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Who Drives Climate-relevant Policy Implementation in China?

Yixin Dai

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Abbreviations

BIPV	building-integrated photovoltaic
CAST	China Association for Science and Technology
CDM	Clean Development Mechanism
CMA	China Meteorological Administration
CPI	China Power Investment Corporation
DRC	Development and Reform Committee
EPC	Environmental Protection Commission, China
ETS	Emissions Trading Scheme
EV	electronic vehicle
FIT	feed-in tariff
GDP	gross domestic product
GHG	greenhouse gas
GW	gigawatt
GWh	gigawatt hour
IPCC	Intergovernmental Panel on Climate Change
kW	kilowatt
kWh	kilowatt hour
LEC	Lanzhou Electric Corporation
LVRT	low voltage ride through
MEP	Ministry of Environmental Protection, China
MIIT	Ministry of Industry and Information Technology, China
MoA	Ministry of Agriculture, China
MoE	Ministry of Education, China
MoF	Ministry of Finance, China
MoFA	Ministry of Foreign Affairs, China
MOFCOM	Ministry of Commerce, China
MoST	Ministry of Science and Technology, China
MoWR	Ministry of Water Resources, China
MLR	Ministry of Land and Resources, China
MW	megawatt
NBO	National Bureau of Oceanography
NDRC	National Development and Reform Commission, China
NEA	National Energy Administration
NIS	national innovation system
NLGACCECER	National Leading Group to Address Climate Change and Energy Conservation and Emission Reduction
NNSFC	National Natural Science Foundation of China
PV	photovoltaics
R&D	research and development
SC	State Council, China
SCCPC	Standing Committee of Chinese People's Congress
SDIC	State Development and Investment Corporation, China
SEPA	State Environmental Protection Administration, China
SERC	State Electricity Regulatory Commission, China
SFA	State Forestry Administration, China
SOE	state-owned enterprise
UNFCCC	United Nations Framework Convention on Climate Change
VAT	value added tax
WWEA	World Wind Energy Association

1 Introduction

Climate change is emerging as one of the biggest challenges confronting the sustainability of our planet, affecting the development prospects of both developed and developing countries. There is a global effort to find solutions to reduce greenhouse gas (GHG) emissions, the cause of climate change, by altering patterns of socioeconomic development. Although there is limited progress in international negotiations, there have been sustained efforts by the major contributors of GHG emissions to find solutions to reduce emissions. Since the signing of the Kyoto Protocol in 1992, emerging powers such as China, India and Brazil have joined ranks with the developed economies as leading emitters of GHGs. As a result, emerging literature and policy discourses have started focusing on the role of emerging powers to tackle this challenge (Patrick 2010; Bailey and Compston 2012). Most of the existing literature on the role of emerging economies focuses on understanding the role of the 'global South' in international negotiations and global climate politics. However, there is now a separate strand of literature that focuses on understanding the domestic policy and politics of climate change in emerging economies (Hallding *et al.* 2011; Hurrell and Sengupta 2012).

A comprehensive understanding of domestic climate policy requires dealing with the different stages of policy cycle from policy formulation to policy implementation. Like any other policymaking process, it entails complicated negotiations and compromise (Kingdon and Thurber 1984). There are different actors involved at the different stages of the policy cycle and these actors have divergent interests. This makes the policy formulation and implementation landscape complex. Given the complex nature of climate policy implementation, we use political economy analysis to answer the core question: who drives/obstructs climate change policies in the rising powers? We study the case of China, focusing on renewable energy development. This focus is due to two reasons. First, renewable energy can make a large and critical contribution to mitigating climate change by substituting for the use of fossil fuels. Second, China has emerged as a global leader in renewable energy supply in a relatively short period of time. As a result, the lessons from a political economy analysis of who drives and who obstructs renewable energy development in China would be relevant for policymakers as well as other stakeholders interested in the renewable energy development globally.

In China, climate policy formulation is centralised and most policy decisions are taken by the national government. Since 2006, the Chinese government has promoted the concept of 'climate friendly development'. Accepted as a part of the basic national development strategy at the central level, this concept emphasises balancing the twin goals of reducing GHG emissions and preserving economic growth rate. Most existing studies focus on analysing the policy development and formulation at the central level. However, developing a comprehensive understanding of climate change policy requires dealing with aspects of policy formulation as well as policy implementation. In China, there is a great deal of decentralisation in policy implementation. Most of the policy implementation is the responsibility of provincial and city governments (Lieberthal 1997). This is where climate-related policies encounter implementation gaps (Chan *et al.* 1995; Lo, Fryxell and Wong 2006; Ma and Ortolano 2000; Schwartz 2003; Swanson, Kuhn and Xu 2001; Kostka and Mol 2013). Yet the local level is less well understood. This study attempts to fill the gap in the existing literature by developing two detailed case studies on renewable energy development from the stage of policy formulation to implementation. The two case studies, on solar photovoltaics (PV) and wind technology, examine the role of stakeholder interests in driving or obstructing the implementation of national policies.

It is worth noting that due to the diversity of actors and interests, local implementation has become more complicated in China than before. This is partly driven by a proliferation of actors responsible for the implementation of policies at the local level. The implementation of climate policies is managed by multiple actors within local government and by specialised climate change-related local agencies. As a result, collaboration among specialised agencies and local governments has become essential for effective implementation of policy (Zhan, Lo and Tang 2014). However, Lieberthal (1997) points out the potential for conflict between the specialised local agencies and local government. The local agencies responsible for implementing climate change policies might have relatively less power than the local governments whose mandate is to promote economic development policies, such as industrial policy. The need for collaboration for effective implementation between actors with divergent priorities is a challenge for effective climate policy implementation in China.

At the same time, the space for innovation in interpreting national-level policies as well as discretion in policy implementation has expanded. For example, the Chinese central government has a national goal to reduce carbon emission intensity by 40–45 per cent in 2050. Under this umbrella policy, some local governments actively encouraged renewable energy manufacture, some focused on renewable energy deployment, while some asked for higher levels of carbon emission intensity by arguing that they were still in a nascent stage of industrialisation and would need a higher emission cap (Qi 2011). The example shows that a higher degree of flexibility can be observed at the local level, compatible with local socioeconomic conditions, to explore suitable implementation methods for climate-related policies.

It is well established that China has a unified top-down system of policy design and implementation in which people's delegates represent stakeholders in major law making. The day-to-day decisions on policy interpretation and implementation are made by the local government and public servants. However, climate change policies cannot be implemented solely by the government machinery. Effective implementation requires the participation of all stakeholders who are responsible for climate change and can contribute to addressing it. A key actor in addressing climate change is local business. In China, industrial emissions account for over 75 per cent of the total carbon emissions; therefore, effective climate action required a shift from high-carbon industries to low-carbon industries (Dai 2009; Heggelund Andresen and Buan 2010). As a result, the industrial sector and its political representatives have been actively involved in this process of resource reallocation. Another key actor is the local citizenry. Climate actions are highly relevant to their daily life as they depend on the citizens' adoption and usage of low-carbon technologies. With rising levels of public awareness and increasing public participation in the policymaking process, disregarding the concerns of local citizens might generate strong opposition to policy decisions and delay the implementation process (Lorenzoni, Nicholson-Cole and Whitmarsh 2007; Fleishman, De Bruin and Morgan 2010). In recent years, climate experts have increasingly played a crucial role in providing knowledge and consultancy for climate policy decisions. The existing literature recognises the role of these experts in the local decision process, but the process in which they influence local implementation is still unclear (Zhu 2009a, 2009b). The analysis of local implementation of climate policies needs to engage with these key stakeholders who have been increasingly involved in climate governance through regular interaction with the local governments.

Given the complex nature of climate governance driven by the diversity of actors and interests at various levels, detailed empirical analysis is critical to develop a nuanced understanding of who drives and who obstructs the local implementation of climate-related policies. This study examines the multiple local stakeholders and their interests who are involved in implementing the climate policies formulated by the central government. Focusing on renewable energy policy implementation at the local (city) level, the paper is organised as follows. Section 2 reviews the existing literature and identifies the key actors in Chinese

renewable energy and their motivations to drive or obstruct policy implementation. Section 3 introduces the research methodology and case study selection criteria. In Sections 4 and 5, the paper presents the two case studies – photovoltaic and wind energy – including a detailed analysis of the interest of the stakeholders involved in policy implementation. Section 6 presents the conclusions of the paper.

2 Literature review

This chapter has a dual purpose: to provide contextual information on China and to identify the key actors and their motives from the existing literature.

2.1 Chinese renewable energy development and policy implementation

As a developing country, China was not listed as an Annex 1 country in the Kyoto Protocol. Therefore, it did not have an international obligation of cutting down emissions in accordance with the United Nations Framework Convention on Climate Change (UNFCCC). Yet with rapid economic growth, China encountered severe environmental degradation. At the same time, China overtook the United States as the largest emitter of GHG (US EPA 2013). International political pressure combined with rising domestic concerns due to severe environmental degradation pushed the Chinese government to adopt a national strategy in response to climate change. The climate policy suite contained a wide range of policy instruments that included financial, industrial, science and technology, market stimulation, energy and environment policies. Among all of these, renewable energy policy played a significant role (Urban, Nordensvärd and Zhou 2012).

The policy initiatives in renewable energy have been a catalyst for rapid growth in the wind and solar energy sectors. In 2013, China had a 28.7 per cent share of the global cumulative installed capacity and ranked the first in the world, while India ranked fifth in terms of cumulative capacity (WWEA 2014). China produced over 50 per cent of the global solar cells in 2010. Although it has experienced a slow-down since, the Chinese government still plans to have 35GW solar power installed capacity by 2015. This would be a sevenfold increase on the installed capacity at the end of 2012.

The impressive growth of the renewable energy sector notwithstanding, there were several challenges that were encountered by the actors involved in the implementation of these policies. The first set of challenges was due to the divergence between the priorities of the sub-national and national government (or local–central relationship). Although the national government was responsible for mainstreaming climate change mitigation and adaptation into the national development strategy, it was the sub-national government or local government that would turn these national policies into reality (Harrison and Kostka 2012; Teng 2012). The conflict between the two is hardly news. Any central policy that would harm the local benefits might encounter implementation obstacles. For example, Kang *et al.* (2012) pointed out that there were uncoordinated policy goals between central and local governments. This lack of coordination is exemplified by the rapid development of wind farms at the local level without adequate provisions made for grid connectivity at the national level. Solangi *et al.* (2011) found that Chinese local governments should have a focus on solar utilisation (e.g. operation and maintenance) and make medium- and long-term plans to reach this goal. However, there were no incentives for the achievement of these goals (Zhang *et al.* 2009).

The second set of implementation challenges emanated from the specificities of the sector. The energy sector became very important for rapid economic development and was a major contributor to GHG emissions. Under the pressure of increasing coal costs, national electricity shortage and high tariff rate, traditional energy industries (e.g. the coal mining industry and the national grid) were facing great challenges, although they continued to be the primary players. At the same time, new stakeholders, including actors promoting renewable energy, were entering the energy domain at a fast speed (La Rovere and Poppe 2012; Tongia 2007). The conflict between the interests of the incumbents and the new

entrants was a source of challenge leading to difficulties for renewable energy to connect to the grid (Wang 2012).

Owing to contextual difference, the existing literature focusing on policy instruments and experiences of renewable energy in a developed country does not readily lend itself to analysing the Chinese case. This is due to two reasons. On the one hand, the Chinese renewable energy sector experienced a 'reversed' development sequence as compared to the developed country experience: it relied on massive manufacture and exportation first and then reached the stage of domestic deployment. In addition, it acquired core technology via technology import, licensing and acquisition rather than from basic research and development (R&D). This sequence called for a different combination of policy tools and implementation skills. On the other hand, Chinese wind and solar policies were designed and implemented at an unprecedented pace along with a dramatic industry development pace, which left little room for deliberate policy analysis. This experience was unique and cannot be explained by the existing literature on policy implementation. This present study fills this gap in the existing literature through a detailed empirical study enhancing the understanding of implementation behaviour in the Chinese renewable energy area.

2.2 Key policies to promote Chinese renewable energy development

The Chinese government has created a wide array of policies to address the impacts of climate change. By 2010, there were 24 energy policies and 18 innovation policies designed in response to climate change. As a result of this focus, renewable energy, particularly wind and solar energy, has played a key role in GHG emission reduction. National-level support for renewable energy development through these policies has increasingly gained importance in recent years with the enunciation of clear national goals to increase their share in the total energy consumption to 15 per cent by 2020.

