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A New Era for China's Renewable Energy Development? External Shocks, Internal Struggles and Policy Changes

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A NEW ERA FOR CHINA'S RENEWABLE ENERGY DEVELOPMENT? EXTERNAL SHOCKS, INTERNAL STRUGGLES AND POLICY CHANGES

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Abbreviations

EU	European Union
GHG	greenhouse gas
IEA	International Energy Agency
INDC	Intended Nationally Determined Contributions
MIIT	Ministry of Industry and Information Technology
MOF	Ministry of Finance
MOFCOM	Ministry of Commerce
NDRC	National Development and Reform Commission
NEA	National Energy Administration
PV	(solar) photovoltaic
SERC	State Electricity Regulatory Commission
UNFCCC	UN Framework Convention on Climate Change

1 Introduction

As the world's largest greenhouse gas (GHG) polluter, China's annual emissions accounted for almost 30 per cent of the world's total emissions in 2014 – more than the United States (15 per cent) and the European Union (EU) (10 per cent) combined (World Bank 2015). China's efforts to curb its soaring emissions will play a decisive role in containing temperature rise and in preventing the catastrophic consequences of climate change. In recent years, the Chinese government has paid greater attention to climate change. President Xi Jinping's attendance at the COP21 conference in Paris was a first by a Chinese leader. Before the conference, China's climate officers submitted the country's Intended Nationally Determined Contributions (INDC) to the UN Framework Convention on Climate Change (UNFCCC) as its formal commitment to the international community to control its GHG emissions. In this document, the Chinese government pledges to peak its emissions by 2030 and promises to try to achieve this goal sooner rather than later. One of the major avenues to achieve this target is to increase the share of non-fossil fuel energy in the current coal-dominated primary energy mix to reach more than 20 per cent by 2030. The share was around 11.1 per cent in 2014 (NDRC 2015a). China's recently released master plan for economic and social development, the 13th Five-Year Plan, also requires this share of non-fossil fuel to reach 15 per cent by 2020.

The key questions are then whether and how these targets can be met? On the surface, this does not seem an over-ambitious target. During China's 11th and 12th Five-Year Plans between 2005 and 2015, the country transformed itself into the largest investor in renewable energy sectors in the world. The International Energy Agency (IEA) estimates that between 2010 and 2015, China contributed more than 40 per cent of the newly installed renewable energy capacity around the globe, with its total investment during this period exceeding the US and EU combined (IEA 2015). However, this decade of massive wind and solar energy development only increased the share of renewable energy to less than 2 per cent of the national energy mix by 2014 – casting serious doubt on China's future plans to decarbonise its energy system.

This Evidence Report investigates the changes in China's wind and solar energy policies, and argues that since late 2012 a new policy paradigm has been taking shape within the Chinese renewable energy policy community due to a series of external and internal shocks. These policy changes will have a tremendous impact on how China is going to further develop its renewable energy sector. Renewable energy industries in China are at a critical crossroads and are moving towards a new era that contrasts sharply with the previous decade, which was characterised by the massive capacity expansion of wind and solar farms. A number of emerging external and internal dynamics are affecting both policy priorities and process, which have consequently had a tremendous impact on the existing institutional arrangements and interest constellations that have developed in the past decade. As these policy changes would ultimately affect China's capability to fulfil its emissions reduction pledge at an international level, it is therefore crucial to understand both the deep causes of these changes and their implications for the future of China's renewable energy industries.

In this report, wind and solar energy sectors are selected as a case study. The focus on wind and solar industries is based on two considerations. First, other non-fossil fuel energies such as the hydro power and nuclear power sectors have a long development history in China and are therefore governed by rather mature and enclosed policy communities. By contrast, newly emergent bureaucratic blocs and non-state actor groups govern the wind and solar energy sectors (see Section 2 for a detailed explanation). This emerging policy community

has only taken shape in the last decade and is constantly changing to adapt to new actors or interests (Shen 2016). Secondly, both large hydro and nuclear power have been subjected to constant scrutiny regarding their negative environmental or social impacts, whereas wind and solar are often believed to be more sustainable and therefore merit, at least theoretically, greater prioritisation for development. However, this is not to suggest that hydro and nuclear are irrelevant for China's energy outlook and politics, as they are indeed important segments in its energy system, and their relationship with wind and solar energies is a key element of our analysis in later sections.

In order to understand the policy paradigm in the new era we need to go back to the key features of institutional arrangements and interest constellations in the previous era. The year 2014 is chosen as the line of demarcation because it is believed that a number of external and internal shocks happened in that year. Although the development path of the wind and solar industries is obviously a continuum, with interests and institutional development evolving in a dynamic and non-abrupt fashion, these significant incidents have led to significant policy changes when comparing the previous pathway to a new one. The signs of such shocks are plenty and will be explained in detail in the later sections of this report. Here I would only list notable policy changes. First, quantitative targets of capacity expansion in the wind and solar sectors are less common in central policies. In the 13th Five-Year Plan, such quantitative targets have been totally abandoned and replaced by a set of qualitative criteria. Second, policy priorities have shifted to address the problems arising from the previous decade of fast, but sometimes reckless, development, such as grid connectivity and curtailments. Third, in the previous era large-scale wind farms and solar parks were the mainstream activities that accounted for most of the growth in renewable energy sectors. But since 2014, the policies are more focused on distributed systems.

