Rizhao High-Tech Industrial Park, Rizhao Industrial Equipment Park and Ju County Industrial Park (Shandong FAO, 2014).

[18] In 2013 (Jan to March), out of total exports 27% was steel, 14% "marine industries", 13% auto-products, 6% chemical products, 5% clothing and 4% coal (Rizhao Bureau of Commerce, 2013). Main imports were iron ore (30%), soybeans (23%), coal (15%), palm oil (6%), copper products (6%), and wood (almost 4%). These numbers looked similar in 2012 (RCB, 2012; RCB, 2013).

company with high technology and no pollution is likely to get land cheaper than a normal factory with higher pollution and standard technology (Interview with company manager, Rizhao, 2013.03.12)

Rizhao High-Tech Industrial Park aims specifically to develop as a centre for energy-saving and environmental technologies (RMPG, 2011c; RMPG, 2011d). An example of this type of company that is operating here is China Building Technique Group Company. This firm is setting up a low carbon industrial base to promote energy-efficient construction technologies. The company's research focuses on light building materials, PV, solar thermal storage, heat pumps and energy conservation (CBTG, 2012).

6.1.6 Low carbon campaigns

Finally, Rizhao Municipality uses traditional promotional campaigns to support low carbon lifestyles. These campaigns allegedly encourage "green" practices, establishment of "green communities", and activities of social organizations, community committees, and individual citizens (RMPG, 2009a). The government spreads energy-saving information in televised campaigns, brochures, newspapers and online. To act as a leading example in resource conservation, Rizhao Construction Committee introduced energy auditing systems and energy use monitoring in public buildings, and set up an energy building monitoring centre (an example of self-governing) (RMPG, 2012c). This was coupled with a campaign to reduce resource consumption in public offices. The campaign encourages "every individual to develop a good habit of saving every unit of electricity, every piece of paper and every drop of water … every time when finishing work or leaving the work place, computers and other energy using equipment should be turned off, in order to make an effort to save" (Fan, 2012).

A couple of parastatal associations led this type of climate campaign. Rizhao (Communist) Youth League collaborated with Rizhao Garden Department in establishment of a low carbon action fund. The fund supports planting a "low carbon forest" and construction of low carbon micro-environments made up of green roofs, green walls, office-greening projects, and flowers in homes, offices and balconies (RMPG, 2011h). Communist Youth Leagues are managed by the CPC for members between fourteen and twenty-eight years old. They are political organizations that promote the agenda of the CPC on a local level.

Another example is Rizhao Municipal Women's Federation's campaign for "low carbon households", based on a list of practical suggestions: using energy-saving lamps, turning off lights, unplugging plugs, reducing air-conditioning use, driving less often, and so forth (Fan, 2010). The Municipal Women's Federation is part of All China Women's Federation, officially labeled an NGO, but an organization closely monitored by the CPC and interests closely aligned with the party. Rizhao Occupation and Technology School has also encouraged young volunteers to hold a public promotion event with the theme "promote low carbon life, build a green home" (Li, 2012).

6.1.7 From regulator to enabler?

What does this case study say about modes of climate governance in Chinese cities and the opportunities of urban climate action? The strategies employed in Rizhao suggest that governing through authority and provision is possible, but associated with challenges. The case study also suggests that local climate schemes involve enabling, and that interaction-based approaches are important in supporting energy saving in the private sector.

Municipal authorities ruling through authority

The case study presents a successful example of governing through authority. Rizhao's solar water heater program is based on a building requirement adopted by the municipal government. This administrative policy had a strong effect on adoption, as has been seen with the use of such schemes elsewhere, for example building requirements in Barcelona (C40, 2011).

Unfortunately, there is no publicly available data on residential electricity to evaluate the effect of the exchange of electric water heaters for solar powered units.[19] Rizhao's total urban electricity consumption is listed in Shandong Provincial Yearbook (2011) as 12,500 million kWh in 2010, with household use accounting for only around 8 million kWh, and the industrial sector for 10,600 million kWh. Household electricity thus accounted for only 0.06% of urban electricity consumption. A previous study on urban electricity use in China indicates that the largest share of residential electricity consumption is attributable to refrigerators, air-conditioning, and lighting. Electricity used to heat water accounts on average for only about 2% of annual household electricity consumption (Brockett et al, 2004). These figures indicate that electricity saved by switching from electric heaters to solar heaters accounts for such a small share of total urban energy use that the impact does not appear in aggregated data.

Although Rizhao's solar heater program may play a limited role in reducing urban carbon emissions, the initiative has gained considerable political attention. The motivation for granting Rizhao (the "solar-powered sunshine city") the World Clean Energy (WCE) Award in 2007, stated that "in a nation known for its heavy dependence on coal, Rizhao represents an inspiring example of the mainstreaming of renewable energy sources" (Worldchanging, 2007). The Mayor responsible for initiating the scheme gained credit as a policy entrepreneur, confirming the political kudos attached to being seen as a climate forerunner (Collier & Lofstedt, 1997; Betsill, 2001; Kousky & Schneider, 2003; Schreurs, 2008; Gustavsson et al, 2009; Bulkeley, 2010). Notably, the promotion of solar water heaters was not conceived as a "climate mitigation strategy" until Rizhao applied for the WCE awards in 2007. The opportunity to frame the city as a forerunner in climate action encouraged the municipal leadership to reimagine popularization of renewables from an issue of energy access in rural and low income households to a question of sustainability and climate engagement (Interview with researcher, 2017.04.28, London).

Reflecting on the possibility for Chinese municipalities to engage in climate action by adopting local regulation, the case study suggests that the status associated with environmental achievement may encourage other leaders to take similar measures. At the same time, the case study points to some limitations. First, it is necessary for the local leadership to perceive progress in sustainability development as beneficial. This is unlikely to be the case if and where climate policy conflicts with economic goals. Second, political support must be sustained for implementation to be effective. As shown in Rizhao, the solar heater requirement was overlooked in rural areas where enforcement was not prioritized. In a new mandate period where the issue is not seen as important, the requirement may be overlooked along with other environmental guidelines that are ignored. As stated by a Chinese professor in environmental law, "China's green laws are useless" (Wang, 2010).

Another problem is that the room for independent regulation is limited by the numerous requirements imposed by higher levels of government. The central government plays a key role in rule setting activities in relation to pollution control, energy saving targets and standards. The case study demonstrates that Rizhao's municipal authorities spend considerable time and resources devising strategies for implementation of central targets. This leaves urban authorities to "tinker on the margin" of national policy (Schreurs, p.344-346, 2008) rather than spending time devising rules that may be more appropriate to the local context.

Governing through provision

Rizhao's provision of a green bus fleet shows that Chinese municipalities use their influence over public services to provide low emission alternatives. This is also a clear example of how emission reductions are framed by reference to other urban issues: pollution, traffic congestion, and "long term protection of the urban environment". In this way, local leaders turn the national concern of emission reduction into a local issue (Bai, 2007b). It can also be related to Harrison

[19] The World Bank cites Rizhao's energy use being cut by a third and emissions by half as a result of solar water heater promotion (World Bank, p.21, 2010b). It is unclear on what numbers or calculations this is based.

and Kostka's (2012) observation of Chinese authorities' use of issue bundling as a means to promote energy policy options.

Investments into improved transport infrastructure and a waste-to-energy plant illustrate another phenomenon, namely financing of public services through company funding (PPPs and BOTs). In both examples, Rizhao receives access to economic and technical resources of large SOEs operating on a nation-wide and international basis. The projects are strategies through which the municipality can mobilize funding and knowledge lacking within the governmental organization.

The importance of enabling

The implementation of environmental regulation illustrates limitations associated with traditional modes of governance. Due to limited resources of municipal EPBs, monitoring of environmental regulation is not always carried out effectively. Punishments for failing to meet pollution levels are not enough to catalyze investments into environmental equipment or support development of new technology. In the case of small, heavily polluting industrial units, some factories are closed down. This is desirable in light of the central government's aim of economic restructuring. However, this is not a strategy that can be used for all units in the industrial and construction sectors that fail to meet energy saving targets.

Energy conservation targets in these two sectors are set by higher levels of government, meaning that municipal units have limited room to govern through authority. Municipal budgets are too limited to provide funding for required equipment upgrades. It falls on provincial and central authorities to distribute funding for energy conservation investments. To implement energy saving targets and standards, Rizhao Municipality instead resorts to enabling strategies. This involves knowledge dissemination through training, auditing and benchmarking, as well as persuasion that points to cost benefits. Local officials see these strategies as central in helping companies adopt low emission practices.

The promotion of eco-industries is a combination of regulation and provision. The central government acts as regulator by introducing preferential tax policy for strategic industries. The municipality in turn provides preferential policies, such as lower land costs for high-tech investors. Municipal authorities also provide industrial clusters to facilitate high-tech investments. The support schemes contribute to an increased establishment of high-tech firms and foreign investment into prioritized sectors. Table 14 maps out Rizhao's energy conservation and emission reduction actions according to mode of governance and actor in charge of the initiative.

Table 14: Roles of actors in energy saving activities in Rizhao

Sector		**Authority/ Regulation**	**Self-regulation**	**Enabling**	**Provision**
Public	Central/ Provincial	Pollution regulation Industrial energy efficiency targets Energy saving standards in buildings Green construction targets Retrofit targets Economic and financial policy for eco-industries		Energy saving awards	
	Municipal	Solar heater policy Green construction requirement for large projects Preferential policy for eco-industries	Energy auditing/ Monitoring in public buildings	Training, auditing, benchmarking Campaigns Industrial zones	New energy buses
Private					Waste-to-energy plant Inter-city railway

Eco-tech promotion is clearly a case of "good business" (Kousky & Schneider, 2003), as it contributes to local economic growth, employment and FDI. At the same time, it is not clear if and how an expanding eco-tech sector contributes to emission reductions in Rizhao. It is possible that local industrial units or construction projects use green technologies because they are produced and promoted in the city, but this is not certain. Nonetheless, Rizhao Municipality promotes eco-industrial growth as an achievement in terms of low carbon development (RMPG, 2009a). In other cities in China that are branded eco-tech hubs (e.g. Baoding and Dezhou), manufacturing of environmental and new energy products has increased. This development has received domestic and international attention and been referred to urban "low carbon" development (e.g. Baeumler et al, 2012). The question of whether or not this is the case is for now left unresolved – the issue is further discussed in Chapter 9. However, the development does underline the connection between sustainable development, economic growth, industrial expansion, and technological innovation discussed in Chapter 5.

6.2 Climate action through partnerships

This section shows that municipal led partnerships has been used to a limited extent to pursue low carbon development in Rizhao. A few examples are raised, including partnerships with a higher-level research institute and a bilateral partner in demonstration projects in the construction sector and with "owner representative groups" in implementing energy efficiency retrofits. On the other hand, the case study demonstrates that partnerships have been formed in a bottom-up fashion between companies and academic institutes in development of energy saving technologies.

6.2.1 Demonstration projects

Authorities in Rizhao have formed partnerships with a research institute and a foreign cooperation partner in the design of low emission demonstration projects in the construction sector. There are a couple of examples of this. One project is Rizhao Planning Exhibition Hall, featuring solar PV applications, LED lighting, ground source heat pumps, and natural cooling (RMPG, 2012d). This project was designed by Shandong Energy Research Institute (RMPG, 2012d). A second project is a passive house, located in Rizhao Demonstration Area for New Building Materials. This design of this project received technical advice from the German Energy Bureau DENA (GIZ, 2015). A third example is a so-called "Energy Nexus Plus House", for which the German development assistance agency GIZ provided advice through the project Nexus (GIZ, 2015). The plan is that this house will generate more energy than it consumes by relying on a combination of micro-generation technology, energy conserving devices, passive solar building design, insulation, and careful site selection (Ibid). GIZ will cooperate with Rizhao Construction Committee in the realization of this project, and the implementation will involve training of local real estate firms. One of the aims is to disseminate knowledge and experience in green construction, with the hope of spreading successful practices to other cities or through endorsement of MoHUrD. These examples illustrate that partnerships with research institutes and traditional development organization can allow municipal authorities to access new technology and designs by forming cross-sector, cross-border connections.

6.2.2 Implementation of energy efficiency retrofits

Rizhao Municipality strives to be leading in energy efficiency retrofits in buildings and has been successful in this area. In 2016, the central government recognized Rizhao Municipality as a "model city" for energy retrofits (QLW, 2016). At the end of 2011, Rizhao had received 36 million RMB in funding from the central government to support energy saving in buildings. Rizhao Municipal Government used this support to subsidize energy saving retrofits (30 RMB/m^2 directly from the municipality and 45 RMN/m^2 from the central government) (RMPG, 2011e; RMPG, 2011f; RCC, 2014).

Energy efficiency retrofits in buildings is a kind of measure that cannot easily be managed only by public actors. The reason is that residential buildings belong to individuals who must be involved in decision making and enforcement. In Rizhao, energy retrofits of residential buildings is the responsibility of the energy office of Rizhao Construction Committee. It is to make sure that applications and proposed retrofits meet technical guidelines and standards (RCC, 2014). [20] However, implementation involves owners' representative groups that participate in project promotion and decisions related to the use of funding and management. The groups are made up of individuals from property management centres who are to coordinate energy saving processes and solve problems in relation to funding (Ibid). This approach is adopted to tackle individual households that do not cooperate in retrofit programs and to improve the process of supervision (RMPG, 2012e).

Further, Rizhao's guidelines for energy saving in residential buildings stress that tenants must mobilize funds to finance the share of costs not covered by municipal and central subsidies. For this reason, it is important to "enthuse" tenants through promotion and campaigns to make them actively participate in energy saving work (RCC, 2014). The retrofit guidelines encourage "energy-saving propaganda" for tenants to understand the purpose of energy-saving, the economic and social benefits, and the relation with China's energy saving policies (RCC, "Financing Plan", 2014). The organizations carrying out retrofits are companies chosen through public tender processes.

6.2.3 Technology development

This section shows that partnerships with the function of innovation and technology development are prevalent in Rizhao. These partnerships are created both through top-down and bottom-up dynamics. In particular, bottom-up connections play an important role in in the introduction of energy saving and emission reduction technology in firms.

Research partnerships though top-down dynamics

To encourage innovation, Rizhao Municipality has established "government-led, business-oriented" platforms for technology development. By the end of 2012, Rizhao boasted a long list of such platforms: two national enterprise technology centers, 22 provincial engineering technology research centers, five provincial academic workstations and a provincial key laboratory. These centers cooperate with "innovative pilot enterprises", as well as with researchers from think tanks and universities (CAS, Chinese Academy of Engineering, Shandong Academy of Sciences, Tsinghua University, and Beijing University) in over 60 projects at over 30 demonstration sites in Rizhao (Shandong Net, 2014). The centers emphasize participation of SMEs, which are supported by a provincial Technological Innovation Fund (Ibid).

In 2010, total investments into Rizhao High-Tech Industrial Park where these platforms operate reached two billion RMB (RMPG, 2011d). In the same year, activities in the park generated 142 patents and over one hundred kind of high-tech products (RMPG, 2011d). The platforms allegedly produced over 300 scientific and technological "achievements" (Shandong Net, 2014). Although this is self-reported data, this suggests that activities in these innovation platforms contribute to introduction of new technology in Rizhao.

Rizhao Municipal Government also uses public-private research partnerships to support the introduction of renewable energy in the industrial sector. Two large chemical industrial units, Jiahong Biotechnology and Jinhe Shenghua developed bio-waste to energy technologies in cooperation with Rizhao Environmental Protection Bureau (EPB). In the case of Jiahong, the company invited a consultant from the EPB, a previous professor from Rizhao Vocational and Technical College, to cooperate in the development of the enterprise's environmental protection

[20] The retrofits have taken the form heat metering devices, temperature control devices and heat exchange systems and improved insulation of windows, doors, facades and roofs (RMPG, 2011g; Shandong h 2014; RCC, 2014). In 2014, it was reported that a total residential area of 1.2 million m2 would be completed by the end of the year (coal consumption would decrease by 30'000 Tsc per year) (Shandong Xinhuanet, 2014).

work. The project included joint research on technology to convert the waste product methane into electricity (Interview with policy advisor, Rizhao, 2013.03.13). There are further examples of public-private partnerships in development of solar power technology, such as the case of a local solar technology producer whose product development was supported by China National Lighting Research Institute (Interview with local company, Rizhao, 2013.05.21).

Research partnerships though bottom-up dynamics

Section 6.1.4 has already provided a discussion on the role of central government energy efficiency targets in promoting emission reduction practices in the industrial sector in Rizhao. This section discusses the strategies used by key energy consuming enterprises in reaching these targets. The focus on company strategy not only reveals that efforts differ depending on the characteristics of firms, but also that connections with other companies and academic institutes are forged in the search for new solutions. Four strategies used by ten of the key energy consuming firms are discussed below: technology transfer from foreign companies, private-academic partnerships, energy management through contracting, and internal research. These strategies are described below.

The largest energy consuming enterprise in the city is Rizhao Steel, a private company that has achieved considerable energy savings through a combination of technology transfers, private-academic partnerships, domestic contracting, and internal R&D. Rizhao Steel exceeded the energy saving targets of the 11th FYP and the 12th FYP by introducing large-scale industrial recycling systems. Several environmental projects were realized by contracting domestic enterprises specialized in thermal energy and metallurgical engineering. One contract signed in 2007 led to the introduction of non-blast furnaces, and a wastewater and exhaust gas recovery system (BWK, 2014). The company invested over three billion RMB into the adoption of systems that generate power through exhaust gas recovery and heat transfer and storage capacity (Ibid). The factory's iron waste recycling equipment was imported from France, and the technology to convert waste powder into cement was developed by Rizhao Steel in cooperation with China Steel Research Institute (Ibid). In 2011, Rizhao Steel claimed to reach a power production capacity of 3 Billion kWh, which allowed the firm to rely to 52% on its own electricity production, contributing annual savings of 370,000 Tsc (Rizhao Steel, 2011). In between 2011 and 2013, these measures allowed the factory to save around 465,000 Tsc (SETIC, 2014).

Huaneng Rizhao Coal Power Plant is an SOE producing most of Rizhao's electricity. It is also the second largest energy consuming unit in Rizhao. Most of the energy savings in the power plant have been realized through purchase of foreign and domestic equipment. Two of the main boilers, installed in 2000, were imported from the German company Siemens while the installation was designed by the Spanish firm Foster Wheeler (BBK, 2014a). Two supercritical units were put into operation in 2008, both manufactured by Shanghai Electric (China Huaneng, 2010). The factory's desulphurization equipment was imported from the infrastructure company Alstom (Zhang, 2012a). In 2011, 2012 and 2014 the plant upgraded its motor efficiency and its dust and noise control equipment (Zhang, 2012a; Zhai, 2014). The energy saving of the plant reached around 190,000 Tsc in 2010, and 465,000 Tsc between 2011 and 2013 (Zhang, 2012a; SEITC, 2014).

The third largest energy consuming unit in Rizhao is Shandong Binani Rongan Cement. The company was established in Rizhao in 2003, and is to 90% owned by the Indian conglomerate Binani Industries Ltd. and to 10% by Shandong Wingan Group. In 2008, a Sino-Indian research partnership between the company stakeholders increased production capacity of the factory and reduced energy use by 8 Kg coal/clinker. The collaboration project also led to introduction of a waste-to-heat cogeneration project that contributed a generation capacity of 12 MV, and research into the possibility of introducing bio-waste to energy systems in the factory (YJB, 2015; BBK, 2015). In 2013, it was reported that 120 million RMB was invested into the waste heat to power project, which at that point contributed to reduction of 75,000 tons of carbon

dioxide emissions (HBGCH, 2013). In between 2011 and 2013, the factory's energy saving reached around 22,000 Tsc (SETIC, 2014).

Shandong Yatai Senbo Pulp & Paper is a private company that is part of a large international umbrella organization, Asia Pacific Resources International (APRIL). APRIL's branches operate according to environmental guidelines above those enforced in cities in China, due to the sustainability policy of the organization. In 2010, Shandong Yatai pulp factory in Rizhao adopted an advanced industrial recycling system that enabled it to quit coal and supply bio-waste based power to the grid. The recycling equipment was imported from leading European firms (AkzoNobel, Aquaflow, Purak and Finland Metal) that provided training in use and maintenance (APRIL ASIA, 2013). China United Cement Rizhao is a cement production firm, owned by the SOE China National Building Material Company Ltd. The SOE has a research department working with innovation related to energy saving technology, related to a nationwide strategy to eliminate inefficient cement kilns and introduce waste-to-power technology in all "dry" kilns (CNBM, 2014). The factory in Rizhao adopted a waste heat to power recycling system in 211 and saved over 20,000 Tsc between 2011 and 2013 (RMPG, 2011b; SETIC, 2014).

Rizhao Focal Electric is a company involved in coke manufacturing and electricity engineering. According to their company website, the firm engaged early in resource conservation, allegedly to choose a path of "scientific development" (Rizhao Focal Electric, 2008). The company cooperated with Shandong University in establishing an Engineering Technology Research Centre, self-proclaimed as the first private-academic collaboration focusing on coke and electricity engineering. The center has developed and improved production processes and technical equipment, trained staff, and produced six patented innovations (Ibid). In 2004, this led to introduction of a heat recovery coke oven that saves substantial amounts of energy (Qiang, 2011; Rizhao Focal Electric, 2008). In 2009, the company was titled a "Shandong Province Energy Saving Advanced Enterprise", and in between 2011 and 2013 the company saved around 12,000 Tsc (SETIC, 2014).

Rizhao Port Group is an SOE formed out of Rizhao's port authority. It provides services such as cargo loading, transportation and material processing. In 2006, the Port Group signed energy saving contracts with domestic ESCOs to improve energy management of operations. In 2011, Rizhao Port Group invested into equipment for improved efficiency of heat exchange and unloading, installation of wind turbines, photovoltaic (PV) cells and LED for lighting, electricity metering and GPS navigation for energy conservation in truck-based transport (GLINFO, 2012). In the same year, the investments contributed to a fall in energy consumption of 4% in spite of an increase of 11% in total cargo (GLINFO, 2012).

Rizhao Lingyunhai Sugar Group is a company involved primarily in food processing (sugar and soybeans), but also diverse activities such as e-commerce and hotel services. In 2013, the company was one of the enterprises that received Shandong Province's energy saving awards, due to adoption of advanced industrial recycling equipment in its sugar processing (GLINFO, 2013). The industrial system involves steam recovery, heat exchange and water cooling, based on an investment of around 55 million RMB. These systems were adopted through domestic contracting (GLINFO, 2013). In between 2011 and 2013, the company realized energy savings of around 10,000 Tsc.

Rizhao Yingde Gases specializes in production of industrial gases. In 2014, Yingde signed a contract for introduction of energy management and energy auditing systems (Shandong Lvzhou, 2014). The company's energy savings in between 2011 and 2013 reached 7,000 Tsc (SEITC, 2014). Shandong Wuzheng Group is a manufacturer of trucks and vehicles that has been active since 1962 and operated as a private firm since 2000. Since the 2000s, the company has focused increasingly on R&D and developed its innovative capacities (BBK, 2014b). The company was awarded Shandong's energy saving awards in 2009, due to introduction of energy auditing systems, new energy technologies and water recycling systems (Nongjx, 2010). In between 2011 and 2013, the company saved almost 3,000 Tsc (SEITC, 2014).

In the years between 2008 and 2013, the largest energy savings in Rizhao were reached by adopting waste heat recycling systems and waste material to power equipment. In 2013, twelve companies in Rizhao were recognized as Industrial Recycling Demonstration Enterprises, including several of the key energy consuming enterprises, such as the steel factory and the power plant (REITC, 2014). Although many companies adopted industrial recycling systems, the firms used different strategies to reach energy saving targets. Three companies imported equipment, two companies formed research partnerships with the academic sector to develop new technological solutions, three relied on internal R&D to develop energy saving applications, and four enterprises signed cooperation contracts with domestic ESCOs that helped identify energy saving solutions. Table 15 gives an overview of energy saving strategies adopted by these firms.

Table 15: Technology development and adoption of key energy using enterprises in Rizhao

Name	Activity	Energy saving strategy	Tech. development/ adoption
Rizhao Focal Electric	Coke	Heat recovery cogeneration coke oven	Private-academic Partnership
Rizhao Steel	Steel	Waste heat to power generation Improved heat transfer, recovery & storage capacity	Private-academic Partnership Domestic contracting Technology transfer
Huaneng Rizhao Coal Power Plant	Energy	High efficiency, supercritical boilers Shut down inefficient boilers	Technology transfer
Yatai Senbo	Paper/Pulp	Waste-to-energy system	Technology transfer
Shandong Binani Rongan Cement	Cement	Waste-to-heat co-power generation (Research into bio-waste power generation)	Private-foreign Partnership / Internal R&D
China United Cement	Cement	Waste heat to co-power generation	Internal R&D
Shandong Wuzheng	Auto	Energy optimization	Internal R&D
Rizhao Lingyunhai Sugar	Sugar	Steam recovery Heat exchange and water cooling systems	Domestic contracting
Rizhao Yingde Gases	Gases	Energy optimization	Domestic contracting
Rizhao Port Group	Shipping	Reduction of idle time of conveyor belts, electricity metering, efficiency of heat exchange and unloading, wind turbines, PV, LED, GPS navigation	Domestic contracting

6.2.4 Partnerships and mobilization of information

The case study of Rizhao indicates that public actors in cities in China rely on partnerships to access skills and information, facilitate policy implementation, and support innovation. The examples demonstrate that even a mid-size size city with an average economy creates links with foreign actors and research organizations to mobilize knowledge used to test and showcase new emission reduction solutions. Rizhao municipal authorities explicitly recognize the importance of cross-sector collaboration in innovation and supports it through establishment of technology development platforms. This type of scheme can be seen as a local response to the call of China's *Medium and Long Term Plan for Science and Technology* on public actors to construct multi-stakeholder platforms to accelerate innovation (MOST, 2006).

A surprising result is the extent to which companies create inter-organizational linkages in their efforts to meet energy saving targets. Mapping out the energy saving strategies used by ten key energy using enterprises in Rizhao shows that many of these involve collaboration with foreign and domestic units through contracting or research partnerships. The case study suggests that complex linkages for information sharing are developed as part of energy saving and emission reduction strategies. At the same time, this observation confirms that the perspective of networks and partnerships is a relevant approach for understanding local emission reduction activities in China. This notion is further explored in the following chapter, which presents results from the comparative study of the thesis.

7 Urban climate action through partnerships

The Sino-Singaporean eco-city project in Tianjin (SSTEC) is one of China's most famous eco-city projects. It is known for its long list of performance indicators, the laborious clean-up of the polluted site chosen for the city, its ambitious master plan, smart building design, efficient waste collection system and renewable energy use. The project is less well known for its complex governance structure. A joint steering council with top leaders from China and Singapore is in charge of strategic planning. Below the council, a joint working committee representing ministries oversees implementation. Six working level sub committees are comprised of officials from various public agencies from both countries. The master planner is a joint venture formed by a Chinese and Singaporean consortium. A long list of companies and institutes are involved in planning and delivery of solutions on the ground. The structure of Tianjin eco-city illustrates the argument of this chapter, namely that a multiplicity of heterogeneous actors take on different roles in low carbon projects in China.

Using the results of the comparative study of the thesis, this chapter demonstrates that climate partnerships are common in China, that these take a variety of shapes and forms, and involve sharing of information, technology, and funding. The chapter begins by mapping out the type of actors leading the projects in the sample selected for the study (7.1). The sample illustrates not only a diversity of groups and organizations initiating climate projects, but also shows that type of actor leading projects is associated with initiative function. For example, most initiatives involving some form of rule setting are led by municipal authorities. On the other hand, companies play a key role in delivery of low carbon public infrastructure, such as renewable energy plants and waste-to-energy projects. Initiatives involving information dissemination and demonstration activities aiming to promote low carbon practice are commonly led by both public and private actors, and academic organizations. This section concludes by discussing this division of responsibilities from the perspective of a shift to climate governance in China.

The second section of the chapter (7.2) maps out which of the initiatives in the sample involve partnerships and identifies the form and function of these. The section indicates that climate partnerships are common, and that the functions they perform range from soft rule setting, to service provision, information spreading, technology development, and capacity building. Partnerships are employed as a strategy to access resources of actors in other sectors: technology, funding and information. For example, municipal authorities form partnerships with companies, academic organizations and foreign or international organizations to realize infrastructure delivery, or support technology development. Companies, on the other hand, often form partnerships with other firms, academia or international organizations to develop sophisticated demonstration projects or new technology.

Section 7.3 assesses the role of partnerships in introducing new technologies and policy practices, thus answering research sub-questions 3:

How have partnerships contributed to introduction of new climate policy and technology on an urban level in China during the 10th to 12th FYPs (2001-2015)?

Analysis of the sample of initiatives indicates that partnerships with foreign actors and academia are important in introducing both new technologies and practices. The two key mechanisms leading to introduction of technology are technology transfers and joint technology development. The two mechanisms that contribute to introduction of new policy and planning practices are demonstration and collaborative problem solving. In illustrating these mechanisms, this chapter draws on information collected through the member check interviews of this study. Finally, section 7.4 ties together the observations of the chapter into a conclusion regarding knowledge production in networks in China.

7.1 Actors leading urban climate initiatives

Different actors take on different roles in climate initiatives in cities in China. While adoption of standards, requirements and binding plans remains the realm of municipal authorities, companies play a key role in public infrastructure provision, and both public and non-state actors lead initiatives with the aim of information spreading and demonstration.

To gain clarity about the role that different actors play in the initiatives selected for this study, the projects were categorized according to leading actor and function. The initiatives in this sample perform a range of functions, including rule-setting, service and infrastructure delivery, provision of incentives, information-spreading or demonstration, technology development or capacity building, and industrial sustainability programs. Rule setting is the most common function, followed by information dissemination and service provision. Type of function varies depending on the type of organization leading the initiative, as shown by Table 16.

Table 16: Cross-tabulation over cooperation type & initiative function (expected outcome in brackets)

	Rule - Setting	Service / Infrastructure	Incentives	Information / Demonstration	Tech development / Capacity Building	Green production	TOTAL
Authority	43 (23)	6 (15)	6 (4)	13 (16)	9 (14)	0 (6)	77
Company	0 (15)	18 (10)	0 (3)	15 (11)	8 (10)	12 (4)	53
Academia	0 (3)	3 (2)	0 (1)	3 (2)	5 (2)	0 (1)	11
International	0 (1)	1 (1)	1 (0)	1 (1)	2 (1)	0 (0)	5
National	0 (1)	0 (0)	0 (0)	0 (0)	2 (0)	0 (0)	2
PPP	0 (1)	1 (0)	0 (0)	0 (0)	1 (0)	0 (0)	2
TOTAL	43	29	7	32	27	12	150

The initiatives were also categorized according to leadership and sector, which showed that there is considerable variation in type of leadership in different sectors. As shown by Table 17, municipal authorities lead the largest number of projects related to urban form, climate information dissemination, and in the construction and transport sectors. On the other hand, initiatives in the waste sector and eco-city projects are mainly led by companies. These trends in variation of function and sector in relation to leading actor are discussed below.

Table 17: Cross-tabulation table of leading actor type by sector (expected share in brackets)

	Authority	Company	Academia	International	National	PPP	TOTAL
Industry	17 (16.6)	13 (11.3)	0 (2.1)	1 (1.1)	0 (4)	1 (4)	32
Energy	6 (14)	14 (9.5)	4 (1.8)	1 (0.9)	1 (0.4)	1 (0.4)	22
Construction	12 (10.4)	6 (7.1)	0 (1.3)	2 (0.7)	0 (0.3)	0 (0.3)	20
Transport	14 (9.9)	1 (6.7)	3(1.3)	1(0.6)	0(0.3)	0(0.3)	19
Land use	16 (10.4)	3(7.1)	1(1.3)	0(0.7)	0(0.3)	0(0.3)	20
Eco-city	4 (6.8)	8(4.6)	1(0.9)	0(0.4)	0(0.2)	0(0.2)	13
Dissemination	8 (5.2)	0(3.5)	1(0.7)	0(0.3)	1(0.1)	0(0.1)	10
Waste	1 (4.7)	8(3.2)	0(0.6)	0(0.3)	0(0.1)	0(0.1)	9
TOTAL	78	53	10	5	2	2	150

Municipal authorities: Policy-makers or policy-takers?

In this sample, all the initiatives that perform the function of rule setting are managed by city authorities. This suggests that local governments maintain a firm hold over decision making, and that authority to formulate regulations and standards has not been shared with actors from the private sector or civil society.

There is a strong correlation between municipal leadership and initiatives related to land use (a significance level of 99.7%) and transport (a 97% significance level). Municipal leadership in these two sectors is associated with a large number of initiatives with the function of rule-setting. Many of the initiatives related to land use consist of adoption of targets for urban green space or zoning plans, which is the responsibility of municipal planning bureaus. For example,

common programs include establishment of urban parks or other green areas. In the transport sector, common initiatives are adoption of low carbon transport plans. These typically involve plans for provision of bus, subway or rail infrastructure (sometimes combined with "smart" public transport systems) and infrastructure for electric, hybrid or gas-fueled vehicles. Municipal transport bureaus are responsible for urban transport plans, making them the leading actor in this sector. By contrast, delivery of transport programs, as well as design of innovative details and new technologies, are often developed in cooperation with other actors, as is further discussed below.

The results suggest that municipalities have considerable scope to act as policy makers in urban climate action. However, a closer look at the type of policy that is adopted by municipal authorities reveals that the influence of the central government over local initiatives is strong. To get a better picture of this influence, rule-setting initiatives were grouped into policy based on central level guidelines, and policy initiatives independently adopted by cities. Out of 43 initiatives that involve some form of rule-setting, 23 were based on central guidelines and 20 were independent. The initiatives based on higher level government policy consist of guidelines for implementation, such as regulations to meet targets for green construction (e.g. a certain share of construction must meet green construction standards), or zoning guidelines to meet targets for green space (e.g. a certain amount of space is to be used for tree-planting). Another example is local versions of China's emission trading scheme, which is a policy scheme initiated by the central government, but design and implementation of local schemes is delegated to provincial and municipal DRCs. Another example is requirements to shut down heavy industries in central urban zones, which is a policy element widely used in the 10'000 Enterprises Program.

Initiatives not directly based on higher level guidelines are more varied in nature. A few examples from cities in the South of China can be mentioned to demonstrate this. Shenzhen Municipality has introduced green building standards for low-income housing and promoted this as the first nationwide low carbon low-income residential policy. Shenzhen has also established a city-wide pedestrian system, designed according to the principle of "people-oriented", low carbon development. A third initiative is an "ecological control line", a planning scheme introduced to protect ecological areas, cited as the first of its kind in China. Shenzhen Municipality cites inspiration from other cities and best practice in introducing these schemes, including Hong Kong and Portland.

Xiamen Municipality has introduced two relatively innovative policy approaches related to spatial planning and urban greening. The first is a non-motorized transport plan, launched in 2007 as part of a "walking for health" project. This plan has divided the urban area into three planning zones: an urbanized area, a mountainous area with protected ecological spaces and the beach zone. The Municipality has been recognized as a national demonstration project for this plan. It is integrated into the urban master plan, with emphasis on emission zones, ecological control lines and polycentric planning to limit need to travel. The second example is a construction requirement for public buildings to incorporate vertical greening.