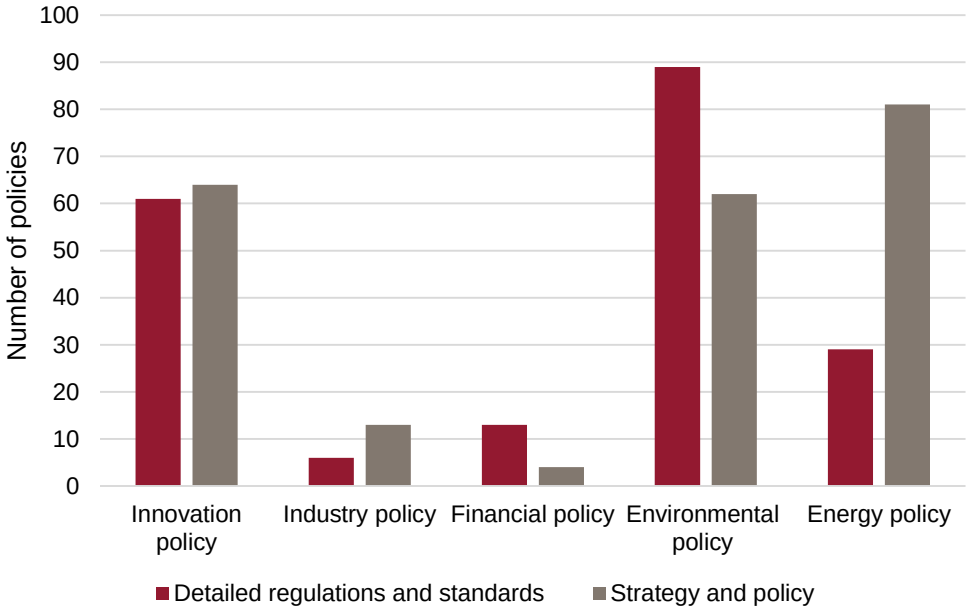
According to Matland (1995), policy implementation effort is greatly influenced by the clarity of a policy and whether it creates conflict or cooperation between actors involved in its implementation. With different degrees of policy ambiguity and conflict, policy implementation would have varying degrees of success. Therefore, we categorise Chinese climate-related policies into two groups: broad strategic policies with vague goals; and detailed regulations, programmes and projects with clear goals. Broad strategic policies include national goals, five-year plans, strategic planning and policies without detailed description of measures to be undertaken. The first step in the implementation of such policies by the local governments is to reinterpret these broad strategic policies into detailed and feasible regulations and/or standards. The advantage of the strategic policies lies in the fact that local governments have a certain degree of discretion in localising the policy according to their particular context. This is especially important when there are widely varying local contexts due to uneven economic development in the different regions. For example, the level of government subsidy supporting the development renewable energy industry might vary according to the local economic development level. However, as a result of the contextual specificities, the strategic policies may bear the risk that local governments interpret them in radically different ways, creating a space for conflict between those who formulate the policy and those who implement them.

Distinct from the broad strategies and policies, the Chinese government also developed detailed regulations, programmes and projects with clear targets, standards and timelines for implementation. For example, the National Development and Reform Commission (NDRC) promoted a 10GW wind farm base construction project clearly indicating the key elements of installed capacity, construction standards and construction timeframe. In such cases, the local governments did not have to reinterpret the policy during the implementation stage. Although such clearly defined top-down projects benefit from clarity in design, they may

generate additional challenges. For instance, the implementation process of such projects would suffer if they do not take into account the contextual specificities of the different regions. In addition, these target-driven projects do not provide the local implementation entities with the necessary discretion for experimentation and might lead to efficiency losses as a result.

Figure 2.1 shows the distribution of the two types of policies defined above within all climate-related policies in China. In the energy policy arena, more strategic policies were designed, which inevitably generated a greater extent of implementation discretion at the local level.

Figure 2.1 Policies separated into the categories of 'detailed policy' and 'strategic plan'



Strategic policies promoting renewable energy included policies such as the Renewable Energy Law of P.R. China (2006, 2009), Mid- and Long-Term Planning for Renewable Energy (2007), Measure on Supervision of Power-Grid Enterprise Purchases of Full Amount of Renewable Energy Electricity (2007); and the 10th, 11th and 12th Five-Year plans for new and renewable energy (2001, 2008, 2013 respectively). The most important policy initiative in the Chinese context was the introduction of the Renewable Energy Law in 2006, an umbrella regulation for renewable energy development in China. It not only emphasised the importance of renewable energy development as a national strategy, but also assigned responsibilities to the different administrative units, making them in charge of technological development, standard setting, grid connection, developing feed-in tariffs, renewable energy industry development and creation of a national renewable energy fund. All the other policies and combination of policies were covered and guided by this law.

Detailed policies for renewable energy promotion included policies such as Interim Measures on Special Fund Management for Development of Renewable Energy (2006), Pursuant to the Circular Abolishing the Requirement on the Rate of Localisation of Equipment Procurement on Wind Power Projects (2009) and a series of programmes to approve local wind price (in Heilongjiang and other places) as well as a series of programmes made by NDRC and the State Electricity Regulatory Commission (SERC) on renewable energy subsidy, the grid connection project and quota treatment.

2.3 Climate policy formulation at central level

2.3.1 Organisational structure of climate policy design at central level

Although China is still discussing its Climate Change Law in 2014, the national strategy towards climate mitigation started from the early 1990s. Right after the adoption of the UNFCCC in New York, the Standing Committee of Chinese People's Congress (SCCPC) approved the legal status of the UNFCCC in China. The State Council approved the Kyoto Protocol in 2002. China built up its climate policy framework under the umbrella of these international agreements.

In 1990, China established the National Climate Change Coordination Group directed by the Environmental Protection Commission (EPC) under the State Council as the national counterpart to the Intergovernmental Panel on Climate Change (IPCC). It was renamed the National Climate Change Coordination Committee during the national institutional reforms in 1998 and was assigned the task of coordinating among different ministries. The major task of this committee is to communicate the status of activities initiated on climate change and draw up the national climate change action plans. For instance, the committee publishes the *National Communication on Climate Change*, which reports on national GHG inventories, climate change impacts and adaptation, mitigation of climate change-related policies and measures, climate observation and research, education and public awareness, finance, technology and capacity building requirements, etc. As climate change mitigation gained priority in the national strategy, the committee was upgraded to the National Leading Group to Address Climate Change and Energy Conservation and Emission Reduction (NLGACCECER) under the direct leadership of Premier Wen Jiabao.

The NLGACCECER leads both international negotiations and domestic climate actions. As the highest-level organisation in climate mitigation in China, its members include leaders from 21 key players, including the State Council (SC), Ministry of Foreign Affairs (MoFA), NDRC, Ministry of Science and Technology (MoST), Ministry of Industry and Information Technology (MIIT), Ministry of Finance (MoF), Ministry of Land and Resources (MLR), Ministry of Environmental Protection (MEP), Ministry of Housing and Urban-Rural Development, Ministry of Transport, Ministry of Water Resources, Ministry of Agriculture, Ministry of Commerce (MOFCOM), Ministry of Health, National Bureau of Statistics, State Forestry Administration, Chinese Academy of Science, China Meteorological Administration, National Energy Administration (NEA), Civil Aviation Administration and State Oceanic Administration.

The daily tasks of NLGACCECER were implemented by offices in the NDRC and MEP, responsible for climate mitigation through emission reduction. However, when the NDRC set up the Department of Climate Change in 2008, major administration tasks were centralised and a series of climate actions and policy designs were proposed under its leadership.

2.3.2 Climate change policy framework at the central level

At the central level, climate policy goals are set via several key policies. In 2004, China started publishing climate change data in the *The People's Republic of China Initial National Communication on Climate Change* report to fulfil its obligations under the UNFCCC (National Committee on Climate Change 2004). In 2005, China initiated its first mitigation actions through a programme promoting *Measures for Operation and Management of Clean Development Mechanism Projects in China* (NDRC, MoST, MoF and MoFA 2005). Up to 23 October 2014, the NDRC approved a total number of 5,059 Clean Development Mechanism (CDM) applications.[1] Another milestone was reached in 2007 when China announced its *National Action Plan on Climate Change* (NDRC 2007a). The action plan

[1] Data source: CDM China website, http://cdm.ccchina.gov.cn.

outlined policies and measures China would adopt, and clarified its basic stance on global warming. The plan also placed the Chinese strategy of climate mitigation under the framework of sustainable development. In other words, China would try to alter its economic growth pattern through methods such as industrial structure adjustment, renewable energy development, and population control.[2] China further detailed its policy goals in 2009 to reduce its carbon dioxide emissions per unit of gross domestic product (GDP) by 40 per cent to 45 per cent in 2020 compared with 2005.

Following the announcement of the action plan in 2007, the different ministries started announcing climate policies in their domains. Focusing on climate technology improvement and innovation, the MoST, along with 13 other ministries and research institutes, announced the *Special Scientific Action Plans Addressing Climate Change Issues* (MoST *et al*. 2007). In this document, MoST not only set out goals to be achieved in the area of climate technology, but also outlined three key categories: scientific challenges arising due to climate change, technologies for climate mitigation, and technologies for adaptation. Strategic solutions listed in the action plan included increasing R&D investment in climate change, building platforms that support R&D, urging collaboration and attracting talent from all over the world. Climate-related technologies were also listed as key research areas in the national *Mid–Long Term Science And Technology Development Plan* in 2006 (MoST 2006). The MoST had three priorities related to climate change: (1) to expand R&D investment: according to the MoST, China invested more than 10bn yuan RMB on climate research during the 11th Five-Year Plan; (2) to further develop the strategic emerging industry; and (3) to reform the scientific management mechanism to allow for interdisciplinary collaboration, attract talent and encourage a problem-oriented flexible support mechanism.[3]

The NDRC was in charge of national planning and promoting economic development. In the area of climate change, reducing GHG emissions and fulfilling the national target of sustainable development was its main policy goal. Its action plan for climate change mainly focused on providing macro-level policy guidance, demonstration projects, standards setting and managing projects (for example, the CDM project).

In China, most GHG emissions result from the industrial sector. As a result, any reduction of GHG emissions would depend on readjustments in the industrial sector. To adjust the industry structure, between 2006 and 2008 China shut down outdated technology (*luo hou chan neng*) with production capacity of 60.59 million tons of iron, 43.47 million tons of steel, 140 million tons of cement, and 64.45 million tons of coke. China also incentivised the growth of the low GHG intensive service sector, which expanded from 31.8 per cent in 1990 to 40.1 per cent in 2008.

To adjust the national energy structure, the NDRC and the National Bureau of Energy announced the *Mid–Long Term Renewable Energy Development Plan* in 2007 (NDRC 2007b), and set a target of 15 per cent of the total energy consumption from renewable energy by 2020. By stimulating nuclear, hydropower, solar and wind development, China is a global leader in all these four areas.

The NDRC set out the national standards for GHG emissions by announcing the start of the provincial GHG emissions inventory preparation in 2010. This regulation was the first step in building capacities among the provinces in China for a nationwide Emissions Trading Scheme (ETS). Carbon trading markets were initiated in seven cities by 2014.

Although domestic politics played a decisive role, huge pressure for climate change regulations came from international sources. Therefore, the MoFA played an important role

[2] http://baike.baidu.com/view/1336873.htm (in Chinese).
[3] Data source: speech by Wan Gang, the minister of the MoST at the kick-off meeting of Scientific and Technological Projects in Response to Climate Change, www.weather.com.cn/static/html/article/20100303/198317.shtml (in Chinese).

in climate policymaking and implementation in China. The major goal for the MoFA was to protect China's right to development at international negotiations and at the same time canvass the path of sustainable development being implemented in China.

The MEP, whose main task is environmental protection, contributed to climate change mitigation through adjustments in pollution standards, environment monitoring, supporting the environmental protection industry, as well as promoting energy saving and emission reduction programmes.

It is worth noting that the majority of the climate change policies were announced jointly by the ministries mentioned above, including the NDRC, MoST, MoF, MEP and MoFA and other relevant ministries. Yet, each policy was designated to one ministry for the sake of implementation, and therefore, was marked with different policy goals embedded in each minister's target. This may cause implementation obstacles from conflicting goals. For example, NDRC promoted the carbon trade mechanism to fulfil the climate change mitigation goal, while the MIIT preferred to build the renewable energy industry and nuclear industry as its response. The MoST, on the other hand, promoted electronic vehicles owing to its preference for this particular technology.

2.3.3 Policy implementation obstacles at local level

Although the different ministries introduced a number of policies in response to climate change, this well-designed policy system constantly encountered implementation obstacles, especially at the local level (i.e. city and county level).

The local governments were monitored on climate policies by the State Council as well as by the different ministries. Through the Party channels, local government officials followed Party and State Council direction. In the climate mitigation area, national strategy and emphasis on green development flowed top-down via this channel. However, local bureaus were also responsible for the implementation of policy diktats from the line ministries. Therefore, different policy goals as well as a desire for self-promotion mingled in the course of climate policy implementation. This generated two implementation obstacles.

First, climate policy implementation involves systemic adjustments and implementation of technologies that require an understanding of multiple disciplines; it is therefore complicated by nature. This is compounded by the fact that policies designed by different ministries emphasised different policy goals. For example, goals for energy saving and emission reduction have been embedded in detailed regulations both in the transportation area and in building standards but with different levels of implementation difficulties. For the achievement of transportation energy saving, 'the fuel economy standards could be checked in the design and manufacturing of the motor vehicles. It is much easier to standardise and make sure the same type of car has exactly the same performance', but it is different and more difficult to implement the building energy efficiency standards because '[they] should be reflected and implemented in the construction process and/or in the operational process, the implementation is very strenuous, and wastes a lot of resources' (Interview with EX4). The lack of implementation capacities together with less professional guidance to local governments sometimes led to perverse behavior. For example, some local governments even allowed downtime, power cuts and other extreme measures to meet the requirement of the energy efficiency goal, which fully reflects the (sometimes irrational) distortion of policy implementation at the local level.