This research intends to investigate the factors that have driven these notable policy changes since 2014. It is based on primary field investigations between 2014 and 2015, with formal interviews and document analysis as the major data collection methods. Altogether 15 interviews were held with major stakeholders in China's wind and solar sectors, ranging from regulators to business practitioners and consultants. Policy papers are the major resource for document analysis with more than 100 policies, measures and laws selected and analysed. Particular attention has been given to the elements that are believed to be highly relevant to institutional arrangements, power dynamics and interest configurations in the renewable energy sectors. The remainder of the report will be divided into five parts. Section 2 provides a brief literature review of previous studies regarding China's renewable energy policies. Sections 3 and 4 aim to present the institutional arrangements and interest configurations in the previous era. They argue that after a decade-long development, the governance structure in China's renewable energy sector has become increasingly plural, with the instrumental interests serving as the glue drawing various actors together as a policy community. These instrumental interests refer mainly to economic returns and bureaucratic power gained through developing renewable energy activities. Section 5 provides a detailed account of the external and internal events since 2014 that have been producing a profound impact on the policy and market development. Section 6 presents an analysis of the major institutional and interests changes that can be noted. Section 7 concludes with a discussion of the major findings and implications for future study of policy coalition and change in China's renewable energy subsystem.

2 Literature review

Almost all types of renewable energy sources have seen breakneck growth in the past decade, driving many scholars to believe that a great transformation or energy revolution is happening within China (Mathews and Tan 2015). Much academic attention has been paid to the tremendous impacts and implications of China's unprecedented renewable development on the international energy outlook, on global competition and on other developing countries (*ibid*.). Others focus on domestic politics and seek to understand the drivers behind the massive growth. Some researchers reveal that China's unique state-led governance model plays a significant role (Lewis 2013; Hochstetler and Kostka 2015; Spratt 2014; Urban and Geall 2014). They noted that Chinese governments at various levels developed a series of supportive policies from feed-in tariffs to tax holidays, in order to foster technological catch-up and stimulate investment in renewable power generation. Consequently, a national 'championship team' was developed both in renewable manufacturing sectors for wind turbines and solar photovoltaic (PV) panels, and investment in power generation facilities such as large-scale grid-connected wind and solar farms.

Other researchers believe that state support is only part of the picture. China's previous state-led efforts for promoting environmental or climate policies often fell into a huge implementation gap at local level. However, the success story of renewable energies seems to indicate an effective synergy of various interests at local and policy implementation level (Harrison and Kostka 2013) when economic, environmental and political interests of various actors are combined to deliver promising policy outcomes. Some researchers advance this further by arguing that an informal coalition or policy community comprising both public and private actors has been taking shape during the fast development of China's renewable energy industries (Shen 2016), which somehow has changed the governance style from a typical state-led or top-down approach to a more pluralistic one in past decades (Schmitz 2016).

As most Western scholars are searching for the answer to China's renewable energy boom, Chinese scholars are looking at the inefficiencies and side effects of a fast-growing renewable market and industry. Sufang Zhang and her colleagues are among the first Chinese scholars to point out the 'disconnection' between China's renewable energy production and manufacturing sector. They argue that, without proper policy coordination along the production chain, the mismatch between upstream manufacturing capability for turbines or panels and downstream production capacity for power generation would threaten the renewable energy industry's future development (Zhang *et al.* 2013). Other researchers focus on specific issues such as the escalating wind curtailment problems (Zhao *et al.* 2013), which are believed to be the major bottleneck for China's future wind energy development. Zhang and Li (2012) pointed out that, to resolve the curtailment problem, proper incentive schemes need to be designed for the grid companies to take renewable energy's access to the grid networks. China has just two grid companies.

Besides this empirical and problem-solving oriented research, Chinese scholars also aim to identify the pathways of policy development through historical analysis of the policy change and learning process. By adopting the concept of social-technical regime, Zhang, Andrews-Speed and Ji (2014) argue that the two-decade development of solar PV indicates that renewable energy policies have not been as effectively and smoothly carried out as many would expect, as many external factors are affecting the policy outcome along with constant internal adjustment of policy priority during this period. The literature has revealed the need to understand the external and internal dynamics shaping these policy adjustments in a way that this report intends to investigate.