Guangzhou Municipality has adopted a green roof requirement for public buildings. Other initiatives include similar construction requirement, such as for solar water heaters (Rizhao and Qingdao), city-wide cycling and pedestrian schemes (Shenzhen, Xiamen, Shenyang, Hangzhou and Wuxi), and zoning plans with emphasis on blue and green urban infrastructure or climate adaptation (Guangzhou, Shenzhen, Shanghai and Xiamen). In an effort to connect urban public transport with climate mitigation efforts, Beijing has adopted a public transport card connected with an emission accounting system. All these examples demonstrate that municipal authorities in China are using the governance mode of authority to address the climate change challenge.

Companies: Providers of service and infrastructure

As is illustrated by Table 16, the majority of the climate initiatives that have the function of service or infrastructure delivery are initiated and led by companies (the correlation has a significance level of 100%). This also means that most projects involving investments into large

scale infrastructure are led by companies, including waste-to-energy plants, renewable energy plants (solar, wind and biomass), intra-city rail lines and district heating and cooling schemes.

This tendency can be illustrated by considering the size of energy saving or emission reduction per project in this sample (self-reported (realized or planned)) energy savings and carbon emission reductions per initiative were reported for 24 and 27 initiatives respectively). If compared with actor leading the initiative, the projects with the largest energy saving or emission reduction scope are those led by city authorities, as shown by Table 18. The reason is that these initiatives are broad planning schemes, such as energy retrofit programs, low carbon transport programs, emission trading schemes, or zoning programs. In these programs, the municipal authority acts as rule-setter, by setting frameworks for action and overall emission reduction targets.

By contrast, large emission reduction initiatives led by companies typically consist of investments into equipment and infrastructure that contribute directly to energy saving and emission reductions. Where city authorities have been in charge of projects with the function of service and infrastructure delivery, it has usually not involved capital-intense investments. With the exception of Kunming's BRT system, publically led projects are either small-scale projects (e.g. solar traffic lights), projects delivered through cooperation with companies (e.g. Guangzhou waste-to-energy plant), projects funded by the national government (e.g. Shenyang geothermal pumps and Chongqing new energy vehicle project), or PPPs (e.g. Baoding solar power plant).

Table 18: Estimated (planned or realized) energy savings & emission reductions of selected initiatives

Actor type	Number of Initiatives	Average energy savings per initiative (Ton of standard coal (Tsc)/y)	Total energy savings (Tsc/y)
City authority	8	2,265,032	18,120,257
Company	14	89,470	1,432,586
		Average carbon emission saving per imitative (ton/y)	Total emission savings of initiatives (ton/y)
City authority	15	3,473,309	52,099,646
Company	10	574,800	5,748,002

One explanation for this division of responsibilities is that many of the firms in this sample are public companies that have formed out of previous municipal or provincial departments. Out of ten SOEs responsible for service or infrastructure, seven fit this description. However, there are also private companies in this category (seven in total), primarily firms specialized in environmental technology, often operating in all of China. There are also four nation-wide SOEs specializing in environmental technologies and large infrastructure projects. This represents a new set of actors playing a key role in public service and infrastructure delivery.

Table 17 shows that companies are the leading actor in the waste sector (the correlation is significant at a 99.8% level) and in eco-city projects (a correlation at a 98.3% significance level). In the waste sector, most initiatives consist of waste-to-energy plants that account for a large share of urban waste. In the construction sector, initiatives led by companies are primarily demonstration projects, such as zero-emission buildings with energy saving design, natural heating and cooling, and district heating schemes. Initiatives led by companies in the energy sector consist for the most part of investments into large scale renewable energy plants, including wind farms, solar plants, and biomass plants. The exception is investment into CCS technology as part of reducing emissions of coal power plants.

Initiatives that fill the function of green production are projects that introduce cleaner production processes in firms. As shown by Table 16, all these initiatives are led by companies. Most initiatives involve energy efficiency retrofits in steel plants or other large industrial units. Notably, the overwhelming majority (11 initiatives out of 12) appear to be responses to central level policy guidelines, such as energy efficiency retrofits typical of the 10'000 Enterprises

Program. This result suggests that industrial units often engage in climate action in response to government pressure, rather than acting as leaders in the climate change issues.

There are only two examples of initiatives led by companies that consist neither of large-scale infrastructure investments or seemingly government-induced energy efficiency measures. One of these is Kunming Green Hotel program, an initiative led by hotels in Kunming in cooperation with the municipality. This is a resource saving scheme that involves improved waste management, recycling and use of energy efficient appliances, in combination with habitat protection. The second example is a waste sorting program in Guiyang through which residents collect and separate waste in different colored bags for monetary compensation. The company was started by a local resident and implemented in a community where most of the households now use this sorting method.

Mixed leadership: Information dissemination & technology development

As shown by Table 16, initiatives with the function of information dissemination and technology development are led by a mixture of actors. However, the nature of projects differ depending on leadership.

Municipal authorities dominate initiatives related to climate information dissemination (the correlation has a 95% significance). Common information dissemination initiatives led by municipal authorities are exhibitions and establishment of centers or museums promoting low carbon technologies and lifestyles. These venues or events are usually run by municipal Science and Technology Commissions. Examples include Shanghai's World Expo Demonstration Site, which featured a list of energy saving technologies and designs, and Guangzhou Low Carbon Technology Fair, a large international exhibition that is arranged once per year. Other common projects are environmental campaigns to promote resource conservation, such as recycling and household saving of water and electricity. Shenyang has, for example, initiated a low carbon campaign as part of a National Science Day. An example of a different character is an elementary school in Baoding emphasizing low carbon education.

By contrast, most low carbon demonstration projects led by companies consist of eco-city projects or demonstration projects in construction sector. This includes low carbon exhibition centers and zero-emission buildings with applications such as renewable energy sources (PV cells, solar collectors, or wind turbines) or natural heating and cooling systems. Companies also often lead technology development projects in the form of industrial eco-tech and recycling economy parks. An example is an eco-economy recycling park in Guiyang, set up by Yanzhou Mining Group.

Projects aiming towards demonstration led by research organizations and international or foreign actors consist primarily of low carbon construction demonstration projects. Examples include APEC's Low Carbon Model Town (LCMT) in Tianjin and China Sustainable Transportation Center's low carbon business district in Kunming. The projects are similar in nature to those led by private planning firms in being technical and aiming to introduce smart urban planning, energy saving architecture and renewable applications. Initiatives that aim towards technology development is the only type where academic organizations have a somewhat stronger representation that other actors. This includes establishment of low carbon research centres and new energy technology development projects.

New roles and shifting authorities?

Municipal authorities are responsible for implementing higher level guidelines, which occupies a considerable share of their climate mitigation efforts. Versions of higher level guidelines account for most of policy initiatives adopted on a local level. At the same time, analysis of the sample of initiatives of this study suggests that Chinese municipal authorities use rule setting to take independent and sometimes innovative leadership in climate action.

The analysis also shows that companies often are in charge of delivery of low carbon infrastructure. This observation raises questions about the extent to which projects led by firms

improve life for citizens and/or create low carbon cities. For example, companies are often the leading actor in eco-city projects, of which the nature varies. Some are constructed along a row of ambitious key performance indicators (KPIs), such as ecological protection, land use, green transport, waste systems and renewable energy use. The sample also includes several demonstration projects that are described as "low carbon" or "eco" that on closer scrutiny exhibit only a couple of green features, for example energy saving elevators. It is questionable whether they have capacity, or even aim, to seriously tackle the emission reduction challenge.

In this sample, municipal authorities dominate initiatives related to climate information dissemination. Awareness raising is a "soft" policy function often associated with non-state actor leadership. The low representation of organizations that usually perform this function, such as independent media and environmental NGOs, explains the higher representation of municipal authorities performing this type of action. Green organizations that raise issues of equity, participation or lobby against companies or public actor are completely missing from this sample, and this function is therefore also absent. Research organizations are the closest thing to civil society represented in this sample. However, these actors are most commonly engaged in projects of a technical nature, such as demonstration projects in the construction sector or technology development projects. This tendency raises caution against the notion that China's development of a modern environmental state will necessarily produce institutions that are increasingly similar to those in liberal democracies. Diversification of actors and emergence of new roles may instead be endemic to the context, such as functions of NGOs taken on by a strong public sector.

7.2 Form and function of climate partnerships

About half of the initiatives in this sample involve partnerships, which exist in different constellations and perform different functions. Linkages created through partnerships allow for technology, information and funding to pass across sectors, government levels and borders. The details of these mechanisms are discussed in this section.

7.2.1 Form of climate partnerships

This sample of initiatives suggests that partnerships in urban climate action is common in China. Almost half of the initiatives (74 initiatives, accounting for 48% of the sample) involve collaboration between actors, as shown by Table 19. As the sample of this study was selected to represent cities that are forerunners in climate action and likely to have used innovative governance arrangements, this share is probably higher than in smaller, "average" urban regions.

Table 19: Form of collaboration in selected climate initiatives

Actors involved in initiative	**Number of initiatives (%)**
City Authority	59 (39%)
Company + International/foreign organization(s)	31 (21%)
Company	17 (11%)
City authority + International/foreign organization(s)	13 (9%)
City authority + Company	9 (6%)
City authority + Local Academia/NGO	6 (4%)
Local Academia/NGO + International/foreign organization(s)	5 (4%)
Company + Local Academia/NGO	5 (3%)
City authority + National/provincial authority	2 (1%)
International/foreign organization(s)	2 (1%)
International/foreign organization(s) + National/provincial authority	1 (1%)
TOTAL	150

As shown by Table 19, the largest share of initiatives (59 projects, accounting for 39%), is led only by city authorities. Most initiatives involving only municipal authorities have a regulatory or administrative nature. As was discussed above, many projects initiated by public actors aim towards enforcement of higher level planning guidelines. Examples of schemes that typically do not require input by other actors include green construction schemes (e.g. adoption of targets or implementation guidelines) and zoning regulations.

17 initiatives (11%) are initiated and managed by a single company. There are a couple of different types of project in this category. The majority is large scale renewable energy projects, all of which are led by large SOEs. Most of these firms are owned by municipal or provincial governments and have extensive operations in the region. The second largest number of initiatives are energy efficiency retrofits of the type carried out under the 10'000 Enterprises Program. Many of these are also carried out by large public or private firms with internal research departments and sufficient economic and technical capacity to upgrade equipment without input from external organizations.

The most common form of collaboration, used in 31 initiatives (21%), is between companies and foreign/international organizations. The foreign organization is in most cases a foreign company and in some cases an international NGO. Two types of relationship are common. The most frequent is import of technology from a foreign to a Chinese company. According to the theoretical discussion in Chapter 2, private-private interaction does not fall under the definition of a partnership, as it does not involve cross-sector collaboration (Glasbergen et al, 2007; Huijstee et al, 2007). However, it is an important mechanism for introducing emission reduction technologies and has been referred to in terms of partnerships in previous research on climate networks (Bulkeley et al, 2012). The second most common relationship is between Chinese companies and foreign companies or research organizations, where the foreign organization participates in the role of planner or project designer.

The second most common form of collaboration, found in 13 initiatives (9%), is partnerships between city authorities and foreign/international organizations. The majority of these initiatives are led by municipal authorities in cooperation with foreign partners that provide some type of knowledge transfer. The partnerships are formed with foreign firms, international organizations, bilateral partners and foreign authorities. The partnerships take the form of traditional development assistance projects, joint ventures, jointly managed projects or loosely structured dialogues.

Nine initiatives (6%) involve partnerships between city authorities and companies. In many of these projects, technology or infrastructure has been delivered by a company in order to implement a project initiated or planned by a municipal authority. There are also a couple of cases where a partnership with a company is formed in order to mobilize funding for project implementation.

Six initiatives (4%) involve partnerships between city authorities and academic organizations, five (3%) between companies and academic institutions, and five (3%) between academic and foreign/international organizations. In most of these cases, the academic or foreign organizations provide expert knowledge for the purpose of technology development or planning design.

7.2.2 Function of climate partnerships

The functions of the partnerships in this sample include rule setting, provision of public service, technology transfer or development, and information sharing/demonstration. This section discusses how different partnership constellations are related to function of initiatives, and how responsibilities are shared between actors.

Rule setting initiatives

The analysis of the results presented in Table 16 (section 7.1) suggests that municipal authorities are the leading actor in all projects involving adoption of plans and regulations.

Through analysis of partnership arrangements, a somewhat different picture emerges. Out of the 74 initiatives involving collaboration, six have some form of rule setting function. These are not binding regulations and requirements, but rather emission reduction targets and low carbon transport plans. The partnerships are created for the purpose of obtaining planning advice, often of a technical nature, from foreign organizations, domestic academia or higher level government institutes (the initiatives are listed in Table 22 in Annex B).

Two of the partnerships in this category were formed to create emission reduction plans in the industrial sector. In one case, Wuxi Municipality built on the Sino-German cooperation platform Low Carbon Future Cities to connect with the municipality of Dusseldorf. Through city-to-city collaboration, involving dialogue between a number of foreign and domestic authorities and research organizations, Wuxi formulated emission reduction strategies for its industrial sector. In another case, the city of Qingdao formed a partnership with WRI (an international NGO) and the Asian Development Bank to create a low carbon development plan. In both cases, the foreign partner contributed technical advice and suggestions based on international best practice.

The other four partnerships are initiatives in the transport sector. They have a similar nature and involve collaboration in formulation of low carbon development plans. One of these was created through Kunming's EcoPartnership with the American city of Portland. Through this partnership, Kunming has received advice on how to shape a non-motorized transport plan to reduce the emission profile of the transport sector. The cities of Baoding and Shenyang partnered with central and provincial level institutes to access technical advice for their low carbon transport plans. In the last initiative, a transit-oriented (TOD) plan in Kunming was developed by a domestic research institute (Kunming Planning and Design Institute and Kunming Urban Transport Institute) in cooperation with foreign design firms.

Service and infrastructure provision

Out of the 74 initiatives involving collaboration, 11 (15%) have the function of service or infrastructure provision. In this group of partnerships, collaborative arrangements are diverse in nature, including PPPs, JVs and BOTs, cooperation agreements, and partnerships for the purpose of mobilizing funding (these initiatives are listed in Table 23 in Annex B).

Three of these initiatives are projects in the energy sector. In these projects, the municipal authorities in Kunming, Baoding and Xiamen formed partnerships with SOEs to provide two solar plants and a solar-powered BRT station. Baoding Municipality has provided a solar plant by forming a PPP with four energy companies, where the firms were in charge of development and delivery of technology and infrastructure. In the delivery of the solar plant in Kunming, the municipality signed a cooperation agreement with a firm to deliver equipment and technology development.

Three partnerships are projects in the transport sector. This includes Qingdao's low carbon transport plan, which was formulated by the municipal transport bureau. In order to provide infrastructure for electric vehicles and LNG filling stations, the municipality formed a partnership with the State Grid. Beijing's low carbon transport system was initiated and promoted by Beijing EPB as a way to allow the public to buy carbon credits. The scheme was jointly managed by two municipal SOEs in charge of public transport. The last example from the transport sector is the project "Shenzhen New Vehicle", in which Shenzhen Municipality introduced a financial leasing model for the purchase of electric buses. The municipality cooperated with financial group Potevio Group (an SOE), who stands as guarantor for the loans. Shenzhen Municipality reached a similar financing agreement with the Southern Power Group (another SOE) in the installation of EV charging stations.

Infrastructure provision in the transport sector also involves partnerships between municipalities and domestic academia. In the delivery of Kunming's low carbon transport system, the municipal authorities was responsible for providing the BRT system, but Kunming

Municipal Engineering Design Institute was in charge of drafting the plan. A "low carbon transport hub" in Shanghai is managed by Shanghai DRC, but Shanghai Urban Construction Design Institute provided technical and planning advice in layout and technical design.

Finally, there are three infrastructure projects in the energy sector provided by SOEs in partnerships with foreign firms. One example is a district heating and cooling scheme in Chongqing, which is a BOT scheme, designed, built and initially operated by a foreign company. The project was financed by a loan from IFC. Two further projects with mixed ownership (a JV and a BOTs), involved partnerships with foreign companies with the purpose of providing renewable energy infrastructure.

Technology transfer

This sample of climate initiatives shows that technology transfers is a common reason for actors in Chinese cities to create linkages with foreign organizations. Out of the 72 initiatives involving collaboration, 16 initiatives (22%) have the function of technology transfer (these projects are listed in Table 24 in Annex B).

Technology transfers in the form of purchase of foreign technology involves limited interaction between actors. Twelve of the initiatives in this sample consisted of purchase of technology from foreign firms. It is questionable whether this type of connection should be thought of as partnerships, although in some cases the foreign company is actively involved in developing and applying the technology, as well as providing training.

Five infrastructure projects owned by domestic firms received technological advice as well as funding from international organizations in connection with technology transfers. One example is a low carbon district in Qingdao, owned and managed by a municipal company, which received technical assistance and funding from ADB. The other four are CDM projects, operated according to similar arrangements. Three waste-to-energy projects are managed by domestic firms in cooperation with a foreign firm, receiving funding through the UNFCCC. The fourth example is an MRT project in Guiyang, managed by a municipal SOE and a foreign firm, funded through the CDM mechanism.

Technology development

This sample of initiatives suggest that forming partnerships for the purpose of developing emission reduction and energy saving technology is common. Out of 72 initiatives involving collaboration, 16 initiatives (22%) had the function of technology development. Partnerships for technology development take two main forms: research projects or establishment of R&D platforms (these projects are listed in Table 25 in Annex B).

There are two examples of municipal authorities forming partnerships with domestic academic organizations for the purpose of technology development. In these projects, the municipal authorities take on a supporting role, while the academic organization is responsible for technology development. This was the case in development of tidal energy led by China Ocean University in Qingdao and residential solar thermal electricity generation in households in Shenyang. In a couple of initiatives, municipal authorities have formed partnerships with companies to establish technology development platforms. In one of these, Guangzhou Municipality and ZTE established an energy conservation technology incubator involving "substantive collaborative" projects in energy conservation industries (GZZSW, 2014).

There are five examples of companies forming partnerships with academic organizations to develop emission reduction technology. This includes joint research projects and joint establishment of research center. An example of the former is development of CCS technology in Chongqing, led by an SOE in cooperation with local academia. Another is a solar thermal power in Beijing, constructed in cooperation between several SOEs and domestic research institutes. Another example is a CCS-development project owned by a mixture of domestic SOEs and foreign firms, funded by ADB and China Ministry of Science and Technology. An example of the latter is an industrial park for new recycling technologies in Qingdao, led by an

SOE in partnership with various academic institutes. Another SOE has set up a recycling economy zone with support of MEP and the German Development Cooperation (GIZ).

Partnerships have also been formed between domestic and foreign academic organizations for the purpose of technology development. This includes a low carbon technology development set up by Guangdong Low Carbon Technology and Industry Research Center (GDLRC) and University of Edinburgh with support from the Consulate General of the UK in Guangzhou. Another research partnership is set up between the Chinese National Energy Administration and several companies from the Netherlands to develop tidal power technology.

Finally, three partnerships are formed to mobilize funding for technology development. One is a PE fund for energy saving set up by Wuxi Municipality, with the Agricultural Bank of China and Guolian Finance Group acting as strategic investors. This fund is used by local firms to fund investments into development of energy conservation equipment. Two research projects are owned by local SOEs and funded by international organizations. The first involves energy efficiency improvement of power plants in Chongqing, financed by IFC (a member of the World Bank Group), distributed by Chongqing Bank and managed by a domestic contracting firm specialized in energy technology. The second is funding for energy efficiency improvements in Wuxi provided through the China Energy Efficiency Financing (CHEEF) Program, provided by the World Bank through the Global Environment Facility, and distributed locally through three Chinese Banks.

Information dissemination and demonstration

Out of the initiatives involving collaboration, 23 initiatives (32%), had the purpose of spreading information or demonstrating new solutions. This accounts for almost one third of initiatives involving collaboration, making it the most common function of partnerships. Many initiatives in this category are large scale demonstration projects involving a variety of actors, taking the form of eco-city projects, landscaping or construction schemes. These projects are used to test and demonstrate emission reduction and energy saving technologies, designs, and planning practices (these projects are listed in Table 26 in Annex A).

In this category, there are eleven municipal led initiatives where a foreign organization or domestic academia provided advice related to technology, design, or planning. This includes four eco-city projects carried out through different constellations of domestic and foreign actors. Two have mixed ownership structures, one of which is the Sino-Singaporean eco-city project in Tianjin (SSTEC), described in the introduction of this chapter. The second is the Sino-Singapore Guangzhou Knowledge City (SSGKC), also managed by a publicly owned consortium. A long list of MoUs is part of the cooperation agreement, which involve actors from the private sector and academia in both countries. Similar to the eco-city projects, three initiatives related to land use involved partnerships between municipal planning bureaus and foreign and domestic firms and academia. An example is the design of a network of green infrastructure in Guangzhou, a waterfront area in Tianjin, and redevelopment of a brownfield area in Shenyang.

There are eight examples of projects where foreign firms and/or foreign or domestic academia have participated in company led partnerships as designer, planner and/or technical advisor. These consist of two construction projects and five eco-city projects. An example is a "neofuturistic" skyscraper in Guangzhou, designed by two foreign architect firms to be the most energy-efficient "super-tall" building in the world. An eco-city project in Qingdao is owned by a large domestic SOE, and the master planning has been done by a foreign design firm. There are two examples of domestic academia leading the planning of similar eco-city and landscaping projects in Kunming. In both these cases, China Sustainable Transportation Center partnered with local planning organizations and foreign design firm to create low carbon spatial plans.

Only three initiatives in this sample explicitly aim towards capacity building (understood here as staff training and development of new policy toolkits). Notably, all three involved

collaboration with international organizations. For example, a project led in partnership between Shanghai Municipality and the World Bank provided technical assistance to develop emission reduction policies in the built environment. An initiative with the aim of capacity building run in cooperation between Guangzhou Municipality and the British Consulate-General in Chongqing provided training in the development of low carbon toolkits. Finally, Beijing Transportation Research Centre formed a partnership with the German Development Agency GIZ to develop a toolkit for transport demand management (TDM).

7.3 Partnerships and introduction of technology and policy practices

This section shows that climate partnerships, in particular those involving foreign actors or academic institutes, contribute to introduction of emission reduction technology and policy practices in cities in China. Two mechanisms are offered to explain how each is realized. Introduction of new technology occurs either through technology transfer or joint research projects. Introduction of new policy and planning practices is realized through either demonstration followed by market diffusion, or collaborative problem solving followed by internalization. In illustrating these mechanisms, this section draws on information collected through the member check interviews of the study.

7.3.1 Introduction of new technology

To find how important different partnership constellations are to the introduction of new technology in this sample of initiatives, a contingency table was created for "introduction of new technology" and "partnership constellation". As shown by Table 20, collaboration between companies and international/foreign organizations play an important role in introducing new technology (the correlation is significant on a 100% level). Initiatives involving partnerships with academia also lead to introduction of new technology more often than expected. Common mechanisms of introduction of technology through partnerships include technology transfers and joint research projects.

Table 20: Contingency table for collaboration type & new technology (expected outcomes in brackets)

Partnership constellation	**Technology introduction**
Company + International/foreign organization(s)	**22 (9)**
Authority + Academia	5 (2)
Company + Academia	5 (1)
Authority + Company	4 (3)
International/foreign organization(s)+ National	1 (0)
Authority + International/foreign organization(s)	0 (5)
Academia + International/foreign organization(s)	0 (2)
Company + National	0 (1)
TOTAL	37

As discussed in section 7.2.2, many of the partnerships in this sample are formed for the purpose of technology transfers. The most commonly imported types of technology is equipment for large scale wind plants, waste-to-energy plants, co-generation facilities, district heating and cooling technology, and equipment used in upgrades of power plants and steel factories (e.g. energy efficient boilers). As mentioned above, a number of partnerships with the function of technology transfers have been funded by international institutions, ADB and UNFCC through the CDM.

Member check interviews with firms confirm that import of foreign equipment remains a common strategy to realize energy savings and emission reductions. Nevertheless, imports are becoming less important with rising sophistication of domestic research. For example, in the paper and pulp industry, equipment import was a way to raise environmental standards and reduce emissions over the past decade (Interview with domestic paper group, 2016.06.18, Shandong; Interview with domestic paper company, 2016.06.13, Shandong). A manager of a

paper and pulp company states that a key reason behind their performance improvement is import of foreign equipment. However, this is now becoming less crucial. This respondent expects domestic equipment and level of environmental research to catch up with Western competitors in a couple of years (Interview with domestic paper company, 2016.06.13, Shandong; Interview with paper industry alliance, 2016.05.22, Beijing). The situation looks similar in the iron and steel industry, where equipment has been imported to raise environmental performance. However, this trend is slowly being replaced by internal technology development. A spokesperson of Shandong Iron and Steel Industry Alliance observes that energy efficiency improvement and emission reduction are key research areas where companies are investing heavily to catch up with the "West" (Interview with Iron and Steel Industry Alliance, 2016.03.04, Shandong).

As domestic innovation is becoming a more important driver of technology development, forging partnerships for innovation is becoming more crucial. The member check interviews confirm that environmental technology development to a large extent is carried out through partnership arrangements between companies, academia and foreign organizations. A representative of China Paper Industry Alliance confirms that research into energy efficiency, emission reduction and waste management often is carried out through private-academic collaboration.[21]. A manager at a paper and pulp firm describes their involvement in research partnerships with China Paper Research Institute (CIPRI), CAS, Beijing Forestry University, foreign companies, and foreign universities. Much of this research focuses on improvement of resource conservation and environmental protection (Interview with domestic paper company, 2016.06.13, Shandong). Another paper and pulp company runs five research platforms involving partnership projects with ten academic institutes and collaboration contracts (strategic alliances) with several foreign firms (Interview with domestic paper group, 2016.06.18, Shandong).

Companies from the iron and steel sector describe a similar relationship with academia. A representative of a steel company explains that the firm has several research centres involving collaboration with universities. In these centres, environmental technology and energy efficiency are prioritized research topics (Interview with steel company, Shandong, 2016.04.19). Research on CCS is raised as an example of technology development carried out through platforms involving universities, companies, government units, foreign authorities and funding from international institutions (Ibid). According to a respondent from Shandong Iron and Steel Industry Alliance, their organization is also involved in cross-sector research partnerships to support research on energy efficiency in the industry (Interview with iron and steel industry alliance, 2016.03.04, Shandong). [22] In sum, multiple connections between the private sector, domestic academia, foreign research organizations and parastatal research institutes are involved in research on industrial emission reductions in China. These connections are created in a bottom-up fashion and illustrate how multiple-level, horizontal interactions play a key role in introducing new technology on a local level.

7.3.2 Introduction of new policy

To find how different partnership constellations are related to introduction of new policy and planning practices, a contingency table was created for "introduction of new policy and planning practices" and "partnership constellation". As shown by Table 21, partnerships between a municipal authority and a foreign or international partner is, by far, the most common way to introduce new policy and planning practices (the correlation between international

[21] The industry alliance in itself functions as a platform for knowledge sharing between sectors, by collecting and sharing data, disseminating research and creating forums for communication and collaboration (Interview with paper industry alliance, 2016.05.22, Beijing).

[22] As in the paper industry, the iron and steel industry alliance is a semi-governmental organization that provides spaces for collaboration. The representative explains that "solutions usually require large infrastructure investments to improve systems solutions. To make this easier our association has a platform for developing large-scale solutions. This is a public platform for cooperation" (Interview with iron and steel industry alliance, 2016.03.04, Shandong).

cooperation and adoption of new policy practices is significant on a 98.3% level). This thesis suggests that two mechanisms explaining introduction of new policy practices through partnerships are demonstration and collaborative problem solving. These two mechanisms are discussed below.

Table 21: Contingency table for partnership and policy innovation (expected outcomes in brackets)

Partnership constellation	**Introduction of policy/planning practice**
Authority + International/foreign organization(s)	**13 (3)**
Authority + Company	3 (2)
Academia + International/foreign organization(s)	3 (1)
Company + International/foreign organization(s)	1 (6)
Company + National	1 (0)
Authority + Academia	0 (2)
Company + Academia	0 (1)
International/foreign organization(s) + National	0 (0)
TOTAL	21

Demonstration followed by market based diffusion

In this sample, the most common way to that new policy and planning practices are introduced is through large demonstration projects. These usually consist of partnerships formed in the construction of eco-city projects and low carbon districts. In online accounts about these projects, a number of policy or planning approaches are self-reported as "new".[23] This includes new energy efficiency building standards in Tianjin (Tianjin SSTEC), use of ecological infrastructure and networks of wetlands in Shenzhen (Guangming Low Carbon District), and low carbon zoning codes in Beijing (Changxindian low carbon community). Further examples are transformation of a poor neighborhood into a livable, climate smart urban area, and man-made wetlands for cleanup of polluted river water in Shenzhen (Pingdi International Low Carbon District), and "participatory simulation" as a planning approach to better integrate the views of stakeholders in Wuxi (Sino-Swedish Low Carbon Eco-City). Other examples include natural flood protection, use of unconventional water sources and permeable surfaces, new waste collection and separation systems integrated with waste-to-power systems, and natural ventilation systems. These projects have one thing in common, which is that their process of design and management involve sharing of ideas between a range of partners, allowing for opportunities to introduce new ideas and perspectives. It is argued, therefore, that large demonstration projects are used to test new policy and planning practices.

The question is to what extent these practices travel from spatially delimited projects to other locations or jurisdictions? The member check interviews suggest that one way in which this happens is by practices being absorbed by domestic companies and reproduced through their marketing strategies. Several accounts support this notion. For example, a foreign consultant states that domestic real estate or architectural companies that receive planning advice from a foreign consultancy firm tend to use these in future projects:

> *For example with the developer X, they will ask us for a demo and then they can learn from this project and then they can copy it and sell it as their own market model! We have seen a lot of this. It makes the practises spread. If they have been part of the whole project, after we finish, some key members will know how the planning done … it is in their interest to learn as they can use it as a selling point (Interview with international consultancy firm, 2016.06.13, Beijing)*

The same respondent explains that companies gain a competitive advantage by learning to apply new technologies and system solutions. They are willing to pay for this knowledge to be

[23] A reminder from the methodology chapter is that reliance on self-reported evidence most likely creates a bias towards exaggeration in description of new practices. As these projects are promoted as flagship examples, they aim to showcase new solutions, and therefore have an inherent incentive to refer to policy as new. The cases have been selected according to the best knowledge of the researcher and compared with projects in other cities to find which practices stand out.

able to provide "show-off" projects, such as low carbon districts or CBDs with an eco-profile (Interview with foreign consultancy firm, Beijing, 2016.06.13). Another respondent claims that using a green image is a way for companies to respond to government policy, which in return provides better investment opportunities (often cheaper land). Real estate companies also pursue eco-city building to create an image of being forerunners and green pioneers (Interview with international consultancy firm, 2013.04.10, Beijing; Interview with energy consultant, 2014.02.25, Hong Kong). Real estate developments with a green image can also create a higher property value. Companies "make a profit out of ecological/low-carbon development, as it creates a high land price" (Interview with domestic policy research institute, 2013.03.08, Beijing). An official at a domestic policy institute observes that in high-level projects (such as eco-cities), the prestige motivates companies to accept higher costs. At the same time, the companies learn to meet higher sustainability performance indicators (Interview with domestic planning institute, 2016.05.02, Beijing).

The limitation of this mechanism is that solutions of a technical nature are preferred, whereas complicated system solutions less often are copied. A foreign planning consultant points out that complex planning approaches that require collaboration between several actors (waste, energy, spatial planning) are especially unlikely to be reproduced. One reason is that these require cooperation with municipal departments, which takes up too much time and trouble (interview with foreign consultancy firm, Beijing, 2016.06.3). New planning procedures, such as participatory planning approaches, are also unlikely to be copied, as these carry no obvious profit for domestic firms (Ibid).

Further, most companies only improve their energy use profile or if it leads to cost cuts.[24] A consultant involved in eco-city planning confirms this view, stating: "if we give them 24 criteria they will just take the one that are economically beneficial and forget the rest… The environmental and ecological calculations are a basis for our planning, but the cost analysis is the basis for them" (Interview with international consultancy firm, 2013.04.10, Beijing). On average, companies only consider energy conservation solutions that contribute directly to cost cuts (e.g. district heating in large public projects), and these incentives are limited due to the low energy costs (Interview with foreign consultancy firm, Beijing, 2016.06.3).

In conclusion, replication of policy strategies introduced through flagship demonstration projects can be realized through market diffusion. However, it is not a potent mechanism for spreading system solutions and policy strategies of a non-technical nature.

Collaborative problem solving followed by internalization

The second mechanism through which partnerships introduce new policy practices is collaborative problem solving. This mechanism is realized when municipal authorities seek external advice from academic/expert organizations, bilateral partners or international institutions to solve a specific urban issue. Through pragmatic absorption of successful solutions, these policy strategies can be internalized by local administrations. Cases from the sample of initiatives illustrate that this mechanism is realized through different partnership constellations.

For example, Guangzhou E-core is a planning approach introduced to protect ecological areas in the city centre of Guangzhou Municipality. This design uses a greenway convergence strategy that connects green areas and at the same time aims to support species diversification, limit the use of elevated highways and employ elevated green walkways. The planning strategy thereby tackles issues of habitat fragmentation and biodiversity protection. The plan was

[24] When questioned about driving forces behind energy and emission improvements, company representatives refer to economic aspects. A representative of a steel company states that considerable savings have been realized through energy efficiency upgrades (Interview with steel company, Shandong, 2016.04.19). A paper company manager makes a statement about their improved energy profile, as the new recycling systems allows the factory to rely on their own electricity production (Interview with domestic paper company, 2016.06.13, Shandong). Improved resource efficiency can also create a competitive edge relative to companies with poor energy performance (Interview with iron and steel industry alliance, 2016.03.04, Shandong).

developed in collaboration between Tongji University in Shanghai and Guangzhou Urban Planning Bureau. This example illustrates how public-academic partnerships produce horizontal linkages for mobilization of knowledge and information in urban planning processes.

There are also examples of initiatives led by domestic research institutes in cooperation with international organizations, such as Guangzhou Sustainable Transport Plan. This is a comprehensive low carbon development plan developed by Guangzhou Municipality in partnership with Institute for Transportation and Development Policy (ITDP), an international non-profit organization. This plan is cited as innovative through its seamless connections between BRT system, railway system, large-scale bike-sharing stations, and cycle paths. The plan is cited as contributing to pollution and emission reductions, and congestion alleviation, while at the same time being socially inclusive. A similar example is the partnership between Kunming Municipality and the foreign charity foundation China Sustainable Cities Program (CSCP), which has produced a Transit-Oriented Development (TOD) plan in Kunming.

An example from the industrial sector is Qingdao DRCs partnership with ADB and WRI (and international NGO) in the establishment of an emission accounting system used to develop an emission reduction development plan. The plan introduces a systematic approach to emission reduction control, by creating an inventory of the city's energy use, sector scenarios, and a technology roadmap. At the same time, the emission reduction strategy claims to improve cross-sectoral coordination, information sharing, public participation and public opinion supervision mechanisms. In the formulation of this ambitious strategy, ADB and WRI drew together an international researcher team that contributed technical advice throughout the process. These three examples illustrate how partnerships between public actors and foreign NGOs introduce new planning approaches on a local level in China.