Second, local government is more incentivised to pursue the goals of economic development as compared to low-carbon development under the current cadre evaluation system. Among the evaluation scores in Baoji, Shaanxi Province, in 2012, the total score of criteria for evaluation related to economic development was 32, while similar scores for low-carbon development added up to 3 (Qi 2014). Therefore, combining the goals of climate mitigation with economic development encountered obvious barriers at the implementation level by the

local cadres. According to Qi (2014), 27 provinces out of 31 failed to meet the energy saving target set by the NDRC during the 11th Five-Year Plan.

As mentioned above, the local implementers also have substantial discretion in the interpretation of central climate policy. For example, in the 10 Cities, 1,000 Units project, MoST, NDRC, MIIT and MoF jointly invested about US$2.5bn aimed at establishing ten pilot areas and promoting 10,000 electronic vehicles (EVs) for three years. Private EV purchase was encouraged, but the main target of the project was public transport and government service cars. The bidding rules for the purchase of vehicles varied from city to city. Cities with local EV producers allowed bidding by local producers, thereby lowering the efficiency of the project. Some cities relied on the public transport company for the purchase and operation of EV buses but lost profits due to the lack of motivation of the state-owned transport company. Cities with strong connections with the grid tried the battery exchange model, while others adopted a plug-in infrastructure model.

In summary, the discussion above suggests that although the Chinese central government designed a series of climate policies, these policies encountered several implementation barriers at the local level. This is due both to the complexity of the problem and to the emergence of new stakeholders. Multiple interests mingled with climate policy implementation making the policies difficult to execute on the ground. The following sections elaborate on the key stakeholders and their interests.

2.4 Key actors and drivers of policy implementation

For each policy, the six levels of governments in China – central, provincial, city, district, town and village – together with other stakeholders were involved in the implementation process. Existing literature usually combines the latter five levels under the nomenclature of the local government. For most policies, detailed implementation, including policy reinterpretation or resource allocation, happens largely at the provincial or city level. Local governments below city level are normally regarded as pure implementation agencies with no authority to modify policy. For renewable energy development, particularly wind and solar energy, existing literature has identified some of the key actors.

At central level, the highest legislative body of the country is the National People's Congress where all the laws and regulations are passed. As mentioned above, the State Council, together with different ministries, such as the NDRC, MoST, MoF, MEP, MoFA, MIIT and MOFCOM, designed strategic policies as well as detailed policies for developing the sector.

At local level, most of the existing literature focuses on the provincial government. As the highest level of the implementation system, provincial government aims at creating incentives for local production as well as for local policy design. For example, it is responsible for the design of feed-in tariffs for wind energy in accordance with the local economic conditions as well as the local price of fossil fuel-based electricity.

However, for most Chinese scholars, city governments are the real implementer of central policies for two reasons. First, city governments are directly responsible for the delivery of public services, such as education and public health. Further, they are responsible for stimulating private sector investment and production. They are also the responsible entities for job settlement and tax collection. Local economic development and local public service delivery interact with each other directly at the city level. Second, city-level cadres are evaluated and promoted with written targets, such as local GDP, emission reduction target fulfilment and local taxation increase. But promotion and evaluation at provincial level has less correlation with these written targets. This makes city-level governments focus more on detailed policy targets and play a critical role in the implementation of renewable energy policy.

Firms, both domestic and international, produce the equipment, engage in R&D projects, and operate the wind farms or solar farms. Large firms are also directly or indirectly involving into the policymaking process. For example, state-owned enterprises (SOEs) helped the NDRC to set up new standards for wind turbines in 2013.

Besides government actors, the involvement of international organisations, international funding and new mechanisms of international negotiations are creating the space for a range of actors who are active in the development and implementation of climate policy. In analysing climate policy in emerging countries such as China, it is not enough to consider domestic stakeholders. Rather, the inclusion of international actors, both state and non-state, would help governments of these countries generate a ‘rooted understanding’ of their own climate strategies and policies (Fischer 2012).

Therefore, it is essential to identify the key players and recognise their motivations. Existing studies explain the motives of the national and provincial governments. Implementation at city government level has not been dealt with to the same extent. On the basis of a description of the multiple actors involved in policy implementation, we further unpack the key research question of who drives the implementation of renewable energy in China into the two following questions:

1. Who are the key/emerging players responsible for renewable energy development, and what are their interests?
2. How do the interactions between these actors with several interests influence the renewable energy policy implementation in China?

3 Research design and data collection

3.1 Methodology

A three-step procedure was designed to answer the above two research questions. Figure 3.1 illustrates the research logic and process.

The central challenge in understanding China's climate action was to understand and deal with its complexity. There were many different types of actors: they came from government, business and civil society. They operated at different levels: local, national and global. They had different priorities: climate change mitigation, energy security, competitiveness or job creation. There were competing narratives. And the policy process had different stages.

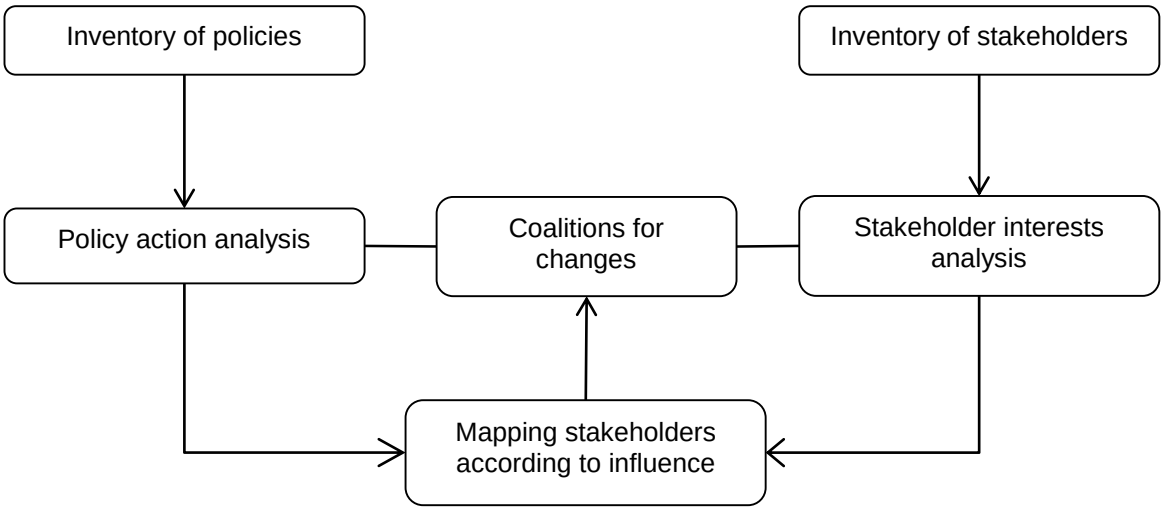
The first stage of the research was to list Chinese policies related to climate change. The inventory included policies and agreements that dealt explicitly with reducing carbon emissions and climate-relevant policies, notably those concerning the renewable energy sector. Policy documents were traced and reviewed to give an overview of the explicit ambitions for low-carbon development. At this stage, the review focused on the timeline of policy formulation and adoption rather than implementation or monitoring. Due to the large number of policies in this area, the research then focused on a particular case and narrowed the policies down to those that were relevant and representative. For example, we selected one key policy that dominated Chinese solar energy development between 2009 and 2012 as the major policy to be analysed.

At the same time, the actors that had an influence on the particular policy were identified. According to the type of organisation, stakeholders were grouped as government, business and civil society and further classified depending on whether they operate at the sub-national, national or international level. The research was based on secondary literature and trial interview information to identify the relevant stakeholders. Primary interviews were conducted with the relevant stakeholders. Snowball sampling methods were used to ensure that no important stakeholders were left out.

Any successful policy, or policy implementation, depended on the effectiveness of the coalitions involved in implementing the policy. A successful coalition represented reconcilable relationships between stakeholders (Peiffer 2012). Thus, a higher level of reconcilable interests ensured an effective coalition. The research explicitly analysed different interests and preferences of each stakeholder. It should be noted that each stakeholder might have several and divergent interests. And there might be several coalitions formed during the policy implementation process. The complexity of the coalition formation and its evolution contributed to the complexity of the policy implementation process, and to the variety of results emanating from it.

Basing our analysis on the interviews with stakeholders had certain limitations. First, self-reported interests would be biased even if we adjusted the result by asking all stakeholders to evaluate others' interests. Second, our research was based on *ex post* interviews that were undertaken three years after the policy had been launched and implemented. As a result, there would be information distortion even if the stakeholders tried their best to be unbiased.

Figure 3.1 Research design



3.2 Case selection criteria

We adopted two criteria for case selection. First, the cases selected needed to be representative of Chinese climate policymaking or implementation. As shown in Section 2.1, energy policy was the major policy area China concentrated on in response to climate change. Within energy policy, policies aimed at promoting renewable energy were quite dominant. Starting from the 10th Five-Year Plan (implemented between 2001 and 2005), China started to focus on solar energy and wind energy as part of the national strategic plan and experienced rapid growth in these two areas. Each area started from an inception phase, experienced fast growth, faced market turbulence and experienced several policy adjustments. The rich stories in each area makes them ideal case studies that illustrate historical changes in the policy area.

Second, the selected cases needed to contain the necessary range of stakeholders with divergent interests and influences on the policy process. As mentioned above, along with the rapid development of renewable energy, many stakeholders became involved in renewable energy fields. Central government was a key stakeholder purposing its developmental philosophy change to green economy. Many local governments were eager to include renewable energy in local strategic framework. Some encouraged the development of local manufactures (e.g. Baoding, Xuzhou) while others stimulated large-scale deployment projects (e.g. Jiuquan, Daban city). Equipment manufacturers, developers and operators of wind/solar farms were closely tied to local development strategies. The real policy implementation process was influenced by all relevant stakeholders.

The report selected one case each from solar and wind energy. The solar case focused on the Golden Sun Project while the wind case focused on the 10GW wind farm base construction project. Although there was only one core policy presented in each case, there existed an entire policy system that drove the implementation of the policy in each case. As illustrated in Section 2.1, China started to develop climate policies from different perspectives, including energy policy, financial policy, industry policy and science and technology. Therefore, in each case, several policies worked together during the implementation process. For example, both solar and wind energy industries were influenced by the Renewable Energy Law of 2006 and the taxation deduction policy designed for high-technology industry. Our analysis of the cases was based on the combined result of all these policies that had an impact on the implementation of the projects. It was critical to include the

impact of the various policies because the stakeholders' interests, as well as their power to influence the implementation, were affected by these different policies.

It is worth noting at this stage a limitation of our research. Both the solar project and the wind project started in 2009. The solar project ended in 2013 but the wind project is still ongoing. Demonstrable policy results exist. However, there is no consensus on whether these projects were successful or not. Given that the main purpose of the research was to map the influence within the policy process rather than setting standards for policy evaluation, the case selection would serve their purpose. However, generalisation of the results should be limited only to the political economy analysis.

4 Case I: Chinese photovoltaics

4.1 Background information on the Golden Sun Project

The Golden Sun Project started in 2009 and ended in 2013. This was the first large-scale market exploration policy for Chinese photovoltaic technology and was, therefore, important for the development of the industry. The project was designed especially to support 'solar demonstration in different areas and the industrialisation of its core technologies' via financial support from the Renewable Energy Special Fund. The project was co-managed by the MoF, MoST and NDRC. The first batch of the project had three programme application areas: grid-connected rooftop, building-integrated photovoltaic (BIPV) and ground mounted systems. For off-grid systems, only remote rural areas were covered in the programme. Therefore, off-grid did not become the main object of the programme both in terms of importance of the technology and the scale of deployment. The programme stipulated that projects with a scale larger than 300kW were eligible for the subsidy. The subsidy was designed to be larger for an off-grid system, covering 70 per cent of the construction cost. For grid-connected systems, on-site consumption was encouraged. However, excess electricity could be sold back to the utility. Buy-back rates were based on local benchmark coal-fired grid price.

4.1.1 Project implementation

The project was implemented in two stages, with a significant policy adjustment in the middle. The original policy plan was announced in 2009. The central government provided a subsidy covering 50 per cent of the total construction cost of a solar farm greater than 300kW in scale constructed within a year with an expected operation period of at least 20 years. With this subsidy, solar farm developers could shorten the payback time from 20 years to about 10 years (Interview F1). Policy designers believed this policy could greatly encourage the solar farm investment all over the country. Indeed, the installation capacity increased dramatically from 2009 (see Table 4.1 for detailed figures).

Table 4.1 Photovoltaic production capacities and the share of domestic usage

Year	Production capacity (MW)	Installed capacity (MW)	Domestic usage ratio (%)
1999	16	--	--
2000	19	3	16
2001	23.5	4.5	19
2002	42	8.5	20
2003	52	10	19
2004	62	10	16
2005	70	8	11
2006	80	10	13
2007	100	20	20
2008	140	40	29
2009	300	160	53
2010	800	500	63
2011	3,300	2,500	76
2012	8,300	5,000	60

Source: Lu, Xu and Wang (2012). Ratio calculation by the author.