3 Institutional arrangements and governance process

In this section, an institutional analysis is carried out to show the formal governance structures and decision-making process for developing renewable investment activities in the previous decade. It will also explain how such institutional arrangements were established, based on a coalition that has helped China to achieve significant growth in renewable investment before 2014. China's total grid-connected wind energy capacity increased from 743MW in 2004 to 114.6GW in 2014 (China National Renewable Energy Center 2015). The domestic solar energy market was developed at a much later stage in comparison to the wind energy sector; however, its total installed capacity also jumped from 820MW in 2010 to 28.05GW in 2014, making the country the largest wind and solar power investor since 2011. Along with the unprecedented market expansion is the constant evolution of regulatory institutions to govern the mushrooming renewable investment activities and manufacturing facilities around the country. Chinese industrial governance has long been characterised by a very fragmented system where different ministries have their very specific regulatory territories, and coordination between them is normally inefficient (Mertha 2009). Compared to traditional industries, the renewable energy sector has a relatively simplified governance structure (see Figure 3.1). At present, four ministry-level entities are directly involved in regulating the development of the renewable energy industries. On the surface, there is a seemingly clear role-sharing scheme among these entities. For example, the National Development and Reform Commission (NDRC) and its National Energy Administration (NEA) are responsible for overseeing, planning and regulating all the renewable energy investment activities in China. The Ministry of Industry and Information Technology (MIIT) is responsible for overseeing and regulating all the manufacturing activities in the renewable energy sectors. The Ministry of Finance (MOF) is responsible for collecting, budgeting and monitoring the 'Renewable Energy Development Fund', which is the core subsidy programme for supporting the development of renewable energy projects. As for the overseas wind and solar projects, formal approvals need to be acquired from both NDRC and the Ministry of Commerce (MOFCOM).

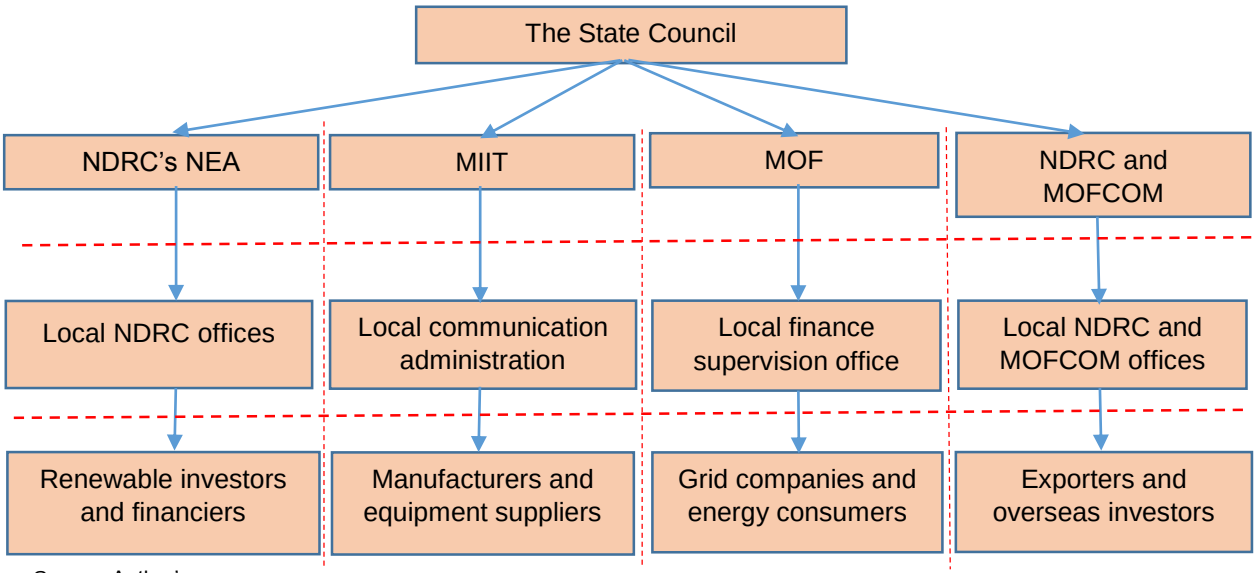
This governance model, involving four powerful ministries regarding various aspects of renewable energy industries, is a reflection of how China's energy subsystem has been governed in the past decade – and of the trend towards fragmenting governance institutions so that institutional conflicts can be avoided when each ministry has a territory to govern. Such fragmentation has long been noted by scholars of the Chinese political system (Yang 2004), and is often believed to be a source of confusion and contradictions among the policies and a reason why coordination and efficiency are lacking (Breslin 2007). However, in the renewable energy sectors, it should be noted that the decision-making power of these governing institutions is not evenly distributed, and therefore, as this report found, the contradictory policies are rarely found. The most influential institution among all these governing authorities is the NEA, which is part of the NDRC, a powerful macroeconomic management agency under the Chinese State Council, with broad administrative and planning control over the Chinese economy.

A merger of the former State Electricity Regulatory Commission (SERC) in 2013 has reinforced the current NEA, under the NDRC. Before being abolished, SERC's governance domain mainly resided in monitoring how power generation markets were run and in setting various operational standards. The merger significantly enhanced the NEA's political status and governance capabilities, helping it to become the dominant institution for regulating the energy subsystem, including the renewable energy segment among other ministries in

Beijing. The NEA's Renewable Energy Department is the direct authority for regulating renewable energy investment and approvals of project development around the country. Until recently, the annual and total installed capacity of renewable energy generation has been treated as the single most important indicator to evaluate the progress of renewable energy sectors. Clearly specified capacity targets are enshrined in China's domestic and international political agenda. For example, the 12th Five-Year Plan (between 2010 and 2015) set a target for total wind energy capacity of 100GW by 2015 (already achieved). The NEA also set a target of 15GW for solar PV instalment in 2015, a single year.