Another partnership constellation is collaboration between Chinese authorities and foreign municipalities. This takes the form of participation in transnational networks, as demonstrated by Wuxi's participation in the Low Carbon Future Cities project. Through the project, the municipality has cooperated with the German organization Wuppertal Institute in formulating industrial emission reduction plans. This has involved dialogue between local stakeholders and representatives from Dusseldorf to identify new solutions. Concrete action plans resulting from this partnership include establishment of a database and online information system used to estimate the capacity of renewable energy development in Wuxi's urban region. Wuxi has also developed a policy tools for successful emission reduction in the industrial sector. Another example is Kunming Municipality's EcoPartnership with the city of Portland as part of the program "We Build Green Cities". Through the project, planning and design experts from Portland have helped Kunming to promote new planning practice in transit development, primarily by introducing walking and cycling paths. The aim of these strategies have been both to lower carbon emissions and alleviate traffic congestion.

Finally, partnerships between Chinese authorities and bilateral partners can contribute to introduction of new policy strategies. An example of from the transport sector is Shenzhen Municipality's cooperation with the German development agency GIZ to develop improved parking management strategies. The aim was to tackle issues of congestion, pollution and emissions. The project took the shape of a pilot project introducing parking charges in four zones. Due to the effectiveness of the approach it was up-scaled to the whole city. A similar project was carried out in Beijing, where transport demand management (TDM) and parking management programs were piloted in partnership with GIZ. The aim was to develop evaluation toolkits for TDM. These two examples illustrate how partnerships formed through traditional development assistance contribute to local policy development in China.

These examples demonstrate that municipal authorities in China are actively seeking novel ways to solve urban emission reduction challenges. In their quest for solutions, they create links across sectors and across borders, which mobilize ideas, tools and information. The result is the establishment of networks of knowledge populated by public actors, researchers, and experts

at international institutions. These networks represent new loci of authority that extend beyond public borders and in part remove policy directions from the top-down structure of China's political system.

7.4 Networks of knowledge production

The overall conclusion of this chapter is that partnerships in urban climate action in China are common. The results of the comparative study and information from the member check interview both demonstrate that municipal authorities and companies draw on resources of other actors (information, technology, and funding) to realize local emission reductions.

The chapter also demonstrates that climate partnerships fulfil various functions. In this sample, the most common function is information dissemination and demonstration, followed by technology transfers and technology development, public service provision and rule setting. This is consistent with the literatures on sustainability partnerships and transnational climate networks, which highlight information dissemination and knowledge sharing as important partnerships functions (Betsill & Bulkeley, 2004; Glasbergen, 2007; Andonova et al, 2009; Pattberg et al, 2012; Bulkeley et al, 2012; UN, 2015). The sample of this study indicates that partnerships with the function of information dissemination and demonstration typically take the form of either large scale projects, such as eco-city projects or low carbon communities, or resource saving campaigns.

Partnerships with the function of technology transfer often involve Chinese companies importing foreign equipment, while research partnerships either have the form of joint research projects (for example between domestic and foreign academia) or establishment of innovation platforms. A key conclusion of this chapter is that partnerships involving technology transfers and technology development play an important role in introducing emission reduction technology on a local level in China. While technology transfers remain a common mechanism for introducing new technology, research partnerships have become central to development of energy conservation and emission reduction technology. This is consistent with China's shift from being an importer of renewable technology (e.g. wind turbines) to being a leading clean-tech exporter (e.g. PV cells) (Caprotti, 2008). It is also consistent with studies that point to the capacity of actors in the global South to build independent pathways of change, rather than simply relying on leading firms catching up with the West (Berkhout et al, 2010). Research partnerships form linkages between domestic and foreign firms, domestic and foreign academia, as well as parastatal research institutes. The member check interviews demonstrate that most actors are involved in multiple, parallel collaboration projects. The image that emerges is one of relatively close-knit networks of knowledge production that are interconnected with global flows of information.

Partnerships with the purpose of providing low carbon public service and infrastructure exist in a broader range of constellations. Municipal authorities form alliances with firms and academic organizations to facilitate delivery, access new designs, share financing burdens, and create new funding arrangements. In provision of infrastructure such as renewable energy plants and district heating systems, companies form linkages with foreign firms to introduce new technical solutions. Mixed ownership structures (PPPs, JVs and BOTs) appear to be relatively common in provision of low carbon infrastructure, such as renewable energy plants.

In partnerships with the purpose of rule setting, municipalities create coalitions with organizations representing expertise, such as academic institutes and foreign partners. These connections provide channels of information and knowledge that are used to shape urban emission reduction strategies, policy tools, and low carbon development plans. These results are consistent with Mai and Francesch-Huidobro's (2015) research on collaborative municipal networks. The results of the comparative study confirm that municipal actors create vertical and horizontal intra- and intergovernmental linkages to access resources and facilitate urban climate action.

Clearly, actors also operate independently to deliver climate action. However, this sample suggests that climate initiatives led by a single actor tend to reproduce known examples of climate action and be less innovative than initiatives led through partnerships. Many municipal-led initiatives had a regulatory or administrative nature, such as targets for green construction and zoning regulation. Nearly all initiatives were led by large SOEs with significant financial and technical capacity and the ability to deliver projects without collaborating with other actors. While most non-partnership initiatives in this sample were projects following top-down guidelines or large infrastructure projects, collaborative initiatives often involved experimentation with new solutions. This difference in character suggests that governance through partnerships is linked with policy and technology innovation.

This chapter presents empirical evidence suggesting that climate partnerships, especially between municipal authorities and domestic or foreign academia, introduce new policy and planning practices on a local level in China. Two mechanisms explain how this is realized. The first consists of large scale demonstration projects involving multiple organizations, which function as platforms where new policy ideas are tried out. The member check interviews suggest that low carbon policy and planning approaches maybe absorbed by actors that are involved in these projects (often real estate forms and consultancy companies), who will diffuse them by applying them in other projects. However, this mechanism is weak. Companies are unable to replicate system solutions (which require coordination with local authorities) and tend to be primarily interested in technical solutions.

The second mechanisms through which new policy approaches are introduced is through collaborative problem solving. This mechanism is realized by local authorities or academic institutes forming coalitions with foreign authorities, research organizations, bilateral partners or international NGOs when drafting urban low carbon plans. Through dialogue and joint search for new solutions, new solutions can be absorbed and adapted to fit local contexts. This conclusion is aligned with the research of Bauer and Steurer (2014), who have shown that climate partnerships contribute to policy diffusion. Bauer and Steurer (Ibid) argue that collaborative strategies, such as working groups, leads to information sharing that affects formulation of action plans and strategies. The results of this study demonstrate that this tendency also exists in China.

The findings also build on the research of Schroeder (2008) who have shown that Chinese NGOs participating in transnational networks contribute to internalization of international climate policy. This chapter demonstrates that participation of municipal authorities in transnational networks is one way through which partnerships contribute to policy innovation. Beyond this, this chapter shows that other forms of partnership (public-academic partnerships, partnerships between public actors and international NGOs, and traditional development assistance), create the same kind of internalization mechanism. These linkages are more pervasive than expected and seem to make up an integral element of Chinese authorities' search for low carbon development solutions. They suggest that knowledge production related to emission reductions is concentrated in linkages that on the one hand are integrated into international flows of skills and technology, and on the other hand are concentrated in local inter-institutional linkages.

At the same time, these results indicate that partnerships create new channels of participation and influence for non-state actors over policy making, in particular "soft" rule setting, such as (not necessarily binding) emission reduction targets and low carbon transport schemes, development of new policy toolkits, and spatial plans that are part of eco-city and land-scraping projects. In local climate action in China, foreign organizations and domestic research institutes regularly exert influence over climate policy on a local level. The locus of technical and planning expertise thereby shifts towards cross-sector and cross-border linkages through which local planners and policy makers mobilize information. However, not all groups are part of these information flows. The next chapter will continue the exploration of which actors participate in environmental policy networks, and why some actors are excluded.

8 Participation in environmental policy based on techno-economic rationalities

> *The leadership navigates by special interests – they are trying to keep everyone happy, this is rational… but a transition requires losers and winners (Interview with manager at international NGO, 2013.01.25, Beijing)*

In the quote above, a manager at an international NGO observes that the pursuit of sustainability in China is not a neutral quest. The citation refers to the way in which authorities at a central and local level in China try to avoid conflict, but inevitably need to deal with diverging actor interests. The respondent raises the auto manufacturing industry as an example of a group that would lose out by shifting towards a low carbon transport system. According to this respondent, the leverage that this group has over policy makers is preventing such a transition from taking place. This chapter provides further insight into which groups are able to influence environmental policy, which interests are considered, and which actors are seen as legitimate in intervention in environmental issues. The chapter does so by relying on information from member check interviews conducted in Beijing and Hong Kong in 2013, 2014 and 2016.

The first section of the chapter (8.1) describes a traditional approach to environmental policy. In this approach, central and local government authorities deal with the climate change challenge by adopting increasingly strict environmental regulations. Government authorities are the key actors in environmental policy, acting on behalf of the public good. Their leadership in environmental action is based on traditional authority. Companies are the key object of these regulations, in particular industrial firms. In response to higher emission standards, companies are adopting improved environmental protection equipment or are forced to shut down. The member check interviews suggest that this traditional form of environmental governance (rather, environmental "government") remains important and common in China. As noted by Rosenau (p.39, 1995), the notion of governance does not imply that national governments no longer are central loci in processes of governance; government authorities continue to be central, although they have lost some of their earlier dominance to other systems of rule.

The second section (8.2) presents a different principle for intervention in environmental policy issues. Information from the member check interviews shows that actors representing local economic and political interests have the opportunity to influence decision making processes and align decisions with their priorities. This refers to local government departments representing economic issues (such as DRCs), local political leaders (Mayors and the Mayor's Office), as well as economic stakeholders. In making this argument, this section builds on the insights of Chapter 5, which applied a policy network perspective on local decision making. The argument is that actors with a crucial role in the political economy are seen as legitimate to intervene in environmental policy making processes.

The third section (8.3) discusses another rationale for participation in environmental policy, which is based on the expertise of organizations. Groups that (are believed to) represent technical knowledge are able to influence environmental policy and participate in sustainability projects. Because government authorities and companies see expert organizations as legitimate cooperation partners, green organizations need to frame themselves as technical advisors to be included in environmental efforts. The argument in this section is that expert organizations are seen as legitimate actors in environmental policy issues by virtue of the professionalism or technical skills they hold.

Section 8.4 presents additional analysis to contrast to these principles. In includes the findings of the additional period of fieldwork in Hong Kong. The case study of Hong Kong provides an alternative picture of a greater diversity of voices, interests, and viewpoints influencing environmental policy processes. The member check interviews from Hong Kong show that in this somewhat more open political space, participation in environmental policy is based on a broader variety of rationales. Interviewees themselves compare their experiences in Hong Kong with those of colleagues in mainland China. Apart from groups representing political and

economic interests and expert knowledge, a range of social concerns related to energy issues are expressed and debated. At the same time, this variety demonstrates the range of social and environmental objectives that are lost in environmental policy on the mainland.

Section 8.5 draws these arguments together by showing that the principles of inclusion into environmental policy in China can be explained by theories of technocracy. This section discusses how principles of legitimacy in China's political system are based on an ideology that places economic stakeholders and experts as authorities in public policy. This thesis proposes to refer to this tendency using the concept of techno-economic rationalities. This concept explains how inclusion and exclusion in environmental policy is structured according to deep-set values and routines of China's political system.

8.1 Traditional environmental "government"

This thesis focuses on the role of non-state actors in environmental governance and the ways in which authority is shared horizontally with companies, think tanks, academic institutes, NGOs and foreign partners. While these actors are important, government organizations continue to play a central role in formulation and delivery of environmental policy. The member check interviews emphasize that traditional forms of steering are central to local environmental action in China. The interviews show that companies perceive government authorities primarily as an actor formulating regulation, standards and emission requirements. Much of the energy saving and emission reduction actions taken by local companies are carried out in response to binding regulation. In this section, statements from key respondents illustrate this tendency.

In an interview with a department in charge of climate change issues at China's Ministry of Environmental Protection (MEP), an official confirms that introducing increasing emission standards is their key strategy to reduce emissions in the industrial sector. The respondent sees continuously rising emission standards as a key tool for forcing companies to improve equipment or otherwise to shut down (Interview with domestic environmental authority, 2016.05.28, Beijing).

Respondents from industrial units and industry associations point in a similar way to environmental legislation as a key driving force behind their pollution reduction activities. A manager at a paper and pulp company in Shandong Province describes the increased pressure on small, polluting units over the past few years as follows:

> *For example in COD [emissions[25]], we have made extremely fast progress. 3-5 years ago … the limit in Shandong was around 300 ppm, and then suddenly they cut it to 40 ppm! This meant that a lot of the small factories had to close. The investment in equipment to meet that kind of standards was very high. Our leadership had been proactive in that area, so it was quite easy for us to reach that target. But for all the household size units in Shandong there were really a lot that had to close down. They were rather accepting the fines for pollution than installing that kind of waste control equipment, because it was just too expensive (Interview with domestic paper group, 2016.06.18, Shandong)*

A representative of another paper and pulp company in the province makes a similar statement, pointing out that rising emission standards has contributed to closure of small plants and consolidation of the paper industry. The respondent states that their company consistently stayed above the standards, but while they invested massively in new equipment, the local government kept rising the emission control levels. After the most recent upgrade, the company found that their emission levels were lower than an American cooperation partner (Interview with domestic paper company, 2016.06.13, Shandong).

Representatives of the iron and steel industry point to the importance of government regulation as a driving force behind energy saving measures. Within this sector, the most important policy pressure has been local government requirements to shift from coal to gas boilers, in

[25] A measure of organic compound concentration in water, an indicator for water pollution.

combination with rapidly raised emission standards and performance targets for energy efficiency. Many small, inefficient units have been shut down in this sector as well. A representative from Shandong Iron and Steel Industry Alliance states that recent environmental improvements in the sector definitely were incited by government regulation (Interview with Iron and Steel Industry Alliance, 2016.03.04, Shandong). A manager of a large steel enterprise notes that investment into gas boilers were made specifically due to government pressure: "companies have been forced to shut down coal boilers and replace them with gas units. This was an expensive investment for us, which generated no economic benefit. Of course, it is good that they are cleaner, but I doubt that companies would have made this type of investment without the government pressure, it made no economic sense" (Interview with steel company, Shandong, 2016.04.19).

Respondents also observe that the pressure of raised pollution emission standards will continue to affect industrial activities in the coming years. A representative of China Paper Industry Alliance states that "the key thing right now is the recently introduced environmental law, which has very high standards for certain types of emissions … A lot of small factories will have to shut down in the coming years" (Interview with China Paper Industry Alliance, 2016.05.22, Beijing). A representative of a pulp and paper company states that all industrial sectors will be under high pressure during the 13th FYP due to government regulation. The intention of the central government is to consolidate the sector and only allow high performing units and companies with economies of scale to remain in the market (Interview with domestic paper group, 2016.06.18, Shandong). Another round of shut-downs is expected in the iron and steel sector as well (Interview with Iron and Steel Industry Alliance, 2016.03.04, Shandong).

Other policy strategies also affect company activities, but to a more limited extent. Overall, the member check interviews suggest that the most important tool is economic incentives: subsidies and tax benefits. A respondent from MEP confirms that use of locally issued subsidies is an important policy support. However, capacity to rely on these tools is connected with economic strength of local authorities, which means that economically weaker areas ted to fail implementation of such strategies (Interview with domestic environmental authority, 2016.05.28, Beijing). According to representatives of the steel and paper industries, beneficial tax policy is the type of incentive that has the largest effect on their activities (Interview with domestic paper group, 2016.06.18, Shandong; Interview with paper industry alliance, 2016.05.22, Beijing; Interview with domestic paper company, 2016.06.13, Shandong).

A related observation is that many private sector actors continue to have a reactive approach towards energy savings and emission reduction activities. The interview material suggests that respondents from the industrial sector perceive government authorities as the actors primarily responsible for the quality of the environment. Empirical material presented in other chapters of the thesis points to a similar tendency. For example, the comparative study included very few companies that had taken independent climate mitigation action – almost all initiatives in the industrial sector appeared to be measures adopted in response to government regulations or guidelines. In the case study in Rizhao, key industrial actors did not agree to participate in interviews. If these actors had seen themselves as leaders in climate action, it is possible that they would have been more enthusiastic about the opportunity to promote their efforts online or through discussions with researchers.

These accounts demonstrate that traditional "government" (rather than governance) still plays an important role in environmental protection efforts in China. These accounts indicate that authorities in charge of environmental actors remain the most important actors addressing environmental issues on a local level. However, environmental government authorities are not the only actors shaping and delivering environmental policy.

8.2 Political-economic interests in environmental policy

Chapter 5 shows how local authorities, economic stakeholders, external planners, and academia interacted in urban planning processes in Rizhao. The chapter illustrates that some actors, such as the top municipal leadership and economic stakeholders, have better opportunities to influence policy and planning outcomes. The member check interviews confirm that actors with access to political or economic resources influence decisions with a considerable impact on the local environment. This section illustrates this argument by providing further information regarding environmental and economic conflicts in planning processes. This relates to intragovernmental conflict and the uneven ability of municipal authorities to influence decisions. It also relates to conflicts between environmental agendas and economic growth, and the leverage that economic stakeholders exercise over local planning processes.

Several member check interviews demonstrate that conflict and lack of coordination characterizes interaction between municipal departments. A researcher at a domestic research institute suggests that "departments are parallel and have their own ideas. There should be a higher level office that coordinates their agendas instead of them fighting with each other" (Interview with domestic policy research institute, 2013.04.24, Beijing). The same respondent explains that "if an issue is not a department's focus, they will not care much about it, or at least not do much about it, not try hard … Every department has different interests and demands and puts their own priorities on top" (Interview with domestic policy research institute, 2013.03.08, Beijing). These observations provide an image of local departments in pursuit of non-coordinated goals and in continuous clashes over diverging priorities.

Further, the priorities of environmental units are less influential and frequently differ from those of economically oriented units. This situation is reflected at the highest level of government. A representative of the climate change department of MEP states that "environmental legislation has exerted a larger influence on the industry, but it is still a lot weaker than the influence from NDRC. Only recently has the NDRC and other economic units recognized the influence that climate change and pollution has on the economy and realized that this must be considered" (Interview with domestic environmental authority, 2016.05.28, Beijing).

A foreign researcher at an NGO explains that municipal authorities often face conflicting priorities. For example, transport department often argue for road expansion, which is opposed by construction commissions and EPBs. The decision in these cases are made by the Mayor, and the EPBs are seldom able to affect the outcome (Interview with international NGO, 2013.04.18). On a local level, the DRC usually has a stronger influence than environmental bureaus (Interview with policy advisor, Beijing, 2013.01.18). A representative of a municipal EPB confirms that suggestions of their unit sometimes simply are ignored:

> *As an environmental department we do our own research in this area. We will come with policy suggestions to other departments. Our feeling is that if the solutions are helpful and can contribute to earnings in some way, they follow them. If the suggestions are expensive, they ignore them (Interview with local EPB, 2016.06.20, Shandong)*

The relative weakness of environmental departments relative to economic units has been observed in a number of previous studies (Lo & Leung, 2000; Liu et al, 2012; Kostka, 2014; Mai & Francesch-Huidobro, 2015). The added insight of these observations is that conflict is an integral part of inter-governmental interactions and that planning processes are influenced by the relative strength of different units.

Several member check interviews support the notion that the strongest influence over local planning decisions lies with the Mayor's office. A planner at a domestic research institute states that "if Tsinghua [University] has done a plan and it says one thing, it will still be done according to what the government wants. In a research project if there are contradictions, the outcome will be decided by the Mayor" (Interview with domestic policy research institute, 2013.03.08, Beijing). A respondent that has been part of drafting eco-city plans in a number of cities states that "the most important factor is what the municipal leadership wants. When their

ideas change, the incentives for the city to change also change … Our plans change with the ideas of the leader" (Interview with urban planner at a domestic planning institute, Beijing, 2013.03.06). A policy advisor at an international NGO states that they try to get their advice into the Mayor's hand, since he will make planning decisions (Interview with international NGO, 2013.04.18, Beijing). These observations support the results of Chapter 5, which suggested that the municipal leadership has the strongest influence over local planning decisions.

A foreign policy advisor illustrates this tendency by describing "sustainable" urban planning as follows:

> *In terms of sustainable urbanization, the Mayor's office basically decides the development direction of a city. In comparison, the EPB has no power. For example, the Mayor's office will decide where the subway lines will be drawn. Then they will ask for research to support this decision. Research organizations that are invited to provide consultancy on urban planning (such as the CAUPD) are placed under the government, and therefore their function is to provide results that show the political office's decisions are correct (Interview with director at international environmental NGO, 2013.03.07, Beijing)*

The citation points to the weak role of the EPBs and the strong role of municipal leaderships. The quote also illustrates how the Mayor's Office prioritizes options that generate economic growth and pushes other actors to support these objectives.

A number of respondents point out that climate change policy is adopted only if it creates investment and economic expansion. An advisor at an international organization states that municipal governments do want renewable technologies and energy efficient applications, but only if they have an economic application for this. The respondent states that "only then will they be seriously considered … this is something that municipal governments do in order to create a city brand and attract more investment" (Interview with director at international environmental NGO, 2013.03.07, Beijing). A policy advisor working at a national policy research makes a similar statement: "there is a strong focus on new technology. For example, in low carbon transport there is a lot of talk on electric vehicles and subway projects. However, this is because such projects can create GDP growth. Big infrastructure attracts investment, especially if it is new technology" (Interview with domestic policy research institute, 2013.03.08, Beijing). These citations also illustrate the tendency to prioritize infrastructure and technology intense climate solutions, because they are viewed as stronger investment options.

According to several respondents, low carbon development will not be considered if it is viewed as conflicting with economic growth. For example, decision makers in less developed regions are unlikely to prioritize climate change policy, or even be aware that this exists. A foreign policy advisor explains that "if you talk to a mayor in Yunnan about low carbon he will probably say: what is this? He has enough to think about his industrial development, his GDP, and has no money to spend on this kind of thing" (Interview with international consultancy firm, 2013.04.10, Beijing). A foreigner researcher states that if a province sees economic benefits of implementing a policy, they will do it. If they do not see the economic benefits, or if the policy is contrary to their benefits, they will try not to implement it (Interview with international research institute, 2013.02.29, Beijing).

Further, Mayors tend to favour planning directions that contribute to city branding and other quick achievements that benefit political careers. As stated by a representative of an international NGO, "leaders have limited timeframes; they only care about the results within their own period of mandate" (Interview with director at international environmental NGO, 2013.03.07, Beijing). A policy advisor at an international organization believes that "political performance seems to be the biggest reason behind [eco-city development]… Many will adopt them for the sake of the benefit of their political leaders… They need quick results. So after their period they can say, I have done this, now we are an eco-city" (Interview with policy advisor, Beijing, 2013.03.08). These observations suggest that climate policy only will be considered if it is directly related to political achievements.

For the same reason, long term, strategic decisions, such as investment into non-motorized transport systems, are less useful for political promotions and therefore less likely to be prioritized or sustained with changes of leadership (Interview with director at international NGO, 2013.03.07, Beijing; Interview with policy advisor, Beijing, 2013.03.08). Further, this short-sighted focus on political results makes the realization of system level change difficult. As explained by a consultant in relation to introducing system level solutions "it needs time, patience and courage to aim for this. There is no fast-track. If you are using eco-cities as a strategy for realizing a political career, there is no way to get results. You get a spotlight on a project, then nothing happens" (Interview with foreign consultancy firm, Beijing, 2016.06.3). As a result, political leaders are more likely to opt for technical fixes with a high level of visibility when considering climate policy alternatives.

Access to funding in the form of grants and subsidies is another motivation to adopt eco-city agendas (Interview with international NGO, 2013.04.18; Interview with domestic research centre, 2013.04.24, Beijing). A representative of a local government in Shandong Province explains that the city accessed 30 billion RMB in central government investments into local projects when it became approved as an environmental model city. This was an important driving force for the leadership (Interview with local EPB, 2016.06.20, Shandong). However, this also means that carbon reduction calculations often are carried out for the purpose of receiving grants, but completely overlooked in the implementation phase when the only important aspect is how much land real estate developers can sell (Interview with foreign consultancy firm, Beijing, 2016.06.3). As stated by an engineer at a foreign consultancy firm, "I have so many examples of cases where we have been asked by a company or municipality to give a district heating plan with energy optimization, and once it is approved by the NDRC, they forget about the plan. They are almost never implemented" (Ibid).

In conclusion, the member check accounts point to the way in which political and economic motivations play a key role in urban policy decisions, and how actors that represent local economic or political interests influence important planning decisions. These insights strengthens the conclusion from Chapter 5, namely that inclusion in urban planning is closely associated with structures of the local political economy and priorities of local elites. There is also further evidence suggesting that the dominating role of political leaders and key economic stakeholders allows for planning conflicts to be made invisible. He (2006) has previously described how planning meetings in cities in China have the purpose of reaching consensus, which in turn helps build legitimacy of policy decisions. In this context, however, key actors involved in planning meetings tend to be those that represent reasonably well-aligned interests. There is no attempt to, for example, involve representatives of citizens that are negatively affected by industrial expansion and build-up of land in decision making processes. "Building consensus" in this consensus therefore is not so much an exercise in resolving conflicting interests, but rather a way for political and economic elites to agree on mutually supportive agendas.

8.3 Participation in environmental policy based on "expertise"

Apart from participation in environmental policy based on traditional authority and political-economic interests, a third form of influence over environmental policy is participation legitimized through technical "expertise". This section shows that this influence is expressed through inclusion of representatives of technical knowledge in local planning processes and partnerships. The section also argues that by acting as experts, channels of influence are created for actors that otherwise would not be able to access environmental policy and programs.

The member check interviews confirm that experts from research institutions and universities often are invited by local governments to draft planning documents, in particular if local planning bureaus lack experience and knowledge (Interview with policy advisor, Beijing, 2013.01.18). According to a policy maker at a government policy research institute, researchers and planners that work at semi-governmental institutes and universities are guided by the

priorities of their organization, rather than local development interests. For this reason, the plans developed by external "experts" are more likely to give weight to environmental considerations (Interview with domestic policy research institute, 2013.03.08, Beijing).

A number of respondents suggest that external planners act as a counterweight to economic interests, by placing more emphasis on long term sustainability considerations and ecological capacity. Two examples of this are provided by a researcher and a planner in relation to eco-city projects. The first is stated by a low carbon planner involved in designing the spatial lay-out of Tianjin eco-city. This planner explains that the Singaporean development partner, a private investment company, wanted a large residential area for the purpose of selling property. The central planning organization of the respondent wanted instead to follow ecological principles:

> *One motive for [the Singaporean firm] was to have a chance to use many new forms of technology, such as water technology, city district lay-out, and so forth. However, they were also interested in getting some form of economic profit from this. They wanted to sell real estate in the eco-city, so they wanted to increase the planning of the real estate area. However, we thought that in an eco-city the residential area could not be too large. So a main source of conflict was the size of the residential area (Interview with domestic planning institute, 2013.05.24, Beijing)*

A similar example is provided by a consultant at an international consultancy firm involved in the eco-city planning in Wuxi. The respondent explains that their organization suggested protecting a larger amount of green area and water resources, whereas the local government preferred to develop a larger area to generate more profit from the project. Eventually, the advice of the external organization was accepted in this case:

> *We thought that the amount of protected green areas left by the government was not wide enough, this was a key conflict. Also, although the water system of Wuxi is developed, we thought that they had not left enough water resources from an eco-city perspective. Both sides were in agreement to develop the area according to eco-city principles, so in the end they agreed to leave more water… I think one key issue was the amount of green areas left to be protected. From the local government's perspective, they might want to develop more area, but from the eco-planners perspective, we wanted to keep more area protected (Interview with eco-city planner at a domestic consultancy firm, Beijing, 2013.05.27)*

For green NGOs in China, public mobilization and policy advocacy activities can be difficult to perform. This difficulty is described in previous research (Tang & Zhang, 2008), and is confirmed by the member check interviews of this study. A representative of an international NGO explains that the main role of their organization is meant to be environmental activism and raising awareness about environmental issues. This is hard for the organization to realize as their online information and publications get removed and blocked by the government (Interview with international NGO, 2016.05.05, Beijing). When running into these dead ends, the organization has instead engaged in research and explored the possibilities to work in partnerships in the role as technical advisor. The organization does research and writes reports, collects data and measures industrial impact on the environment and people's health. Through their technical engagement in pollution issues, the organization has joined a partnership with the toxic chemicals unit of the MEP, where it participated as policy advisor (Ibid). This is a much less confrontational approach than the NGO usually takes, but one which has allowed it to achieve greater impact on environmental policy in China.

A second NGO presents a similar picture. The organization works with research into energy trends, emission trends and energy policy and functions as a technical advisor in policy issues (Interview with international NGO, 2016.04.17, Beijing). The NGO has partnerships with several domestic central and local research institutions. According to the respondent, the advice they provide to their domestic cooperation partners travels through these connections to national and local decision makers. Furthermore, the respondent states that their advice is considered by central and local policy makers because it carried the authority of science:

[Our domestic research partners] pass on policy recommendation to various ministries through their cooperation partners … Our role in this becomes an expert advisor of sorts. We continuously review our research projects, and provide funding for those that go well. These results in turn serve as policy advice through our domestic partners. Our recommendations can have a lot of impact on central and local decision-makers, because they see it as scientific (Interview with international NGO, 2016.04.17, Beijing)

An example of the organization's influence on environmental policy is the joint development of environmental standards for coal to gas conversion projects. The NGO also works directly with local policy makers in developing strategies to reduce the economic impact of emission reduction programs. According to the respondent, a central part of this work is to find ways to reduce negative economic impacts of shifting from reliance on coal, such as by developing alternative industries. Interestingly, even though the emphasis is on economic considerations, this advice incorporates social and ecological aspects. For example, the organization tries to explain to local decision makers that there are red lines, ecological capacities, they have to consider (Interview with international NGO, 2016.04.17, Beijing). To lay off coal, they have also worked on development of policy for protecting laid-off workers from the coal industry by using welfare and insurance programs. The respondent admits that "there is a lot of political opposition to these kinds of suggestions, though. They will only go through if alternative [economic] development paths can be identified" (Interview with international NGO, 2016.04.17, Beijing).

There are also examples of engagement in partnerships between Chinese authorities and foreign partners acting as technical advisors in environmental policy development. A representative of MEP explains how dialogue with foreign cooperation partners is one way in which China's new soil pollution standards (currently being drafted) is developed. According to the respondent, other countries have worked for decades with soil pollution, which means that China can draw on their knowledge and experience to shape effective action. Central and local government authorities use the experience of their partners and best practice examples as guidelines for deciding who takes on responsibility for clean-up, procedures for risk assessment, use of remediation technology, and so on. The format for sharing these experiences is joint work-shops and conferences, collection of case studies, bilateral dialogues and inviting foreign companies to take part of remediation projects. The dialogues also involve representatives of leading universities who access information and contribute to the central government's policy development (Interview with domestic environmental authority, 2016.05.28, Beijing).

Similar processes of interaction with foreign partners influence policy development on a local level. A representative of a municipal environmental protection bureau in Shandong Province describes how bilateral cooperation projects contribute to environmental awareness raising and adoption of new policy, standards and institutional frameworks. These projects primarily take the form of traditional development assistance, where partners carry out environmental research, find out where to emphasize environmental protection, identify polluted areas where agriculture is taking place, and learn about methods for risk management. The local government have absorbed elements of the partner's environmental assessment indicator system, as well as format for operation of a local environmental court (Interview with local EPB, 2016.06.20, Shandong).

The previous chapter on partnerships provides many similar examples. Section 7.2.2 discusses initiatives involving local rule setting activities, where academic organizations and foreign partners act as advisors in formulating emission reduction schemes. The section also demonstrates the variety of organizations involved in large scale demonstration projects. For example, in eco-city projects, planning institutes and consultancy firms participate to provide managerial or technical advice on lay-out and design, and companies provide input into technological solutions. The next section of the chapter (7.3) discusses how the involvement of

non-public actors in policy processes contribute to adoption of new policy elements. It concludes that partnerships are providing avenues for organizations representing technical expertise to influence local policies and projects.

On the contrary, "the public" is usually not able to participate in policy processes, as has been observed in previous research (e.g. Lo & Leung, 2000). A number of member check interviews point to public opinion as largely irrelevant to environmental planning processes. A researcher at a national institute that has been involved in environmental planning in many cities expresses that common citizens "have almost no say. It seems more like suddenly there will be a plan and nobody knows where it came from" (Interview with domestic policy research institute, 2013.03.08, Beijing). A domestic researcher agrees, and points to the lack of participation as a weakness of planning procedures, which tend to be based on technological consideration but divorced from local priorities and lifestyles (Interview with domestic research centre, 2013.04.24, Beijing). A local official claims that the public is not "mature" enough to be involved, as otherwise there would be chaos. In case they were aware of environmental issues, they would swarm public authorities with claims for pollution compensation (Interview with local EPB, 2016.06.20, Shandong). These observations suggest a designation of organisations holding expertise as justified in their intervention in environmental policy in China, and a lack of recognition of other groups that lack this capacity.

What are the implications of allowing groups representing certain forms of interests or knowledge to participate in environmental policy formulation and delivery? Below, the city of Hong Kong is used as a contrasting case to show the various viewpoints and interests that are made invisible through the selective inclusion of interests in environmental agendas on the mainland.

8.4 Hong Kong: A contrasting case

At the time when the member check interviews in Hong Kong were carried out, the city was involved in a consultation process aiming to decide the strategy of a future urban energy policy. As part of the interviews, various views on this process were discussed with representatives from government authorities, academia, companies and environmental NGOs. The diverging and conflicting priorities and interests of these actors are discussed below.

First, a few words of introduction to the consultation process are in order. Currently, the energy mix of the power sector in Hong Kong is made up of around 53% coal, 23% natural gas, 22% coal and 2% renewables. In 2017, a number of coal power plants will retire, leaving room for other types of energy sources to replace this supply. This has led to a discussion about what future energy mix is desirable, as well as what economic, social and environmental priorities should dictate urban energy policy. Two key options proposed by the local government are hotly debated. The first is to import electricity (either nuclear or coal based) from China and the second to import natural gas.

Several actors express concerns with the proposal to import electricity from China. Some aspects of these considerations are environmental. There is limited knowledge about the sources of energy used for electricity production in China, which may eventually lead to a higher reliance on coal, thereby increasing the emission footprint of Hong Kong (Interview with researcher, 2014.02.24, Hong Kong; Interview with environmental activist, 2014.02.27, Hong Kong). Use of electricity produced on the mainland may also imply a higher reliance of nuclear power, which is associated with safety concerns – an aspect that is highlighted after Fukushima (Interview with researcher, 2014.02.24, Hong Kong; Interview with utility manager, 2014.02.26, Hong Kong).[26]

[26] The current proposal has already steered away from a previously heavier focus on nuclear power, due to Fukushima accident (utility public relations manager, 2014.06.26, Hong Kong).