However, the NDRC and the Ministry of Finance soon found that some developers started cutting corners to reduce cost after they received subsidy from the government.[4] Some investors were more eager to apply for the project and gain the subsidy than to construct the project, not to mention operate the solar farm. Two major reasons existed. First, there was no requirement in the project for the solar farm to be operational as a necessary condition for the release of subsidy. Second, some solar farm developers faced obstacles in connecting to the grid, demotivating them to be involved in work towards electricity sale.

The central government adjusted the policy when the second part of the Golden Sun Project was announced in December 2012. With 2.83GW solar cells to be installed in the following two years, the amount of subsidy was closely tied to electricity sales: for each kilowatt the farm generated, the government would subsidise the project by 5.5 yuan RMB per watt if the project connected to the grid before 30 June 2013 (see Table 4.2).[5]

It was estimated that at least 6GW solar installation capacity would be stimulated by the policy within four years (Interview EX1). However, problems with implementation persisted. In June 2013, the National Audit Office reported that about 0.26bn yuan RMB were lost in the project. The Ministry of Finance then announced the termination of the project, and the NDRC announced feed-in tariff as the main policy replacement for solar energy in the future.

Table 4.2 Scheduled installation capacity for the second part of the Golden Sun Project (2012–2013)

Company (owner)	Project scale (MW)	Location
Yingli	268	Various locations
Trina Solar	10	Jiangsu Province
EGing Photovoltaic Tech. Co. Ltd	13.6	Jiangsu Province
Jinko Solar	16	Shangrao Economic and Technical Development Zone
LDK Solar Hi-TEch (HeFei) Co. Ltd	40	Ezhou, Hubei; Hunan Province

Source: Author's own based on information from www.MoST.gov.cn/tztg/201212/W020121211517128750955.pdf.

4.2 Power and interests in the Golden Sun Project

In order to analyse the implementation of the Golden Sun Project (*Jin Tai Yang Gong Cheng* in Chinese), we focus on a particular case – a photovoltaic electricity farm built by Yingli Solar in Dingzhou city in the Hebei Province. We selected the case for two reasons. First, Yingli is one of the industry leaders in China both for photovoltaic manufacturing and for technology deployment. It is representative of the 'big players' in the industry in terms of its interests and the policy influence channels. Second, Dingzhou is a county-level city located far away from any city that had experienced green city planning. Additionally, due to its size and location, it has no political influence on policies related to industrial development. It is simply an implementer of those policies. With its focus on local interests, Dingzhou is a good example of 'weak local government' that is quite different from the local governments with the strong 'local entrepreneurship' feature reported in existing literature.

[4] Source: National Audit Office of the People's Republic of China, www.audit.gov.cn/n1992130/n1992150/n1992500/3296067.html (accessed 5 May 2015).
[5] If the farm connects to the grid later than 30 June 2013, the government would reduce the amount of subsidy to 5 yuan RMB per watt before 31 December 2013, and 4 yuan RMB per watt before 30 June 2014.

4.2.1 Stakeholder identification

There were four major actors (or stakeholders) in the Golden Sun Project: national government (central government), local government, the solar manufacturer and the solar electricity farm developer. They were involved in the policy implementation process simultaneously with different goals, responsibilities and interests.

National government

The Chinese national or central government (Chinese: *Zhong Yang Zheng Fu*) was responsible for designing the Golden Sun Project. At the central level, the NDRC, MoST and MoF jointly designed the policy and the implementation process. The implementation was executed along the following steps:

First, the solar farm developer prepared a feasibility study report on the project and submitted it to the local Development and Reform Committee (DRC), Bureau of Science and Technology and Bureau of Finance, together with the subsidy application form and the project implementation plan. In these documents, the farm developer provided basic information about the project to be reviewed by the various agencies in the local government.

With supplementary application documents (such as an environmental impact assessment report), the solar farm developer then passed the application to the provincial DRC for project assessment. The provincial Bureau of Science and Technology and the Bureau of Finance then assessed the qualifications of the developer. Subsequently, the three governmental branches officially granted the developer permission to implement the project. When construction started, the MoF provided the matching financial subsidy to the developer. The audit started when the project was finalised.

During this process, the central government retained the key authority of application approval and subsidy allocation.

Local government (county-level government where the solar project locates)

The layers of government below the provincial government assisted the central government by sharing the administrative workload, which included passing on the necessary documents and application forms to the higher levels of government and passing on the permission and financial subsidy to the developer. The local government seldom had any voice in policymaking or policy adjustment. But local government could influence the implementation procedure to a large extent. Local government that expects benefit from the local taxation on solar farm developers when they generated profits from electricity sales would actively promote the implementation by setting higher priority over the administrative process and speeding up the necessary document work, or by setting supplementary local policies to attract solar farm developers (e.g. extra tax deduction policy for solar farms). Demotivated local governments, however, can easily establish implementation obstacles by setting a lower priority for the policy or by passively processing the documents and extending the application procedure.

Solar manufacture and farm developer

Industrial experience from around the globe suggests that there is substantial specialisation in the solar energy industry. Solar farm developers are usually different from the PV cell manufacturers. Yet, in China, many solar farm developers were affiliated to manufacturers of PV. For example, in this particular case, the developer was also the solar cell manufacturer – Yingli Solar (Chinese: *Ying Li Neng Yuan*) was the solar electricity generation branch of Yingli Solar Electricity (Chinese: *Ying Li Guang Fu Dian Li*).

4.2.2 Analysis of stakeholder interests

Central government mainly interested in climate mitigation and solar industry development rather than in energy security/generation

The policy intent of the Golden Sun Project reflected the interests and concerns of the central government in developing the solar industry in China. As part of the Chinese climate strategy, renewable energy development, including PV technology, was a long-term development goal. Besides, the policy was especially designed in 2009 to protect the domestic PV industry from recession after the global financial crisis. 'The major goal of the project was to promote domestic technology development and up-scale the PV industry for the first time', solar expert Zhao Yuwen indicated in an interview, which clearly indicated the priorities of the central government (Interview EX1).

The direct policy goal was to digest overcapacity by stimulating domestic deployment when the international solar cell demand slumped in 2008. Although China had bypassed Germany to be the largest PV manufacturer in the world, most of the products were still made for export. For example, the manufacturing capacity reached 4.1GW in 2009, yet the domestic installation only accounted for 300MW. Over 90 per cent of the production capacity was exported. The excessive reliance on the vagaries of the export market was combined with a push by the United States and the European Union to initiate an 'anti-dumping and anti-subsidy' investigation procedure towards Chinese PV products starting from 2012. As a result, the policy imperative was also driven by the need to look inward and explore options domestically. By designating photovoltaics as one of the emerging industries, the central government embarked on the plan to use the domestic market as the means to stimulate the industry through the Golden Sun Project. Although the project contained off-grid energy generation as one of the targets, it clearly indicated it was 'to demonstrate electricity solutions such as photovoltaic power station, solar/wind station, or hydro/solar station in remote areas or off-grid areas'. For example in 2012, out of a total number of 275 projects in remote areas, only 18 were off-grid while the other 257 projects were on-grid projects.[6] This focus on on-grid projects clearly suggests that industry development and new technological solution rather than energy generation/security were the main goals of the central government.

Manufacturers' emphasis on improvement in competitiveness

During the implementation of the Golden Sun Project, the cost of solar electricity was higher than the cost of coal electricity in China. During interviews, Yingli Solar, Suntech and other solar farm owners expressed the view that 'the project might not gain huge profit without government subsidy' (Interview F1). In other words, the real motivation to implement the Golden Sun Project was not based on short-term cost–benefit analysis.

Indeed, solar farms were of extreme importance to Yingli Solar in terms of long-term strategic growth of the company. Developing a solar farm was a large project involving PV manufacturers, solar farm developers and the owner/operational firm of the farm, which required strong organisational capacity.

> *On the one hand, the project was definitely good news for the manufacturing sector (of solar industry), because it clearly indicated that the government wanted to stimulate the domestic market. Also, the company [Yingli] took it as an opportunity to expand its business from pure manufacturing to systematic design and down-stream electricity station operation.*
> (Interview F1)

[6] *Source*: Project list of the Golden Sun Project (*in Chinese*): http://wenku.baidu.com/view/9acca2d8d15abe23482f4d49.html (accessed 12 December 2014).

Yingli Solar, therefore, built the Dingzhou solar electricity farm to increase its long-term competitiveness using the opportunity provided by the subsidy support from the government.

As the interviewees told us, Yingli was able to save on costs, achieve technological improvements and make profits through the process.

> *Originally, Yingli took the Dingzhou project mainly as a demonstration project. The project was profitable, although not hugely so. The situation started to change in 2008 with the global financial crisis. The material costs [the cost of silicon worldwide] decreased from US$500 per kilogram to US$20 per kilogram; at the same time, the exploration of the domestic market through concession projects pushed manufactures to further reduce the cost and increase the conversion efficiency of the modular.*

In response, Yingli Group (the mother company of Yingli Solar) set itself a target of developing the entire production chain of the solar electricity industry, including polysilicon production, solar panel production, solar system design and integration, solar farm development and solar farm operation since 2010. It is this production chain extension that ensured that the company was able to 'enjoy lowest cost at each stage of the production and development and save overall cost dramatically'. After that, Yingli set up several branches in many provinces of China developing solar farms locally. Yingli's participation in the project is indicative of their intention of increasing competitiveness by integrated development and operation of solar farms.

Local government mainly concerned about taxation and job creation

Under a top-down policymaking paradigm, it is assumed that local government would implement policies announced by the central government. However, existing literature suggests that the effort in policy implementation might be influenced by contextual variables (such as local public support), structural variables (such as clear and consistent objectives) and material variables (such as technical difficulties or the extent of behaviour change required) (Mazmanian and Sabatier 1983). Local governments could therefore be motivated by their own concerns in policy implementation, even though central government clearly set up climate change mitigation as the main policy goal.

When we interviewed the local DRC and Bureau of Finance in Dingzhou city government, the interviewee clearly indicated the gap between central government and local government as policymaker and policy implementer. On the one hand, implementing the central policy was quite important to the local government, especially in terms of their administrative duty of implementation compliance. The representative from the Dingzhou Bureau of Finance declared that it exactly followed the central direction of how to allocate the fund without local discretion: 'Local government had no right to design the subsidy policy. All policy directives came from the central government, while local government simply implemented these policies' (Interviewee LG2). Interviewees also expressed that they had little control over the project application and operation since this policy was top-down. Interviewee LG1 mentioned:

> *Both the project application and the subsidy in a project like this [Golden Sun Project] can be managed between the provincial government and the firm. In that sense, we (local DRC or Bureau of Finance) might have no knowledge about the existence of the project.*

For example, the local government might not be fully aware of the central financial subsidy unless it is clearly notified by the upper authority. In this case, Dingzhou Bureau of Finance realised that the solar farm subsidies existed only when Yingli asked them if they had received the subsidy transfer.

Meanwhile, the interest gap between the local government and the firm was large. The greatest concern local government had was related to local income taxation. 'What we were

mainly concerned with was the extent to which this project might bring local government taxation. For example, job generation and tax income increase were all welcome.' 'We eagerly wanted to know what Golden Sun Project might bring to the local city [from you]' (from Interviewee LG2). Yet the local government could barely see any tax benefits because of the central tax policies for the renewable energy industry. The so-called 'exemption for two years and half rate redeem for three years' (*liang mian san jian ban*) indicated that starting from the profit-making year, renewable energy enterprises would be exempt from income tax for the first two years and enjoy a half-rate reduction for the subsequent three years. In this sense, the local government would lose tax income for each Golden Sun Project for at least two years.

We have drawn up a stakeholder interests table (Table 4.3). It is worth noting that the Golden Sun Project did not involve the general public in the policymaking and implementation procedure, so no civil society interests are presented.

Table 4.3 Key interests of stakeholders in the Golden Sun Project

Stakeholder	Climate change	Local taxation	Jobs	Competitiveness	Profit
Central government	✓			✓	
Local (city) government		✓	✓		
Firms				✓	✓

4.2.3 Stakeholders' attitudes towards implementation

With different interests, stakeholders in the Golden Sun Project show different attitudes towards policy implementation. One stakeholder may have different attitudes towards different policy goals (see Figure 4.1).