Since the installed capacity of renewable energy has been viewed as the most important indicator, and since capacity increase largely depends on investment in large-scale grid-connected wind and solar farms, the regulators of these project development and investment activities have consequently become the most powerful institutions among all the governing entities. Those who regulate the manufacturing facilities (MIIT) and subsidy programmes (MOF) are instead playing a supportive role in the governance system. Such an arrangement has a tremendous advantage because within a single target system, various actors can be relatively easily organised into a powerful alliance to pursue the same goal (Shen 2016). China's unprecedented progress in terms of capacity increase in its wind and solar sectors owes much to this institutional arrangement. Almost all the institutions and decision-making processes are designed to make sure that the quantitative targets are met. Meanwhile, other interests or appeals not directly related to capacity accumulation are often viewed by the regulators as less urgent and consequently are set aside.

Figure 3.1 Governing institutions of China's renewable energy sector: vertical and horizontal links



Source: Author's own.

A typical example of this is the delay in paying renewable subsidies to the project investors. This has become a constant pattern due to the fast expansion of the renewable energy sectors. In an interview, one solar power farm owner complained:

> *Our subsidy payment has been delayed for over a year now. But this is a normal phenomenon. Some investors waited for more than two years to get it. The problem is that there is no specific entity responsible for the delay of payment. All ministries claim that they are not responsible [for the late payment]. We can do nothing but wait.*
> (Interviewee no. 13, December 2015)

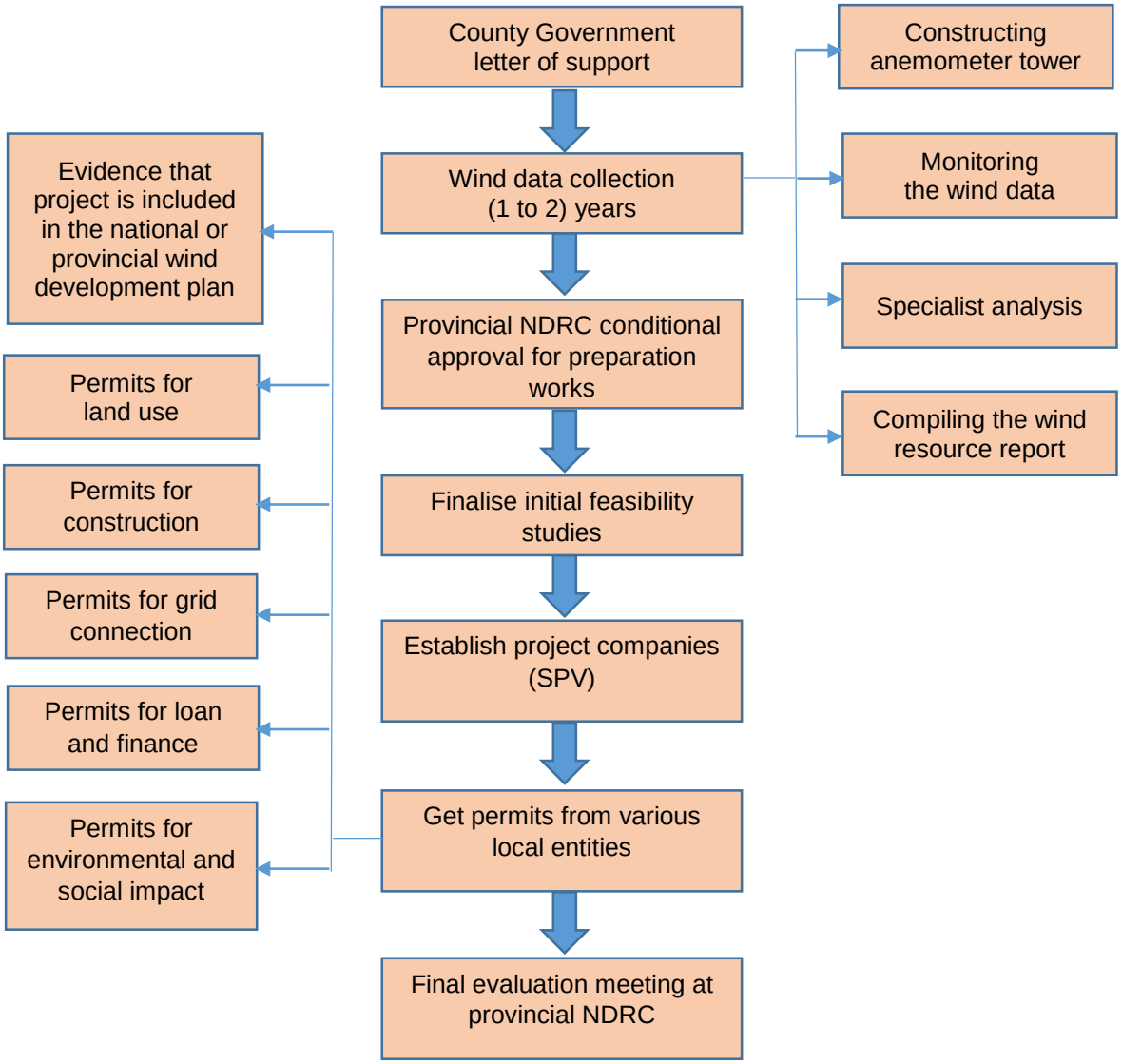
It is estimated that the total overdue subsidy payment for solar investment could be as high as 20bn to 30bn yuan RMB (US$3.2bn to US$4.8bn) in 2015 (China Electricity Council 2015). This is mainly because renewable subsidy is collected as a renewable additional charge from the energy end users, which has become increasingly inadequate due to the fast expansion of renewable activities around the country. Although the MOF as the funding 'manager' has issued several measures (Ministry of Finance 2012, 2015) to ensure payments are collected from end users via the grid companies, the insufficiency is still as high as 50 per cent. Being a central budgeting ministry, the MOF has very limited influence both at the energy supply and energy consumption side (see Section 4 for a detailed explanation). It therefore denies responsibility for the delay in subsidy payments because it believes that the inadequacies of the funding system are far beyond its own control and regulatory power.