Another problematic aspect related to import of electricity is energy security. The mainland is said to experiences power shortages and is not seen as a reliable supply source (Interview with researcher, 2014.02.26, Hong Kong). Further, residents in Hong Kong are averse to increasing their reliance on resources from the mainland, for fear of falling under increasing Chinese control (Ibid; Interview with environmental activist, 2014.02.27, Hong Kong). Other concerns with importing electricity from China are economic. A viewpoint proposed by a researcher is that this suggestion implies moving gear, jobs, infrastructure, and training opportunities away from Hong Kong to the mainland. From an economic perspective, natural gas therefore makes much more sense (Interview with researcher, 2014.02.26, Hong Kong).

Rather than accepting the proposal to increase the supply of natural gas, several organizations oppose a continued reliance on fossil fuels. One environmental NGO expresses frustration that promotion of renewables have completely disappeared from the consultation process (Interview with environmental activist, 2014.02.26, Hong Kong). Increasing the share of renewables in the fuel mix is an issue that has been formally debated previously, but is overlooked in the current proposals ("it's like they forgot it"). This organization disagrees with the government's pessimism about the capacity of renewables and points to the need to encourage small scale solutions, such as end of line wind power generators. Focus on large renewable farms always ends up in the same dead ends of lack of space and ecological impacts (Ibid).

A representative of an environmental NGO explains that their organization supports neither of the government proposals, as both alternatives support the current "energy monopoly" and fails to introduce sustainable alternatives (Interview with environmental activist, 2014.02.26, Hong Kong). Their main criticism is that increased import from China does not imply liberalization of Hong Kong's electricity market. The respondent states:

> *As a green group, we are obviously concerned with the impacts of climate change, and we hope to increase the share of renewables and improve energy efficiency in HK. The structure of the market right now is not encouraging these goals. I'll give you an example. Right now, if you have your own renewable power system, and you manage to generate a surplus of power, you can't feed this back into the grid. Because the grid is owned by CLP and HKE, you can't supply any electricity to the grid, it is impossible! The problem is that they own everything, the power production, the distribution, and so forth, and this situation does not encourage renewable distribution (Interview with environmental activist, 2014.02.26, Hong Kong)*

This organization argues that opening up the markets to imports from the Chinese mainland might contribute to a larger supply of renewable energy from alternative suppliers (Ibid). The respondent also complains that one of the reasons this is not happening is because the two power utilities have too much power over the negotiations with the government.

In contrast, a representative from one of the two power utilities argues that there is no monopoly, but simply an electricity market with high barriers of entry. The respondent expresses that "actually there is no monopoly, anybody who has the money or has the interest can come and knock the door and then say I have interest to build so and so. I mean of course, practically it would be very, very difficult to build another grid" (Interview with utility public relations manager, 2014.06.26, Hong Kong). The respondent also points out that the utility company has made the largest investments into renewable energy in the city, as well as very early investments into environmental protection technology. According to the company representative, lack of space is the greatest barrier to adoption of renewable energy systems in Hong Kong. Their proposed off-shore wind projects have, for example, not been approved because of their expected impact on sensitive marine ecosystem (Ibid).

A representative of a local green movements points out that it is impossible to have a standpoint in relation to either of the proposals, because it is unclear how future options are related to price (Interview with environmental activist, 2014.02.27, Hong Kong). This respondent argues that energy poverty of households, related with high electricity prices, is a key social concern that the consultation fails to address. At is it unclear how import of natural gas or electricity from China will influence consumer prices, the debate makes no sense. Instead of choosing a

standpoint in this process, the NGO focuses on helping energy poor households manage costs, for example by promoting energy-efficient home appliances (Ibid)

Rather than focusing on a shift in the energy mix, other green NGOs are arguing that the authorities should redirect their attention from supply to energy demand. In particular, there is a need to address electricity consumption in buildings, which accounts for a high share of electricity demand in the city. Some environmental NGOs are pushing for demand side management as an alternative to, what in their opinion constitutes, "unsustainable" energy supply (Interview with environmental activist, 2014.02.24, Hong Kong; Interview with environmental activist, 2014.02.27, Hong Kong). Others suggest that the power utilities should take on a greater burden through energy saving targets (Interview with environmental activist, 2014.02.26, Hong Kong).

Another contested issue related to energy supply is use of waste-to-energy incineration. At the time of the interviews, this was promoted by the government as a way to contribute renewable sources to the energy mix and solving the issue of lack of space for landfills. Individuals contesting the project point to the production of ash and toxic pollutants, as well as the destruction of sensitive ecosystems in construction and operation of the plant and associated infrastructure (Interview with energy researcher, 2014.02.26, Hong Kong). They argue that setting up a large scale system of collection of waste and recycling would solve the problem more effectively (Interview with environmental activist, 2014.02.27, Hong Kong). In response to vocal protests against this plant, the government allegedly reconsidered the project (Interview with energy researcher, 2014.02.24, Hong Kong).

In spite of the diversity of viewpoints expressed through the consultation, respondents complain that the final decision making of the process is not handled openly. An activist explains that "it is hard for us to say anything about the energy planning, because this happens behind closed doors… sometimes there are public hearings in the legislative councils and so on, but how they decide I don't know, we can't monitor the decision-making process… everything that is related to policy making and planning is very difficult to do" (Interview with environmental activist, 2014.02.26, Hong Kong). A researcher and policy advisor with a position on an advisory committee describes the processes in Hong Kong legislative council as rubber stamp procedures, in which "experts" and professionals with personal connections to the political leadership are invited to present evidence in support of government proposals (Interview with policy advisor, 2014.02.26, Hong Kong). The respondent states disparagingly that the processes are becoming more and more "like in China" (Ibid). Another respondent describes the consultation as "a one-sided process, where advice goes in and it is not clear if anyone is listening" (Interview with environmental activist, 2014.02.27, Hong Kong).

The reason for describing the contested nature of Hong Kong's future energy policy is to demonstrate the variety of principles that underpin the viewpoints of different groups and individuals. These principles are geopolitical (concern with increasing China's influence over issues in Hong Kong), economic (debates on the electricity market and issues of monopoly versus liberalization), social (the impact of electricity prices on low income households), technical (feasibility of introduction of renewables into the energy mix), and environmental (ecological protection in relation to development of renewable energy sources and waste-to-energy technology). Although the final decision of the consultation occurs behind closed doors, a multiplicity of concerns are expressed and hotly debated in the process. There is also evidence that these views are considered, such as in the repeal of planned expansion of supply of nuclear power (in response to safety concerns) and reconsideration of a waste-to-energy project (due to ecological impacts). This is surprising in comparison with the situation on the mainland. In China, the key arguments that are seriously considered are primarily economic and technical. Explanations for this tendency are discussed in the last section of this chapter.

8.5 Techno-economic rationalities as a principle of policy participation

This chapter centres on the question of who influences and participates in formulation of environmental policy in China. This question ultimately concerns which groups and actors are seen as appropriate or legitimate in intervention in environmental issues. This chapter suggests that alongside traditional forms of management of environmental policy (environmental government), two groups of actors influence environmental policy. That includes groups with an important role in (local) political economies and groups representing expert knowledge.

To explain this tendency, it is necessary to step back and consider principles of inclusion and legitimacy of Chinese politics. During the years of communism under Mao's leadership, recruitment to and mobility within the political system was based on class background, political ideology, and seniority within the party (Zang, 1999). A turning point in communist politics occurred with Deng Xiaoping's reformist agenda at the end of the 1970s. Deng Xiaoping introduced the concept of modernization, thereby placing technology at the centre of the political agenda and of political leadership (Cheng and White, 1990; Zang 1999; Ouyang, 2003). Deng Xiaoping's modernization campaign in the 1980s is associated with promotion of a generation of leaders identified as "technocrats". This involved appointment of scientists and engineers to party positions, along with a rapid increase of university graduates among China's political ranks, and establishment of influential think tanks connected to the political apparatus (Cheng and White, 1990; Zang, 1999; Ouyang, 2003). Zhu (p.284, 2012) describes the nature of these experts as "politically engaged intellectuals" (in communist politics), making a distinction between this group and the "social intellectuals" who were not welcome in public policy making circles. The advice of the former is assumed to be neutral and offered in the name of public (rather than personal) interests (Ibid).

According to Cheng and White (1990) China's long history of officialdom based on scholarship facilitated the turnaround in the 1980s. They describe China's traditional bureaucracy as a "meritocratic" political system, in which examinations and educational was the basis for inclusion into civil service. Elitist ideologies underpinned this system, such as Menicus' proposition that those who labour with their minds "rule" and those who labour with their body are "ruled" (Ibid, p.17).

The concept of technocracy originally emerged in the literature on Chinese politics as a way to describe the nature of China's political apparatus (Cheng & White, 1999).[27] However, the concept also represents as an ideology used to legitimize political leadership. Zang (p.112, 1999) observes that China's technocratic leadership is able to "co-opt intellectuals and professionals into the power circle". This refers to inclusion of intellectuals into the party, but also applies to powerful think tanks, working groups and parastatal committees. By drawing on the ideology of technocracy, China's political leadership manages dissent and creates mutual support between intellectuals and party officials. The leadership also uses the ideology to manage and resolve ideological conflict between sociology and capitalism and to legitimize leadership in the face of declining faith in communist principles (Cheng & White, 1999). As an ideology, technocracy therefore explains more than recruitment and mobility within China's political apparatus. It also extends to actors and units tied to the bureaucracy, such as groups and actors involved in policy making processes.

Ouyang captures this argument by defining technocracy as "governance of society by a group of experts who attempt to develop social policy based on technological principles and promises an efficiency approach to the solution of social problems" (p.177, 2003). Ouyang argues that Deng Xiaoping placed technological development as a prerequisite for economic development, making it a political goal in itself. These principles transformed China into a technological society in which "managerial effectiveness and economic utility become the ultimate moral

[27] In contemporary Chinese politics, they define a technocrat as an individual that is specialized by training, has a professional background, who contributes to politics through his or her expertise (Cheng & White, p.19, 1990).

values" (Ibid, p.178). Within this society, engineers, managers and professionals have a self-defined legitimacy to govern. As a result, experts shape political decisions, even when they are not themselves decision makers. Ouyang (p.187, 2003) concludes that due to effective popularization of technocracy as an ideal, the only responsibility of Chia's ruling elites (officials, bureaucrats and SOEs) is to maximize economic gain and managerial effectiveness, leaving morality to operate in a vacuum:

> *Clearly, if Deng's technocratic model of reform made China an economic giant, it also may be a Faustian bargain, with the attendant crisis of emptiness of values for the well-off and the crisis of resentment, injustice, and poverty for those marginalized by the policies of the state. The emptiness of values of the wealthy can be in large part attributed to the fact that the one value that can be pointed to is the Greatness of the State. And yet the greatness of the State amounts to nothing more than promotion of technological and economic power (Ouyang, p.188, 2003)*

This thesis suggests that the way in which authority over environmental policy is constituted in China matches underlying principles of the ideology of technocracy. The empirical evidence of the thesis illustrates that while non-state actors are intervening in formulation of environmental policy in China, this does refer to any or all groups. Rather, as China's leadership have based development goals on principles of economic expansion and technological progress since the 1980s, these principles structure intervention and participation in current environmental agendas. This means that arguments based on economic growth have a strong resonance within the political system. Further, actors representing technical expertise are considered authorities on public issues. This thesis proposes that the concept of techno-economic rationalities explains trends in participation in China's environmental policy. Techno-economic rationalities is a broader concept than technocracy. Technocratic principles explain who is included in a political apparatus and how policy directions are legitimized by individuals operating in the political bureaucracy. By contrast, techno-economic rationalities explain broader notions of political agency and authority that extends beyond the state. The concept also identifies what actors are seen as appropriate collaboration partners, what actors are excluded from political processes, what projects are seen as legitimate, and what operations and practices are understood as normal.

For example, techno-economic rationalities explain why NGOs act as technical advisors in order to access political processes related to environmental concerns. Examples provided in this chapter demonstrate how green organizations frame their activities as research-based and scientific in order to gain influence. This throws further light on results from previous research on how activities of NGOs affect policy processes in China. Schroeder's (2008, p.522) conclusion regarding the way in which NGOs introduce policy elements is stated as follows: "the conveyers of the message, the 'norm entrepreneurs' in constructivist terms, do not seem to have been the transnational advocacy network of like-minded NGOs, but rather scientists that shared information with policy-makers". Schroeder attributes this tendency to the scientific nature of the climate change agenda. Further explanation is provided by considering that NGOs are not seen as legitimate policy advisors unless guised in robes of science and technology.

Moreover, techno-economic rationalities explain why foreign organizations are seen as appropriate cooperation partners in environmental policy when they represent technical knowledge. Examples provided in this chapter relates to how Chinese authorities seek to tackle soil pollution. This involves multi-partner dialogues and an active search for tested technical tools, such as risk assessment systems and remediation technologies. The concept also explains the greater variety of interests addressed in energy policy processes in Hong Kong, which is a city with a different political history embedded in a different ideological context. In policy processes in this setting, a much broader spectrum of issues surface in the formulation of energy agendas. Finally, it matches the observation that public opinion is marginal in environmental policy processes in China. Due to their lack of access to significant economic resources or any special technical skills, citizens are seen as the subjects of rule rather than rulers.

9 Conclusions

China does not escape the power of vested interests in the political economy of carbon and its solid coalitions of firms, employees and governments (Balme, p.51, 2011)

The quote above refers to the way in which issues related to power and entrenched political and economic interests cause difficulty in implementing low carbon development targets in China. The citation also illustrates the impossibility of escaping particularistic interests and political choices when constructing paths to a sustainable future and deciding what this future should look like (Meadowcroft, 2011). This thesis investigates these political priorities by considering which groups and interests are represented in urban policy making, how their priorities conflict, and which interests prevail in decision making processes. This focus reveals that political and economic interests play a central role in shaping environmental decisions in cities, and that these interests are negotiated in informal governance networks.

Informal governance networks, made up of companies, research institutes and think tanks, international NGOs, and foreign authorities, are sites where local environmental policy is negotiated and formulated. These networks are also sites of technology development, design of emission reduction plans and instruments, and implementation of demonstration projects related to low carbon development. The first section of this chapter (9.1) discusses the nature and characteristics of these networks by presenting answers to the research questions of this thesis.

Although sustainability policy is shaped through network interactions, participation in these networks is not open for all actors. Rather, inclusion is structured by what this thesis refers to as techno-economic rationalities. Section 9.2 reflects on how concepts such as partnerships and collaborative environmental governance can be interpreted in this political context and in the light of techno-economic policy practices. This discussion points to the difficulty of applying concepts developed in liberalized democracies in (semi-)authoritarian political systems based on entirely different ideologies. Section 9.2 also presents a discussion on how to interpret vertical and horizontal diffusion of state authority that result from emerging network interactions. Empowerment of municipal authorities is discussed in relation to Brenner's (2004) interpretation of urban entrepreneurialism as a form of reconfiguration of state power. Horizontal diffusion of authority is explained through Allen and Cochrane's (2007) conceptualization of relational expressions of state power.

Techno-economic rationalities relate to broader debates on viewing sustainability as a quest produced through economic progress and technological advance, for example as portrayed in ecological modernization theory (Mol, 1997; Dryzek, 1997; Gibbs, 2000). This approach is criticized for ignoring how environmental issues are interconnected with social questions (Romero Lankao, 2007). The implications of these tendencies on China's current energy policy are discussed in section 9.3. The section points out that current climate initiatives in China are limited in their exploration of new practices, habits, lifestyles, or any other social aspect of emission activities that need to be altered to set China on a path to a low carbon future. A question for further research is how social innovation can become part of climate policy experimentation in China. Another question for future research is further exploration of the legitimacy basis of sustainability policy and practices in China. Legitimacy and accountability aspects have been amply analyzed in studies of network governance in the global North, but a completely different theoretical toolbox is required to understand these aspects in China's non-democratic political system.

9.1 Answers to the research questions

This section returns to the research question of this thesis: How have municipal authorities and non-state actors participated in climate mitigation action in cities in China during the period of the 10th to 12th FYPs? The evidence presented in this thesis suggests that China is no exception from the global shift from government to governance in environmental politics. Local formulation and delivery of climate mitigation policy in China relies on interactions between public and non-state actors, while cross-sector, cross-jurisdictional and cross-border linkages are employed to access information, skills, technology, and economic resources.

Further, this thesis demonstrates that China has a particular style of climate change governance. Previous research on China's political system has already demonstrated that complex interactions emerge within this fragmented authoritarian system (Lieberthal, 1992; Dumbaugh and Martin; 2011). Studies of local policy interactions have illustrated that the top-down, hierarchical structures of China's central government remain, while semi-independent groups and organizations create vertical and horizontal links embedded in this superstructure (Mai & Francesch-Huidobro, 2015). The literature on environmental governance in China describes a transition towards new styles of governing, expressed through increasing autonomy of local officials and non-state actors in addressing environmental issues (Mol & Carter, 2006; Mol, 2009). This thesis tracks, specifically, how some non-state actors are incorporated in networks of environmental governance, and which activities (such as policy making, technology development, and information dissemination) are carried out through cross-sector collaboration.

9.1.1 RSQ1: Non-state actor participation in local policy and planning

The first sub-question is how have non-state actors participated in environmental planning processes in Rizhao during the 10th and 12th FYPs (2001-2015)? Local authorities, companies, external planning experts, and to some extend local academics interact in Rizhao's environmental planning processes through rounds of consultation and meetings involving negotiation. Through both consultation and meetings, these actors are able to express their views and in some cases influence planning outcomes.

Both Chapters 5 and 8 confirm previous studies on local decision making processes in China, showing that deliberation and consultations are an integral part of urban planning processes (He, 2006; Mol, 2009; He & Warren, 2011; Zhou, 2012). The results also build on Mai and Francesch-Huidobro's (2015) research on municipal collaborative networks, which illustrates that vertical and horizontal connections both within and without government structures shape local climate policy. The evidence in Chapter 5 confirms that when drafting urban plans and policy, local authorities create connections across government levels and sectors. For example, they develop relationships with higher level government organizations or research institutes to access information and expertise. This also involves extensive horizontal interaction with local authorities and economic stakeholders to assess planning options and consolidate different viewpoints.

The case of Rizhao in Chapter 5 shows that the involvement of stakeholders in urban planning is associated with economic development interests and the structure of the political economy. Actors participate in planning processes on an uneven basis of power, and planning processes are characterized by multiple lines of conflict. For example, in Rizhao, tourism development agendas clash with industrial development strategies, as air and water pollution ruin the waterfront. Similarly, concern with protection of ecologically sensitive areas conflict with land development interests. In these conflicts of interest, economic stakeholders, primarily industrial units and land developers, have a strong ability to pursue their priorities. Moreover, their interests tend to be aligned with those of the top leadership. The dependence of political leaders on economic stakeholders to generate economic growth, and of economic interests on the leadership for political support, creates interdependence between local elites and a tendency to form coalitions.

The literature on policy networks asserts that existing distributions of power and priorities of local elites shape planning interactions, particularly when there is a lack of formal principles for inclusion and decision making (Aars & Fimreite, 2005; Sorensen, 2006; Khan, 2013). The structure of the political economy also shapes policy processes, as economic stakeholders tend to have significant leverage over political decision makers (Levy & Newell, 2005; Newell, 2008). The case study in Rizhao confirms these insights within the context of environmental governance in China. Planning decisions in Rizhao systematically favour conversion of land into real estate developments or industrial zones. These decisions downplay priorities of authorities responsible for environmental protection, tourism, forestry or agriculture, who favour ecological protection or development of land for other purposes. Priorities of populations residing close to polluting factories or waste-to-energy plants are similarly overlooked. Although the viewpoints of these actors are raised in consultation processes, they are overruled by decisions of the Mayor's Office, which are in line with economic development concerns. Studies of state-group relations have since long recognized that policy decisions dominated by economic and political elites are unlikely to generate radical change (Richardson & Jordan, 1983; Rhodes & Marsh, 1992). In Rizhao, stakeholder co-optation of the planning process means that any opportunity to explore alternative development paths are curtailed. There is a risk of cementation of status quo, which in this case implies reproducing the factors that create high carbon paths of growth (Khan, 2013).

Thus, a contribution of this thesis is to demonstrate that while urban planning meetings ostensibly have the purpose of resolving conflicts in order to reach consensus, interactions are dominated by political and economic elites representing common development interests. Rather than to resolve planning conflicts, municipal authorities use planning meetings to legitimate and cement mutually beneficial policy options. This confirms the inherent danger of elite management of deliberative processes (as noted by He (2006)), which magnifies the voice of powerful actors while permanently excluding marginalized interests. The results of this thesis thus point in a considerably less optimistic direction than previous research on the micro-level, deliberative interactions seen to emerge in urban decision making contexts (Leib & He, 2006). Rather than contributing to democratising practices (He & Warren, 2011), the empirical results of this thesis shows that political-economic elites use planning interactions to strengthen their dominant position and block alternative agendas.

Another insight related to participation of non-state actor in urban planning processes is that lack of capacity of municipal authorities creates dependence on expert advice. The case study and information from the member check interviews shows that planners and researchers from provincial and central institutes often participate in urban policy and have a relatively strong leverage over decision making. This confirms the findings of previous research on the role of professional groups as local policy advisors (Mai & Francesch-Huidobro, 2015) and the possibility for parastatal research organizations to act as advocacy coalitions that promote certain environmental narratives (Francesch-Huidobro & Mai, 2012). The empirical evidence of the case study of Rizhao shows how inclusion of these actors in local decision making allows discourses to travel across government levels. External experts participating in urban planning processes can highlight otherwise marginalized environmental narratives based on long term sustainability and ecological protection. To some extent, this can act as a counterweight to local economic development interests. On the other hand, it enhances tendencies of technocratic rule, as is further discussed in section 9.2.

9.1.2 RSQ2: Modes of urban climate governance

The second sub-question is how have different modes of urban climate governance contributed to climate mitigation in cities in China during the 10th to 12th FYPs (2001-2015)? A mixture of governance modes is used by municipal authorities to address the climate change challenge in China. Alongside traditional administrative and regulative approaches, local government departments use strategies of low carbon public service provision and soft approaches such as training and information dissemination to support local emission reduction activities. Chapter

7 also provides evidence showing that climate partnerships are common, and that these are initiated by both public and non-state actors.

Chapter 7 demonstrates that alongside implementation of energy conservation and emission reduction agendas set by the central government, municipal authorities in China address the climate change challenge by adopting local requirements, planning guidelines and emission reduction schemes. This includes construction policy, such as requirements to use solar heaters or vertical greening, zoning strategies based on emission reduction strategies, and comprehensive sector-based emission reduction plans (e.g. for industry and transport). The case study in Chapter 6 demonstrates the effectiveness of regulation in supporting the adoption of renewable energy technology. The member check interviews presented in Chapter 8 similarly point to stricter emission reduction standards adopted by local governments playing a key role in emission control activities in companies.

At the same time, binding requirements and regulations are vulnerable to implementation flaws. Previous research on environmental protection in China shows that enforcement of environmental regulation is weak (Ma & Ortolano, 2000; Lo & Leung, 2000; Wang, 2010; Liu et al, 2012; Kostka, 2014; Mai & Francesch-Huidobro, 2015). The case study of Rizhao presented in Chapter 6 demonstrates that active support of the Mayor's office was essential to secure implementation of a local requirement to attach solar heaters to buildings. In the outskirts of the city were implementation was not prioritized, a much lower share of buildings were constructed with solar heaters.

To a more limited extent, municipal authorities use provision of low carbon services as a climate governance strategy. An example from the case study is Rizhao Municipality's provision of gas fueled and electric buses, which is promoted as a way to reduce energy consumption and air pollution. The comparative analysis in Chapter 7 suggests that companies play a central role in provision of large scale public infrastructure in Chinese cities, such as renewable energy plants (wind and solar), waste-to-energy projects and transport infrastructure. This can be explained in part by the conversion of public departments into firms. Similar examples can be found in countries in Europe (e.g. the UK, Sweden, Germany), where privatization leads to a lower degree of public influence over service and infrastructure provision (Wolmann, 2004; Monstadt, 2007). The comparative study presented in Chapter 7 of this thesis demonstrate that public actors in China often influence energy and emission profiles of waste, energy and transport infrastructure through adoption of plans and strategies (e.g. municipal low carbon transport plans), rather than through direct provision.

Furthermore, the evidence in Chapters 6 and 7 shows that municipal authorities in China act as enablers of local climate action. The case study of Rizhao in Chapter 6 illustrates that in implementing energy saving targets in the industrial and construction sectors, public authorities emphasize the importance of information dissemination. This takes the form of energy management activities, demonstration projects, promotion of energy measuring and monitoring, benchmarking activities and improvement of energy evaluation and examination systems. In interviews, local officials proclaim that this type of activities help companies overcome knowledge barriers associated with adoption of green practices, while demonstrating cost savings related with going "green". The comparative study presented in Chapter 7 also shows how municipal authorities arrange low carbon exhibitions, centres or museums promoting low carbon technologies and lifestyles and engage in environmental campaigns. These enabling strategies can be seen as complementary to "hard" tools, while covering a gap in the civil society space created through the weak representation of green NGOs in local environmental action in China.

The key contribution related to this sub-question is to demonstrate the common use of partnerships in urban climate action, and the extent to which non-state actors are leading climate initiatives in China. Out of the climate initiatives selected for the comparative study of this

thesis, about half involved inter-organizational interaction.[28] The selection of initiatives was chosen in cities considered to be leading in climate action in China, so the findings are not expected to be representative of all urban areas in the country. At the same time, there is evidence of a trend emerging in cities with an explicit climate agenda. The implication is that public actors in cities that are aiming to actively respond to the climate mitigation challenge are likely to search for new strategies by drawing on resources and ideas offered by non-state actors and parastatal organizations. However, in forming collaborative arrangements, not all actors and groups are considered potential cooperation partners.

The comparative study presented in Chapter 7 demonstrates that municipal authorities often form partnerships with firms or academia to facilitate technology or infrastructure delivery, access new ideas and planning designs, and create new funding arrangements. Municipal authorities also form partnerships with foreign entities in the formulation of local emission reduction strategies. Companies often lead large scale infrastructure projects and low carbon demonstration projects in the form of low emission buildings, eco-city projects, and industrial eco-technology/recycling economy centres. In these projects, firms form partnerships with foreign and domestic companies, and research and design institutes to access information, skills, and technology. These linkages allow parastatal think tanks, research institutes and universities to play an important role in designing local projects. Cross-sector, cross-border linkages thereby create transfers of knowledge, funding and technical capacity that facilitate local climate action.

This observation confirms that in China, different actors join and are active members of transnational networks that govern environmental governance. The study of transnational networks is well documented at the global level (Andonova et al, 2009; Bulkeley & Betsill, 2010; Bulkeley et al; 2012). The empirical material in the thesis emphasises that transnational dynamics are present in China, not only through city participation in municipal led networks, but also through formation of connections between local authorities and international NGOs and bilateral partners.

The contribution of this thesis is to demonstrate that mobilization of knowledge through cross-sector, cross-border linkages are an integral part of technology and policy development in China. As long as an organization is seen as able to provide technological skill and expertise, Chinese authorities see this actor as an appropriate collaboration partner. As national and local authorities seek to address environmental issues, myriads of relations are created through which information is shared. These activities are the collective expression of active problem solving within the bounds of the rationalities of China's political system.

9.1.3 RSQ3: Climate governance through partnerships

The third sub-question is how have partnerships contributed to introduction of climate policy and technology on an urban level in China during the 10th to 12th FYPs (2001-2015)? Partnerships, in particular with foreign actors and academic institutes, contribute to introduction of new climate technology and policy in cities in China. New technology is introduced through technology transfers as well as through research partnerships. The two key mechanisms through which policy practices are introduced are demonstration projects, followed by market based diffusion, and collaborative problem solving followed by pragmatic selection and absorption of policy elements.

The analysis of the comparative study presented in Chapter 7 demonstrates that partnerships are common in development of emission reduction and renewable energy technologies in China. Or, turning this statement around, development of technology is a common reason for actors to form partnerships. The analysis of the comparative sample in Chapter 7 suggests that partnerships with foreign or international organizations play an especially important role in introducing energy saving and emission reduction technology on a local level. This is realized

[28] This includes firm-firm interactions and public-public interactions that according to the definition of this thesis (Huijistee et al, 2007) are not considered partnerships.

both through technology transfers and research projects. Research partnerships in China exist in two key forms: joint research projects and joint innovation platforms. The most common constellation is partnerships between private and academic actors, and private or academic actors with foreign organizations. It is also common for private and academic actors to be involved in technology development projects with multiple actors, including foreign institutes.

Empirical evidence from the member check interviews presented in Chapter 7 shows that technology development in China occurs in relatively close-knit networks involving domestic research institutes, firms, universities and foreign partners. The increasing concentration and sophistication of knowledge in these networks allows domestic R&D to become increasingly important, relative to technology transfers. This is consistent with China's shift from renewable energy importer to renewable energy exporter (Caprotti, 2008). It is also consistent with the suggestion that sustainability innovation is becoming advanced to the extent that a key purpose no longer is to simply catch up with European or North American firms (Berkhout et al, 2010). This suggests that China is interconnected with global flows of knowledge, but also that China is actively aiming to concentrate these flows around local concerns.

Finally, the results of the comparative study presented in Chapter 7 suggest that partnerships are important in the introduction of new policy and planning practices on a local level in China. This is consistent with the research of Bauer and Steurer (2014) who argue that climate partnerships contribute to policy diffusion. Chapter 7 demonstrates that policy development most commonly occurs in partnerships between local authorities with foreign partners of academia. The mechanisms through which this is realized is through joint demonstration projects, as well as through joint problem solving processes that seek new solutions to urban issues, such as improved transport planning or emission control in the industrial sector.

Through the first of these mechanisms, policy and planning practices are introduced through large-scale projects, such as eco-cities or low carbon districts, which involve an ambition to show-case new solutions. Leading companies and research organizations are frequently invited to provide high-tech applications, novel designs and new planning strategies in these projects. Information from the member check interviews discussed in Chapter 7 suggests that companies (real estate developers, consultancy firms or utilities) absorb successful designs, and that these may be multiplied in other projects. This occurs to the extent that the companies gain advantage from a green profile. However, a limitation of this mechanism is that companies rarely replicate complex system solutions. Further, technical solutions are more likely to spread than policy and planning practices.

Through the second mechanism, municipalities form partnerships with other actors in their pursuit for low carbon development solutions. Through dialogue, meetings and workshops, urban development challenges are debated and best practice examples are studied. Chapter 7 provides several examples to illustrate this tendency, showing for example how the cities of Wuxi and Kunming used such strategies to improve low carbon transport planning and industrial emission reduction plans. These observations confirm Schroder's (2008) observation that participation of Chinese organizations in transnational networks contributes to internalization of international climate policy elements.

The empirical evidence presented in Chapter 7 and 8 illustrate that this type of policy transfer is created not only by participation in transnational networks, but through a greater diversity of interactions. Municipalities form partnerships with domestic or foreign academic institutes to seek strategic planning advice, for example in designing emission zoning strategies. An example is Guangzhou E-core (a planning approach based on ecological networks), which was drafted by Tongji University in Shanghai in collaboration with Guangzhou Urban Planning Bureau. These linkages are can be understood in terms of Mai and Francesch-Huidobro's (2015) collaborative municipal networks, where local authorities mobilize knowledge and expertise through vertical and horizontal connections. Other types of interactions include partnerships with bilateral partners, through which elements of environmental policy are absorbed. These take the form of traditional development assistance projects, such as

collaboration between the German development agency GIZ and Beijing Municipality in the development of transport demand management (TDM) tools. It also takes the form of international dialogues and forums initiated by Chinese authorities to collect information about foreign policy strategies, such as national and local level collaboration in development of China's soil pollution standards described in Chapter 8.

The contribution of this thesis is to demonstrate that partnerships, as a governance mode, is associated with pursuit of material and policy innovation. Climate initiatives led by a single actor (usually a local authority or a company) tend to be characterized by top-down control or large infrastructure investment. These interventions reproduce well-known responses to climate change on a local level in China. By contrast, initiatives managed through partnerships exhibit a greater variety of strategies and instruments, and more often an explicit focus on introducing novel solutions. The emergence of projects led through collaborative arrangements in China thus appear to open up for greater possibilities to experiment with new policy and planning approaches. This experimentation plays a particularly important role in China's top-down political system, which as a whole is less able to generate pluralistic policy processes.

9.2 State authority beyond top-down steering

The empirical evidence in this thesis shows that actors other than the central government intervene in environmental policy in China. However, increased participation by no means suggests equal opportunity for any group or actor to engage in climate change issues. Trends revealed through the research of this thesis calls for further attention to constellations of collaboration and trends of bias in access and participation (Andonova & Levy, 2003; Benner et al, 2004; Pattberg & Stripple, 2008; Forsyth, 2010). This section discusses how governance arrangements such as partnerships replicate existing power structures, rather than open up for broader societal participation. Non-state actor participation is also discussed from perspectives of reconfiguration or diffusion of state authority.

9.2.1 Partnerships: Vehicles for societal deliberation or techno-economic empowerment?

The scholarship on public policy has long observed how, in practice, policy makers contribute to the reproduction of hegemonic practices that are understood to represent normality. In his seminal essay on "muddling through", Lindblom (1959) explains that bureaucrats choose policy instruments and strategies that appear "normal" and appropriate according to their set routines rather than making rational, calculated choices. In China, local bureaucrats and decision makers that are confronted with the policy issue of climate change cannot choose freely between all theoretically conceivable ways to address this new challenge. Political structures and processes are deeply rooted in the ideologies and institutions of China's political system.

A key finding of this thesis is that techno-economic rationalities guide the perception of which actors are normal, appropriate, and legitimate participants in China's climate change agendas. This argument builds on the concept of technocracy as it has already been applied in describing China's political system (Cheng and White, 1990; Zang 1999; Ouyang, 2003). It also draws inspirations from Zhu's (2012) description of the role of "neutral" experts in policy processes. Overall, this illustrates that principles of economic growth and technological progress are deeply ingrained in China's political development visions. These ideals guide recruitment and mobility of politicians and bureaucrats, which lends environmental policy a rational-managerial and technical character. Ouyang (p.177, 2003) broadened the debate on technocracy in China by defining the concept of technocracy as societal rule by "groups of experts", indicating that the principles extend beyond the political apparatus. By introducing the concept of techno-economic rationalities the focus is further expanded, as this explains a broader logic that shapes governance modes and instruments.

Techno-economic rationalities produce multiple effects on climate policy in China. One is that local government authorities favor projects with a focus on advanced technologies or financial

investments over potential alternatives. Further, groups or actors representing either economic resources or technical skills are included in formulation and delivery of climate projects. The concept also identifies what actors are seen as appropriate collaboration partners, what actors are excluded from political processes, and what policy operations and practices are understood as normal.

Epistemic authority (Haas, 2017) has a particular strong traction in this particular context. Cross (2016) observes multiple circumstances in which expert authority is likely to be particularly persuasive, which includes political contexts of uncertainty and limited knowledge. Uncertainty and limited knowledge characterizes the climate policy domain in general, but in particular with regards to local government authorities with inherently limited capacity and knowledge about this issue. Further, experts need to have direct access to decision makers. This is clearly the case in urban policy processes in China, where experts in fact often are delegated responsibility for drafting environmental policy and planning documents. Moreover, Cross (2016) suggests that experts should be involved in technical decision making, rather than in shaping political beliefs, in order to be seen as legitimate and authoritative. In China, where energy policy is predefined as an issue of technical development, experts are posed as self-evident authorities. Finally, experts are more likely to be authoritative on policy issues involving natural systems, which is the case in sustainability issues as they pertain to the natural environment. All of these specific characteristics reinforce the positions of technical experts and professionals in climate policy processes on an urban level in China.