Figure 4.1 Stakeholders' attitudes and different priorities

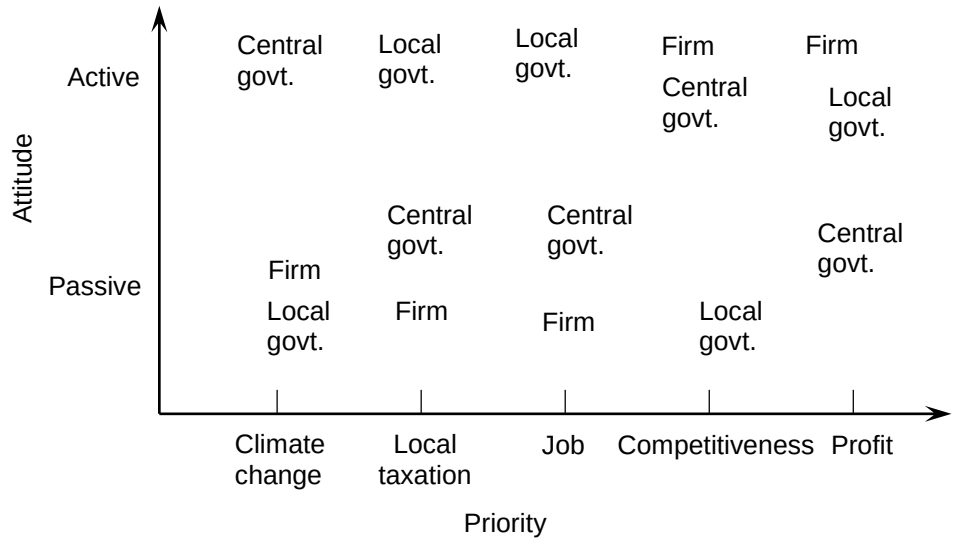


Table 4.4 Measurement of attitudes towards implementation

Attitudes	Themes appearing in interview
Passive	'We don't care' 'It is not important' 'We could do nothing about it' 'We are short of budget'
Active	'This is extremely important' 'We will fully obey this' 'We will consider firms' suggestions' 'We will try to contact the provincial government or the central government'

As defined in Table 4.4, we describe the implementation attitudes of the different stakeholders. In interviews, we found a positive attitude of the central government in the implementation process. Namely, the project had two goals: to contribute to climate mitigation and to improve the industry's competitiveness in solar industry. The central government pushed the policy from the beginning. This was confirmed both by local governments and by firms in our interviews. The central government mainly adopted two policy instruments: administrative regulation, and financial support to qualified projects. According to the central government, administrative regulations would smoothen the process by making local agencies responsible (local Bureau of Science and Technology, local Bureau of Finance and local Development and Reform Commission); and financial support would provide enough motivation for firms to build PV projects to meet the industrial development goals and experiment with innovative ideas to implement the project.

Local governments (particularly city government) we interviewed in Dingzhou had passive attitudes towards the project. They were enthusiastic about local firm profit, local job creation and local taxation, but policy instruments selected by the central government did not align with their preferences. With solar farms enjoying income tax deductions, local government could get hardly any taxation from the solar farm in the first three years. In addition, the solar farm was not a labour-intensive project, thereby having limited job creation prospects. Therefore, with little interest in climate mitigation and improving firm competitiveness, local governments had little interest in the Golden Sun Project other than being passive allies in discharging their administrative duties.

Outside government, firms or business sectors were very active in promoting the Golden Sun Project. In the interview, Yingli explained the project application process as following. First, the firm ascertained whether the local government (Dingzhou government) had any local policies promoting solar farm development and operation. Having found that no such policies existed, they also noticed that the local government had little knowledge about the Golden Sun Project, including the application process and financial support channels. Therefore, Yingli Guo Xiang Solar Farm did not apply for the project through Dingzhou government, where the farm was to be located. Rather, it applied through Baoding city (the city that is one level higher than Dingzhou city) where the parent company was located. The interviewee from Yingli said:

> *We applied for the project through Baoding city… because the Yingli Group had been there for nearly 10 years and had built very good relationship with the government, which (we supposed) would smoothen the application process and speed it up.*

In this case, Yingli was more active than the local government.

We also asked if the company used any of its connections with experts in Beijing to influence the policymaking process. The interviewees could not recall any evidence, but they indicated 'there might be indirect influence since Yingli has been the leading firm in the industry for

years and is getting to know a majority of the experts. The company's opinion will surely be directly or indirectly passed to the policymakers'. Leading firms such as Yingli built good relationships with ministries in Beijing (such as the Ministry of Science and Technology through R&D project), which positioned them strongly as compared to many city governments.

4.2.4 Mismatching interests and implementation barriers

To understand stakeholders' attitudes to the project, it is important to check stakeholders' interests. However, it is also important to ascertain whether different interests are matched to each other in the implementation process. The hypothesis is that if different interests are not aligned to each other, the implementation process might encounter difficulties. Figure 4.2 presents the analytical results including both policy goals (presented in circles) as well as actions taken to fulfil those goals (presented in rectangles) of different stakeholders in the implementation of the Golden Sun Project.

It is worth noting that implementation could be smooth when some of the stakeholder's interests aligned with each other. For example, the central government provided financial subsidy to the industry hoping this could stimulate the development of the industry, which was perfectly aligned to the firms' goal of increasing profit and gaining support to increase the competitiveness of the project. Therefore, firms were very active in pushing the implementation of the project. They even pushed the local government for the administrative procedure. The administrative interests of central and local government aligned with each other as well. Local government, when involved into the project application process, was responsible for all document process within deadlines.

Mismatching interests: unaligned interest

Some of the policy goals did not lead to an alignment of interests of the stakeholders and could, instead, lead to conflicts during the implementation process. For example, the central government aimed at expanding the solar energy market as a direct result of the project, an interest aligned with the firms' interests but not of the local governments. The local governments' interest in solar market enlargement would be primarily driven by the ability of such enlargement to deliver higher taxes or create more jobs. In other words, unless the project led to job creation or taxation increase, the pure enlargement of a certain industry would hardly be in line with the local governments' interests. This is why Dingzhou city government lacked motivation in promoting the solar farm in their jurisdiction.

Mismatching interests: insufficient policy tools

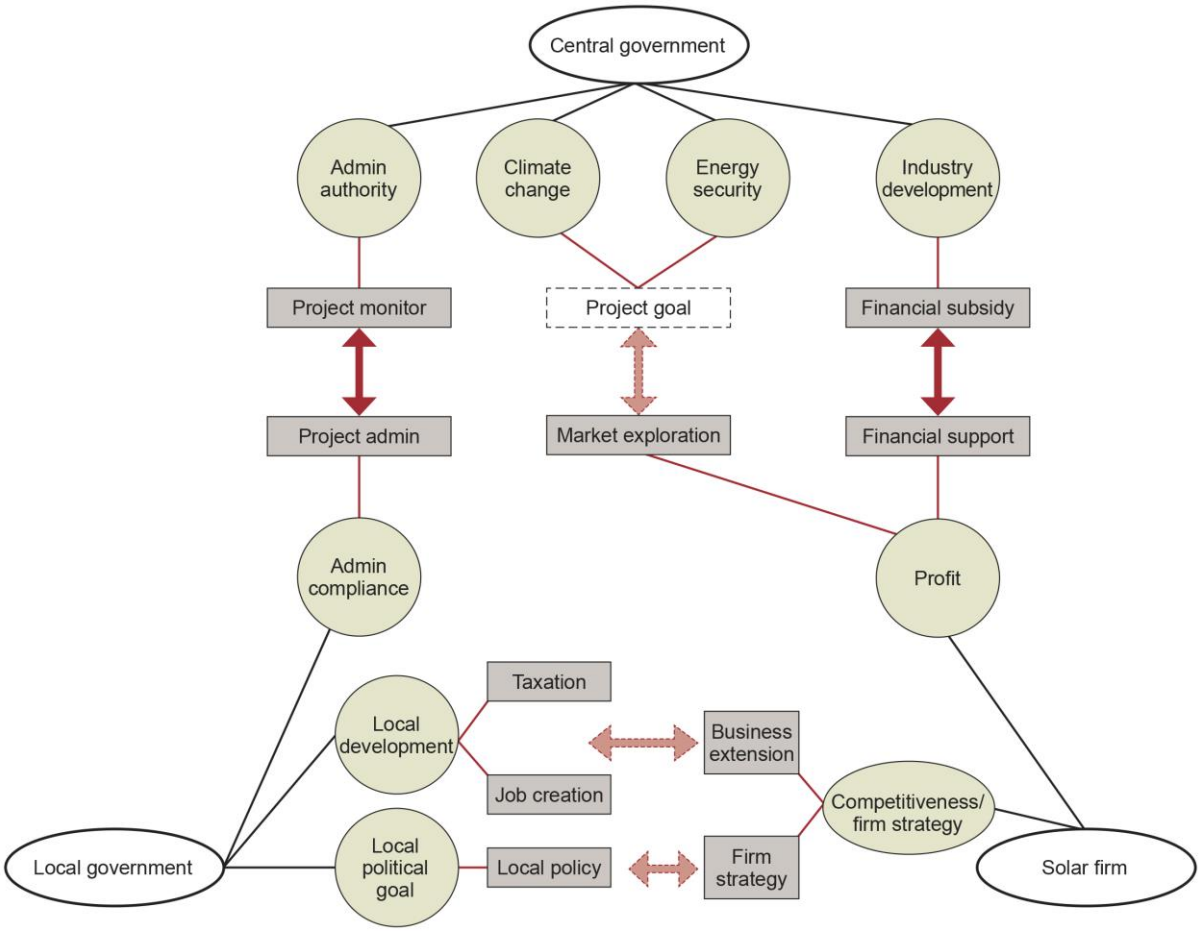
At the same time, there were certain issues that were of interest to only one stakeholder. For example, encouraging technological improvement in the PV industry was an interest of the central government. Yet, the financial subsidy allocation did not have any prerequisites for technological improvement. In other words, no detailed policy instruments were designed for the accomplishment of this policy goal. Therefore, the local government, which had no interest in improving the technological level in the industry, was not motivated to respond to this central preference. The passive attitude and mismatching of interests of the two left the project with 'no real improvement in a technological sense' (Interview EX1).

It is worth noting that the Golden Sun Project, although clearly designed as a public project, was not designed in detail with specific targets. It encouraged local firms to invest in solar farm construction, yet with no quota assigned to each local government. This gave plenty of room to the local governments to implement it selectively. When local government chose not to fully push the policy forward, the implementation process did not stop, since other stakeholders pushed it forward based on their interests and the matching of interests among them.

Mismatching interests: different interpretation of policy contents

When central government targeted domestic market exploration, it adopted installation capacity as the measurement. '[These targets] were easier to set and easier to get information about', said Zhao Yuwen. Therefore, 'central government didn't regulate the solar farms to connect to the grid and sell electricity'. This interpretation of market expansion led to perverse actions. Some solar farm developers cheated on the project to get national subsidy but postponed or cancelled the solar farm construction. Low-quality construction also happened. However, this also implied that firms that were interested in operating solar farms and gaining long-term electricity sales profit were prevented from aligning interests with the central government due to the lacunae in policy design.

Figure 4.2 Relationship of interests in the Golden Sun Project



4.3 Conclusion of Case I: photovoltaics

4.3.1 Implementation gap between central policy design and local implementation

The PV case confirms the gap between national policy formulation and local policy implementation in China. Existing literature on Chinese policy implementation has already revealed this gap in different policy areas, including climate-related policies. While central government shifted its policy priority from being pure GDP-driven to having multiple goals (e.g. environmental protection, climate mitigation, energy security), it designed national-level policy through strategic balancing between different policy goals. At the implementation level,

however, local governments were still concerned about local economic development and preferred short-term and relatively simple policy goals. Our research provides a detailed insight into this tension at the local and central level driven by the divergent interests.

The tension was clearly present in the PV case, in which the central government considered solar energy development as a national strategy in response to climate change and energy security, while local government considered solar energy development more as an opportunity to increase local taxation or create jobs. Local government in Dingzhou clearly lost its motivation in implementing the Golden Sun Project when it found no significant economic benefits due to its implementation.

4.3.2 Passive local governments and active firms in policy implementation

The existing literature does not find cases where there is passive implementation at the local level. The implementation of the Golden Sun Project in Dingzhou city suggests that the lack of alignment of interests between the local government and local firms can generate substantial risks and uncertainties.

When the local government's interests do not align with those of the local firms, as in the case of the Golden Sun Project, there is hardly any motivation for the local government to promote industrial development. Primarily focused on local development, the local governments passively responded to the central policy. It was the leading firm that filled in the motivation gap and pushed local government to transfer benefit down at the business level. It also clearly showed that local government could be bypassed when it was only responsible for the administrative aspects of the policy implementation process.

The judgment of whether an industry is potentially profitable or not depends on the local government's perception of the industry and might be influenced by many factors. One important factor is the matching of interests between local governments and firms. While the solar case suggests that the lack of such alignment led to a passive role of the local government, we now turn to the case of wind energy, which shows how alignment of interests between the firms and local governments leads to the development of collaborative relationships. Such collaborative relationships raise the motivation of the local government to promote industrial development.

5 Case II: Chinese wind energy technology

5.1 Background information on the Jiuquan 10GW Wind Farm Project

Located in the north-west of China, Gansu Province has rich wind resources. Jiuquan city is located in the western part of Gansu Province. Jiuquan has a land area of 19.2km^2, with potential wind resource of 210GW and available storage of 82GW. It is geographically and climatologically appropriate for large-scale, concentrated wind farm construction.