The case of delayed subsidy payments underlines a crucial challenge for the NEA-dominated co-governance arrangement – how to properly motivate those supporting ministries since their preferences or administrative power are sometimes contained and overlooked (see Section 4). In addition, most of these supportive ministries do not gain any immediate benefit from a growing market. This challenge is particularly pertinent at the local level where local officers are hugely demotivated if they are excluded from decision-making regarding individual investment activities. One solution is to share the decision-making authority among various institutions both at central and local levels, but such a balancing approach would almost inevitably lead to a very complicated process for renewable project development, as illustrated in Figure 3.2. It is clear that local entities play a significant role in determining the fate of investment activities within their political purview. In the past decade, the consent of both county and provincial-level governments has been a prerequisite for developing any wind or solar farms.

It should be noted that the institutional arrangement for project approvals has been modified several times in the past decade and the current process was legitimised only in 2012. Previously, the NEA decided to retain central control over the power to approve projects because delegating such power to the local governments had led to a disorganised development of project activities before 2010. However, the decision to keep control of project approval in Beijing since 2010 has led to a sharp contraction of the market. This forced the NEA to return approval back to local governments in 2012, as illustrated in Figure 3.2. The struggle between central and local governments regarding project approval rights highlights an issue that has long haunted China's political system, namely that power delegation to local level often leads to market disorder which, in turn, leads to tighter control from Beijing and, consequently, stagnation (一放就乱，一管就死, *meaning* disorder follows delegation, stagnation follows centralisation). A vicious circle of power delegation and power control has been occurring throughout the years of governance. The current decision-making process in the renewable energy sectors indicates a new approach to address this problem. It could be described as a 'centrally coordinated bottom-up' process, where central government still controls the governance functions such as overall planning and target setting, and local governments are given more autonomy to decide each project's fate according to their own preferences. It is believed that this arrangement is playing a central role in reining in the reckless expansion without hurting local enthusiasm for attracting renewable investments.

Although the policymaking system of renewable energy projects is both horizontally and vertically fragmented, the core interests shared by the main actors can be noted during the interviews conducted. This is illustrated in the following sections.

Figure 3.2 Key stages for wind farm project approval



Source: Author's own, based on interviews with wind farm project managers.

4 Developing renewable energy sectors: a common goal out of fragmented interests

The previous section presented the institutional arrangements and decision-making processes for developing renewable energy industries and investment activities. It is clear that in China the development of wind and solar industries is sustained by a coalition including multiple administrative entities at central and local levels, and state-owned and private companies as investors and manufacturers. Consequently, tremendous coordination efforts are needed during the implementation of individual wind or solar project investments. Each party has its own instrumental interests to pursue in wind or solar activities, so making sure everyone gets what they want is crucial for the continuous development of renewable energy industries.