These insights explain trends that emerged in previous chapters of the thesis. The comparative study of Chapter 7 and the member check interviews presented in Chapter 8 demonstrate that not all types of actors are included in climate governance networks. Notably, there is a complete absence of local green NGOs, communities or other social movements. All the civil society organizations represented in the sample are either research organizations, think tanks or NGOs with a predominantly technical character. As a result, channels of influence over local policy and programs reach companies, such as environmental technology firms, high-tech developers, and consultancy firms working with environmental planning and design. The networks also incorporate civil society organizations of a technical character, such as research organizations, planning institutes, and international organizations with a claim to expertize, such as the Asian Development Bank. However, diffusion of authority is contained within the circle of actors that possess these capacities.

This conclusion has broader implications for the way in which partnerships as a specific governance mode are understood from a normative perspective. While notions of collaborative environmental governance can be associated with normatively positive outcomes in terms of enhanced participation and democratic performance (e.g. Glasbergen, 2007), this is not necessarily the case in a (semi-)authoritarian political system. The empirical material presented in this thesis demonstrates that authority, in the form of influence over sustainability plans and policy processes (through design, technical advice, direct rule setting), is transferred from municipal authorities, such as planning departments, to non-state expert organizations, such as parastatal research organizations, foreign institutes, and firms. While a larger number of actors are involved in formulating and delivering sustainability plans and projects, this does not necessarily imply a diversification in the *type* of actor or social group, greater equity, or higher degree of representation in participation.

These observations caution against assuming that China's transitions towards a modern environmental state will necessarily create institutions that are more similar to those in the "West" (Mol & Carter, 2006; Carter & Mol, 2013). The emergence of partnership constellations in this context follows a particular logic and is a response to perceived development challenges that are intimately related with China's political and economic context. As a result, climate partnerships produced in this political system to a large extent focus on linking local activities to the global economy, or to access technology and information that is understood to represent cutting-edge solutions. Although there is some evidence that collaborative arrangements allow for new ideas, there is scant evidence of increased societal deliberation or representation

resulting. Diversification of actors, therefore, cannot be equated with a process of democratization of environmental governance in China.

Further reflections of the role of techno-economic rationalities in climate politics in China pertain to the nature of environmental discourses. The insertion of techno-economic agendas into the core of sustainability principles is a broader problem, linked to narrow conceptualizations of technological progress, which cause ethical concerns to be obscured or erased (Davison, 2010). The socio-political meaning of sustainability can thereby be reinvented as a quest for technological and economic advance, which is a concern that has permeated sustainability debates since their inception (Lélé, 1991). A review of international environmental policy documents, for example, reveals that one of the key changes in policy framing since the 1970s is a shift from a political to a technocratic focus, through which environmental challenges have been depoliticized (Gomez-Baggethun & Naredo, 2015). There are important implications linked to the dominance of technocratic discourses and ideals in low carbon policy in China. One is the ease with which social considerations can be continuously framed as subversive and unnecessary elements in climate mitigation initiatives. This restricts possibilities to experiment with social innovation in projects at a local level. As a result, limited emphasis is placed on low carbon policy and planning approaches that aim to develop new processes for participation, new ways of doing things, new routines, or lifestyles. This is consistent with previous research that criticizes the definition of "eco" and sustainability in China for one-sided promotion of GDP generation and use of sophisticated technologies for the benefit of local governments, high-end developers, and high-tech corporations (Caprotti, 2014).

Environmental discourses are reproduced in policy documents by authorities on all political levels in China. Furthermore, official language and formal development goals play a strong role in politics by being constantly reiterated by public figures of all capacities and in all kinds of situations (although this does not necessarily mean that goals are implemented), by political figures such as party representatives, by newspapers, on television, and on banners on public infrastructure. As a result, dominant political discourses gain a strong salience. Public figures reciting policy aims may not always believe in their fundamental logic, but nevertheless, dominant ideas and priorities become ingrained in politics on all levels. Arguably, this allows for techno-economic discourses to become more self-evident than might be the case in more pluralistic sociocultural environments. Opportunities to question problem assumptions or priorities become completely marginalized, while continuous reproduction strengthens dominant ideologies and narratives.

The way in which dominating techno-economic ideologies and practices shape inclusion and exclusion into climate mitigation policy in China is of broader theoretical relevance. While China's historical and political background explains the particularly strong resonance of techno-economic rationalities in this context, ideologies and political practices are likely to similarly empower or exclude certain groups in emerging climate mitigation politics in other jurisdictions and locations. Understanding how policy practices are embedded in beliefs, ideologies and firmly established "ways of doing things" constitutes a strategy to reveal patterns through which agency is produced in local climate change politics.

9.2.2 Reconfiguration and reconceptualizations of state authority

This thesis suggests that through formation of governance networks, authority may be transferred vertically and horizontally from the state to municipal authorities and non-public actors. Below, these processes are discussed from the theoretical perspectives of urban entrepreneurialism and relational conceptualizations of state power.

Reconfiguration of state authority through urban entrepreneurialism

How is state authority transferred to urban governments as local authorities they take on a more visible role in urban governance? This question can be answered by referring to Brenner's (2004) interpretation of state power reconfiguration through specific processes of urban governance. Brenner has mapped out transformations of urban governance and state spatiality

in Europe over four decades. This effort resulted in a system of categorization based on three distinct phases of urban governance: spatial Keynesianism, the crisis of Fordism, and urban entrepreneurialism. During the phase of urban entrepreneurialism, which unfolded since the 1980s, urban governance has been shaped by neo-liberalist policies and pressures, demands on economic performance, and competition. Alongside weakening of former economic nodes of manufacturing and industrial activity, new economic centres based on financial activities and trade have emerged, followed by a deepening inequality between high-income urban cores and depressed peripheries. In response to this development, national governments have begun to perceive urban centres as drivers of national economies and dynamic growth engines. Attracting investment and encouraging property development became fixed as key urban policy agendas, replacing former programs of regional redistributive policies.

Brenner (2004) understands the entrenchment of urban entrepreneurialism as a major reconfiguration of the way in which state authority regulates social relations across space. He points to the "splintering" of state regulatory activities on behalf of "glocalization" strategies – a trend that involves at least two mechanisms. The first is a rise in local capacity to introduce economic regulation and responsibilities for socio-economic development to improve the competitiveness of the urban economy. The second is concentration of socioeconomic assets in globally competitive urban regions and industrial districts, captured by the concept of "Glocalizing Competition State Regimes (GCSRs)". Rather than attempting to create equal development opportunities across space, these new urban agendas encourage concentration of populations and economic enterprises in cities. Brenner (2004, p.481) describes this process as a form of institutionalization of competitive relations and reformulation of state power as local accumulation strategies:

> *Within this rescaled configuration of state spatiality, national governments have not simply downscaled or upscaled regulatory power, but have attempted to institutionalize competitive relations between major subnational administrative units as a means to position local and regional economies strategically within supranational (European and global) circuits of capital. In this sense, even in the midst of the wide-ranging rescaling processes that have unsettled traditional, nationally focused regulatory arrangements and institutional forms, national states have attempted to retain control over major subnational political-economic spaces by integrating them within operationally rescaled, but still nationally coordinated, accumulation strategies.*

This thesis indicates that a similar development has unfolded (and continues to unfold) in Chinese cities. While financial regulation and other legislative domains remain under control of central agencies, local authorities are granted increasing responsibilities and opportunities to create conditions for economic growth. From this perspective, reconfiguration of state power is expressed as increasing local room for manoeuvre to shape economic development strategies and devise plans to attract investment. While municipal authorities are also held responsible for other aspects of their performance (such as infrastructure provision or environmental protection), ability to generate economic expansion remains the most important indicator of success for local political leaders in China.

The analyses of environmental policy agendas presented by this thesis reveal patterns that match Benner's (Ibid) observations of urban entrepreneurialism. Efforts to construct growth-oriented low carbon solutions dominate examples of climate agendas presented both in the case study and comparative study of this thesis. Sustainability policy is associated with emergence of new institutions, such as enterprise zones and urban development corporations, geared towards improving the economic competitiveness of the urban region. Local authorities direct significant time and resources towards development of high-technology, high-growth, high-investment clusters, in the form of eco-city or low carbon demonstration projects, clean-tech industrial development zones, or clean energy technology innovation platforms. Climate protection agendas are components of broader strategies to create domestically or internationally competitive urban areas. Establishment of sustainability projects and

partnerships becomes a key strategy for local authorities to access global flows of information, technology, and financial resources. Reconfiguration of state authority, from this perspective, takes the form of a national mandate for municipal authorities to pursue growth- and investment enhancing activities and contribute to local accumulation of wealth and capital.

Brenner (Ibid) argues than urban entrepreneurialism is associated with major challenges in terms of the ability of national governments and cities to simultaneously pursue objectives of equality and social justice. As urban governance processes become increasingly focused on building connections with the global economy and attracting competitive capital, other agendas may become permanently under-prioritized. Ironically, the central government's concern to create cities built on harmony and social stability may become side-lined by city-branding, investment-attracting agendas that instead accentuate the divide between high-income urban centres and rural hinterlands. Such a tendency is already visible in China's increasingly splintered social landscape.

Reconceptualizing state authority as a relational property

The question of how state authority is diffused through vertical linkages to non-public actors can be explored by turning to theories of relational forms of power. This is a perspective that seeks to move beyond perceptions of authority as fixed to specific "levels" of government, as well as to geographical territories.

In making this argument, Allen (2004) takes as point of departure the apparent contradiction of power at once being highly centralized (which is certainly the case in a semi-authoritarian state such as China), and at the same time present everywhere or even nowhere (along Foucauldian or Rosneau-inspired views of reinforcing rule systems on all levels). At the centre of Allen's argument is a fundamental criticism of the traditional view of state power as a constant resource or property that central institutions can non-problematically extend in a top-down fashion. This perception is extended through theories of multi-level governance, where top-down command is simply interchanged by influence extended across government levels and sectors (power is still tied to hierarchical "levels" where actors higher up on the ladder are associated with stronger power resources). Attention to relational, or associational, properties of power helps to escape this binary conflict and reveal a more nuanced understanding of state power is expressed and employed by different actors.

A relational interpretation of state power recognizes that governance is realized through fluid, political arrangements that stretch across regional boundaries (Allen & Cochrane, 2007). Allan and Cochrane (Ibid) propose that the concept of complex "assemblages of power" represents how such political arrangements operate. These arrangements are populated by sets of semi-elite actors which normally are interpreted as "multi-level" governance that intervene in policy issues on different political levels. Cochrane and Allen suggest that these arrangements are made up of fragmented collections of institutions and agencies that are connected through series of networked relationships and involvement in formal and informal forums (Ibid, p.1165). The key difference between conceptualizations that focus on government levels is that actors are not necessarily clustered around traditional, hierarchical elites. These actors are professional and business elites, such as non-profit and private consultant organizations involved in delivering politics to public agencies. While their agendas may cluster around interests that are discursively associated with "regional" issues, they also pursue individualistic interests, through persuasive or manipulative means. In these assemblages, actors compete over resources, legitimacy, interests, agendas, and political framing.

In these political arrangements, power is accessed and expressed in multiple ways, rarely in a direct fashion and often through tangled sets of relations. On the one hand, national government actors can manipulate these arrangements by using them to mobilize pre-defined national agendas through "local" organizations. On the other hand, heterogeneous sets of actors can introduce "shared agendas" that represent particularistic interests and potentially mask

significant conflicts of interest. Power assemblages can create significant opportunities for professional organizations to mediate decision making processes or to legitimize decisions of others. A key insight based on this conceptualization is that power is not a static resource that political actors on lower government levels can access in a straightforward fashion. Rather, it is specific practices and relations that allow actors to mobilize resurces and assets. Allen and Cochrane (2007, p.1171) observe that:

> *Such capabilities [of state power], however, represent latent rather than actual qualities of power; they refer to the effective institutional resources and decision-making abilities that can be marshalled to great effect. Indeed, there is no question as to how effective and extensive such capabilities can be and have been over time; they encapsulate all that one understands by the term, state power. But such territorially embedded assets and resources are of less help when it is the actual practices of power that one wishes to understand, rather than the concentration of abilities that lie behind them.*

We witness in local politics in China such assemblages of power that cluster around politics of sustainability, climate protection, and climate action. In this context, construction of assemblages of power does not imply that the state is or becomes powerless. Rather, it implies that actors representing central government are often not exercising power over policy processes and projects in cities. In the formulation and delivery of climate plans and projects, heterogeneous sets of actors are drawn together in dynamic constellations – tight-knit or loose, durable or short-term alliances. These constellations encompass local authorities, as well as company representatives, foreign advisors, parastatal research organizations, universities, and design institutes.

Through constantly renegotiated sets of relations in these constellations, actors use a variety of means to mobilize power. Some actors are able to broker consensus to allow particular courses of action to be pursued. Some actors are able to dictate designs or technical details of plans and sustainability projects. Some actors draw on political or economic resources to leverage decisions in a particular direction. In this setting, power is less about visibly taking control over decision making processes and government activities, but more about displacing central authority by creating new political relations. Which actors are included in local politics is defined by practices of governance instead of formal (geographical, administrative) principles of inclusion. Proximity between actors and degree of influentiality is better understood by considering the nature of interorganizational or interpersonal relationships rather than formal positons within the political hierarchy. This is an understanding that resonates with the socio-political environment in China, heavily characterized by the importance of *guanxi* (relationships).

A final remark on this topic is that if power resides in relations between actors in networks, and if public and non-state actors are constantly involved in processes that shape and formulate public policy, we are led back to the perennial question of how to define the elusive borders of the state (Mitchell, 1991). It may be necessary to revisit the question of how to draw the conceptual boundaries of the government machine in order to encompass the way in which non-state actors exercise state authority through complex sets of relations.

9.3 Future research

While there is already a consolidated tradition of research in environmental governance in China (Mol & Carter, 2006; Mol, 2009; Liu et al, 2012; Carter & Mol, 2013; Zhang & Barr, 2013; Mai & Francesch-Huidobro, 2015) this thesis makes a significant contribution by mapping the reasons behind the proliferation of actors active in environmental governance networks and their efforts to govern carbon emissions in Chinese cities. The thesis also raises a number of questions that require further research. A key question is the extent to which current Chinese climate policy strategies place China on a path to a low carbon transition. This is a

question which may emerge in other contexts as well. In China, however, there is a pressing concern associated with the context of rapid urbanization and industrial development, as well as the mere size of China's emission reduction challenge.

This thesis also raises more complicated questions related to the limitations of available methods and conceptual tools required to understand current trends. Specifically, there is a need for greater understanding of theoretical perspectives that merit exploration, including legitimacy issues of current climate policy arrangements in China, as well as how rationalities of climate governance can be explained using the concept of governmentality.

9.3.1 Chinese cities and social innovation

Much of the analysis of this thesis has dealt with the technical nature of low carbon policy in China. The discourse analysis of Chapter 5 illustrated how key planning documents frame energy policy as an issue of industrial development. This produces policy solutions that emphasize upgrading of traditional industries, support of emerging industries and development of new technologies. The case study of Rizhao in Chapter 6 demonstrates how strongly these preferences are reflected in municipal agendas. Similarly, the comparative analysis of Chapter 7 demonstrates a bias towards technology-intense interventions in local climate action.

The perspective of techno-economic rationalities and associated legitimacy of technology-based projects is one way to explain this tendency. Another way to approach this trend is to consider that social innovation is seen as subversive and a threat to political power in China. Under Xi Jinping's leadership, restrictions over NGOs, media and social mobilization have increased (Zhan & Tang, 2013; Lam, 2015; Shambaugh, 2016). This has important implications for opportunities to experiment with social innovation at a local level. In current policy documents and discourses, there is very little emphasis on policy and planning approaches that aim to develop new processes for participation, new ways of doing things, new routines or lifestyles. Although this thesis has emphasized that involving external organizations in local projects can contribute to introduction of new ideas, this often refers to new architecture, planning design, accounting systems, or other technical tools. Although some projects refer to use of participatory procedures, this is seldom emphasized or prioritized.

If China is to move beyond large-scale technology investments and industrial incrementalism in climate agendas, social dimensions may be crucial. A possible area of research is to direct attention towards social innovation from a bottom-up perspective. More research is required to establish whether such dynamics are invisible in China because of their political sensitivity, or whether they simply do not exist at all. If this is the case, is the lack of social innovation preventing development towards a sustainable transition in China? If so, how can social innovation be brought about? How can a broader range of actors be brought into existing networks and produce climate action associated with practices, lifestyles, beliefs, values, and habits? If China is to move beyond technical interventions and incrementalism in climate agendas, these dimensions are likely to be crucial.

9.3.2 Issues of legitimacy and governmentality

Two theoretical research agendas are presented to round up this thesis. The first pertains to issues of legitimacy and accountability of network governance, which is an important topic in studies of nations with liberal democratic systems (Sorensen, 2002; Aars & Fimreite, 2005; Bogason & Musso, 2006; Backstrand, 2008; Peters & Pierre, 2010; Forsyth, 2010). The problem with governance networks is that participation and decision making is not based on equal opportunity to influence public policy decision through the electoral mechanism. The transfer of authority from elected politicians to administrators, companies, NGOs and supranational organizations thereby undermines the legitimacy attached to political decisions in electoral systems.

These arguments are turned on their head in China, where little or no electoral legitimacy are attached to decisions to begin with. Legitimacy and accountability of decisions are assessed

according to other principles, as was discussed in the argument on the ideology of technocracy in Chapter 8 (section 8.5). It has also been argued that China's political system relies on ideological legitimacy (and continuous ideological reformulation) (Chen, 1995) and performance legitimacy (also known as output based or substantive legitimacy) (Wang, 2013b). According to a performance based perspective, delivering improved environmental protection is an important aspect of maintaining legitimacy, while the process for doing so is less important (Ibid).

However, a robust framework for evaluating legitimacy of decisions in governance networks in China does not yet exist. At the same time, issues related to current decision making models are already protruding. For example, a trend that merits scrutiny is the shift of influence to companies in delivery of urban infrastructure. As argued by Owens and Cowell (2011), a fundamental role of planning is to allow for scrutiny and critique, in which social and environmental objectives are taken into meaningful account. Such questioning appears to work particularly poorly in the promotion of glamorous initiatives such as eco-towns, where sustainability tags instead are used to legitimize investment decision (Ibid).

The use of low carbon and sustainability tags allows projects to be delivered in the name of sustainability, without raising questions about the generation of actual environmental or social benefits. Hodge and Greve state in relation to PPPs in Europe:

> *Private financing … has seen new powerful interest groups moving in alongside elected governments. New infrastructure projects are now being suggested by real estate agents, project financiers and merchant bankers, rather than by the bureaucrats who historically had this responsibility. If such government-business deals do end up meeting the public interest, that would seem more by coincidence than by design (Hodge & Greve, p.S17, 2010)*

Hodge and Greve suggest that long term infrastructure arrangements based on private funding reduce accountability arrangements without being questioned in democratic debates. Hodge and Greve argue that "the analogy of governments quietly making a Faustian bargain (where a deal made for 'short term benefit may come at a tremendous long term cost in both economic and democratic terms') would indeed seem well placed" (Ibid, p. S17). In the case of China, reliance on company investments to deliver low carbon infrastructure is associated with similar risks. Rather than assuming that company investments into projects with an eco- or low carbon label will generate sustainability benefits, initiatives should be placed under scrutiny for potential long term lock-in implications. Local governments relying on the financial and economic capacity of firms to realize emission reductions through infrastructure projects may otherwise fall victim to short term business interests poorly aligned with socio-environmental priorities. There is also a risk that investment interests systematically override actors and coalitions representing less strongly articulated social and environmental concerns.

The final remarks of this thesis consist of ideas and observations yet to be fully explored. Reviewing the results of this research, the findings on principles of participation in environmental policy may contribute to an emerging research agenda on rationalities and governmentality. This new direction of research recognizes the limitations of formal regime and state-centric theories, but continue the search for conceptual tools to understand agency and authority in climate change politics. Stripple and Bulkeley (2014) propose to draw on Foucault's theories on governmentality as a way to problematize governing strategies. They see this as a way to examine particular articulations and rationalities of steering, and enable deeper interrogation of the sets of processes that govern the climate. According to Stripple and Bulkeley, rationalities can help to engage with the particular logics that structure social order in climate politics and explain why and how particular forms of authority dominate the climate change domain (Ibid, p.14).

Governments need to formulate rationalities of climate change politics to make the issue acceptable and normal. Looking empirically at the case of China, the way that this has been done is by building responses on deep-set ideologies and norms that are fundamental parts of the political system. Administrations face a new problem, but this does not mean that any new

cooperation partner, instrument or strategy is seen as relevant, appropriate, acceptable, or normal. To make new programs acceptable, policy formulations are strongly influenced by belief systems, preferences, and overarching political and economic development goals. A governmentality approach could shed further light on how climate policy practices are produced, internalized, normalized and legitimized in political processes in China.

Perhaps closer attention to political practices and processes of legitimization also could help answer the question of how far China can run with techno-economic approaches to environmental issues. What happens when (literally) a million voices in cyberspace criticize the government's failure to recognize ethical and social dimensions of environmental agendas? Will trajectories follow those of the West in the 1990s, where public responses to technical, rational management of sustainability issues created an unravelling of the "mainstream agenda" (Berkhout et al, p.6, 2003)? If so, it may be the beginning of a true diversification of actors, agendas, strategies and interests in China's environmental policy; a real shift from government to governance.

List of literature

Aars, J. & Fimreite, A. (2005), "Local Government and Governance in Norway: Stretched Accountability in Network Politics", *Scandinavian Political Studies*, Vol 28, Issue 3, Pp. 239–256

AGI (2009), "Tony Blair launches program for low carbon corporate action in China", Africa Governance Initiative – Tony Blair Faith Foundation Website, Accessed 2016.03 at: http://www.tonyblairoffice.org/climatechange/news-entry/tony-blair-launches-program-for-low-carbon-corporate-action-in-china/

Alasuutari, P. & Qadir, A. (2013), "Epistemic governance: an approach to the politics of policy-making", European Journal of Cultural and Political Sociology, Vol. 1, No. 1, Pp. 67-84

Allan, J.I. & Hadden, J. (2017), "Exploring the framing power of NGOs in global climate politics", *Environmental Politics*, Vol. 26, Issue 4

Allen, J. & Cochrane, A. (2007), "Beyond the Territorial Fix: Regional Assemblages, Politics and Power", *Regional Studies*, Vol. 41, Issue, 9, Pp. 1161 –1175

Allen, J. (2004), "The whereabouts of power: Politics, government and space", Geographical Annotations, Vol. 86, No. B (1), Pp. 19–32

Almond, G. (1983), "Corporatism, Pluralism, and Professional Memory", *World Politics*, Vol 35, Issue 02, Pp. 245 – 260

Ambrosio, T. (2008), "Catching the 'Shanghai Spirit': How the Shanghai Cooperation Organization Promotes Authoritarian Norms in Central Asia", *Europe-Asia Studies*, Vol. 60, Issue 8

Andersen, S. & Burns, T. (1996),"The European Union and the erosion of parliamentary democracy: A study of post-parliamentary governance" In S.S. Andersen & K.J. Eliassen (eds), *The European Union: How democratic is it?* Sage, London

Andonova, L., Betsill, M., Bulkeley, H. (2009),"Transnational Climate Governance", *Global Environmental Politics*, Vol. 9, No. 2, Pp. 52-73

Andonova, L. & Levy, M. (2003), "Franchising global governance: making sense of the Johannesburg type II partnerships", In (Eds) Stokke, O.S. & Thommessen. O. *Yearbook of International Co-operation on Environment and Development 2003/2004*, Earthscan, London, Pp. 19–31

Andonova, L. (2010), "Public-Private Partnerships for the Earth: Politics and Patterns of Hybrid Authority in the Multilateral System", *Global Environmental Politics*, Vol. 10, No. 2, Pp 25-53

Anguelovski, I. & Carmen, J. (2011), "Something borrowed, everything new: innovation and institutionalization in urban climate governance", Current Opinion in Environmental Sustainability, Vol. 3, Issue 3, Pp. 169–175

APRIL ASIA (2013), APRIL Website > Sustainability> Sustainability Report 2013, Accessed 2015.03 at: http://www.aprilasia.com/en/sustainability/sustainability-report

Arts, B. (2002), "GREEN ALLIANCES' OF BUSINESS AND NGOs. NEW STYLES OF SELF-REGULATION OR 'DEAD-END ROADS'", *Corporate Social Responsibility and Environmental Management*, Vol. 9, Pp.26-36

Arts, B., Leroy, P., van Tatenhove, J. (2006), "Political Modernisation and Policy Arrangements: A Framework for Understanding Environmental Policy Change", Public Organization Review, Vol 6, Pp. 93–106

Atkinson, M. & Coleman, W. (1989), “Strong States and Weak States: Sectoral Policy Networks in Advanced Capitalist Economies”, *British Journal of Political Science*, Vol 19, Issue 01, Pp. 47 – 67

Backstrand, K. (2008), “Accountability of Networked Climate Governance: The Rise of Transnational Climate Partnerships”, *MIT Press Journals*, Vol. 8, No. 3, Pp. 74-102

Backstrand, K. et al (2010), *Environmental Politics and Deliberative Democracy: Examining the Promise of New Modes of Governance*, Edward Elgar, Cheltenham

Baeumler, A. & Ijjasz-Vasquez, E. & Mehndiratta, S. (2012), *Sustainable Low Carbon City Development in China*, The World Bank & China National Development & Reform Commission, Washington

Bai, X. (2007a), “Solar Powered City”, in Starke L. ed., *State of the World: Our Urban Future*, Worldwatch Institute, Washington D.C., Pp.108-109

Bai, X. (2007b), “Integrating global environmental concerns into urban management: the scale and readiness arguments”. *Journal of Industrial Ecology*, Vol, Pp. 11:15–29

Bai, X. & Wieczorek, A. & Kaneko, S. & Lisson, S. & Contreras, A. (2009), “Enabling sustainability transitions in Asia: The importance of vertical and horizontal linkages”, *Technological Forecasting and Social Change*, Vol. 76, Issue 2, Pp. 255–266

Bai, X. & Roberts, B. & Chen, J. (2010), “Urban sustainability experiments in Asia: patterns and pathways”, *Environmental Science & Policy*, Vol. 13, Issue 4, Pp. 312–325

Bai, X., Chen. J., Shi. P. (2012), “Landscape Urbanization and Economic Growth in China: Positive Feedbacks and Sustainability Dilemmas”, *Environmental Science and Technology*, Vol. 46, Pp. 132–139

Balme, R. (2011), “China's Climate Change Policy: Governing at the Core of Globalization”, *Carbon & Climate Literature Rev*iew, No. 44, Pp. 44-56

Bardach, E. (1977), *The Implementation Game*, MTT Press, Cambridge

Bauer, A. & Steurer, R. (2014), “Innovation in climate adaptation policy: are regional partnerships catalysts or talking shops?” *Environmental Politics*, Vol. 23, Issue 5

BBK (2014a), “华能日照电厂”, Accessed 2015.03 at: http://baike.baidu.com/link?url=FYGeE7spJDa1ZRNQs-iDc0bc3urcTq0XbgRLbxxVAryM4JQSL3Iec_mTp-fdsgoptJGEgpVynSKX43aA8YOBza

BBK (2014b), “山东五征集团有限公司编辑”, Accessed 2015.03 at: http://baike.baidu.com/link?url=h-tXGmwgE7xpITq0gYiWi5q5bCq6hE1LmUcJWOauHwGAG0BWqbWboVSxsqIwqW3dlp3FA7X5IJnSKryPjN_-NK

BBK (2015), “山东彼那尼荣安水泥有限公司”, Accessed 2015.03 at: http://baike.baidu.com/link?url=TjhHPuUuHx1PMOH8SgDv-7pWuc_RAy8kN4RdQHeRCwYIk2IIvDWeiTUWNmOBaDZlDhAGjhUvzF_Tw39_e9Bp3a

BBC (2012), BBC NEWS Online> Asia Pacific> “How China is ruled: Provinces and townships”, Retrieved 2012.12 at: http://www.bbc.co.uk/news/world-asia-pacific-13908276

Benner, T., Reinicke W.H., Witte, J.M. (2004), “Multisectoral networks in global governance; towards a pluralistic system of accountability”, *Government and Opposition*, Vol. 39, Pp. 191–210

Berger, P. & Luckmann, T. (1966), *The Social Construction of Reality: A treatise in the sociology of knowledge*, Penguin, London

Bernstein, S., Betsill, M., Hoffman, M., Paterson, M. (2010), "A Tale of Two Copenhagens: Carbon Markets and Climate Governance, *Journal of International Studies*, Vol. 39, No. 1, Pp. 161–173

Berkhout, F., Leach, M. & Scoones, I. (2003), "Shifting perspectives in environmental social science", In (Ed) Berkhout, F., *Negotiating Environmental Change: New Perspectives from Social Science*, Edward Elgar, Cheltenham

Berkhout, F. (2010), "Reconstructing boundaries and reason in the climate debate", Global Environmental Change, Vol. 20, Issue 4, Pp. 565–569

Berkhout, F. & Verbong, G. & Wieczorek, A.J. & Raven, R. & Lebel, L. & Bai, X. (2010), Sustainability experiments in Asia: innovations shaping alternative development pathways?" *Environmental Science & Policy*, Vol. 13, Issue 4, Pp. 261–271

Berry, F. & Berry, W. (1999), "State Lottery Adoptions as Policy Innovations: An Event History Analysis", *American Political Science Review*, Vol. 84, Issue 02

Berry, F. & Berry, W. (2007), "Innovation and diffusion models in policy research". In P. Sabatier (Ed.), *Theories of the Policy Process (2nd ed.)*, Westview Press, Boulder

Betsill, M. (2001), "Mitigating Climate Change in US Cities: Opportunities and obstacles", *Local Environment*, Vol 6, Issue 4, Pp. 393-406

Betstill, M. & Bulkeley, H. (2004), "Transnational networks and global environmental governance: The cities for climate protection program", *International Studies Quarterly*, Vol. 48, Pp. 471–493

Betsill, M. & Bulkeley, H. (2007), "Looking Back and Thinking Ahead: A Decade of Cities and Climate Change Research", *Local Environment: The International Journal of Justice and Sustainability*, Vol. 12, Issue 5

Beyer, Stefanie (2006), *Environmental Law and Policy in the People's Republic of China*, Oxford University Press, Oxford

Biello, D. (2008), "Sunrise on China's First Carbon-Neutral City", *Scientific American Online*, Accessed 2013.02 at: http://www.scientificamerican.com/article/sunrise-on-chinas-first-carbo-neutral-city/

Biermann, F. & Pattberg, P. (2008), "Global Environmental Governance: Taking Stock, Moving Forward", *Annual Review of Environment and Resources*, Vol. 33, Pp. 277-294

Bitzer, V., Francken, M., Glasbergen, P. (2008), "Intersectoral partnerships for a sustainable coffee chain: Really addressing sustainability or just picking (coffee) cherries?" *Global Environmental Change*, Vol. 18, Issue 2

Bloomberg (2014), Bloomberg Visual Data Website> Infographics > "China Pollution Poses Test for Regime as Middle Class Protests", Retrieved 2014.07 at: http://www.bloomberg.com/infographics/2013-07-11/china-pollution-poses-test-for-regime-as-middle-class-protests.html

Bloomberg (2016), "China Scales Back Solar, Wind Ambitions as Renewables Cool", Bloomberg, 2016.11.08, Accessed 2016.03 at: https://www.bloomberg.com/news/articles/2016-11-08/china-scales-back-solar-wind-ambitions-as-renewables-boom-cools

Bo, Zhiyue (2002), "Chinese Provincial Leaders: Economic Performance and Political Mobility since 1949", *Studies on Contemporary China*, Sharpe Inc., New York

Boasson, B. & Wettestad, J. (2014), "Policy Invention and Entrepreneurship: Bankrolling the Burying of Carbon in the EU", *Global Environmental Change*, Vol. 29, Pp. 387–394

Bodansky, D. (1993), “The United Nations Framework Convention on Climate Change: A Commentary”, *Yale Journal of International Law*, Vol. 18, Issue 2, Pp. 451-558

Bogason, P & Musso, J. (2006), “The Democratic Prospects of Network Governance”, *American Review of Public Administration*, Vol. 36, No. 1

Boeing (2015), “Boeing, Hainan Airlines, Sinopec Celebrate China's First Commercial”, Boeing Website, Accessed 2015.12 at: http://boeing.mediaroom.com/2015-03-21-Boeing-Hainan-Airlines-Sinopec-Celebrate-Chinas-First-Commercial-Flight-with-Sustainable-Aviation-Biofuel

Börzel, T. (1998), “ORGANIZING BABYLON – ON THE DIFFERENT CONCEPTIONS OF POLICY NETWORKS”, *Public Administration*, Vol. 76, Pp. 253–273

Boyd, E. & Ghosh, A. (2013), “Innovations for enabling urban climate governance: evidence from Mumbai”, *Environment and Planning C: Government and Policy*, Vol. 31, Pp. 926–945

Braun, V. & Clarke, V. (2006), “Using thematic analysis in psychology”, *Qualitative Research in Psychology*, Vol. 3, Issue 2, Pp. 77-101

Breidenich, C., Magraw, D, Rowley, A. & Rubin, J.W. (1998), “The Kyoto Protocol to the United Nations Framework Convention on Climate Change”, The American Journal of International Law, Vol. 92, Issue 2, Pp. 315-331

Brenner, N. (1999) Globalisation as reterritorialisation: the re-scaling of urban governance in the European Union, *Urban Studies*, 36, Pp. 431–451

Brenner, N. (2004), “Urban Governance and the Production of New State Spaces in Western Europe, 1960-2000”, *Review of International Political Economy*, Vol. 11, No. 3, Pp. 447-488

Brockett, D., Fridley, D., Lin, J., & Lin, J. (2004), *A Tale of Five Cities: The China Residential Energy Consumption Survey*, American Council for an Energy-Efficient Economy, Pacific Grove, CA, Retrieved 2012.10 at: http://china.lbl.gov/sites/china.lbl.gov/files/ACEEE.2002.pdf

Bulkeley, H. & Betsill, M. (2003) “Introduction”, In *Cities and Climate Change: Urban Sustainability and Global Environmental Governance*, London, Routledge

Bulkeley, H. et al (2003), “Environmental Governance and Transnational Municipal Networks in Europe”, *Journal of Environmental Policy & Planning*, Vol. 5, Issue 3, Pp.235-254

Bulkeley, H. (2005), “Reconfiguring environmental governance: Towards a politics of scales and networks”, *Political Geography*, Vol. 24, Issue 8, Pp. 875–902

Bulkeley, H. & Betsill, M. (2005), “Rethinking Sustainable Cities: Multilevel Governance and the 'Urban' Politics of Climate Change”, *Environmental Politics*, Vol. 14, Issue 1, Pp. 42-63

Bulkeley, H. & Kern, K. (2006), “Local Government and the Governing of Climate Change in Germany and the UK”, *Urban Studies*, Vol. 43, No. 12, Pp. 2237– 2259

Bulkeley, H. & Kern, K. (2006), “Cities, Europeanization and Multi-level Governance: Governing Climate Change through Transnational Municipal Networks”, *Journal of Common Market Studies*, Vol.47, Issue 2, Pp. 309–332

Bulkeley, H. Schroeder, K. Janda, J. Zhao, A. Armstrong, S.Y. Chu, S. Ghosh (2009), “Cities and Climate Change: The Role of Institutions, Governance and Urban Planning”, 5th Urban Research Symposium: Cities and Climate Change, 28-30 June 2009, Marseille

Bulkeley, H. (2010), “Cities and the Governing of Climate Change”, *Annual Review of Environment and Resources*, Vol. 35, Pp. 229-253

Bulkeley, H. & Betsill, M. (2010), “Rethinking Sustainable Cities: Multilevel Governance and the ‘Urban’ Politics of Climate Change”, *Environmental Politics*, Vol. 14, No. 1, Pp. 42 – 63

Bulkeley, H., Castan Broto, V., Hodson, M. & Marvin, S. (2011), *Cities and Low Carbon Transitions*, Routledge, London

Bulkeley, H., Andonova, L., Bäckstrand, K., Betsill, M. Compagnon, D., Duffy, R., Kolk, A., Hoffman, M., Levy, D., Newell, P., Milledge, T., Paterson. M., Pattberg, P., Van Deever, S. (2012), “Governing climate change transnationally: assessing the evidence from a database of sixty initiatives”, *Environment and Planning C: Government and Policy*, Vol. 30, Pp. 591 – 612

Bulkeley, H., & Castan Broto, V. (2012), “Government by experiment? Global cities and the governing of climate change”, Transactions of the Institute of British Geographers, Vol. 38, Issue 3

Bulkeley, H. & Betsill, M. (2013), “Revisiting the urban politics of climate change”, *Environmental Politics*, Vol. 22, No. 1, Pp. 136-154

Bulkeley, H. et al (2014), *Transnational Climate Change Governance*, Cambridge University Press, Cambrigde

Bulkeley, H. & Newell, P. (2015), *Governing Climate Change*, Routledge, Oxon

Bumpus, A. & Liverman, D. (2008), “Accumulation by Decarbonization and the Governance of Carbon Offsets’, *Economic Geography*, Vol. 84, No. 2, Pp. 127–55

Burch, S. (2010), “In pursuit of resilient, low carbon communities: An examination of barriers to action in three Canadian cities”, *Energy Policy*, Vol. 38, Issue 12, Pp. 7575–7585

BWK (2014), 百度文库>专业资料>工程科技能源/化工> “日照钢铁节能”, Accessed 2015.05 at: http://wenku.baidu.com/link?url=K3R8vUPUP_YNFLyB3UQw6yWZjyGpvJqUPaw0PQZ6zWzssQ2VBnVRa8bPF3X9AxOl6dcbKKib77NaQE1Lr5llBtyNg2r0GyH8nPG3FRsXble

C40 (2011), “Barcelona's Solar Hot Water Ordinance”, C40 Cities Website, Accessed 2015.03 at: http://www.c40.org/case_studies/barcelonas-solar-hot-water-ordinance

Cai, H. & Treisman, D. (2007), “Did government decentralization cause China’s economic miracle?”, *World Politics*, Vol. 58, Issue 04, Pp. 505-535

Caprotti, F. (2008), “China's cleantech landscape: the renewable energy technology paradox”, *Sustainable Development Law & Policy*, Vol. 6

Caprotti, F. (2014), “Critical research on eco-cities? A walk through the Sino-Singapore Tianjin Eco-City, China”, *Cities*, Vol. 36, Pp. 10–17

Caprotti, F., Springer, C., Harmer, N. (2015), “‘Eco’ For Whom? Envisioning Eco-urbanism in the Sino-Singapore Tianjin Eco-city, China”, *International Journal of National and International Urban Research*, Vol. 39, Issue, 3

Carmen Lemos, M. & Agrawal, A. (2006), “Environmental governance”, *Annual Review of Environmental Resources*, Vol. 31, Pp. 297–325

Carmin, J.A., Angueloovsky, I., Roberts, D. (2012), “Urban Climate Adaptation in the Global South: Planning in an Emerging Policy Domain, Journal of Planning Education and Research, Vol. 32, Issue 1, Pp. 18–32

Carrington, D. (2016), “China's coal peak hailed as turning point in climate change battle”, *The Guardian*, Accessed 2017.01 at: https://www.theguardian.com/environment/2016/jul/25/china-coal-peak-hailed-turning-point-climate-change-battle

Cashore, B. (2002), “Legitimacy and the privatization of environmental governance: How non–state market–driven (NSMD) governance systems gain rule–making authority”, *Governance*, Vol. 15, Issue 4

Castán Broto, V. & Bulkeley, H, (2013), “A survey of urban climate change experiments in 100 cities”, *Global Environmental Change*, Vol. 23, Issue 1, Pp. 92–102

Castán Broto, V., Augusto Macucule, D., Boyd, E., Ensor, J., Allen, C. (2015a), “Building collaborative partnerships for climate change action in Maputo, Mozambique”, *Environment and Planning A*, Vol 47, Pp. 571 – 587

Castán Broto, V., Ensor, J., Boyd, E., Allen, C., Seventine, C. Augutso Maducule, D. (2015b) *Participatory Planning for Climate Compatible Development in Maputo, Mozambique*, UCL Press, London.