Jiuquan Wind Base was the first of seven state-planned wind bases over 10GW under construction. In May 2008, the NDRC approved the construction of Jiuquan Base in the 11th Five-Year Plan. In stage I, four wind farms with 3.8GW installed capacity were constructed in Changma, North Bridge, Ganhekou and Qiaowan. In 2009, another 16 wind farms of the stage I project started construction. By the end of 2011, 3,600MW capacity had been installed and connected to grid with 200MW still under construction. With the smooth advance of Jiuquan stage I programmes, the NDRC informed relevant participants to begin planning Jiuquan stage II, with 5GW capacity. In May 2011, preparatory work for Jiuquan II had been approved by the National Energy Bureau. By the end of February 2013, the programme passed the technology-related tests and was about to begin operation.

In each stage, multiple wind farms were constructed. In each wind farm, multiple developers purchased wind turbines from different manufacturers in different stages. There were three main wind farms at stage I owned by State Development and Investment Corporation (SDIC), China Power Investment Corporation (CPI) and HydroChina. Construction of HydroChina Wind Farm began in 2009, installing 67 Goldwind 1.5MW turbines and 67 Sinovel 1.5MW turbines. The project was connected to the grid at the end of 2009 and had generated 4.87 million kWh by the middle of 2012.

According to interviews with local government officials in Jiuquan, the wind industry became a major contributor to economic development. In 2010, the wind farm in Jiuquan generated 11.868 million kWh electricity with 5.5bn yuan RMB sales; 8.4 per cent of the GDP increase came from wind-related sectors (Interview LG2). Local firms in Jiuquan were involved in wind farm construction for more than five years and built good relationships with local government. These made wind sector development and policy implementation in this case quite different from solar policy implementation.

5.2 Power and interests in the Jiuquan 10GW Wind Farm Project

This report selected the implementation process of Jiuquan 10GW Wind Base in Gansu Province as a case study. This was the largest wind farm base built in China in 2009. Important manufacturers as well as wind farm developers in the Chinese wind energy industry were all involved in this project making this a good representative case.

5.2.1 Stakeholder identification

There were five major stakeholders in the Jiuquan Wind Base Project: national government, local government, domestic wind equipment manufacturers, foreign wind equipment manufacturers and the grid. They were all involved in the policymaking and implementation process simultaneously with different interests and behaviours.

National government

Policy support for wind energy in China was top-down. Like solar energy, wind energy was regarded as one of the promising renewable energy options to be explored in response to climate change. Listing wind in the Renewable Energy Law of 2006, the Chinese government promoted its development in line with its climate mitigation goal. And also like solar development in China, the wind sector did not benefit from government policy until the industry grew to a certain scale by itself and encountered developmental difficulties. Without a systematic climate policy framework to guide wind sector development, Chinese central government promoted the sector through industrial policies due to the large economic scale and strategic importance wind sector had to national economic development.

From 2003, central government, including the NDRC, MoST, MoF and MIIT, worked to stimulate the wind energy industry (Interview NDRC, 2012). Through six rounds of concession projects, China overtook the United States as the country with the largest cumulated wind turbine installation capacity.

However, the central government (especially the NDRC) slowed down its support to local wind farm construction after 2009 when many off-grid electricity abandonment accidents happened in different areas. Grid connection became more essential than wind turbine manufacture and wind farm development. As a result, the NDRC slowed down the administrative procedure for new wind farm construction. In 2012, the NDRC launched a new policy and made 80 per cent of wind electricity usage the necessary condition for further wind farm construction approval.

Local government (provincial government and city government)

In 2013, the GDP of Gansu Province was 626.8bn yuan RMB and it was ranked 27th out of the 31 provinces under the jurisdiction of the central government.[7] However, in terms of size, with an area of 453,700km^2, it was ranked seventh in the country. Not suitable for agriculture development and falling behind in industrial development, Gansu Province was in great need of finding its development pathway through policy interventions. At the provincial level, encouraging local economic development and improving local technology were core goals of these policy interventions. For example, the policy documents described the 10GW Wind Farm Base as the 'Three Gorges on the Land' (i.e. comparable to the massive hydropower project) to emphasise the importance this project might have for China. After the Chairman of the National People's Congress Standing Committee, Wu Bangguo, inspected Jiuquan and encouraged the wind farm project, provincial leaders inspected the construction site quite often (Interview LG3). The provincial government also provided R&D support to local wind turbine firms, though not so huge in the absolute amount.

Jiuquan is located in the Hexi corridor and at the centre of the 10GW Wind Farm Base of Gansu Province. All wind farms are built around it geographically. The Jiuquan government is responsible for all the administrative duties of wind farm construction and operation. The Jiuquan government is the public service provider to firms, supporting new technology development and commercialisation. It built the Jiuquan Wind Electricity Park,[8] facilitating the provision of tax breaks and other financially beneficial policies coming from the central and the provincial government including R&D support. For example, Jiuquan government has an annual budget of 5m yuan RMB for technological research on grid connection and for conducting R&D on new types of wind turbine.

[7] Data source: National Bureau of Statistics of China, National Data: http://data.stats.gov.cn/workspace/index?m=fsnd (accessed 6 May 2015).

[8] 10GW Wind Farm Base is the overall project name constructed in two stages. For each stage, several wind farms are constructed at different places in Gansu with several wind turbines installed in each wind farm. Jiuquan Wind Electricity Park is the manufacturing base that produces wind equipment to be installed in wind farms; it was upgraded as a national economic and technological development zone in 2013.

Local firms
Before 2008, Lanzhou Electric Corporation (LEC) was the major wind turbine firm in Gansu. LEC entered the wind turbine business in 2006. It had torque converter drive technology licensed from German firm Voith, localised the technology with brushless synchronous technology in 2007 and produced a prototype of a 1MW wind turbine. The improvement was specially designed for the harsh weather conditions in Gansu.

Nationwide, LEC did not rank in the top ten wind turbine manufacturers. Yet it received a lot of help from Gansu Province. For example, LEC received R&D funding jointly from the central government (800,000 yuan RMB) and the provincial government (4m yuan RMB). 'We [Gansu Province] are also limited in R&D budget. We could only help a little with the firm's R&D cost' (Interview LG6). LEC is still short of R&D funding and has fallen behind in market competition.

Other domestic firms (leading firms) and foreign firms
After Jiuquan Wind Electricity Park was built, more wind turbine manufacturers rushed in to take advantage of the economic opportunities. As of now, all the major domestic wind turbine manufacturers and assembly plants have local plants in Jiuquan, including Goldwind, Sinovel, United Power and Hui Teng.

There are no foreign wind turbine manufacturers located in Jiuquan Wind Farm. But foreign wind turbines are competitive in life-cycle efficiency and wind turbines from Vestas and Gamesa with 1.5MW and 2MW have taken a major share in Jiuquan. Since the NDRC eliminated the requirement for localisation of wind turbine manuafacture in 2009, foreign companies can compete with domestic firms on the spot.

5.2.2 Analysis of stakeholder interests

Central government tried to promote the growth of wind energy industry
As shown in Table 5.1, the central government realised that wind energy development is essential for climate mitigation. By increasing the proportion of renewable energy (i.e. wind and solar) and nuclear energy in the total energy consumption, China would be able to rely less on low-quality coal. The development of the renewable energy industry was, therefore, strategically important for China. However, this goal was only mentioned as a broad policy intent in the Jiuquan wind project proposal. No detailed measurements or policy instruments were outlined to fulfil this particular goal. Energy security was also unrelated to wind energy development since the major emphasis was on oil (Interview EX2).

The central government clearly indicated its interest in stimulating the wind energy industry through an approval from the NDRC for the planning of wind farms. The approved plans indicated that the wind farm would generate 8.48 billion kWh each year after the wind base construction, which would save 2.97 million tons of coal and reduce GHG emission by 8.299 million tons.

Unlike the solar project, the 10GW Wind Farm Base did not enjoy extra subsidy or financial policy besides the feed-in tariff (FIT) policy and support through the CDM. NDRC believed wind energy was more competitive than solar energy. With the FIT, most of the wind farms were profitable and the enlarged market could further increase the profit (Interview EX2).

The targets for technological improvement were partly fulfilled by the detailed planning of the NDRC. It was believed that by enlarging the market size, technological innovations would also be incentivised. To promote technological development in the wind sector, China followed the European Union model, which obtained intellectual property rights for core technologies, rather than the Indian model, which licensed key technologies from other countries.

As mentioned above, a short-term economic effect soon appeared in Jiuquan from the wind manufacture sector. But grid connection appeared to be the main obstacle for the long-term development of wind in the area. Small turbulence in the grid (caused either by a turbine failure or grid instability) might cause a large number of wind turbines to go offline leading to grid downtime and wind electricity abandonment (the grid will not accept wind electricity due to the instability). Jiuquan experienced accidents from such offline incidents in 2009 and bore a huge amount of electricity abandonment. Three reasons contributed to abandonment. First, when a large number of wind turbines connected to the grid, their capacity to operate through periods of lower grid voltage became essential. Turbines without capacity for low voltage ride through (LVRT) can create a chain effect in the grid and take other generators offline. Second, Jiuquan is located far from end users in the south-east costal area. Although local government planned to sell all wind electricity generated to the grid, electricity supply was greater than demand due to the limited local demand and limited capacity of long-distance electricity transmission. Third, the Chinese grid followed a central planning control model in which the grid manager distributed contributions between all electricity resources. Since renewable energies, such as wind and solar, need supplementary energy (e.g. coal-fire power) to reduce their instability, they are regarded as less competitive by the grid manager and are given less opportunity to contribute, especially when supplementary energy sources are scarce for heating in the winter.

The large scale of wind electricity curtailment alerted the central government about product quality and operational standards. Policy interests at central level had switched from wind installation capacity to the strengthening of deployment efforts. The NDRC introduced new standards for LVRT in 2011 and urged all the wind farms to meet the standards before they could connect to the grid again. When we visited the Yumen wind farm (one of the early wind farms built in the wind base) in summer 2012, it was in the process of upgrading wind turbines to meet the new standards. The average output accounts for only 6–20 per cent of designed capacity.

Both the NDRC and some leading firms took this as ‘normal industry reshuffle’. ‘This [strict standards] is a must-do action for further development of wind energy industry, and this is what market should do’ (Interview EX1).

Table 5.1 Main stakeholders’ interests in the 10GW Wind Farm Base Project

Interests / Stake-holders	Climate /energy	Local development		Technology	Industry development		
		Local taxation	Jobs	Core technology	Market share	Profit	Competitiveness
Central government	✓			✓			✓
Provincial government				✓		✓	
Local government		✓	✓			✓	
Local firms				✓	✓	✓	✓
Domestic firms					✓	✓	✓
Foreign firms					✓	✓	✓

Provincial government promoted local R&D and made wind energy a strategic industry

Gansu provincial government was not directly involved in wind energy development. On the one hand, it had less legislative power over national strategic policymaking and was therefore more of an implementer than a policymaker. On the other hand, in this case it had very limited financial power (given its location in the north-west of the country with low per capita GDP) to promote local development through financial support. In addition, the weak connections with local firms made the provincial government reliant on city government for project management. However, the provincial government was highly motivated to implement central policy. It aimed at differentiating its development path from other provinces by becoming known for its support for wind power. To pursue this goal, it made its efforts on three tasks: supported local R&D activities, offered partial support for local FIT, and helped local government in lobbying the central government.

From the R&D perspective, the provincial government first chose LEC and supported its technology as potential mainstream technology. Second, the provincial government had the capacity and willingness to support wind resource prediction research. The provincial government also set up R&D projects.

For local FIT, according to NDRC (2009a), the provincial government would cover the price gap between the local desulfurised coal electricity price and the bidding price of the project. This requirement gave provincial government an important role in the wind farm project. The incentives for the firm would have been greatly raised if the provincial subsidy reached the business in time with the full amount. It might have also demotivated the business sector if it went in the opposite direction.

The lobbying position at provincial level is stronger than at local level. Unlike emission reduction goals or economic growth targets that were written into the local cadre's annual evaluation, the renewable energy development target was optional. In other words, both provincial government and city government had a choice of whether to implement it or not. Considering the large share that the wind industry contributed to Gansu, the provincial government was highly motivated to promote its further development. It not only includes wind development in its 11th Five-Year Plan, but also helps local government to lobby the central government for additional beneficial policies. For example, the provincial government collaborated with experts at the Chinese Academy of Engineering in a research project to study how to transfer wind electricity generated in Gansu to end users in a more efficient and effective way. The ultimate goal for the project was to build an ultra-high voltage transmission line in Gansu (Interview EX5).

Local government was interested in local industrial development, job creation and taxation

Local government emphasised three things in its policy documents as well as in the interviews: local government taxation, local job creation and local consumption, and the spillover effects the wind industry might have on other industries.

During the interview, local government always started by describing the wind energy industry as a strategic emerging industry nationally and locally, yet they made detailed policy recommendations to the central government asking for higher FIT, more R&D funding, less tax deduction (which meant more local taxation gain) and beneficial national planning on grid upgrading. And at the core of all these recommendations, it is the local development goal that mattered the most.