In this section, the various instrumental interests are discussed in detail. Purdon (2015) points out that in the climate governance domain, various interests are often reflected in the tensions between political and economic objectives, and in the trade-offs between long-term and immediate benefits. China's renewable energy industry is a typical example of how these tensions are embedded within the complex governance structures. However, it should be noted that fragmentation of interests in the renewable industries is inevitable because this industry is by nature multipurpose-driven – each actor has only a limited interest in the environmental, political and economic benefits that renewable energy offers. Chinese leaders view renewable energy not just as having climate benefits, but also having multiple strategic values as part of its development. At the outset, as a country that heavily imports energy resources, locally produced energy resources such as wind and solar would enhance China's energy security and energy independence. Geopolitically, it would also help to reduce the competition or friction with other major energy importing countries (Jiang 2006; Salameh 1995; Zweig and Bi 2005). Renewable energy is also believed to be useful in relieving the air pollution problems in many cities around China, where heavy smog has become the biggest worry and source of discontent for many citizens, hence a social problem (Ho and Edmonds 2007). Lastly, renewable energy as a 'sunrise' industry provides comparatively equal opportunities for Chinese companies and technologies to compete with Western companies on the same level. For a country that is desperately upgrading its inefficient industrial system to achieve industrial modernisation, there is a convincing possibility of 'cutting the corner' to catch up with advanced industrial countries thanks to massive investment in this emerging sector (Lema and Lema 2012; Mathews 2007). Therefore, development of the renewable energy sector has tremendous political value for the political leaders in Beijing.

The environmental benefits of renewable energy, by replacing the high-polluting, high-emission fossil fuel system, provide the fundamental drive and strong rationale that government officers need to support its development. Locally produced renewable energy such as wind and solar need no minerals from abroad, and therefore is crucial to relieve China's growing reliance on energy imports, enhancing energy security and independence. For Chinese leaders, the advancement of renewable energy industries would also help the country to claim a commanding position in the global energy future. Economically, investment in wind and solar farms and the development of manufacturing capacity would produce significant economic benefits for the localities that host these activities, often in terms of employment and tax income. As a result, all these pragmatic interests are intertwined in the massive development of the renewable industries.

Many previous studies on China's renewable energy policies or politics have noted the diversity of interests within this sector (Dai 2015). But the analytical focus is often given to understanding the rival interests in the central–local or state–private actor nexus (in other words, it focuses on the contrasted interests along the vertical chain presented in Figure 3.1). This focus arguably overlooks the varied interests among the entities or actor groups at the same horizontal (central, local and business) level, suggesting that actors belonging to the same category would have the same interests. This report argues that central ministries, local regulators or business communities should not be stereotyped as having only a single set of interests. Instead, our field study and interviews reveal that actors within the same horizontal cluster vary significantly in terms of their priorities or preferences regarding renewable energy development. Different regulatory ministries in Beijing may have highly contrasted interests in developing wind or solar energy projects, and similar contrasts can also be found within the local regulatory system and business communities.

Based on the stakeholder interviews and analysis of the policy documents, Table 4.1 aims to present the configuration of major interests and objectives in China's renewable energy and the key actors who are endorsing these interests. It is noted that most of the entities involved in the governance structure and process possess multiple rather than single interests, particularly at the central level. NEA and MIIT officers in Beijing often hold political, economic and environmental objectives simultaneously. This is hardly surprising as most of these ministries have a wide range of duties compared to local regulators and profit-making business organisations. The interests of local or business entities appear to focus on short-term industrial or economic benefits. However, given the highly diversified interests among the key actors, the expansion of renewable energy investment and energy generation capacities emerged as the most popular goal because it meets the multiple interests held by most of the actors (Table 4.1).

Table 4.1 Interests configuration of China's renewable energy sectors

Clusters of long-term interests	Leading role in international climate negotiations	Enhancing energy security and achieving energy independence	Reducing pollution and carbon emissions	Building a world-leading renewable energy technology and manufacturing industry	Boosting wind and solar farms investment for economic growth	Enhancing operational safety and financial viability of renewable energy markets
Short-term interests and goals	Fulfilling China's pledge of achieving 20% non-fossil fuels in energy mix	Reducing energy imports and enhancing locally produced energy	Generating green electricity to substitute fossil fuel power	Nurturing technology and manufacturing leaders; managing production capacity	Encouraging more project investment and manufacturing facilities	Safety of grid operation, relief from financial stress due to heavy subsidies
State Council	↑	↑	↑	↑	↑	↑
NEA of NDRC	↑	↑		↑	↑	↑
MIIT				↑	↑	↑
MOF					↓	↑
MOFCOM				↑		
Provincial leaders					↑	
Local NDRC					↑	↑

(Cont'd).

Table 4.1 (Cont'd).

Clusters of long-term interests	Leading role in international climate negotiations	Enhancing energy security and achieving energy independence	Reducing pollution and carbon emissions	Building a world-leading renewable energy technology and manufacturing industry	Boosting wind and solar farms investment for economic growth	Enhancing operational safety and financial viability of renewable energy markets
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Local MIIT				↑	↑	
Local MOF						↑
Local MOFCOM				↑		
Project investor					↑	
Manufacturers				↑	↑	
Financiers					↑	
Grid companies					↓	↑