Castán Broto, V. & Westman, L. (2016), “Just sustainabilities and local action: evidence from 400 flagship initiatives, *Local Environment*, Pp.1-16

Caulfield, J. (2006), “Local government reform in China: a rational actor perspective”, *International Review of Administrative Sciences*, Vol. 72, No. 2, Pp. 253-267

CBTG (2012), China Building & Technology Group Website> Home> Projects> Rizhao, Retrieved 2012.10 at: http://www.cbtgc.com/index.aspx

CCAN (2015), China Civil Climate Action Network (CAN-China) [online], CCAN, Available from: http://www.climatenetwork.org/profile/member/china-civil-climate-action-network-can-china

CCG (2007), China Central People’s Government of the PRC Official Website> 首页> 执法监管> 环境> “山东省公布 2007 年度 17 市节能目标责任考核情况”, Retrieved 2013.05 at: http://www.gov.cn/zfjg/content_1027149.htm#

CCPITRZ (2010), China Council for the Promotion of International Trade Rizhao Website> Index > English> Main Industry, Accessed 2012.10 at: http://www.ccpitrz.com/ewww/showart.asp?artid=3699

Chai, Q. & Zhang, X.G. (2010), “Technologies and policies for the transition to a sustainable energy system in china”, *Energy*, Vol. 35, Issue 10, Pp. 3995-4002

Chen, F. (1995), *Economic Transition and Political Legitimacy in Post-Mao China*, Stat University of New York Press, New York

Chen, J. (2007), “Rapid urbanization in China: A real challenge to soil protection and food security”, *CATENA*, Vol. 69, Issue 1, 16, Pp. 1–15

Chen, G. (2009), *Politics of China’s Environmental Protection, Series on Contemporary China*, World Scientific Publishing Co., Singapore

Chen, T. (2015a), “Environmental Trial Tests Beijing’s Nerve on Pollution”, *The Wall Street Journal*, 2015.05.18

Cheng, L. & White, L. (1990), “Elite transformation and modern change in mainland China and Taiwan: empirical data and the theory of technocracy”, *The China Quarterly*, Vol. 121, Pp. 1-35

Cherni, A.J. & Kentish, J. (2007), “Renewable energy policy and electricity market reforms in China”, *Energy Policy*, Vol. 35, Issue 7, Pp. 3616-3629

Cheung, D. et al (2009), “CSR and the Environment: Business Supply Chain Partnerships in Hong Kong and PRDR, China”, *Corp. Soc. Responsib. Environ. Mgmt*, Vol. 16, Pp. 250–263

China Huaneng (2010), 首页> 新闻中心> 网上展厅> 成员相册> 区域子公司> 华能日照电厂, Accessed at:

http://www.chng.com.cn/n31531/n31613/n293133/n418910/n418990/n423686/c476249/content.html

China Knowledge Net (2008), 中国知网> 期刊全文库> “山东政报” 2008 年 01 期> “中共山东省委 山东省人民政府关于健全推动科学发展促进社会和谐考核监督体系的意见”, Accessed 2013.09 at: http://www.cnki.com.cn/Article/CJFDTotal-SDZB200801009.htm

Chinaports (2010), 中国港口网> 港口业务> 港口介绍, Accessed 2012.10 at: http://www.chinaports.com/port/%E6%97%A5%E7%85%A7%E6%B8%AF/intro

China State Council (2005), China State Council Official Website> Chinese Government’s Official Web Portal> Accessed 2013.05 at: http://www.gov.cn/english/2005-08/05/content_20763.htm

China State Council (2014), *China National New-type Urbanization Plan (2014-2020)*, China Stata Council. Beijing

Chinadaily (2009), Chinadaily> Home> City Instruction> Rizhao, Accessed 2012.10 at: http://shandong.chinadaily.com.cn/e/2009-07/30/content_8490823_3.htm

China Daily (2016), “School built before land was prepared”, *China Daily Online*, 2016-04-27, Accessed 2016.07 at: http://www.chinadaily.com.cn/china/2016-04/27/content_24885529.htm

Christo, P. (2000) “Ecological modernisation, ecological modernities”, In Stephen, C.Y., *The Emergence of Ecological Modernization, Integrating the environment and the economy?* Routledge, Cornwall

Choi, J., Chung, J., Lee, D. (2010), “Risk perception analysis: Participation in China’s water PPP market”, *International Journal of Project Management*, Vol. 28, Issue 6, Pp. 580–592

Chu, E. Anguelovsky, I., Carmin. J.A. (2015), “Inclusive approaches to urban climate adaptation planning and implementation in the Global South”, *Climate Policy*, Vol. 16, Issue 3

CK (2014), China Knowledge Open Databank, Accessed 2015.01 at: http://www.chinaknowledge.com/Databank/Default.aspx

Clapp, J. (1998), “The Privatization of Global Environmental Governance: ISO 14000 and the Developing World”, *Global Governance*, Vol. 4, No. 3, Pp. 295-316

Clapp, J. (2005), “Global Environmental Governance for Corporate Responsibility and Accountability”, *Global Environmental Politics*, Vol. 5, No. 3, Pp. 23-34

CNBM (2015), China National Building Materials Ltd. Website, “About us”, Accessed 2015.03 at: http://www.cnbmltd.com/english/zgjc/index.htm

Coen, D. (2005), “Environmental and business lobbying alliances in Europe: Learning from Washington”, In (eds) Levy, D. & Newell, P. (2005), *The Business of Global Environmental Governance*, MIT Press, Cambridge

Collier, U. & Lofstedt, R. (1997), “Think globally, act locally?: Local climate change and energy policies in Sweden and the UK”, *Global Environmental Change*, Vol. 7, Issue 1, Pp. 25-40

Collier, U. (1997), “Local authorities and climate protection in the European union: Putting subsidiarity into practice?” *Local Environment*, Vol. 2, Issue 1

Collier, U. & Lofstedt, R. (1997), “Think globally, act locally?: Local climate change and energy policies in Sweden and the UK”, *Global Environmental Change*, Vol. 7, Issue 1, Pp. 25-40

Creswell, J. & Miller, D. (2000), “Determining Validity in Qualitative Inquiry”, *Theory Into Practice*, Vol. 39, Issue 3, Pp. 124-130

Cross, M.K.D. (2013), “Rethinking epistemic communities twenty years later”, Review of International Studies, Vol. 39, Pp. 137–160

Cui, J. (2008), “3500 Environmental NGOs in China”, *Xinhua News*, 2008.10.30

CURC (2009), *Low Carbon Development of Cities in China*, China Urban research Centre (国城市科学研究会), Beijing

Curtis, S. & Gesler, W. & Smith, G. & Washburn, S. (2000), “Approaches to sampling and case selection in qualitative research”, *Social Science & Medicine*, Vol. 50, Pp. 1001-1014

Dahl, A.R. (1957), “The concept of power”, *Behavioral Science*, Vol. 2, Issue 3, Pp. 201–215

Dauvergne, P. & Listner, J. (2012), “Big brand sustainability: Governance prospects and environmental limits*”, Global Environmental Change*, Vol. 22, Issue 1, Pp. 36–45

Davis, T. (1999), “Reflecting on Voluntary Environmental Partnerships: Lessons for the Next Century”, *Elsevier Science*, 6, 1

Deng, J.S., Wang, K., Hong, Y. Qi, J. (2009), “Spatio-temporal dynamics and evolution of land use change and landscape pattern in response to rapid urbanization*”, Landscape and Urban Planning*, Vol. 92, Issues 3–4, 30, Pp. 187–198

Dente, B. (1995), *Environmental Policy in Search of New Instruments*, Environment, Science and Society Series, Vo. 3

Dhakal, S. (2009), “Urban energy use and carbon emissions from cities in China and policy implications”, *Energy Policy*, Vol. 37, Issue 11, Pp. 4208–4219

Dhakal, S. (2011), “Urban energy transitions in Chinese cities”, in Bulkeley, H., et al., *Cities and Low Carbon Transitions*, Routledge, London

Dingwerth, K. (2008), “North-south parity in global governance: the affirmative procedures of the Forest Stewardship Council”, *Global Governance: A Review of Multilateralism and International Organizations*, Vol. 14, No. 1, Pp. 53-71

van Dijk, T.A. (1993), “Principles of critical discourse analysis”, DISCOURSE & SOCIETY, Vol. 4, No. 2, Pp. 249- 283

Donnelly, J. (2000), *Realism and International Relations*, Cambridge University Press, Cambridge

Dowding, K. (1995), “Model or Metaphor? A Critical Review of the Policy Network Approach”, *Political Studies*, Vol. 43, Issue Supplement 1, Pp. 136–158

Dryzek, J. (1997), *The Politics of the Earth, Environmental Discourses*, Oxford, Oxford University Press

Dubash, Navroz, K. 2013. “The Politics of Climate Change in India: Narratives of Equity and Co-benefits”, *WIREs Climate Change*, Vol. 4, Pp. 191-201

Dunlop, C.A. (2014), “The possible experts: how epistemic communities negotiate barriers to knowledge use in ecosystems services policy”, Environment and Planning C: Government and Policy, Vol. 32, Pp. 208–228

Duggan, J. (2013), The Guardian Online> Environment> China’s Choice> “Kunming pollution protest is tip of rising Chinese environmental activism”, Accessed 2014.06 at: http://www.theguardian.com/environment/chinas-choice/2013/may/16/kunming-pollution-protest-chinese-environmental-activism

Dumbaugh, K. & Martin, F. (2011), “UNDERSTANDING CHINA'S POLITICAL SYSTEM”, *Current Politics and Economics of South, Southeastern, and Central Asia*, Vol. 20, Issue 2

Eaking, H, & Carmen Lemos, M (2006), "Adaptation and the state: Latin America and the challenge of capacity-building under globalization", *Global Environmental Change*, Vol. 16, Pp. 7–18

Easton, D. (1965), *A Framework for Political Analysis*, Prentice Hall, New Jersey

Economy, E. C. (2004), *The River Runs Black: The Environmental Challenge to China's Future*, Cornell University Press, Ithaca

Elster, J. (1998), *Deliberative Democracy*, Cambridge University Press, Cambridge

Emmott, R. & Bartunek, R.J. (2017), "As U.S. retreats, EU and China seek climate leadership at summit", *Reuters*, 1 June 2017.

EPA (2006), *Environmental Governance in China*, EPA Task Force on Environmental Governance, EPA: New York

Ergenc, C. (2014), "Political Efficacy through Deliberative Participation in Urban China: A Case Study on Public Hearings", *Journal of Chinese Political Science*, Vol. 19, Pp. 191–213

Evans, J. (2011), "Resilience, ecology and adaptation in the experimental city", *Transactions of the Institute of British Geographers*, Volume 36, Issue 2, Pp. 223–237

Everbright (2016), "About us: Corporate profile", Everbright International Website, Accessed 2014.10 at: http://www.ebchinaintl.com/en/company/company.php

Fan, K.X. (2010), "The Municipal Women's Federation initiates 15 low carbon items", *Rizhao News Website*, Accessed 2012.12 at: http://www.rznews.cn/news/folder16/201005/2010-05-141426.html

Fan, Y.K. (2012), "Department of roads, section of materials creates a unit for low carbon and conservation", *Rizhao News Website*, Accessed 2012.12 at: http://www.rznews.cn/index/folder3/2012-12-19/2012-12-19300005.html

Fang, Y. Cote, R., Qin, R. (2007), "Industrial sustainability in China: Practice and prospects for eco-industrial development", *Journal of Environmental Management*, Vol. 83, Issue 3, Pp. 315–328

Feindt, P. & Oels, A. (2006), "Does discourse matter? Discourse analysis in environmental policy making", *Journal of Environmental Policy & Planning*, Vol. 7, Issue 3

Ferreria da Cruz, N., Simoes, P., Cunha Marques, R. (2013), "The Hurdles of Local Governments with PPP Contracts in the Waste Sector", *Environ Planning C Government and Policy*, Vol. 31, No. 2, Pp. 292-307

Feng, D. & Xi, D. (2009), "Study of the Coastal City's Sustainable Development between Regional Oceanic Economy and Ecological Environment", Donghua University, Shanghai, Retrieved 2012.10 at: http://www.seiofbluemountain.com/upload/product/200911/2008qyjjhy10a49.pdf

Fish, E. (2013), The Economic Observer Online> HOME > Economic > News > Nation> "The Forgotten Legacy of the Banqiao Dam Collapse", Retrieved 2013.10 at: http://www.eeo.com.cn/ens/2013/0208/240078.shtml

Fischer, F. & Forester, J. (1993), *The Argumentative Turn in Policy Analysis and Planning*, Duke University Press, Durham

Fischer, F. (2006), "Participatory governance as deliberate empowerment: Cultural politics and the facilitation of discursive space", *American Review of Public Administration*, Vol. 36, Pp. 19-40

Flaherty, J., Liu, M., Ding, L., Dong, B., Ding, Q., Li, X., Xiao, S. (2007), "China: The Aging Giant", *Journal of the American Geriatrics Society*, Volume 55, Issue 8

Flyvjberg, B. (2006), “Five Misunderstandings About Case-Study Research”, *Qualitative Inquiry*, Vol. 12 Number 2

Forsyth, T. (2006), “Cooperative environmental governance and waste-to-energy technologies in Asia”, *International journal of technology management and sustainable development*, 5 (3). pp. 209-220

Forsyth, T. (2010), “Panacea or paradox? Cross-sector partnerships, climate change, and development”, *Wiley Interdisciplinary Reviews: Climate Change*, Vol. 1, Pp. 683–696

Francesch-Huidobro, M. & Mai, Q (2012), “Climate advocacy coalitions in Guangdong, China”, *Administration & Society*, Vol. 3

Friedman, et al. (2000), “Small and medium-sized enterprises and the environment: evaluation of a specific initiative aimed at all small and medium-sized enterprises”, *Journal of Small Business and Enterprise Development, Vol.* 7, Issue 4, Pp. 325-342

Gardiner, R. (2002), *Earth Summit 2002 Briefing Paper*, UN Johannesburg Summit Secretariat, New York

GEF (2016), “China and GEF: 25 years of collaboration for sustainable development”, GEF Website, Accessed 2016.02 at: https://www.thegef.org/news/china-and-gef-25-years-collaboration-sustainable-development

Geels, F.W. (2004), “From sectoral systems of innovation to socio-technical systems: insights about dynamics and change from sociology and institutional theory”, *Research Policy*, Vol. 33 (6–7), Pp. 897–920

Geels, F.W. (2014), “Regime Resistance against Low-Carbon Transitions: Introducing Politics and Power into the Multi-Level Perspective”, *Theory, Culture & Society*, Vol. 31, 5, Pp. 21–40

Gerring, J. (2006), *Case Study Research: Principles and Practices*, Cambridge University Press, Cambridge

Gibbs, D. (2000), “Ecological modernization, regional economic development and regional development agencies”, *Geoforum*, Vol. 31, Issue 1, Pp. 9–19

Gilley, B. (2012), “Authoritarian environmentalism and China's response to climate change”, *Environmental Politics*, Vol. 21, Issue 2, Pp. 287-307

GIZ (2015), “Nexus: Case study Rizhao”, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Accessed 2015.01 at: http://www.unescap.org/sites/default/files/Rizhao%20Case%20Study_0.pdf

GIZ (2016), Workshop for capacity building for the establishment of emission trading schemes in China, GIZ/NDRC, Beijing, 2016/04.23-24

Glasbergen. P. (1998), *Co-operative Environmental Governance: Public-Private Agreements as a Policy Strategy*, Kluwer Academic Publishers, Utrecht

Glasbergen, P. & Groenenberg, R. (2001), “Environmental partnerships in sustainable energy”, *European Environment*, Vol. 11, Pp. 1-13

Glasbergen, P., Biermann, F., Mol, A. (2007), *Partnerships, Governance and Sustainable Development: Reflections on Theory and Practice*, Edward Elgar, Cheltenham

Glasbergen, P. (2011), “Understanding Partnerships for Sustainable Development Analytically: the Ladder of Partnership Activity as a Methodological Tool”, *Environmental Policy and Governance*, Vol. 21, Pp. 1–13

GLINFO (2012) 钢联资讯 > 煤炭 > 正文 > “日照港: 建设节能型国际一流强港”, Retrieved 2013.10 at: http://coal.glinfo.com/12/1011/08/76FB2E69C271F688.html

GLINFO (2013), 大宗商品 > 大宗商品资讯 > 文章内容 > 正文> “日照凌云海糖业纳入发改委节能奖励名单”, Accessed 2015.04 at: http://info.glinfo.com/13/0801/07/4872D317B4B4C1B4.html

Gong, M. & Werner, S. (2014), *District heating research in China*, Svensk Fjarrvarme AB

Golding, W.F. (2011), “INCENTIVES FOR CHANGE: CHINA’S CADRE SYSTEM APPLIED TO WATER QUALITY”, *Pacific Rim Law & Policy Journal*, Vol. 671, Pp. 399-428

Gough, C. & Shackley, S. (2001), “The respectable politics of climate change”, *International affairs*, Vol. 77, Issue 2

Graham, S. & Marvin, S. (2001), *Splintering urbanism: networked infrastructures, technological mobilities and the urban condition*, New York, Routledge

Granberg, M. & Elander, I. (2007), “Local Governance and Climate Change: Reflections on the Swedish Experience”, *The International Journal of Justice and Sustainability*, Vol. 12, Issue 5

Granek, F. & Hassanali, M. (2006) “The Toronto Region Sustainability Program: insights on the adoption of pollution prevention practices by small to medium-sized manufacturers in the Greater Toronto Area (GTA)”, *Journal of Cleaner Production*, Vol. 14, Issue 6, Pp. 572-579

Gray, V. (1973), “Innovation in the States: a diffusion study”, *APSR*, Vol. 67, No. 4, Pp. 1174–1185

Gupta, J. (1997), *The Climate Change Convention and Developing Countries: From Conflict to Consensus*, Kluwer Academic Publishers, Dordrecht

Gupta, S. et al (2007a), “Climate change: a ‘glocal’ problem requiring ‘glocal’ action”, *Environmental Sciences*, Vol. 4, Issue 3

Gustavsson, E., Elander, I., Lundmark, M. (2009), “Multilevel governance, networking cities, and the geography of climate-change mitigation: two Swedish examples”, *Environ. Planning C*, Vol. 27, Pp. 59–74

GZZSW (2014), “ZTE Low Carbon centre”, On Invest Guangzhou Website, Accessed 2014.10 at: http://www.investguangzhou.gov.cn/web/eng/jsp/content/content_detail.jsp?catEncode=001006001001&contentId=34230

Haas, P. (2004), “When does power listen to truth? A constructivist approach to the policy process”, *Journal of European Public Policy*, Vol. 11, Number 4, Pp. 569–592

Haas, P. (2017: forthcoming), “The epistemic authority of solution-oriented global environmental assessment”, *Environmental Science and Policy*

Hajer, M. (1995), *The politics of environmental discourse: ecological modernization and the policy process*, Oxford, Clarendon Press

Hajer, M. & Kesselring, S. (1999), “Democracy in the risk society? Learning from the new politics of mobility in Munich”, *Environmental Politics*, Vol. 8, No. 3, Pp. 1-23

Hajer, M. & Wagenaar, H. (2003), *Deliberative Policy Analysis: Understanding Governance in the Network Society*, Cambridge University Press, Cambridge

Hale, T. & Roger, C. (2014), “Orchestration and transnational climate governance”, *The Review of International Organizations*, Vol. 9, Issue 1, Pp. 59-82

Halila, F. (2007), “Networks as a means of supporting the adoption of organizational innovations in SMEs: the case of Environmental Management Systems (EMSs) based on ISO 14001”, *Corporate Social Responsibility and Environmental Management*, Vol. 14, Issue 3, Pp. 167-181

Han, H., Swedlow, B., Unger, D. (2014), “Policy Advocacy Coalitions as Causes of Policy Change in China? Analyzing Evidence from Contemporary Environmental Politics, *Journal of Comparative Policy Analysis: Research and Practice*, Vol. 16. No. 4, Pp. 313-334

Hansen, E. G. & Klewitz. J. (2012) “Publicly mediated inter-organizational networks: a solution for sustainability-oriented innovation in SMEs”, In *Entrepreneurship, innovation and sustainability*, Greenleaf, Sheffield, Pp. 254-278

Harrison, T. & Kostka, G. (2012), “Manoeuvres for a Low Carbon State: The Local Politics of Climate Change in China and India”, *Developmental Leadership Program (DLP)*, No. 22

Hartman, C. & Stafford, E. (1997), “Green alliances: building new business with environmental groups”, *Long Range Planning*, Vol. 30, Issue 2

Haug, C., Rayner, T., Jordan, A., Hildingsson, R., Stripple, J., Monni, S., Huitema, D., Massey, E., Asselt, H., Berkhout, F. (2008), “Navigating the dilemmas of climate policy in Europe: evidence from policy evaluation studies”, *Climatic Change*, Vol. 101, Pp. 427–445

Haug, G. & Berkhout, F. (2010), “Learning the hard way? European climate policy after Copenhagen”, Environment, Vol 52, Issue 3, Pp. 20-27

He, B. (2006), “Participatory and deliberative institutions in China”, In (Eds) Leib, E. J. & He, B., *The Search for Deliberative Democracy in China*, Palgrave, New York

He, B. & Warren, M. (2011), “Authoritarian Deliberation: The Deliberative Turn in Chinese Political Development”, *Perspectives on Politics*, Vol. 9, No. 2

He, G. (2014), “Special report: The victims of China's soil pollution crisis”, Chinadialogue Online, 30.06.2014, Accessed 2016.07 at: https://www.chinadialogue.net/article/show/single/en/7073-Special-report-The-victims-of-China-s-soil-pollution-crisis

Heclo, H. (1978), ‘Issue Networks and the Executive Establishment’, in A. King (ed.), *The New American Political System*, AEI, Washington

Hildén, M., Jordan, A. & Rayner, T. (2014) “Climate policy innovation: developing an evaluation perspective”, *Environmental Politics*, Vol 23, No. 5, Pp. 884-905

Hilton, I. (2016), “China emerges as global climate leader in wake of Trump's triumph”, *The Guardian*, 22 November 2016.

Ho, P. (2007), “Embedded Activism and Political Change in a Semiauthoritarian Context”, *China Information*, Vol. 21, No. 2, Pp. 187-209

Hodge, G & Greve, C. (2005), *The Challenge of Public-private Partnerships*, Edward Elgar Publishing, Cheltenham

Hodge, G & Greve, C. (2007), “Public–Private Partnerships: An International Performance Review”, *Public Administration Review*, Vol. 67, Issue 3, Pp. 545–558

Hodge, G. & Greve, C. (2010), “Public-Private Partnerships: Governance Schemeor Language Game?” *The Australian Journal of Public Administration*, Vol. 69, No. S1, pp. S8–S22

Hoffmann, M. (2011), *Climate Governance at the Crossroads: Experimenting with a Global Response after Kyoto*, Oxford University Press, Oxford

Hooghe, L. & Marks, G. (2001a), *Multi-level Governance and European Integration*, Rowman and Littlefield, Oxford

Hooghe, L. & Marks, G. (2001b), “Types of Multi-Level Governance", European Integration online Papers (EIoP), Vol. 5, No. 11

Holgate, C. (2007), “Factors and Actors in Climate Change Mitigation: A Tale of Two South African Cities”, *Local Environment: The International Journal of Justice and Sustainability*, Vol 12, Issue 5

Holmes, T. & Scoones, I. (2001), “Participatory environmental policy processes”, In Deliberative Democracy and Citizen Empowerment, *PLA Notes*, Vol. 40, Pp 76-84

Hood, C. (1991), “A PUBLIC MANAGEMENT FOR ALL SEASONS?” *Public Administration*, Vol. 69, Issue 1, Pp. 3–19

Hoppe, R. (1999), “Policy analysis, science and politics: from ‘speaking truth to power’ to ‘making sense together’”, *Science and Public Policy*, Vol. 26, Issuer 3, Pp. 201–210

Howlett, M. (2014), “Why are policy innovations rare and so often negative? Blame avoidance and problem denial in climate change policy making”, *Glob. Environ. Change*, Vol. 29, Pp. 395–403

Hsu, A. (2010), “Updates from Tianjin: Progress on the GreenGen IGCC project”, ChinaFAQs Online, Accessed 2014.04 at: http://www.chinafaqs.org/blog-posts/updates-tianjin-progress-greengen-igcc-project

Hu, G., Zhong, N., Ran, P. (2015), “Air pollution and COPD in China”, *J Thorac Dis*, Vol. 7, No. 1, Pp. 59–66

Hua, S. (2016), “China going green at rapid, near-record rate”, *Xinhua News*, Available through China Daly Online, Accessed 2016.06 at: http://usa.chinadaily.com.cn/china/2016-03/07/content_23775918.htm

Huang, Y. (2013), The Diplomat Online > Features > Environment > East Asia> China> “Choking to Death: Health Consequences of Air Pollution in China”, Retrieved 2013.05 at: http://thediplomat.com/2013/03/choking-to-death-the-health-consequences-of-air-pollution-in-chia/

Huijstee, M., Francken, M. & Leroy, P. (2007), “Partnerships for sustainable development: a review of current literature”, *Environmental Sciences*, Vol. 4, Issue 2

Huitema, D., Adger, W. N., Berkhout, F., Massey, E., Mazmanian, D., Munaretto, S., Termeer, C. C. J. A. M., (2016), “The governance of adaptation: choices, reasons, and effects: Introduction to the Special Feature”, *Ecology and Society*, Vol. 21, Issue 3

IEA (2007), *WORLD ENERGY OUTLOOK 2OO7: China and India Insights*, International Energy Agency, Paris, Retrieved 2012.05 at: http://www.worldenergyoutlook.org/media/weowebsite/2008-1994/weo_2007.pdf

IEA (2010), International Energy Agency> Newsroom & events > Press Releases & News > News “China overtakes the United States to become world’s largest energy consumer”, Retrieved 2012.05 at: http://www.iea.org/newsroomandevents/news/2010/july/2010-07-20.html

IEA (2011), *International Energy Statistics*, International Energy Agency US Energy Information Administration, Washington

IEA (2013), *Redrawing the Energy-Climate Map, World Energy Outlook Special Report 2013*, International Energy Agency, Paris

IEA (2015), *Energy and Climate Change: World Energy Outlook Special Report*, IEA, Paris

IEPD (2012), Industrial Efficiency Policy Database> Countries > China > CN-19: Low Carbon Development Zones, Retrieved 2013.02 at: http://iepd.iipnetwork.org/policy/low-carbon-development-zones

IEPD (2013), Industrial Efficiency Policy Database> Countries > China > Top 10,000 energy consuming enterprises program, Accessed 2013.02 at: http://iepd.iipnetwork.org/policy/top-10000-energy-consuming-enterprises-program

IEPD (2014), Industrial Efficiency Policy Database> Countries> China. Accessed 2015.01 at: http://iepd.iipnetwork.org/policy/energy-and-carbon-intensity-targets-12th-five-year-plan

IMIW (2013), International Maritime Information Website > Home > Rizhao Port, Retrieved 2013.10 at:
http://www.simic.net.cn/news_list.php?lan=en&id=368&flag=cnports&pname=rizhao

IPCC (2014), "Summary for policymakers", In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability, Part A: Global and Sectoral Aspects*, Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, United Kingdom and New, York, NY, USA, Pp. 1-32

Jagers, S. Stripple, J. (2003), "Climate Governance beyond the State", *Global Governance*, Vol. 9, Issue 3

Jahiel, A. (1998), "The Organization of Environmental Protection in China", *The China Quarterly*, Vol. 156, Pp 757-787

Jeanrenaud, C. (1997), *Environmental Policy Between Regulation and Market*, Birkhauser Verlag, Basel

Jong, M. et al, (2010), "Introducing public–private partnerships for metropolitan subways in China: what is the evidence?" *Journal of Transport Geography*, Vol. 18, Issue 2, Pp. 301–313

Jones, C. (1997), "A general theory of network governance: Exchange conditions and social mechanisms", *ACAD MANAGE REV*, Vol. 22, No. 4, Pp. 911-945

Jordan, G. (1891), "Iron Triangles, Woolly Corporatism and Elastic Nets: Images of the Policy Process", *Journal of Public Policy*, Vol. 1, Issue, 1, Pp. 95-123

Jordan, G. & Schubert, K. (1992), "A preliminary ordering of policy network labels", *European journal of political research*, Vol. 21, No. 721

Jordan, A., Wurzel, R. & Zito, A. (2003), "'New' Instruments of Environmental Governance: Patterns and Pathways of Change", *Environmental Politics*, Vol. 12, No. 1, Pp. 1-24

Jordan, A. & Huitema, D. (2014a), "Policy innovation in a changing climate: Sources, patterns and effects", Global Environmental Change, Vol. 29, Pp. 387–394

Jordan, A. & Huitema, D. (2014b), "Innovations in climate policy: the politics of invention, diffusion, and evaluation", *Environmental Politics*, Vol. 23, Issue, 5

Jordan, A., Wurzel, R. & Zito, A. (2013) "Still the century of 'new' environmental policy instruments? Exploring patterns of innovation and continuity", *Environmental Politics*, Vol. 22, No. 1, Pp. 155-173

Jorgensson, M. & Phillips, L. (2002), *Discourse Analysis as Theory and Method*, Sage, London

Kaiman, J. (2014), "China's 'eco-cities': empty of hospitals, shopping centres and people", *The Guardian*, 2014.04.14

Kalathil, S. & Boas, T. (2003), *Open Networks, Closed Regimes: The Impact of the Internet on Authoritarian Rule*, Carnegie, Washington

Kamieniecki, S. & Kraft, M (2012), *The Evolution of Research on U.S. Environmental Policy, The Oxford Handbook of U.S. Environmental Policy*, Oxford University Press, Oxford

Katzenstein, P. (1986), *Small States in World Markets. Industrial Policy in Europe*, Cornell University Press, Ithaca

Keeley, J. & Scoones, I. (1999), *Understanding Environmental Policy Processes: A Review*, IDS Working Paper 89

Kemper, E. & Stringfield, S. & Teddlie, C. (2003), "Mixed Methods Sampling, Strategies in Social Science Research", in Eds. Tashakkori, A. & Teddlie, C., Handbook of Mixed Methods in Social & Behavioral Research, Sage Publications, California