In local planning documents, Jiuquan city called its strategy 'resource for equipment', which aimed at building an industrial park for wind equipment manufacture and required firms that wanted the wind farm concession to build local manufacturing plants. According to the city, it built wind manufacturing plants in a 6km^2 zone and solar equipment manufacture plants in a zone of 4km^2. The target was to attract more than 35 major wind equipment firms with local

investment of 8.35bn yuan RMB. The production value reached 20bn yuan RMB in 2010 (Interview LG2). But local benefit from wind electricity sale was neither stable nor of a large amount. According to the National Bureau of Energy, the 2014 national average of wind power utilisation hours was 1,905 hours, 120 hours down from the 2013 average. And in Gansu, 0.7 billion kWh wind electricity was abandoned, which further reduced wind farm profit and local taxation.

Firms (local, domestic and foreign) intended to increase competitiveness
Local firms entered the industry late and had less market competitiveness. Their strategy was to obtain core technology that might bring long-term potential for future competitiveness and future market (Interview F5).

Leading domestic firms took Jiuquan as a good project to extend their market share in China. Relying on their licensed technology and their strong R&D capacity, implementation of wind farms in Jiuquan was not technologically challenging for these firms. It was the market exploration and technological demonstration that made the project very attractive to them (Interview F2, F3).

Foreign firms clearly understood the Chinese government's policy goal to change energy structure in response to climate change. In interviews with Vestas China, the director of public relations said that the company had great faith in the development of the Chinese wind market due to the clear governmental goal. The company was even willing to accept short-term loss in exchange for long-term profit in China. Foreign companies, such as Vestas, had clear strategic goals in China: to increase the market share and to educate Chinese users for life-time cost–benefit analysis which would make foreign turbines more competitive. In the Jiuquan case, foreign companies did not have a large share in the concession until 2009 when more strict national standards were under discussion (Interview F6).

5.2.3 Stakeholders' attitudes towards policy implementation
Owing to different interests in wind farm policy goals, stakeholders showed different attitudes towards the policy implementation (see Figure 5.1).

Central government had the strongest power to push the policy
Central government (especially NDRC and MoST) was leading the wind policymaking process. Local government, firms and experts kept lobbying for new policies according to their own interests, but it was still the central government that made the final decision for others to implement.

For the Chinese wind energy industry, the central government guaranteed policy implementation mainly through administrative authority. But this top-down political structure led to an implementation gap between central policy requirements and local reality. For example, local government sought tax increase and job opportunity generation, which could not be fulfilled by the policy goal at all. The conflict normally converged at the provincial government level and passed onto central government for collaborative solutions in a policy adjustment process.

Local government and firms sought real benefits in policy implementation
As in the solar PV case, local government could not fulfil its interests in the concurrent wind farm policy because 'local government had no right to make policy, especially taxation policy, which was essential to local benefit' (Jiuquan Bureau of Taxation). Yet local government did not behave passively in the wind case. They were very active in lobbying the central government because of the huge economic potential wind energy brought. To get short-term benefit, they urged wind energy companies to build manufacturing facilities locally to gain income tax and value added tax. For long-term benefits, they kept pushing the central policy adjustment towards wind electricity sales and/or developing new industry for local electricity

consumption (e.g. chemical engineering business). Jointly with the local industry sector, the Jiuquan government used all its efforts in lobbying for better FIT and local industry rearrangement. In addition, starting from 2011, Jiuquan organised research projects that advanced turbine development and policy recommendations. Local government invited provincial leaders for site visits and built demonstration wind farms to meet new national standards. Through all these efforts, Jiuquan successfully persuaded the central government for better FIT in 2013.

Provincial government had the least influence in the process

Provincial government was also active in the wind farm base policy process. However the support provided was largely symbolic. In our interviews, provincial DRCs as well as provincial leaders emphasised the economic influence of the wind farm base to Gansu. But they emphasised more the symbolic meaning that wind farms brought to the province. In 2006, the party secretary of Gansu proposed the project of 'Construction of the wind corridor in the west, build "Three Gorges" on western land'. He clearly named wind development as part of the 'western development' strategy of the central government. Therefore, wind development could 'upgrade traditional heavy industry in the province', 'could increase local income', and could 'protect the local environment as well as the ecological system', and 'we gradually changed the outdated heavy industry into wind manufacturing' (Interview PG1).

The provincial government described its policy goal as coordinating relevant stakeholders in three ways: first, it collaborated with local government for local wind electricity consumption planning so that the electricity could be efficiently used even if it could not be fully accepted by the grid; second, the provincial government collaborated with the land resource department, electricity department and meteorology department to improve wind resource prediction; third, one of the provincial government's key roles was to help local governments to lobby the central government. Yet neither the provincial government nor local government had hardly any voice to coordinate the national grid.

Figure 5.1 Stakeholders' attitudes towards wind policy goals

5.2.4 Mismatching interests and implementation barriers

As in the solar case, in Figure 5.2, there are several broken-line arrows presenting mismatch between the different stakeholders. Some of the mismatches arise due to different understanding of the policy goals, while others arise due to differences in their interests. We will focus on three major mismatches in the discussion section.

Central and local governments had different preferences for R&D activities

From 2006, China developed a national innovation system (NIS) to gradually replace its sole national support system and to stimulate private R&D capacities. In this new system, the national, provincial and local governments shared the R&D burden in many ways. For Gansu Province where local firms had weak R&D capacities, it was the national government that provided the largest share of R&D funding. Neither provincial government nor local government had enough capacity or willingness to support local R&D because of the limited taxation income.

In the Jiuquan case, the torque converter brushless synchronous generator was a technology originally selected by the local firm LEC. Owing to its limited market share, the technology was not regarded as one of the major wind technologies in China. Rather, only large-scale (over 5MW) double-fed and permanent-magnet generators were regarded as innovative technology and supported by most. Although local government and provincial government kept lobbying to fund this technology, the results were not encouraging.

Different interpretations of market exploration and profit-gaining goals

The policy goal of the 10GW Wind Farm Base was to explore the domestic wind energy market. But central government and local government had different interpretations of 'market exploration', which led to barriers in implementation.

The original central policy encouraged the building up of wind farms by setting an installation capacity target. Yet, this was not a necessary condition for wind energy market exploration, which should generate real demand from the end user. In the case of wind energy, the end use was the grid that purchased wind energy from wind farms. In the policy document setting up the 10GW Jiuquan Wind Farm Base, the NDRC clearly described the number of wind farms, scale of wind farm capacity and FIT (NDRC 2009b). Therefore, from an administrative point of view, provincial government and local government implemented the policy fully when the wind farm finished its construction. But what the local government really meant about market exploration related to the extent to which the local wind farm could sell its wind electricity to the grid (Interviews LG3, LG4, LG5). As a result, there was a mismatch between the understanding and interests of the local government and the central government.

Policy documents also stipulated that the national grid would buy the electricity generated by renewable energy. The Renewable Energy Law (2006) indicated in Article 14 that:

> The relevant electricity grid enterprise shall, through entering a grid synchronisation agreement with the enterprise that has obtained an administrative licence for or report for archival purposes on electricity generation by using renewable energy, purchase the full amount of the synchronised electricity, as covered by its grid, of the project of synchronised electricity generation by using renewable energy, and provide synchronisation service for electricity generation by using renewable energy.

The State Electricity Regulatory Commission (SERC) was the central government unit in charge of monitoring the electricity market in terms of making standards, ensuring competition and price checking.[9] SERC had hierarchical branches down to county level to monitor the electricity market operation. But 'there were not enough staff for monitoring

[9] SERC was merged into the NDRC (under the National Energy Administration) in 2013. Thus, the separation of pricing authority and monitoring authority ended. Yet, the case presented in the report still has a background of split authority.

purpose. SERC had to rely on bottom-up report and appeal to disclose market failure in the industry' (Interview F6). This made the monitoring function of SERC useless, especially at the low level of government. The grid had stronger control over electricity purchase in spite of the national law enforcing renewable energy electricity sales.

In 2007, SERC published *Regulatory Approach on Grid Enterprises Purchase Renewable Energy Electricity* in coordinating the Renewable Energy Law, which declared that 'unless the renewable energy electricity causes force majeure or threatens the security and stability of the grid, grid enterprises shall not restrict renewable energy efforts' (SERC 2007). Yet, the regulation also declared 'SERC has the ultimate authority to interpret the situations for force majeure and grid threatening'. According to expert (F6):

> *The key element preventing the grid to accept more wind energy was not technology but benefit distribution… The grid had very little motivation accepting wind energy for now. This could explain why the grid keep asking for higher standard for wind energy.*

The obstacles to the sales from the wind farms to the grid due to their different interests became the major reason preventing wind energy polices from being implemented properly and effectively. The further policy amendments had to add wind energy sales and consumption targets to align the interests of the various stakeholders.

Some local government interests were not represented

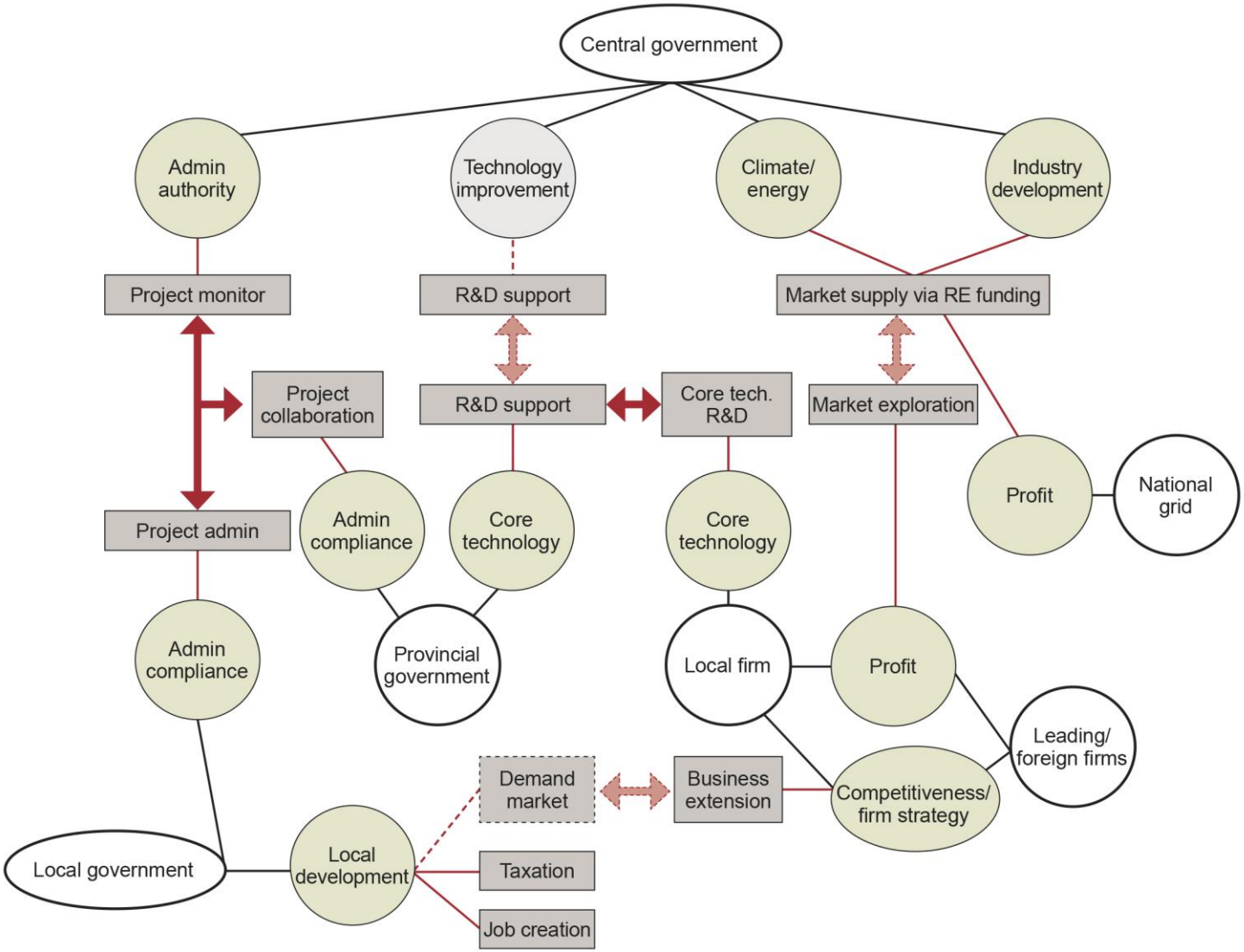
From an implementation perspective, the local implementer's commitment as well as its leadership in the implementation is essential to the success of a policy (Mazmanian and Sabatier 1983). The whole set of wind energy promotional policies at the central level were aimed at increasing the scale (e.g. of installed capacity) of the industry rather than increasing local profit. Existing research suggests that only when local governments can ensure that financial benefits remain within their jurisdiction, would they have consistent and strong motivation towards the implementation of central government policies (Jin, Qian and Weingast 2005; Montinola, Qian and Weingast 1995; Qian and Weingast 1997). Ignoring local interests led to several implementation obstacles.