At the central level, many key regulatory entities wish to see fast-expanding wind and solar investment activities across the country, because the installed capacity for renewable energy can be a major quantitative indicator of their performance against policymakers in other policy segments. It is also the most direct way of achieving the political target of 20 per cent non-fossil fuel energy in the national energy mix by 2030 at a macro level. As the direct authority, the NEA and its local officers would benefit tremendously if such targets were met. At the micro level, the approval of individual renewable investments also conveys significant bureaucratic power to its officers. The MIIT, as another powerful central institution responsible for supervising industrial activities, also shares this goal with NEA officers because the growth of equipment manufacturing sectors largely depends on the growth of upstream investments in power generation facilities. The only slight difference is that wind energy is a domestic-oriented market from the start (Xu, He and Zhao 2010) so the alliance between turbine manufacturers, wind farm developers and their regulators including the MIIT and NDRC can be traced back for a decade. However, for the solar industry, before 2010 its manufacturing capability had been mainly serving export and overseas markets. Domestic solar farms only emerged after overseas markets slumped in 2011 and 2012, due to several anti-dumping and anti-subsidy investigations and charges brought against Chinese solar products by the EU and the US (Lewis 2014). The State Council and the NDRC introduced ambitious feed-in tariff systems in 2013 to help the domestic market take off (State Council 2013; NDRC 2013a). The sudden shift towards domestic solar capacity expansion also changed the interest configuration within both the policy and business communities tremendously. The interviewees from solar industries indicate that prior to 2012, the MIIT and MOFCOM were their major contacting ministries as they were responsible for manufacturing and trade policy design and making. Now it seems that the NEA has taken over as the leading governing entity of the development of the solar energy industry, both for

macro-level planning and micro-level project approvals, just as it does with the wind energy industry.

> *Since* Shuangfan *[or 双反, meaning the anti-dumping and anti-subsidy charges], our only hope to avoid total collapse of this industry is the fast expansion of the domestic solar market. NEA's planning and supportive policy for this industry, such as annual solar instalment targets and feed-in tariff, determines our survival. How can we ignore them?*
> (Interviewee no. 4, August 2014)

It is noted that the MIIT as the former chief governing entity fully realises the importance of the domestic market for the survival of the manufacturing industries that it supervises, so there is hardly any friction in this power transition from the MIIT to the NEA. However, the MIIT remains the main regulator for the turbine and panels manufacturing facilities, which are a popular interest cluster (Table 4.1). Technology innovation and manufacturing capability are deemed by Chinese leaders to be the crucial objective of developing a world-leading renewable energy sector (Lewis 2013). At the initial stages of market development between 2004 and 2007, protectionists and favourable policies were designed to protect China's newly emerged manufacturing sectors from strong foreign competitors (Lewis 2013; NDRC 2005). However, most of these protectionist policies have been gradually phased out since 2010 after Chinese wind turbine and solar PV manufacturers overtook foreign competitors and dominated the domestic markets.

Today, the priorities of the renewable manufacturing sector are twofold and, in a way, conflicting. On the one hand, according to the policies announced by the MIIT, it aims to cultivate world-leading manufacturers of wind turbines and solar PVs in China (MIIT 2012). On the other, it also aims to curb the over-capacity problems that threaten the future of Chinese renewable manufacturing industries (MIIT 2013, 2014). For example, the overall production capacity of solar PV panels in China is estimated to exceed 43GW in 2015 while the annual global total installed capacity is only around 55GW, including 15GW being installed in China (China Photovoltaic Industry Association 2016). Therefore, it is estimated that more than 50 per cent of production capacities remained idle in 2015, and this over-capacity problem cannot be resolved by domestic investment in solar farms. The significant elimination of existing production capacity is inevitable. However, shutting down the local manufacturing facilities can be politically difficult as local governments are, in general, reluctant to do so for fear of provoking social unrest and economic loss. Even the MIIT's local branches are following their Beijing headquarters' request wholeheartedly for fear of offending their local provincial or municipal leaders, who are their immediate superiors in the hierarchical bureaucratic system. Consequently, the expansion of investment capacity is a more realistic solution – arguably the only solution. Such conflicts are not unusual in China's central–local politics, and the vertical decision chain is jeopardised by local compartmental politics and interests, often referred to as '*tiaokuai*' (条块) in China (Breslin 2007). In the renewable energy sectors, it seems that such vertical-compartment conflicts are obvious in manufacturing, which partly explains why alliances or alignments of interests are achieved more easily around expanding renewable investment where such conflicts are less common.

Another interest cluster that has become increasingly popular among stakeholders relates to the operation and maintenance challenges of wind and solar farms. The massive development of the wind and solar energy sectors in the past few years has produced serious maintenance, coordination and financial problems. First, it has been found hard to connect some renewable energy to the grid. Even where it is, the power generation is often curtailed by the grid companies, mainly due to the limited grid accommodation capacity (NDRC 2013b, 2014). As the curtailment grows each year along with the fast expansion of wind and solar investment across the country, it has become the biggest concern of most

stakeholders interviewed during our field investigation. As one interviewee from the local State Grid Corporation put it:

> *Previously when curtailment happens, we grid companies are often denounced as not supporting clean energy development. But now the consensus has been reached that nothing can be done by the grid companies in the short run, unless large-scale investment is equally poured into the grid infrastructure construction rather than just invest in power generation facilities such as wind and solar farms. But it is difficult because wind and solar farms have government subsidies, so there is a strong commercial interest in it. Grid expansion relies on our own budget allocated by the central state annually. There will always be a gap between commercial investment and state investment.*
> (Interviewee no. 2, August 2014)