Keohane, R.O. (1989), *International Institutions And State Power: Essays in International Relations Theory*, Westview Press, Michigan

Keely, J. & Scoones, I. (1999), "Understanding Environmental Policy Processes: A review", IDS Working Paper 89, Sussex

Kern, K. & Alber, G. (2008), "GOVERNING CLIMATE CHANGE IN CITIES: MODES OF URBAN CLIMATE GOVERNANCE IN MULTI-LEVEL SYSTEMS", Competitive Cities and Climate Change, Ch. 6 of OECD CONFERENCE PROCEEDINGS MILAN, ITALY 9-10 OCTOBER 2008

Kern, K. & Bulkeley, H. (2009), "Cities, Europeanization and Multi-level Governance: Governing Climate Change through Transnational Municipal Networks", *JCMS*, Vol 47, No. 2, Pp. 309–332

Khan, J. (2013), "What role for network governance in urban low carbon transitions?" *Journal of Cleaner Production*, Vol. 50, Pp. 133–139

Khanna, N. et al (2016), "Estimating China's Urban Energy Demand and CO2 Emissions: A Bottom-up Modeling Perspective", Paper presented at the 2016 ACEEE Summer Study on Energy Efficiency in Buildings, August 21, 2016 to August 26, 2016, Pacifi Grove California, Accessed 2016.01 at: http://aceee.org/files/proceedings/2016/data/papers/11_129.pdf

Kickert, W. Klijn, E. & Koppenjan, J. (1997), *Managing complex networks: Strategies for the public sector*, Sage, London

Kingdon, J., (1984), *Agendas, Alternatives and Public Choices*, Little, Brown, Boston

Kjaer, A. (2004), *Governance*, Polity, Cambridge

Klewitz, J., et al. (2012), "Intermediaries driving eco-innovation in SMEs: a qualitative investigation", *European Journal of Innovation Management*, Vol. 15, Issue 4, Pp. 442-467

Klijn, E.-H., & Koppenjan, J. F. M. (2004), *Managing uncertainties in networks*, London, Routledge

Knoepfel, P. (1995), *New Institutional Arrangements for a New Generation of Environmental Policy Instruments: Intra- and Interpolicy Co-operation*, Environmental Policy Analyses Series, Springer, Berlin

Knoke D. (1990), *Political networks: the structural perspective*, Cambridge University Press, New York

Knoke, D. (1996), *Comparing policy networks: labor politics in the U.S., Germany, and Japan*, Cambridge University Press, Cambridge

Knutti, R. et al (2016), "A scientific critique of the two-degree climate change target", *Nature Geoscience*, Vol. 9, Pp. 13–18

Koehn, PH. (2008), "Underneath Kyoto: emerging subnational government initiatives and incipient issue bundling opportunities in China and the United States", *Glob. Environ. Polit*, Vol. 8, Pp. 53–77

Kohler-Koch, B. & Eising, R. (1999), *The Transformation of Governance in the European Union*, Routledge, London

Kolk, A., Pinkse J, Van Houten L H, (2010), "Corporate responses to climate change: the role of partnerships", In (Eds) Martens, P. & Chang, C., *The Social and Behavioural Aspects of Climate Change: Linking Vulnerability, Adaptation and Mitigation*, Greenleaf Publishing, Sheffield, Yorks, Pp. 48–67

Konnola, T. & Unruh. G. (2006), "Really changing the course: the limitations of environmental management systems for innovation", Business Strategy and the Environment, Vol. 16, Issue 8, Pp. 525–537

Kooiman, J. (1999), "Social-Political Governance, Overview, reflections and design", *Public Management: An International Journal of Research and Theory*, Vol. 1, Issue 1

Kostka, G. & Hobbs, W. (2012) "Local Energy Efficiency Policy Implementation in China: Bridging the Gap between National Priorities and Local Interests", *The China Quarterly*, Vol. 211, Pp.765-785

Kostka, G. (2014), *Barriers to the Implementation of Environmental Policies at the Local Level in China*, World Bank Policy Research Working Paper, No. 7016

Kousky, C. & Schneider, S. (2003), "Global climate policy: Will cities lead the way?" *Clim. Policy*, Vol. 3, No. 3, Pp. 59–72

Krause, R. (2010), "POLICY INNOVATION, INTERGOVERNMENTAL RELATIONS, AND THE ADOPTION OF CLIMATE PROTECTION INITIATIVES BY U.S. CITIES", *Journal of Urban Affairs*, Vol. 33, Issue 1

Lam, W. (2015), *Chinese Politics in the Era of Xi Jinping: Renaissance, Reform, Or Regression*, Routledge, New York

Leck, H. & Sion, D. (2013), "Fostering Multiscalar Collaboration and Co-operation for Effective Governance of Climate Change Adaptation", *Urban Studies*, Vol. 50, No. 6, Pp. 1221-1238

Lehmann, M. (2006), "Government–business relationships through partnerships for sustainable development: the green network in Denmark", *Journal of Environmental Policy and Planning*, Vol. 8, Issue 3, Pp. 235-257

Lei, X. (2007), "NGOs finally accepted as valuable partners", *China Daily Online*, 2007.04.13, Available at: http://www.chinadaily.com.cn/opinion/2007-04/13/content_849704.htm

Leib, E. J. & He, B. (2006), *The Search for Deliberative Democracy in China*, Palgrave, New York

Levy, D. (2005), "Business and the evolution of the climate regime", In (Eds) Levy, D. & Newell, P. (2005), *The Business of Global Environmental Governance*, MIT Press, Cambridge

Levy, D. & Newell, P. (2005), *The Business of Global Environmental Governance*, MIT Press, Cambridge

Li, Y. (2011), "The Current status of low-Carbon Eco Cities in China", Paper presented at the annual conference of the Chinese society for Urban Studies, Yangzhou

Li, X.Y. (2012), "University volunteers go out and "sell" low carbon", RZNews Website, Accessed 2012.12 at: http://www.rznews.cn/news/folder16/201203/2012-03-28264258.html

Li, Y. et al (2012), Essential Building. The Emergence of "Low-Carbon Cities in Post-Industrial Urban China, Institute for Building Efficiency, Accessed 2015.01 at: http://www.institutebe.com/InstituteBE/media/Library/Resources/Energy%20and%20Climate%20Policy/Issue-Brief-Low-Carbon-Cities-in-China.pdf

Lieberthal, K. (1992), *Bureaucracy, Politics, and Decision Making in Post-Mao China*, University of California Press, Berkeley

Lin, G. & Ho, S. (2003), “China's land resources and land use change: insights from the 1996 land survey”, *Land Use Policy*, Vol. 20, Issue 2, Pp. 87–107

Lindblom, C. (1959), “The Science of "Muddling Through"”, *Public Administration Review*, Vol. 19, No. 2, Pp. 79-88

Lindblom, C. E. (1980), *The Policy making Process*, Englewood Cliffs, New Jersey

Lincoln, Y.S., & Guba, E.G. (1985), *Naturalistic inquiry*, Sage, Newbury Park

Lindseth, G. (2004), “The Cities for Climate Protection Campaign (CCPC) and the framing of Local Climate Policy, Local Environment”, *The International Journal of Justice and Sustainability*, Vol. 9, No. 4, Pp. 325-336

Linsroth, T. & Bell, R. (2007), *Local Action: The New Paradigm in Climate Change Policy*, University of Vermont Press, New England

Lipsky, M. (1980), *Street-Level Bureaucracy*, Russell Sage Foundation, New York

Litfin, K. (1994), *Ozone discourses: Science and politics in global environmental cooperation*, Columbia University Press, Columbia

Liu, M. & Tao, R. (2008), *Centralization-decentralization Cycle in China*, Vanderbilt University Press, Vanderbilt

Liu, Z. & Salzberg, A. (2012), “Developing low-carbon cities in China”, In (eds) Baeumler, A. & Ijjasz-Vasquez, E. & Mehndiratta, S., *Sustainable Low Carbon City Development in China*, The World Bank & China National Development & Reform Commission, Washington

Liu, L. Zhang, B., Bi, J. (2012),”Reforming China's multi-level environmental governance: Lessons from the 11th Five-Year Plan”, *Environmental Science & Policy*, Vol. 21, Pp. 106–

Liverman, D. (2004), “Who Governs, at What Scale and at What Price? Geography, Environmental Governance, and the Commodification of Nature”, *Annals of the Association of American Geographers*, Vol. 94. No. 4, Pp. 734-738

Lo, C.W. & Tang, S.Y. (2006), “Institutional reform, economic changes, and local environmental management in China: the case of Guangdong province”, *Environmental Politics*, Vol. 15, Issue 2

Lo, C.W.H. & Leung, S.W. (2000), “Environmental agency and public opinion in Guangzhou: the limits of a popular approach to environmental governance”, *The China Quarterly*, Vol. 163, Pp. 677-704

Lo, J. (2014), “Increased diversity needed in China’s infrastructure financing”, *China Daily*, 2014.09.26

Loorbach, D.W. et al (2010), “Business strategies for transitions towards sustainable systems”, *Business Strategy and the Environment*, Vol. 19, Issue 2, Pp. 133-146

Lu, Y. (2007), “Environmental Civil Society and Governance in China”, *International Journal of Environmental Studies*, Vol. 64, No. 1, Pp. 59–69

Luken, R. A. & J. Navratil (2004), “A programmatic review of UNIDO/UNEP national cleaner production centres”, *Journal of Cleaner Production*, Vol. 12, Issue 3, Pp. 195-205

Lukes, S. (1974), *Power: A radical view*, McMillan, New York

Ma, X. & Ortolano, L. (2000), *Environmental Regulation in China. Institutions, Enforcement and Compliance*, Rowman and Littlefield Publishers Inc., Maryland

Mai, Q. & Francesch-Huidobro (2015), *Climate Change Governance in Chinese Cities*, Routledge, Oxon

Majone, G. (1976), “Choice among Policy Instruments for Pollution Control”, Policy Analysis, Vol. 2, Issue 4, Pp. 589-613

Marchi, B. Ravetz, J. (2000), “Participatory Approaches to Environmental Policy”, *Environmental Valuation in Europe*, Policy Research Brief No. 10

Marsh, D. & Rhodes, R. (1992), *Policy Networks in British Government*, Oxford University Press, Oxford

Marston, G (2004), *Social Policy and Discourse Analysis: Policy Change in Public Housing*, Ashgate, Aldershot

Massey, M., Biesbroek, R., Huitema, D., Jordan, A. (2014), “Climate policy innovation: the adoption and diffusion of adaptation policies across Europe”, *Glob. Environ. Change*, Vol. 29, Pp. 434–443

Matisoff, D. (2008), “The Adoption of State Climate Change Policies and Renewable Portfolio Standards: Regional Diffusion or Internal Determinants?” *Review of Policy Research*, Vol. 25, Issue 6, Pp. 527–546

Meadowcroft, J. (2005), “Environmental political economy, technological transitions and the state”, *New Political Economy*, Vol. 10, Issue 4, Pp. 479-498

Meadowcroft, J. (2007), “Democracy and Accountability: The challenge for cross-sector partnerships, In Eds. Glasbergen, P., Biermann, F., Mol, A., Partnerships, *Governance and Sustainable Development: Reflections on Theory and Practice*, Edward Elgar, Cheltenham

Meadowcroft, J. (2011), “Engaging with the politics of sustainability transitions”, Environmental Innovation and Societal Transitions, Vol. 1, Issue 1, Pp. 70–75

Meidan, M. & Andrews-Speed, M. & & Ma, X. (2009), “Shaping China's Energy Policy: actors and processes”, *Journal of Contemporary China*, Vol. 18, Issue 61, Pp. 591–616

Mehndiratta, S. (2012), “Cycling and Walking: Preserving a Heritage, Regaining Lost Ground”, In Baeumler, A. & Ijjasz-Vasquez, E. & Mehndiratta, S., *Sustainable Low Carbon City Development in China*, The World Bank & China National Development & Reform Commission, Washington

Minx et al (2011), A “Carbonizing Dragon: China’s Fast Growing CO2 Emissions Revisited”, *Environmental Science and Technology*, Vol. 45, Issue 21, Pp 9144–9153

Miller, C. & Edwards, P. (2001), *Changing the Atmosphere: Expert Knowledge and Environmental Governance*, MIT Press, Cambridge

Mintrom, M. (1997), “Policy entrepreneurs and the diffusion of innovation”, *American journal of political science*, Vol. 41, No. 3

Mitchell, T. (1991), “The limits of the state - beyond statist approaches and their critics”, *American political science review*, Vol. 85, Issue 1

MoHUrD (2005), Ministry of Housing and Urban Development> 部门户网站> 公共信息> 网上课堂> 不定期课堂> “民用建筑节能管理规定”, Accessed 2013.02 at: http://www.mlr.gov.cn/ggfw/wskt/wskt_bdqkt/200806/t20080617_105883.htm

Mol, A. (1997), “Ecological modernization: industrial transformations and environmental reform”, In (Eds) Redclift, M.R. & Woodgate, G., *The International Handbook of Environmental Sociology*, Edward Elgar, Cheltenham

Mol, A. (2006), “Environment and Modernity in Transitional China: Frontiers of Ecological Modernization”, *Development and Change*, Vol. 37, Isue 1, Pp. 29–56

Mol, A. & Carter, N. (2006), “China's environmental governance in transition”, *Environmental Politics*, Vol. 15, Np. 02, Pp. 149-170

Carter, N. & Mol, A. (2013), “China’s Environmental Governance in Transition”, In (eds) Mol, A. & Carter, N. *Environmental Governance in China*, Routledge, Oxon

Mol, A. (2009), “Urban environmental governance innovations in China”, *Current Opinion in Environmental Sustainability*, Vo. 1, Issue 1, Pages 96–100

Monstadt, J. (2007), “Urban Governance and the Transition of Energy Systems: Institutional Change and Shifting Energy and Climate Policies in Berlin”, *International Journal of Urban and Regional Research*, Vol 31, 2, Pp. 326–43

MOST (2006), *Medium and Long Term Plan for Science and Technology*, China Ministry of Science and Technology, Beijing

Munro, J.F. (1993), “California water politics: explaining policy change in a cognitively polarized subsystem” in Sabbatier and Jenkins-Smith, *Policy Change and learning: An Advocacy Coalition Approach*, Westview Press

NDRC (2006), *China 11th Five-Year-Plan*, China National Development and Reform Commission, Beijing

NDRC (2007), *China National Climate Change Program*, China National Development and Reform Commission, Beijing

NDRC (2010), *China’s 12th Five-Year-Plan*, China National Development and Reform Commission, Beijing

NDRC (2013), NDRC website> Whitepapers> V. Developing Low-carbon pilot Projects, Accessed 2014.02 at: http://www.china.org.cn/government/whitepaper/2013-11/10/content_30555331.htm

NDRC (2015), Enhanced actions on climate change/强化应对气候变化行动 -中国国家自主贡献 China’s intended nationally determined contributions. Beijing: China National Development and Reform Commission

NDRC (2016), *China’s 13th Five-Year-Plan*, China National Development and Reform Commission, Beijing

NEAA (2007), *China Now No. 1 in CO2 Emissions; USA in Second Position*; Netherlands Environmental Assessment Agency, Wexford, Ireland

Newell, P. (2008), “The political economy of global environmental governance”, *Review of International Studies*, Vol. 34, Issue 03, Pp 507-529

Newman, P. (2000), “Changing Patterns of Regional Governance in the EU”, *Urban Studies*, Vol. 37, No. 5–6, Pp. 895–908

Nongjx (2010), China Agriculture Web> Companies> Companies News> Wuzheng Energy Saving Company, Accessed 2015.03 at: http://app.rzw.com.cn/print.php?contentid=210882

NPC (2004), The National People’s Congress Official Website > “Constitution”, Accessed 2012.11 at: http://www.npc.gov.cn/englishnpc/Constitution/node_2825.htm

NPC (2015), *Environmental Protection Law of the People's Republic of China*, National People’s Congress, Beijing

Oates, W. & Baumol, W. (1975), “The Instruments for Environmental Policy”, In (Ed) Mills, E., *Economic Analysis of Environmental Problems*, National Bureau of Economic Research

Okereke, C., Bulkeley, H. & Schroeder, H. (2009), “Conceptualizing Climate Governance Beyond the International Regime”, *Global Environmental Politics*, Vol. 9, No. 1, Pp. 58-78

Oksenberg, M. (2001), “China's Political System: Challenges of the Twenty-First Century”, *The China Journal*, Vol. 45

Oshita, S., Price, L., Zhou, N., Khanna, N., Fridley, D. & Liu, X. (2015), *The role of Chinese cities in greenhouse gas emission reduction*, Seattle: Lawrence Berkeley National Laboratory/SEI.

Osofsky, H.M. & Levit, J.K. (2007), "The Scale of Networks? Local Climate Change Coalitions", *Chi. Journal of International Law,* Vol. 8, Issue 9, Pp. 409-436

Ouyang, G.W. (2003), "SCIENTISM, TECHNOCRACY, AND MORALITY IN CHINA", *Journal of Chinese Philosophy,* Vol. 30, Issue 2

Owens, S. (2000), "Commentary", *Environment and Planning A,* Vol. 32, Pp. 1141 – 1148

Owens, S. & Cowell, R. (2011), *Land and Limits: Interpreting Sustainability in the Planning Process* (Second edition), Routledge, New York

Papadopolous, Y. & Warin, P. (2007), "Are innovative, participatory and deliberative procedures in policy making democratic and effective*?", European Journal of Political Research,* Vol 46, Pp. 445–472

Parnell, S. Simon, D. & Vogel, C. (2007), "Global environmental change: conceptualising the growing challenge for cities in poor countries", *Area,* Vol. 39, No, 3, Pp. 357–369

Pattberg, P.H. (2005), "The Forest Stewardship Council: Risk and Potential of Private Forest Governance", *The Journal of Environment & Development,* Vol 14, Issue 2

Pattberg, P.H. & Stripple, J. (2008), "Beyond the public and private divide: remapping transnational climate governance in the 21st century", *Int Environ Agreements,* Vol. 8, Pp. 367–388

Pattberg, P.H., et al., (2012), "Introduction: partnerships for sustainable development", In (eds) P.H. Pattberg, F. Biermann,S. Chan, and A. Mert, *Public-private partnerships for sustainable development. Emergence, influence and legitimacy,* Cheltenham, Elgar, Pp. 1–18

Patton, K. (2007), In (eds) Linsroth, T. & Bell, R., *Local Action: The New Paradigm in Climate Change Policy*, University of Vermont Press, New England

Parker, P. and I. H. Rowlands (2007), "City partners maintain climate change action despite national cuts: residential energy efficiency programme valued at local level", *Local Environment,* Vol. 12, Issue 5, Pp. 505-517

People's Daily (2010), *People's Daily Online*> "Data" > Organs> CPC, Accessed 2012.12 at:http://english.people.com.cn/data/organs/cpc.html

People's Net (2015), 人民网>>山东频道>>日照视窗>>日照要闻> "日照市政府与中国建筑股份有限公司战略合作", Accessed 2014.05 at: http://sd.people.com.cn/n/2015/0707/c177229-25494834.html

Pierre, J. (2000), *Debating Governance. Authority, Steering and Democracy*, Oxford University Press, Oxford

Pierre, J. & Peters, G (2000), *Governance, Politics and the State*, Macmillan, London

Pierre, J. & Peters, G (2010), "Public-Private Partnerships and the Democratic Deficit: Is Performance-Based Legitimacy the Answer?", In Morth, U. & Bexell, M.. *Democracy and Public-Private Partnerships in Global Governance,* Palgrave Macmillan

Pinkse, J. & Kolk, A. (2009), *International Business and Global Climate Change*, Routledge, London

Polsby, N. (1984), "Political Innovation in America: The Politics of Policy Initiation", *The Journal of Politics*, Vol. 47, No. 2, Pp. 748-750

Pressman, J. & Wildavsky, A. (1984), *Implementation: How Great Expectations in Washington are Dashed in Oakland,* University of California Press, Berkeley

Price, L. & Levine M. & Zhou, N. & Fridley, D. & Aden, N. & Lu, H. & McNeil, M. & Zheng, N. & Qin, Y. & Yowargana, P. (2011), "Assessment of China's energy-saving and

emission-reduction accomplishments and opportunities during the 11th Five Year Plan", *Energy Policy*, Vol. 39, Issue 4, Pp. 2165–2178

Puppim de Oliveira, JA (2009), "The implementation of climate change related policies at the subnational level: an analysis of three countries", *Habitat Int*, Vol. 33, Pp. 253–59

Qi, Y. & Ma, L. & Zhang, H. & Li, H. (2008), "Translating a global issue into a local priority: China's local government response to climate change", *Environmental Development*, Vol. 17, Pp. 379-400

Qiang, CG (2011), Wanfang Data Website>首页> 会议首页 > 中国炼焦行业协会五届四次会员(理事)大会. "山东日照焦电公司以科技创新促进节能减排实践与探索", Accessed 2015.03 at: http://d.wanfangdata.com.cn/Conference_7691274.aspx

QLW (2014), "日照新能源公交车将达到 290 台 约占总数的 50%", 黄海晨刊, Accessed 2015.01 at: http://rizhao.iqilu.com/rzyaowen/2014/1225/2259155.shtml

QLW (2015), "日照垃圾焚烧发电项目并网发电 日焚烧生活垃圾 600 吨", 黄海晨刊, Accessed 2015.01 at: http://rizhao.iqilu.com/rzyaowen/2015/1020/2577212.shtml

QLW (2016), "日照今年节能改造既有居住建筑 120 万平方米", 黄海晨刊, Accessed 2016.07 at: http://rizhao.iqilu.com/rzminsheng/2014/0630/2045427.shtml

RCB (2012), Rizhao Commercial Bureau> 首页 > 政府信息公开 > "信息量统计", Retrieved 2013.05 at: http://www.rztrade.gov.cn/subjects/index/sid/35.html

RCB (2013), Rizhao Commercial Bureau> 首页 > 政府信息公开 > "信息量统计", Retrieved 2013.05 at: http://www.rztrade.gov.cn/subjects/index/sid/35.html

RCC (2014), "日照市既有居住建筑供热计量及节能改造工作实施步骤", Rizhao Construction Committee, Rizhao, Available at: http://wenpan.org/5342338974/

RDRC (2006), *Rizhao 11th Five-Year Plan (2006-2010)*, Rizhao National Development and Reform Commission, Rizhao

RDRC (2011), *Rizhao 12th Five-Year Plan (2011-2015)*, Rizhao National Development and Reform Commission, Rizhao

Reinicke, W.H., & Deng, F. (2000), *Critical Choices. The United Nations, Networks, and the Future of Global Governance*, International Development Research Centre, Ottawa

REITC (2011a) Rizhao Economic and Information Technology Commission 首页> "我市 9 家企业获省重大节能技术奖励资金", Accessed 2013.10 at: http://www.rzEITC.gov.cn/content.php?id=331

REITC (2011b) Rizhao Economic and Information Technology Commission 首页> "山东省节能奖励办法", Accessed 2013.10 at: http://www.rzEITC.gov.cn/content.php?id=384

REITC (2011c), Rizhao Economic and Information Technology Commission> 首页>政策法规> "山东省节能奖励办法", Accessed 2013.10 at: http://www.rzeic.gov.cn/content.php?id=384

REITC (2012), Rizhao Economic and Information Committee 首页>"日照市经济和信息化委员会机构设置", Accessed 2013.10 at: http://www.rzeic.gov.cn/content.php?id=5287&upId=6&menuId=33

REITC (2014), Rizhao Economic and Information Technology Commission 首页> "节能奖励信息" Accessed 2013.10 at: http://www.rzEITC.gov.cn/list.php?menuId=11

Rhodes, R. (1996), "The new governance: governing without government", *Politica1 Studies*, XLIV, Pp. 652—667

Rhodes, R. (1997), “From Marketisation To Diplomacy: It’s the Mix that Matters”, *Australian Journal of Public Administration,* Vol. 56, Issue 2

Rhodes, R. & Marsh, D. (1992), “New directions in the study of policy networks”, *European Journal of Political Research,* Vol. 21, Pp. 1-2

Rhodes, R. (2007), “Understanding Governance: Ten Years On”, *Organization Studies,* Vol. 28, No. 8, Pp. 1243-1264

Richardson, J. & Jordan. A. (1979), *Governing under Pressure*, Basil Blackwell, Oxford

Richardson, J., Gustafsson, G. & Jordan, A. G. (1982). "The concept of policy style." In (Eds) J. J. Richardson (ed.), *Policy Styles in Western Europe*, Routledge, Oxon, Pp. 1-16

Richardson, J. & Jordan. A. (1983), “Overcrowded Policymaking: Some British and European Reflections”, *Policy Sciences,* Vol. 15, Pp. 247-268

Richardson J. & Jordan A. (1985), *Governing under pressure: the policy process in a post-parliamentary democracy*, Oxford, Blackwell

Ripley, R. & Franklin, G. (1984), *Congress, the Bureaucracy and Public Policy*, Homewood Ill, Dorsey

Rizhao Fangdichang Wang (2013), 首页 > 资讯 > 政策法规 > 山东> “购买绿色住宅可适当享受贷款优惠利率”, Accessed 2013.09 at: http://www.rzfdc.com/archive/aid-32636.html

Rizhao Focal Electric (2008), Rizhao Focal Electric Website, “Company Profile”, Accessed 2015.3 at: http://a100382670847.oinsite1.cn/_d275751354.htm

Rizhao Municipal Yearbooks (1978-2011), *Rizhao Municipal Yearbooks (1978-2011),* Fangzhi Press, Rizhao

Rizhao Steel (2011): 首页 > 社会责任 > 节能减排 > “日照钢铁加大节能减排力度 建设全流程清洁生产企业纪实”, Accessed 2013.10 at: http://www.rizhaosteel.com/News_info.asp?SclassId=34&ID=35

RizhaoSteel (2013): 首页 > 集团概况 > 集团介绍, Accessed 2013.10 at: http://www.rizhaosteel.com/About.asp?YCL=20

RMPG (2009a), *Planning an Ecological City and Building a Liveable Home – The practice of Rizhao to explore sustainable development*, Application for UN-Habitat Scroll of Honour 2009, Rizhao Municipal People’s Government, Rizhao

RMPG (2009b), Rizhao Municipal People’s Government> 首页 > 新闻动态 > 港城资讯 > “我市新能源开发利用进入新阶段”, Accessed 2013.10 at: http://www.rizhao.gov.cn/ContShow.php?category_id=183&aiticle_id=3904

RMPG (2009c), Rizhao Municipal People’s Government> > 首页 > 新闻动态 > 港城资讯 > “日照对建筑工程出台新规 不节能工程视为不合格”, Accessed 2012.02 at: http://www.rizhao.gov.cn/ContShow.php?category_id=183&aiticle_id=4431

RMPG (2010), Rizhao Municipal People’s Government> HOME > ABOUT RIZHAO> “Economic Development”, Accessed 2012.12 at: http://english.rizhao.gov.cn/content.php?menuid=16&upid=1

RMPG (2011a), Rizhao Municipal People’s Government> Home> About Rizhao> History, Accessed 2013.05 at http://english.rizhao.gov.cn/content.php?menuid=8&upid=1

RMPG (2011b), Rizhao Municipal People’s Government>首页 > 新闻动态 > 港城资讯 > “日照企业节能减排循环生金”, Accessed 2013.10 at: http://www.rizhao.gov.cn/ContShow.php?category_id=183&aiticle_id=7534

RMPG (2011c), Rizhao Municipal People's Government> 首页 > 新闻动态 > 区县动态> "日照高新技术产业开发区被评为山东省节能环保产业基地", Accessed 2014.05 at: http://www.rizhao.gov.cn/ContShow.php?category_id=185&aiticle_id=1376

RMPG (2011d), Rizhao Municipal People's Government>首页> 新闻动态 > 政务要闻> "日照首家省级节能环保产业基地落户高新区", Accessed 2014.05 at: http://www.rizhao.gov.cn/ContShow.php?category_id=182&aiticle_id=3406

RMPG (2011e), Rizhao Municipal People's Government>首页 > 新闻动态 > 港城资讯 > "日照市荣获国家可再生能源建筑应用示范城市称号", Accessed 2013.02 at: http://www.rizhao.gov.cn/ContShow.php?category_id=183&aiticle_id=9837

RMPG (2011f), Rizhao Municipal People's Government>首页 > 新闻动态 > 部门动态 > "我市被财政部和住建部确定为全国可再生能源建筑应用示范市", Accessed 2013.02 at: http://www.rizhao.gov.cn/ContShow.php?category_id=184&aiticle_id=9643

RMPG (2011g), Rizhao Municipal People's Government>首页 > 新闻动态 > 新闻图片 > "我市今年既有居住建筑供热计量与节能改造工作进展顺利", Accessed 2013.02 at: http://www.rizhao.gov.cn/ContShow.php?category_id=317&aiticle_id=7763

RMPG (2011h), Rizhao Municipal People's Government>首页 > 新闻动态 > 媒体关注 > "中华建筑报：山东省日照市全面启动"碳中和"行动", Accessed 2013.02 at: http://www.rizhao.gov.cn/ContShow.php?category_id=186&aiticle_id=5991

RMPG (2012a), Rizhao Municipal People's Government>首页 >新闻动态 > 部门动态> "市经信委组织全市 17 家重点企业参加技术创新优惠政策培训班", Accessed 2014.5 at: http://www.rizhao.gov.cn/ContShow.php?category_id=184&aiticle_id=12607

RMPG (2012b), Rizhao Municipal People's Government>首页 > 新闻动态 > 港城资讯 > "我市初步实现公共建筑能耗动态监测", Accessed 2013.02 at: http://www.rizhao.gov.cn/ContShow.php?category_id=183&aiticle_id=16929

RMPG (2012c), Rizhao Municipal People's Government>首页 > 新闻动态 > 媒体关注 > "齐鲁晚报：日照绿色建筑实施意见出台", Accessed 2013.02 at: http://www.rizhao.gov.cn/ContShow.php?category_id=186&aiticle_id=18043

RMPG (2012d), Rizhao Municipal People's Government>首页 > 新闻动态 > 部门动态 > "日照城市规划展览馆新能源综合应用示范项目设计方案通过专家评审", Accessed 2013.02 at: http://www.rizhao.gov.cn/ContShow.php?category_id=184&aiticle_id=13895

RMPG (2012e), Rizhao Municipal People's Government>首页 > 新闻动态 > 港城资讯 > "我市深入推进既有居住建筑节能改造", Accessed 2013.02 at: http:.//rizhao.gov.cn?ContShow.php?category_id=183&aiticle_id=17582

RMW (2014), "日照市经济技术开发区垃圾焚烧发电厂选址居民", 人民网 (People's net) Accessed 2014.10 at: http://liuyan.people.com.cn/thread.php?tid=2375521

RMW (2015), "山东日照一发电厂："吃"进垃圾"吐"出电能", 人民网 (People's net)，Accessed 2014.10 at: http://www.h2o-china.com/news/233757.html

RPM (2011), Rizhao Planning Museum "Construction Achievements' Exhibition", Rizhao Municipal Government, Rizhao

Rogelj, J. et al (2016), "Paris Agreement climate proposals need a boost to keep warming well below 2 °C", *Nature*, Vol. 534, Pp. 631–639

Rogers, E. (2003), *Diffusion of innovations*, McMillan, New York

Romero Lankao, P., (2007), "How do local governments in Mexico City manage global warming?" *Local Environment*, Vol. 12, No. 5, Pp. 519-535

Romero Lankao, P. (2007), “Are we missing the point? Particularities of urbanization, sustainability and carbon emissions in Latin American cities”, *Environment & Urbanization*, Vol 19, 1

Rosen, D.H. & Houser, T. (2007), *China energy: a guide for the perplexed*, Centre for Strategic and International Studies and Peterson Institute for International Economics, Washington DC

Rosenau, J. & Czempiel, J. (1992), *Governance without government: Order and change in world politics*, Cambridge University Press, Cambridge

Rosenau, J. (1995), “Governance in the Twenty-first Century”, *Global Governance*, Vol. 1, No. 1, Pp. 13-43

Ruwitch, J. (2015), “Thousands protest in Shanghai suburb over chemical plant fears”, *Reuters*, 2015.06.27

Sabatier P. A. (1988), “An advocacy coalition framework of policy change and the role of policy-oriented learning therein”, *Policy Sciences*, Vo. 21, No. 2

Sagawa, S. & Segal, E. (2000), *Common Good; Creating value through business and social sector partnerships*, Harvard Business School Press, Boston

Saich, T. (2008), “The Changing Role of Urban Government”, (eds) In Yusuf, S. & Saich, T., *China Urbanizes: Consequences, Strategies, and Policies*, The World Bank, Washington, Ch. 8

Sancton, A. (2006), “Cities and climate change: policy-takers not policy-makers”, *Policy Options*, 2006.10.06

Satterthwaite, D. (2008), “Climate change and urbanization: effects and implications for urban governance”, Presented at UN Expert Group Meeting Population Distribution, Urban., Intern. Migr. Dev., New York

Schaffrin, A. Sewerin, A. & Seubert, S. (2014), “The innovativeness of national policy portfolios – climate policy change in Austria, Germany, and the UK”, *Environmental Politics*, Vol. 23, No. 5, Pp. 860-883

Scharpf, F. (1999), *Governing in Europe; Effective and Democratic?* Oxford University Press, Oxford

Schmitter, P. (1979), “Still the Century of Corporatism”, In (Eds) Schmitter, P. & Lehmbruch, G., *Trends toward corporatist intermediation*, Sage, London

Schreurs, M. (2009) “From the bottom up: local and subnational climate change politics”, *The Journal of Environment Development*, Vol. 17, No. 4, Pp. 343-355

Schroder, P. (2011), *Civil Climate Change Activism in China – More than Meets the Eye*, German Asia Foundation, Beijing

Schroeder, M. (2008), “The construction of China's climate politics: transnational NGOs and the spiral model of international relations”, *Cambridge Review of International Affairs*, Vol. 21, Issue 4, Pp. 505-525

SEITC (2014), Shandong Provincial Government Economic and Information Technology Commission, 首页 >>> 政务公开 >>> 政府信息公开 >>> 公开目录 >>> 通知公告 >>> 通知: “关于 2013 年山东省万家企业节能目标责任考核情况的通报”, Accessed at: http://www.sdetn.gov.cn/portal/zwgk/xxgk/zwgkml/tzgg/tz/webinfo/2014/07/1403277523022849.htm

Seymour, M., Beach, M., Laister, S. (2005), *The Challenge of Positive Influence: Managing Sustainable Development on the West-East Pipeline Project*, Wilson Centre China Environment Series

Shackley, S. & Wynne, B. (1995), “Global climate change: the mutual construction of an emergent science-policy domain”, *Science and Public Policy,* Vol. 22, No. 4, Pp. 218-230

Shambaugh, D. (2016), *China's Future*, Polity Press, Cambridge

Shandong FAO (2014), Shandong Provincial Government Foreign Affairs Office Website> Home> “Rizhao”, Accessed 2014.01 at: http://en.sdfao.gov.cn/art/2010/6/4/art_829_8034.html

Shandong Government (2008a), Shandong Government Website> 首页 > 新闻 > 正文> “中共山东省委　山东省人民政府 关于健全推动科学发展促进社会和谐考核监督体系的意见”, Accessed 2013.05 at: http://post.news.tom.com/CB000004351.html