First of all, local government preferred to have local manufacturing rather than local wind farms. 'Wind farms would not generate many job opportunities for the city, neither would it contribute to local taxation' (Bureau of Jiuquan Taxation). According to the DRC in Jiuquan, the wind farm would generate at most two or three job opportunities for every 10kW. Normally, for a wind farm of 200kW, only 30–40 workers were needed for daily maintenance. Compared to its attitude to other labour-intensive industries, such as chemical engineering, local government was not interested in promoting the wind energy industry. The local government in Jiuquan once urged wind manufactures to build local plants as one of the bidding qualifications. Although central government halted the policy very quickly, this trend of local protection had a rational background in trying to narrow the interest gap.

Second, local income (e.g. local taxation) did not increase along with the wind farm construction and operation. Rather, it decreased under the central schemes benefiting the wind sectors. Currently, the Jiuquan government is implementing three major financial policies, including value added tax (VAT) deduction for fixed assets in wind farms, 50 per cent of income tax deduction, and an income tax exemption and reduction policy. None of these policies consider the local benefit forgone through loss of tax revenue. The key reason for this was that 'local government had no influence in policy making'. Therefore, local government will not get any tax revenues from wind farms for five years.

However, policy process was not a linear process that ended at the implementation stage. Local government never stopped lobbying the central government for further policy adjustment towards their benefit. The Jiuquan government kept letting the central government know about its difficulties in policy implementation and it did have support.

Figure 5.2 Relationship of interests in the 10GW Wind Farm Base Project



5.3 Conclusion of Case II: wind energy technology

5.3.1 Policy formation at central level and policy implementation at local level

Like the solar PV case, the wind policy case also demonstrates a clear gap between central policy design and local implementation. The Chinese central government framed clear goals for wind energy development. Deployment, rather than wind equipment manufacture, was at the core of central policy design. However, wind turbine manufacturing and wind farm construction and operation had different benefits for the local government. The wind turbine industry was a manufacturing industry, which might bring immediate tax revenues and create jobs in the local economy. Although it might not contribute to environmental improvement and climate mitigation directly, the wind turbine industry was 'framed' by many local governments as the core of wind energy development. On the contrary, wind farm construction and operation represented a new business model that normally needed a much longer payback period. Wind farm operation occupied large areas of land and required limited labour input for maintenance. Economically, wind farm operation would not bring short-term benefits to the local economy. Therefore, the tension between central policy formulation and local implementation was even higher than in solar energy. It is not surprising, then, to observe a higher degree of interests mismatching between the two entities in this case.

Besides local government, the involvement of a larger number of stakeholders in the wind story further complicated the implementation process. The state grid, as an additional stakeholder, played a critical role. Firms built a closer relationship with local government who represented their interests in policy implementation. In this sense, wind energy implementation was not only a bargaining process between central and local governments but also involved actors in the private sector and specialised agencies such as the state grid.

5.3.2 'Policy bundling' or 'policy reinterpretation'?

As more data and cases are reported, there is wider acceptance of the complexity of the climate policymaking process and its implementation. Unlike oversimplified models of top-down or bottom-up decision making, Harrison and Kostka (2012) found the power of bargaining and collaboration between the local and central government:

> In China, a system where decentralization and authoritarianism work hand in hand, the state provides 'signals' of its policy preferences by setting incentives and rewards for local officials. These include regular binding targets with concrete figures, incentives such as promotion and bonus payments through an annual evaluation system and punishments such as redeployment to a remote region. These ensure that officials at every level have incentives to at least partially fulfil national mandates from Beijing.
> (Harrison and Kostka 2012: 4)

The policy implementation process of Chinese climate policy could be explained as an interest bundling and policy bundling process.

This report found that 'the interest bundling' theory requires the implementation analysis to go one step further – to decompose implementation into different actions. The successful degree of policy implementation could be measured by the success of the implementation of these different actions.

In our research, we further explored this policy process. When we check the policy outcomes, it shows that many interests/policy goals had been included when the policy was implemented. In this sense, the bundling theory was correct: local government and other

stakeholders did put their preference into the policy either at policy design stage (e.g. Jiuquan government lobbied the central government to smoothen wind electricity sales) or at the implementation stage (e.g. Jiuquan government required bidding firms to have local manufacture plants). Yet, if we check the process in detail, this report reveals that the bundling process was not simply ‘adding up different interests’, rather, there was a ‘re-interpretation’ process of the central policy at local level.

In the wind case, central government expressed its policy goal and preference clearly in the policy documents. Local government, while administratively complying with the central policy, developed additional implementation requirements (e.g. local taxation) and new pace of the implementation (e.g. construction to be faster than central planning requirements). Central government did not agree to some of these additional requirements. This central–local bargaining happened not at the policy design process, but rather at the implementation stage.

When interests of central government and local government matched with each other, there was no need to reinterpret central policy, and we can observe a smooth process of implementation. As in the solar case, this report found that the degree of interest matching influenced policy implementation in the wind case. The degree of interest matching across stakeholders, especially among central government, local government and the wind energy industry, determined the relative ease with which the policy was implemented.

The drive for reinterpretation of policy came from local interests. In our framework, these local interests are represented by the local government and local industries as well as the interests that are the basis of their relationships. Jiuquan city built a close relationship with wind energy manufacturers and wind farms. Since the city mainly relied on the wind industry to develop, the local government made it strategically important. This close tie between the city and local business was enough to motivate the local government even in the absence of short-term benefits.

6 Conclusions and discussion

To answer the question of who drives or obstructs climate change policies in China, this report compiled two case studies on renewable energy in China. After identifying the key stakeholders in each case, the report linked the stakeholder's key interests with their actions in policy implementation. As the two selected cases occurred within similar time periods within a country, they are probably comparable to each other.

6.1 Who drives and who obstructs climate policy? Every stakeholder does

The real climate policy design and implementation process is much more complicated than has been reported in the existing literature. This research does not find a single entity that is totally active or totally passive towards climate policy. Each entity is positively inclined towards certain aspects of the policy and influences policy design or implementation accordingly. Central government, for example, promoted both solar and wind policy, but delayed the effort to connect wind farms to the national grid. Therefore, while the central government initiated the project, it also created stumbling blocks in its implementation at the local level. The city governments welcomed the development of emerging industries at the local level, yet they rejected the policy effort if it did not allow them to make short-term profits. So local governments, in the solar and wind cases, lobbied for amendments in the policy in order to align the outcome of such policies to their interests.

These observations highlight that we need to decompose climate policy design and implementation into detailed goals and actions to answer the question of who drives or obstructs climate policy in China. Our analysis suggests that each stakeholder's interests and the degree of matching among different interests for each policy goal and each policy action need to be explored as a part of the political economy analysis.

The key contribution of this report lies in the fact that it provides a better understanding of the policy implementation process. We have shown the importance of distinguishing between passive and active local authorities. What drives the latter is not climate considerations but ambitions to accelerate economic development: building competitive local industries, creating jobs and, above all, increasing local tax revenue. Our case material from both the solar and the wind cases have shown this clearly.

We also conclude that industrial development goals motivate both central government and local government to develop climate policy. The development of low-carbon industries in the wind and solar sector allow the fulfilment of climate-related goals of the central government and the local development needs of the local government. Both cases indicate that when core interests are at stake, both local and central government would push for policy adjustments or amendments. This explains why central government terminated the Golden Sun Project, but continues to push the wind farm base project.

6.2 'Conflicting interests' varied at policy design and implementation stage

In both cases, we distinguish between policy formulation and implementation. Policy formulation (at the national level) is motivated by climate change, yet the chosen policy instrument lies more in industrial policy. In the case of solar policy, the initiatives and programmes have been driven by the need to establish a new and competitive industry. Although recently the policy goals have also incorporated domestic energy capacity

consideration, the focus is largely on industrial development. In the case of wind, energy security has been a major driver for central policy design, but the policy goal switched to building a competitive wind turbine industry during the implementation stage. Our analysis of both the cases suggests that although policies were designed in response to climate change, climate change mitigation was at best a co-benefit. Other considerations such as industrial development, enhanced competitiveness, tax revenues and profits drove the implementation of these policies by the stakeholders.

Interests matter at the stage of policy implementation as well. Although local governments have limited influence on the policymaking process, they are responsible for implementing the policy. Therefore, they either passively implement (non-favoured policies) or lobby the central government actively to amend policies so that they are aligned to their interests.

Such shifts in interests may lead to implementation barriers, as shown in our cases. But they are useful for breaking the mismatch of interests as well. In the Chinese policymaking process, interest bargaining normally happens during the implementation process and not at the policy formulation process.

6.3 More stakeholders emerged in climate policy design and implementation

This research reports two cases with a lot in common but also reveals certain differences. While the outcomes of the solar energy case are clearly driven by the divergent interests of two key actors (the local and central government), the wind energy case involves a wider range of actors beyond the local and central government. However, the complicated policy implementation process involving several stakeholders with divergent interests is common to both cases.

Our analysis also suggests that new industry players emerge during the implementation process. These new entrants pay great attention to government actions of reallocating resources among stakeholders. The relationship between the government and these new stakeholders becomes even more complex due to the dynamic changes in their interests during the policy implementation process. Understanding these dynamics is critical for researchers to characterise the evolution of the policy implementation process. Facing a similar situation of losing short-term local taxation, the local governments of Jiuquan and Dingzhou had radically different responses. While the local government of Jiuquan was extremely active, the local government in Dingzhou reacted passively. This difference in approaches lead to substantively different outcomes and benefits for the local economy. Similarly, the effort to influence policy amendments were markedly different across the two local governments. While Jiuquan lobbied aggressively for amendments so that they could be aligned to its own interests, Dingzhou did not make attempts to realign the policies towards its own interests. In addition, the key stakeholders who drove the implementation in the two cases were different. The wind farm operators, who came from the local government in Jiuquan, were the major drivers for the implementation of the policy. Through frequent site visits, both the city government and provincial government officials rallied behind the interests of the local firms. In the case of Dingzhou, the real driver was the private sector company running the solar farm. It bypassed the unmotivated local government and pushed higher authorities to represent its interests.

Our analysis suggests that further discussion and analysis is required in situations when multiple stakeholders have different or opposite interests. For example, if local government does not get access to higher tax revenues in the short run by implementing the policy, its motivation for policy implementation may decrease dramatically. This could lead to the emergence of obstacles in the policy implementation process. However, the emergence of such obstacles might not necessarily mean the failure of the policy. By using complementary policy instruments, such as long-term local strategic planning highlighting the trade-off

between short-term losses with long-term gains, the local government could be coopted in the policy implementation process. Therefore, a more comprehensive theoretical framework is needed to explain the emergence of obstacles, and how these obstacles might be overcome in the policy implementation process.

6.4 Temporary coalition in policy implementation

Beyond highlighting the complexity of the implementation process, this report also suggests the dynamic evolution of interests over time. Similar to the description of Harrison and Kostka (2012) in section 5.3.2, temporary coalitions or alliances are formed in order to fulfil the evolving interests of the different stakeholders. In each case, the degree to which the multiple stakeholders find similar interests (or not) leads to the formation of a coalition (or not). A firm and positive coalition drives the achievement of shared goals and pushes the policy implementation forward. In the solar energy case, when the local government was unable to gain additional tax revenues through policy implementation, motivation decreased dramatically. Yet this did not lead to the failure of the policy implementation process. With local firms to keep pushing the policy forward, Dingzhou finally executed the project successfully.

In sum, our research suggests that the analysis of climate change actions in emerging countries such as China needs to take into account the dynamic and evolving nature of the policy implementation process. In order to do such an analysis in an analytically tractable manner, it is necessary to take an actor-oriented approach. This paper is a first attempt to develop a systematic approach to deal with the complex climate policy landscape.

Annex 1 List of interviewees

Number	Organisation	Interview date
LG1	Dingzhou Development and Reform Committee, Director	20.4.2013
LG2	Dingzhou Bureau of Finance, Deputy Director	20.4.2013
F1	Yingli Solar Co. Ltd./Dingzhou Solar Farm, Department of Public Affairs	20.4.2013
EX1	Expert 1 in solar technology, Zhao Yuwen	7.7.2013
EX2	Expert 2 in wind technology, Gao Hu	18.7.2012
EX3	Expert 3 in wind technology, Cui Rongqiang	12.7.2014
EX4	Expert 4 in climate policy, Qi Ye	15.10.2014
EX5	Expert 5 in wind in Gansu, Wang Ningbo	6.5.2012; 25.7.2011
PG1	Gansu Development and Reform Committee, Deputy Director	6.7.2013
LG3	Jiuquan Development and Reform Committee, Deputy Director	25.7.2011; 5.5.2012
LG4	Jiuquan Bureau of Taxation, Director	5.5.2012
LG5	Jiuquan New Technology Industrial Development Zone, Director	5.5.2012
LG6	Jiuquan Bureau of Science and Technology, Deputy Director	5.5.2012
F2	Yingli Solar Co. Ltd./Jiuquan Branch, Engineer	25.7.2011; 6.5.2012
F3	Sinovel/Jiuquan Branch, Engineer	6.5.2012
F4	Da Tang, Yu Men Wind Farm, Chief Engineer	7.5.2012
F5	Lan Zhou Electricity Engineering Co. Ltd., Chief Engineer	23.7.2011
F6	State Grid, Shen Hong	7.5.2012

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