Shandong Government (2008b), 首页> 执法监管> 环境 > “山东省公布 2007 年度 17 市节能目标责任考核情况”, Accessed 2013.10 at: http://www.gov.cn/zfjg/content_1027149.htm

Shandong Lvzhou (2014), “我公司与日照盈德气体签订能源管理体系建设服务合同”, Accessed 2015.03 at: http://www.sdlzjsxm.com/202681.htm

Shandong Net (2014), 中国山东网 > 日照频道 >新闻 > 正文> “日照:加强企业技术创新能力建设”, Accessed 2015.03 at: http://rizhao.sdchina.com/show/2991890.html

Shandong Provincial Yearbooks (1978-2010), *Shandong Provincial Yearbooks (1978-2010),* Fangzhi Press, Shandong

Shandong Xinhuanet (2014), 首页 > > 正文> “日照今年将完成既有建筑节能改造 120 万平方米”, Accessed 2015.04 at: http://www.sd.xinhuanet.com/sd/rz/2014-06/28/c_1111361820.htm

Shepard, W. (2015), “China’s eco-cities are often neither ecologically friendly, nor functional cities”, *Reuters*, 2015.09.22, Accessed 2016.03 at: http://blogs.reuters.com/great-debate/2015/09/22/chinas-eco-cities-are-often-neither-ecologically-friendly-nor-functional-cities/

Shi, H. & Zhang, L. (2006), “China's environmental governance of rapid industrialization”, *Environmental Politics,* Vol, 15, Pp. 2

Shipan, C. & Volden, C. (2008), “The Mechanisms of Policy Diffusion”, *American Journal of Political Science,* Vol 52, Issue 4

Simmons, B. et al (2007), “The Global Diffusion of Public Policies: Social Construction, Coercion, Competition, or Learning?” *Annual Review Sociology*, Vol 33, Pp. 449–72

Simmons, B. & Elkins, Z. (2004), “The Globalization of Liberalization: Policy Diffusion in the International Political Economy”, *American Political Science Review,* Vol 98, Issue 01, Pp. 171-189

Smith, M. J. (1997). “Policy networks”, in M. Hill (Eds) *The policy process: a reader*, London, Prentice Hall

Smith, A., Stirling, A., Berkhout, F. (2005), “The governance of sustainable socio-technical transitions”, Research Policy, Vol. 34, Pp. 1491–1510

Solow, R. et al (2004), “SOLVING THE CLIMATE PROBLEM; Technologies Available to Curb CO2 Emissions”, *Environment,* Vol 46, No. 10, Pp. 8–19

Sorensen, E. (2002), “Democratic Theory and Network Governance”, *Administrative Theory & Praxis,* Vol 24, Issue 4

Sorensen, E. (2006), “Metagovernance: the changing role of politicians in the processes of democratic governance”, *American Review of Public Administration,* Vol. 36. No. 1, Pp. 98–114

Sorensen, E., & Torfing, J. (2007), *Theories of democratic network governance*, Basingstoke, Palgrave-Macmillan

Spector, M. & Kitsuse, J. (1977), *Constructing social problems*, Benjamin/Cunmings, California

Stadelman, M., Castro, P. (2014), "Climate policy innovation in the South–domestic and international determinants of renewable energy policies in developing and emerging countries", *Glob. Environ. Change*, Vol. 29, Pp. 413–423

Stewart, J. (1992), "Corporatism, Pluralism and Political Learning: A Systems Approach", *Journal of Public Policy*, Vol. 12, No. 3, Pp. 243-255

Stewart, J., Beatty, S., Vella, J. (2014), *Infrastructure 100: World Market Report*, KMPG

Stockmann, D. & Gallagher, M. (2011), "Remote Control: How the Media Sustain Authoritarian Rule in China", *Comparative Political Studies*, Vol 44, Issue 4

Stoker, G. (1999), "Governance as theory: five propositions", International social science journal, Vol. 50, Issue 155

Stripple, J. & Bulkeley, H. (2014), *Governing the Climate: New Approaches to Rationality, Power and Politics*, Cambridge University Press, New York

Su, SL., Jiang, Z.L., Zhang, Q., Zhang, Y. (2011), "Transformation of agricultural landscapes under rapid urbanization: A threat to sustainability in Hang-Jia-Hu region, China*", Applied Geography*, Vol. 31, Issue 2, Pp. 439–449

Svendsen, A. C. & Laberge, M. (2005), "Convening stakeholder networks", *Journal of Corporate Citizenship*, Vol. 19, Pp. 91-104

Sze, J. (2014), *Fantasy Islands: Chinese Dreams and Ecological Fears in an Age of Climate Crisis*, University of California Press, California

Tang, B. (2014), "Development and Prospects of Deliberative Democracy in China: The Dimensions of Deliberative Capacity Building", *Journal of Chinese Political Science*, Vol. 19, Issue 2, Pp 115–132

Tang, S. & Zhan, X. (2008), "Civic Environmental NGOs, Civil Society, and Democratisation in China", *The Journal of Development Studies*, Vol. 44, Issue 3

Tashakkori, A. & Teddlie, C. (2009), *Handbook of Mixed Methods in Social & Behavioural Research*, Sage Publications, California

TBGJXW (2013), "日照：公交升级改造 让市民出行更便利", 图吧公交新闻, Accessed 2014.10 at: http://bus.mapbar.com/rizhao/news/13697.html

TBGJXW (2014a), "日照新建 77 处电子公交站牌　将实现公交一卡通", 图吧公交新闻, Accessed 2014.10 at: http://bus.mapbar.com/rizhao/news/13692.html

TBGJXW (2014b), "日照财政投入 1 亿元购置 150 辆新能源公交车", 图吧公交新闻, Accessed 2014.10 at: http://bus.mapbar.com/rizhao/news/13676.html

The Climate Group (2016), "The HSBC Climate Partnership", The Climate Group Website, Accessed 2016.03 at: https://www.theclimategroup.org/project/hsbc-climate-partnership

Tian, D. (2015), "Govt to promote PPP in public services, infrastructure: NDRC", *China Daily*, 2015.09.16

Toly, N.J. (2008), Transnational municipal networks in climate politics: from global governance to global politics. *Globalizations*, Vol. 5, Pp. 341–56

Torfing, J., Peters, B. G., Pierre, J., & Sørensen, E. (2012), *Interactive governance: Advancing the paradigm*, Oxford University Press, Oxford

Torfing, K. & Sorensen, E. (2014), “The European debate on governance networks: Towards a new and viable paradigm? *Policy and Society*, Vol. 33, Issue, 4, Pp. 329-344

TPYY (2012), Tanpaifang Youyiwang> 网站首页 > 低碳环保 > 正文 > “日照开展“万家企业节能低碳行动”, Accessed 2013.10 at: http://www.tanpaifang.com/ditanhuanbao/2012/1019/7857.html#

Treib, O., Bahr, H., Falkner, G. (2007), “Modes of governance: towards a conceptual Clarification”, *Journal of European Public Policy*, Vol. 14, No. 1, Pp. 1-20

Tsai, K. (2007), *Capitalism Without Democracy: The Private Sector in Contemporary China*, Cornell University Press, Ithaca

Tsang, S. & Kolk, A. (2010), “The evolution of Chinese policies and governance structures on environment, energy and climate”, *Environmental Policy and Governance*, Vol. 20, Issue 3, Pp.180–196

UNDP (2010), *China and a Sustainable Future: Towards a Low carbon economy and Society - CHINA HUMAN DEVELOPMENT REPORT 2009/10*, United Nations Development Program, Beijing

UNECE (1998), *CONVENTION ON ACCESS TO INFORMATION, PUBLIC PARTICIPATION IN DECISION-MAKING AND ACCESS TO JUSTICE IN ENVIRONMENTAL MATTERS*, UNECE, Aarhus. Available at: https://www.unece.org/fileadmin/DAM/env/pp/documents/cep43e.pdf

UNEP (2008), *Climate change: The role of cities*, UNEP, Bangkok

UNEP (2010), The Emissions Gap Report, Are the Copenhagen Accord pledges sufficient to limit global warming to 2° C or 1.5° C?, UNEP, Accessed 2013.11 at: http://www.unep.org/publications/ebooks/emissionsgapreport/pdfs/The_EMISSIONS_GAP_REPORT.pdf

UNESCAP (2000), *What is Good Governance?* United Nations Economic and Social Commission, Bangkok, Available at: http://www.unescap.org/sites/default/files/good-governance.pdf

UNFCCC (2014a), “First steps to a safer future: Introducing The United Nations Framework Convention on Climate Change”, UNFCC Website, Accessed 2017.01 at: http://unfccc.int/essential_background/convention/items/6036.php

UNFCCC (2014b), “Clean Development Mechanism (CDM)”, UNFCC Website, Accessed 2016.02 at: http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php

UN HABITAT (2011*), Cities and Climate Change: Global Report on Human Settlements 2011*, UN HABITAT, Nairobi

UNDSD (1992), *Agenda 21*, United Nations Division for Sustainable Development, Geneva

UNDSD (2015), Partnerships for SDGs Online Platform, United Nations Division for Sustainable Development, Accessed 2015.10 via: https://sustainabledevelopment.un.org/partnerships/

UNWCED (1987), *Our Common Future*, United Nations World Commission on Environment and Development, Geneva

US EPA (2016), “Climate Change Impacts”, US Environmental Protection Agency, Accessed 2017.01 via: https://www.epa.gov/climate-impacts/international-climate-impacts

Varis, O. (2001) “China's 8 challenges to water resources management in the first quarter of the 21st Century”, *Geomorphology*, Vol. 41, Issues 2-3, Pp. 93-104

Vidal, J. et al (2009), “Low targets, goals dropped: Copenhagen ends in failure”, The Guardian, 2009.12.18, Accessed 2017.02 via: https://www.theguardian.com/environment/2009/dec/18/copenhagen-deal

Viguié, V. & Hallegatte, S. (2012), “Trade-offs and synergies in urban climate policies”, *Nature Climate Change*, Vol. 2, Pp. 334–337

Visseren-Hamakers, I. & Glasbergen, P. (2007), “Partnerships in forest governance”, *Global Environmental Change*, Vol. 17, Issues 3–4, Pp. 408–419

Voss, J.P., Smith, A., Grin, J. (2009), “Designing long-term policy: rethinking transition management”, Policy Science, Vol. 42, Pp. 275–302

van Waarden, F. (1992), “Dimensions and types of policy networks”, *European Journal of Political Research*, Vol. 21, Issue 1-2

Walker, J., (1969) “The diffusion of innovations among the American states”, *American Political Science Review*, Vol. 63, No. 3, Pp. 880–899

Wang et al (2009), “The strategic ecological impact assessment of urban development policies: a case study of Rizhao City, China”, *Stochastic Environmental Research and Risk Assessment*, Volume 23, Issue 8, Pp. 1169-1180

Wang, F., Yin, H., Li, S. (2010a), “China’s renewable energy policy: Commitments and challenges”, *Energy Policy*, Vol. 38, Issue 4, Pp. 1872–1878

Wang, J. (2010b), “’China’s green laws are useless’”, *Chinadialogue*, 2010.09.23

Wang, H. & French, E. (2013), “China’s Participation in Global Governance from a Comparative Perspective”, *Asia Policy*, Vol. 15

Wang, H. & Zhang, R. & Liu, M. & Bi, J. (2012), “The carbon emissions of Chinese cities”, Atmospheric Chemistry & Physics, Vol. 12, Pp. 6197–6206, Accessed 2013.01 at: http://www.atmos-chem-phys.net/12/6197/2012/acp-12-6197-2012.pdf

Wang, Y. (2013a), “Public participation and legal reform key to creating ecological civilization”, *China Dialogue*, 2013.12.18, Accessed 2015.02.10 at: https://www.chinadialogue.net/article/show/single/en/6583-Public-participation-and-legal-reform-key-to-creating-ecological-civilisation

Wang, A. (2013b), “THE SEARCH FOR SUSTAINABLE LEGITIMACY: ENVIRONMENTAL LAW AND BUREAUCRACY IN CHINA”, *Harvard Environmental Law Review*, Vol. 37, Pp. 366-440

Wang, J. & He, D. (2015), “Sustainable urban development in China: Challenges and achievements”, *Mitigation and Adaptation Strategies for Global Change*, Vol. 20, Issue 5, Pp 665-682

Watts, J. (2012), *The Guardian Online*> Environment>Pollution> “Air pollution could become China's biggest health threat, expert warns”, Accessed 2015.05 at: http://www.theguardian.com/environment/2012/mar/16/air-pollution-biggest-threat-china

WCT (2012), *Want China Times* > In Depth > Environment > “Environmental protests growing 30% every year in China”, Accessed 2014.07 at: http://www.wantchinatimes.com/news-subclass-cnt.aspx?id=20121030000046&cid=1505&MainCatID=0

Weber, M. (1946), *Essays in Sociology*, Published in Weber, M. (2009), *From Max Weber: Essays in Sociology*, (Eds) Gerth, H.H. & Wright, C.M., Routledge, New York

Wei, L. (2015), “China Launches Stimulus Aimed at Local Debt Crisis”, *The Wall Street Journal*, 2015.13.05

Weiss, J. & Tschishart, M. (1994), “Public information campaigns as policy instruments”, *Journal of Policy Analysis and Management*, Vol. 13, Issue 1

Wetherell, M. (2001), “Themes in Discourse Analysis: The Case of Diana”, In M. Wetherill, S. Taylor & S. J. Yates (Eds.), *Discourse Theory and Practice - A Reader*, Sage, London

While, A. et al (2004), “The Environment and the Entrepreneurial City: Searching for the Urban `Sustainability Fix' in Manchester and Leeds”, *International Journal of Urban and Regional Research*, 28, Vol 3, Pp. 549-569

Whitehead, M. (2003), “(Re)Analysing the Sustainable City: Nature, Urbanisation and the Regulation of Socio-environmental Relations in the UK”, *Urban Studies*, Vol. 40, No. 7, Pp. 1183–1206

Wollmann, H. (2004), “Local government reforms in Great Britain, Sweden, Germany and France: between multi-function and single-purpose organisations”, *Local government studies*, Vol. 43, No. 12

World Bank (2010), Cities and Climate Change: An Urgent Agenda, The World Bank, Washington, Accessed 2013.05 at: http://siteresources.worldbank.org/INTUWM/Resources/340232-1205330656272/CitiesandClimateChange.pdf

World Bank (2014), *Urban China: Toward Efficient, Inclusive, and Sustainable Urbanization*, World Bank, Washington, DC

World Bank (2015), World Bank Website> Data> “GDP per capita (current US$)”, Accessed 2015.01 at: http://data.worldbank.org/indicator/NY.GDP.PCAP.CD

Worldchanging (2007), Worldchanging Website> Home> Archives> “Mainstreaming Clean Energy in Rizhao, China”, Accessed 2012.10 at: http://www.worldchanging.com/archives/007060.html

Wu, F. (2003), “Environmental GONGO Autonomy: Unintended Consequences of State Strategies in China”, *The Good Society*, Vol. 12, No. 1, Pp. 35-45

Wu, J. & Deng, Y. & Huang, J. & Morck, R. & Yeung, B. (2013), “Incentives and Outcomes: China’s Environmental Policy”, National Bureau of Economic Research, Massachusetts

WWF (2012), “Rizhao solar water heating”, WWF Website, Accessed 2014.05 at: http://wwf.panda.org/wwf_news/?204452/Rizhao-solar-water-heating

WWF (2016), “Partnerships”, WWF Website, Accesses 2016.03 at: http://www.worldwildlife.org/pages/partnerships

WWU (2016), *An Assessment of Incentives for Solar Power in Washington State*, Western Washington University, Washington

XHHJ (2007), Rizhao Recycling Technology Web> 政策贵法> “财政政策”, Accessed 2013.10 at: http://www.xhjj.rz.cn/zcfgclass.asp?ClassID=39

Xi, J. (2015), *The governance of China*, Foreign Languages Press, Beijing

Xia, M. (2008), *The People's Congresses and Governance in China: Toward a Network Mode of Governance*, Routledge, Oxon

Xinhua (2011), *Xinhuanet Online*> English news> China> “China pledges its urbanization drive to be low-carbon”, Accessed 2013.04 at: http://news.xinhuanet.com/english2010/china/2011-06/21/c_13942037.htm

Xinhua (2014), “New law invigorates China's environmental NGOs”, *Xinhuanet*, Available at: http://www.chinadaily.com.cn/china/2014-04/29/content_17474999.htm

Xinhua (2016a), “China to fund projects worth $1.6 trillion through PPP”, *China Daily*, 2016.08.16, Accessed 2016.10 at: http://europe.chinadaily.com.cn/business/2016-08/16/content_26488467.htm

Xinhua (2016b), “China to boost cooperation on climate change”, China Daily, 2016.11.10, Accessed 2017.01 at: http://www.chinadailyasia.com/nation/2016-11/10/content_15523758.html

Yang, G. (2005), “Environmental NGOs and institutional dynamics in China”, *The China Quarterly*, Vol. 181, Pp. 46-66

Yang, F. (2013), Xinhuanet Online, “Active yet prudent urbanization needed for China”, Accessed 2013.02 at: http://news.xinhuanet.com/english/china/2013-03/11/c_132224999.htm

Yao, S., Zhang, Z. & Hanmer, L. (2004), “Growing inequality and poverty in China”, *China Economic Review*, Vol. 15, Issue 2, Pp. 145–163

Yao, R. Li, B., Steemers, K. (2005), “Energy policy and standard for built environment in China”, *Renewable Energy*, Vol. 30, Issue 13, Pp. 1973–1988

Yin, R. (2003), *Case Study Research: Design and Methods*, Sage, Los Angeles

YJB (2015), 应届毕业生网> 山东彼那尼荣安水泥有限公司>山东彼那尼荣安水泥有限公司, Accessed 2015.03 at: http://www.yjbys.com/company/5549245.html

Yu, J. (2014), “China changes Budget Law to relax rules on local government bond sales”, *South China Morning Post*, 2014.09.01, Accessed at: http://www.scmp.com/news/china/article/1582512/china-changes-budget-law-relax-rules-local-government-bond-sales

Yuan, J. (2011), “China's Eleventh Five Year Plan GDP Energy Intensity Target --Policy Appraisal”, Power and Energy Engineering Conference (APPEEC) 2011 Asia-Pacific, Wuhan

Zang, X.W. (1999), “The consolidation of political technocracy in china: The fourteenth and fifteenth central committees of the CPC”, *Journal of Communist Studies and Transition Politics*, Vol. 15, Issue 3, Pp. 101-113

Zhai, P. & Sun, A.J. & Ren, F.M & Liu, X.M. & Gao, B. & Zhang, Q. (1999), “Changes of Climate Extremes in China”, *Climatic Change*, Vol. 42, No.1, Pp. 203-218

Zhai, L. (2014), 北极星节能环保网> 脱硫脱硝 > 正文> “华能日照电厂 4 号机脱硫增容改造 每年可节约标煤 2.7 万吨”, Accessed 2015.03 at: http://huanbao.bjx.com.cn/news/20141130/568981.shtml

Zhan, X. & Tang, S. (2013), “Political opportunities, resource constraints and policy advocacy of environmental NGOs in China”, *Public Administration*, Vol. 9, No. 12, Pp. 381-399

Zhang, Y. & Barr, M. (2013), *Green Politics in China: Environmental Governance and State-society Relations*, Pluto Press

Zhang, D. et al (2010), “Municipal solid waste management in China: Status, problems and challenges”, *Journal of Environmental Management*, Vol. 91, Issue 8, Pp. 1623–1633

Zhang, Y. (2012a), “让蓝天碧海金沙滩见证——华能日照电厂创建节约环保型企业工作纪实”, *Dazhong Daily*, Accessed 2012.07 at: http://www.Zhanga.com.cn/article/1213/art1213719.asp

Zhang, C. (2014), *Chinadialogue Online*> “Flawed planning process partly to blame for mass protests, admits MEP official”, Accessed 2014.07 at: https://www.chinadialogue.net/blog/7038-Flawed-planning-process-partly-to-blame-for-mass-protests-admits-MEP-official-/en

Zheng, Y. & Tok, S. (2007), "'HARMONIOUS SOCIETY' AND 'HARMONIOUS WORLD': CHINA'S POLICY DISCOURSE UNDER HU JINTAO", *China Policy Institute Briefing Series*, Issue 26

Zhiping, L. (2010), *Industrial Sector Energy Conservation Programs in the People's Republic of China during the Seventh Five Year Plan (1986-1990)*, Lawrence Berkeley National Laboratory, Berkeley

Zhong, L. Mol, A., Fu, T. (2008), "Public–private partnerships in China's urban water sector", *Environmental Management*, Vol. 41, Pp. 863–877

Zhong, N. (2015), "Government-private partnerships on the rise", *China Daily*, 2015.12.18

Zhou, W. (2012), "In Search of Deliberative Democracy in China", *Journal of Public Deliberation*, Vol. 8, No. 1

Zhou, N., He, G., Williams, C. (2012), *China's Development of Low Carbon Eco-Cities and Associated Indicator Systems*, ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY/ U.S. Department of Energy, Orlando

Zhu, X.F. (2012), "Policy Change and Expert Involvement in China", Public Administration, Vol. 91, Issue 2

Zhuang, H.T. (2007), Economic Daily > "日照港：为企业请个"节能医生", Accessed 2013.10 at: http://energy.people.com.cn/GB/71903/5758229.html

Zou, J. & Wang, K. & Fu, S. (2011), "Approaches and Practices of Low Carbon City Planning: Experiences from China", Building Low-Carbon, Climate-Resilient Cities as an Essential Element of Global Efforts, UNFCCC COP 17 Side Event, Co-organized by ICLEI and Renmin University, Durban

Annex A: Eco-tech firms in Rizhao

Table 22: Eco-tech firms in Rizhao

Name	Year	Key area of business
Rizhao Heat Transfer Equipment	2000	R&D, sales and consultation related to heat exchange equipment
Rizhao Haichen Environmental Tech.	2002	Manufacturing, sales and R&D of kiln waste heat recovery boiler technology, thermal energy conversion technology and wastewater treatment technology.
Rizhao Hongye Environmental Engineering	2003	Contractor of electrical and mechanical equipment engineering, environmental pollution control, sewage treatment, and industrial waste.
Rizhao Haida Automatic Tech.	2004	New energy development, contracting and consulting of energy management and energy services, computer automation control equipment, low-voltage electrical equipment, application and implementation of Internet of Things; building intelligent equipment design. R&D into new technologies.
Rizhao Haicheng Environmental Tech. Engineering	2008	Design, production, installation and services of water treatment, air purification, air sterilization equipment.
Kelin Shier Environmental Tech.	2009	Production and sales of "smart" water boiler and other innovative energy-saving drinking water equipment.
Rizhao Yibang Environmental Protection Equipment	2009	Energy and environmental protection equipment R&D, manufacturing, sales, such as heat recovery and exchange equipment.
Rizhao Xiangchen Energy Saving Construction and Design	2009	Energy construction materials and design.
Rizhao Lande Environmental Protection Tech.	2010	R&D, engineering and sales of thermal environmental protection equipment, e.g. waste heat recovery products and superconducting heat pipe
Rizhao Letian Energy Saving Tech.	2010	R&D and production of energy saving material for the construction sector.
Rizhao Yueda Energy Tech.	2012	Production and development of LED, solar street lights, eco-friendly materials and technical services.
Rizhao Jiangyu Environmental Tech.	2010	Air pollution control and environmental protection advisory services, technology development, environmental engineering and installations.
Shandong Chenneng Energy Tech.	2011	Promotion of energy-saving technologies, through technical advice, technology transfers, and technical services. This includes energy audits, energy management and installations of recycling of waste heat and pressure systems. The company also has an R&D team.
Rizhao Huayi Energy Saving Projects	2011	Energy saving and energy efficiency contracting, as well as sales, design, and manufacturing of energy-saving equipment.
Rizhao Zhongji Tianxiang Low Carbon Construction Technology	2011	Contracting for low carbon construction.
Rizhao Zhongrui Energy Saving Materials	2011	Energy-saving products development, production and marketing, in particular energy saving materials
Rizhao Kaige Environmental Tech.	2012	Environmental research, development, production, sales and services for port, steel, mining, metallurgy, electric power, railway.
Shandong Wanju Energy Saving Equipment Co.	2012	R&D and sales of heat recovery equipment.
Rizhao New Green Construction Energy Saving	2012	Energy saving services for the construction sector.
Rizhao Aodewei Construction Energy Tech.	2012	Energy saving equipment manufacturing and energy saving services.
Rizhao Liqi Keji	2013	Sales of energy saving equipment, in particular heat recovery technology.
Shandong Jiayuan Air-conditioning	2013	R&D and application of low temperature heat source underground extraction. R&D cooperation with academic sector.
Wulian Chenheng Energy Saving Equipment Factory	2013	Manufacturing of vacuum heat pipe heat exchangers, waste heat recovery boilers, and superconducting heat pipe radiators.
Rizhao Wantongda Energy Saving Technology	2014	Consulting and services related to energy saving technology.
Rizhao Wanxiang Weixin Energy Saving Tech.	2014	Energy saving services related to electronic systems.
Rizhao Youwei Energy Saving and Environmental Protection Engineering	2014	Engineering, sales and services of energy saving of central cooling systems, ventilation and heating systems.
Rizhao Wohai Energy Saving Tech.	2014	R&D, sales and consulting related to energy saving technology.
Rizhao Mingruida Energy Saving	2014	Wholesale and retail of carbon fiber heaters, carbon fiber floor heating and energy-saving lamps.
Rizhao Muming Energy Saving Technology	2014	Technical support and services related to energy saving technology.
Rizhao Lanze Environmental Protection Engineering Co. Ltd.	2015	Technical consultation and installation of water treatment, air pollution control, solid waste management and resource utilization, environmental protection equipment manufacturing.

Table 23: Solar-tech firms in Rizhao

Name	Year	Key business	No. Staff	Export
Rizhao Xintailai Photoelectronic	1996	Design and manufacturing of solar panels, LED display screens	201 - 300	Yes
Rizhao Golden Giant Solar	1997	Development, design, production and sales of solar water heaters, solar water collectors + solar R&D	120-200	No
Rizhao Guopu Electronics	1999	Primarily manufacturing of solar water heaters = solar R&D	?	Yes
Shandong Jinfeng Solar Giant	2000	Manufacturing of solar energy technology + solar technology R&D	41-50	Yes
Qiannuo New Energy Technology	2002	Solar energy R&D and development of solar energy high-end products (solar thermal and PV applications)	5-10	?
Rizhao Apollo Solar Energy Technology	2002	Manufacturing of solar water heaters + solar technology R&D	500	Yes
Rizhao Haixing Zhenzhi Clothing, Solar Power Branch	2002	Production of solar water heaters, installation of solar collectors + energy-saving product R&D.	10	No
Rizhao Shenglong solar energy co., ltd	2003	Solar water heater manufacturing	101 - 500	No (?)
Rizhao JF solar water heater factory	2003	Solar water heater manufacturing	?	Yes
Minyue Solar cookers	2004	Solar cooker manufcturing	5-10	No?
Rizhao Shouliang Solar Water Heateer	2005	Development and manufacturing of solar collectors and solar water heaters	51-1000	?
Rizhao Heping Solar Plant	2005	Solar water heater manufacturing	11- 50	Yes
Rizhao Shengneng Solar Products Factory	2006	Manufacturing of solar cookers, solar cells, solar power systems and other household products	5-10	?
Rizhao Aoli Solar Energy	2006	Technical research development, production and trade in solar power products	5 - 10	No
Rizhao Zhongke Meiyang Solar Power	2006	Solar technology manufacturing, sales and installation, solar R&D	+60	No
Rizhao Juheng Guangfu	2007	Manufacturing of solar systems, street lights, PV panels	5- 10	Yes
Shandong Dafeng Energy Saving Equipment	2007	Research, development and manufacturing of high-tech solar water heaters	120	Yes?
Solar Manufacturing Co., Ltd. Rizhao Kingsfield	2007	Solar water heater manufacturing, installations and maintenance	18	No
Rizhao Globe Solar System	2007	Manufacturing of solar power systems, solar street light, wind power systems, solar panels, and wind turbines	10 - 50	Yes
Shandong Rizhao Dongguan Star Solar Water Heaters	2008	Research and manufacturing of solar water heaters and specialized in solar thermal utilization	5-10	?
Rizhao New Energy Environmental Tech.	2008	Manufacturing of solar lights, solar garden lights, LED lights	?	?
Rizhao City Wyatt New Energy	2009	Manufacturing of solar energy products and energy saving products (solar water heaters, energy-efficient appliances, geothermal floor heating)	10-50	No
Shandong Blue Carbon Technology Inc.	2009	Manufacturing of solar module products	101 – 200	Yes
Shandong Rizhao Xuyang Solar Energy Technology	2010	Manufacturing of solar water heaters, solar collectors	51 - 100	No
Hao Ge Solar	2010	Solar water heater production, sales and installation	10 - 99	No
Rizhao Sanguo New Energy Deveopment	2011	Research into and production of solar energy products and industrial and agricultural pumps. R&D cooperation with the academic sector.	100	Yes
Rizhao Yunkai Solar	2011	Manufacturing of solar technology products, primarily solar water heaters	?	?
Rizhao Solar Yuxin Power	2011	Manufacturing of solar equipment	51-100	No
Rizhao Hongzhao Solar Engineering	2011	Production of solar water heaters and air-conditioning energy saving	110- 50	No
Rizhao Yunjia Solar Energy	2011	Research into and manufacturing of solar water heaters	91-100	Yes

Annex B: Partnership constellations

Table 24: Partnerships in rule setting initiatives

Partner 1	Partner 2	Role of partner 2
Municipality	Bilateral partner + Foreign academia + Domestic academia	Planning advice (industry)
Municipality	Foreign NGO + International institute + Foreign academia	Planning advice (industry) + Funding
Municipality	Foreign authority	Planning advice (transport)
Municipality	Central institute	Planning advice (transport)
Municipality	Provincial institute	Planning advice (transport)
Municipality	Domestic academia	Planning advice (transport)

Table 25: Partnerships in service/infrastructure initiatives

Partner 1	Partner 2	Partner roles
Municipality	Four SOEs	PPP: Joint management + Technology delivery (energy)
Municipality	SOE (province-wide)	Cooperation agreement in planning and delivery (energy)
Municipality	SOE (municipal)	Municipal planning + Company delivery (energy)
Municipality	Various SOEs	Municipal planning + Company delivery (transport)
Municipality	Various SOEs	Municipal planning + Company delivery (transport)
Municipality	Bank + Financial group	Municipal planning + Company financing (transport)
Municipality	Domestic academia	Planning/technical advice (transport)
Municipality	Domestic academia	Planning/technical advice (transport)
SOE (municipal)	Foreign Firm	BOT: Technology transfer + Operation + Funding (energy)
Two SOEs (country-wide)	Foreign firms	BOT: Technology transfer + Operation (energy)
SOEs (municipal)	Foreign firm	JV: Technology transfer + Operation (energy)

Table 26: Initiatives involving technology transfer and partnerships

Partner 1	Partner 2	Role of partner 2
Municipality	Foreign firm	Technology transfer (waste)
Private company	Foreign firm	Technology transfer (energy)
SOE (country-wide)	Foreign firm	Technology transfer (energy)
SOE (country-wide)	Foreign firm	Technology transfer (energy)
SOE (country-wide)	Foreign firm	Technology transfer (energy)
Private company	Foreign firm	Technology transfer (industry)
SOE (country-wide)	Foreign firm	Technology transfer (industry)
Private company	Foreign firm	Technology transfer (industry)
Private company	Foreign firm	Technology transfer (industry)
SOE (municipal)	Foreign firm	Technology transfer (industry)
Private company	Foreign firm	Technology transfer (waste)
Private company	Foreign firm	Technology transfer (waste)
SOE (municipal)	Foreign firm + International institution	Company delivery + International funding (CDM) (waste)
SOE (municipal)	Foreign firm + International institution	Company delivery + International funding (CDM) (waste)
Private company	Foreign firm + International institution	Company delivery + International funding (CDM) (waste)

SOE (municipal)	Foreign firm + International institution	Company delivery + International funding (CDM) (transport)

Table 27: Initiatives involving technology development and partnerships

Partner 1	**Partner 2**	**Partner roles**
Municipality	Domestic academia	Technology development + Support (energy)
Municipality	Domestic academia	Technology development + Support (energy)
Municipality	SOE (country-wide)	Joint technology development (industry)
Municipality	SOE (province-wide)	Joint technology development (industry)
Municipality	SOE (municipal) + International org.	Technology development + Funding (industry)
SOE (municipal)	Domestic academia	Joint technology development (industry)
SOE (municipal)	Domestic academia	Joint technology development (industry)
Private company	Foreign academia	Joint technology development (industry)
SOE (country-wide)	Domestic academia	Joint technology development (energy)
Various SOEs	Domestic academia + Foreign institute + National authority	Joint technology development + Funding (energy)
SOE (country-wide, consortium)	Bilateral partner & National authority	Joint technology development (industry)
SOE (municipal)	International org. + Domestic bank	Technology development + Funding (energy)
SOE (municipal)	International org. + Domestic bank	Technology development + Funding (industry)
Domestic academia	Foreign academia + Bilateral partner	Joint technology development (energy)
Domestic academia	Foreign academia	Joint technology development (energy)
National authority	Foreign firms	Joint technology development (energy)

Table 28: Partnerships in initiatives involving information dissemination/demonstration

Partner 1	**Partner 2**	**Partner role**
Municipality (consortium)	Bilateral partner + Firms + Domestic and foreign authorities	Planning/technical advice (eco-city)
Municipality (consortium)	Bilateral partner + Firms + Domestic and foreign authorities	Planning/technical advice (eco-city)
Municipality	Domestic and foreign firms + Domestic and foreign academia	Planning/technical advice (eco-city)
Municipality	Domestic and foreign firms + Foreign academia	Planning/technical advice (eco-city)
Municipality	Foreign institute + Domestic academia	Planning advice (land use)
Municipality	Foreign institute	Planning advice (land use)
Municipality	Foreign institute	Planning advice (land use)
Municipality	Domestic academia	Planning advice (land use)
Municipality	International organization	Technical advice + Funding (industry)
Municipality	International institution	Technical advice + Training + Funding (construction)
Municipality	Bilateral partner	Information dissemination + Training (dissemination)
Domestic SOE (country-wide)	Foreign firm	Technical advice (construction)

Domestic SOE (country-wide)	Foreign firm	Technical advice (construction)
SOE (municipal)	International institute	Planning/technical advice + Funding (construction)
Domestic SOE (country-wide)	Foreign firm	Planning/technical advice (eco-city)
Domestic SOE (country-wide)	Foreign firm	Planning/technical advice (eco-city)
Domestic SOE (municipal)	Foreign firms + International organization	Planning/technical advice (eco-city)
Domestic SOE (municipal)	Foreign Academia + Municipal department	Planning/technical advice (eco-city)
Domestic SOE (municipal)	Foreign firm	Planning/technical advice (eco-city)
Domestic SOE (municipal)	Domestic academia	Planning/technical advice (eco-city)
Domestic academia	Foreign design institute	Planning/technical advice (eco-city)
Domestic academia	Foreign design institute	Planning/technical advice (land use)
Domestic academia	Bilateral partner	Technical advice + Toolkit development + Funding (transport)