Faced by this difficult situation, the State Grid is a hesitant supporter of further expansion of renewable energy production. But it is not the only institution that feels negative side effects of the massive investment in wind and solar farms. Since 2012, the MOF has been appointed by the State Council to become the managing institution of the renewable energy fund, responsible for collecting additional fees from electricity consumers and distributing them to the wind and solar power producers in the form of a subsidy. For most of the wind and solar investors this subsidy payment is 'living stock' because it is the most important source of profitability. Rampant market expansion would inevitably exacerbate the deficiency of the renewable energy fund and further delay subsidy payments. The MOF is therefore arguing for a more sensible development plan for renewable energy investment and a more effective subsidy system for renewable energy investment.

The field investigation also illustrated that besides key actors such as the NEA, MIIT and MOF, other central and local regulators have a rather ambivalent attitude towards most non-economic interests (represented as the blank slots in Table 4.1). For example, as the ministry responsible for foreign trade and overseas investment activities, MOFCOM's major interest is to resolve the trade dispute with other countries so that foreign markets can be reopened to Chinese exporters. Hence, developing domestic markets, either through manufacturing, power generation or operational maintenance, has little relevance for MOFCOM's core interests. In addition, since no environmental or climate regulators are involved at any level of the governance system in the renewable energy sectors, there is an obvious under-representation of pro-environment and pro-climate interests across all layers of the current governance system, even though the renewable industry is presumably aimed at addressing environmental issues first and foremost. Our field investigation indicates that none of the entities, probably with the exception of the State Council at the top of the decision chain, are promoting renewable energy activities specifically for these activities' environmental benefits. This is in sharp contrast to the popularity of economic benefits, particularly through the massive scale of investment in wind and solar farms, which are endorsed by the majority of the entities across the levels.

The interest analysis reveals several insights. First, multiple interests exist among various actors, meaning that most of the actors involved in the renewable energy development are not necessarily climate or environmentally conscious but are looking for instrumental benefits from the market or industrial development. Second, the fragmentation of interests may not be a hindrance for rapid market development, as long as each party gets what it wants during the process. The rapid expansion of large-scale wind and solar farms allows central governments to meet their target and outperform their regulatory competitors; it promises profit returns for the investors; provides new and lifesaving business opportunities for manufacturers; and helps local governments in remote areas to develop their economies. Killing several birds with one stone is the reason behind China's phenomenal expansion of renewable energy industries. However, this is not to say that there are no conflicting

interests within these fragmented interest clusters; particularly, the rising difficulties of connecting to the grid represent a popular new concern that, as many key actors are convinced, needs to be addressed as a priority. It is argued that such conflicts, along with a number of external shocks, are changing the policy agenda and actors' preferences in China's renewable energy sectors tremendously.

5 The changing contexts for renewable energy development since 2014

So far, we have shown how the institutional arrangements and interest configurations of the previous era emerged from the rapid renewable energy development of the past decade. This development era is characterised as an emerging policy coalition with diversified interests but a synergised policy priority of expanding power generation capacities via large-scale wind and solar farms. However, this coalition and its policy priority have been undermined by a series of external and internal shocks.

5.1 A slowing economy and dwindling energy demand

The biggest external shock is China's economy, which has been running out of steam since 2014. After 30 years of stunning economic growth, the pace of economic development has decelerated from an annual growth rate of more than 10 per cent before 2008 to around 7 per cent until recently. The slowing economy, often officially referred to as a 'new normal' ('*xinchangtai'* or 新常态) after President Xi came into power in 2013, is prompting many structural changes within society. One is a sharp drop in demand for electricity due to weaker production activities of heavy industries such as coal, cement, steel and metallurgy. In 2014, the annual total energy consumption increased only by 3.8 per cent, a record low since 1998. In the first three quarters of 2015, this figure continued to fall to 0.8 per cent. The annual increase in energy consumption is estimated at below 1 per cent, a record low since 1974. In the meantime, the total newly installed power generation capacity increased by 9.4 per cent. The accumulation speed on the supply side far exceeds the demand side. As a result, the average utilisation hours for electricity generation facilities in the power plants fell from 2,972 hours to 2,740 hours, indicating that a large amount of power generation capacity is falling idle compared to the previous year. A severe over-supply issue is emerging among China's state-owned power utilities, which is changing the interest configuration of China's energy system tremendously, including the wind and solar energy segments.

As previously explained, over the past two decades, China's renewable sector has developed in a rather enclosed sub-political system and this development remains largely undisturbed by the traditional fossil fuel-dominant energy system. This was mainly because the fast-growing demand of electricity to fuel the red-hot economy required all forms of energy supply regardless of its origin. One of the unique points of China's renewable energy development is the lack of resistance and harassment from the so-called 'electricity incumbents' of traditional energy industries or policy communities often found in other fossil fuel-dominant countries (Baker 2015; Baker, Newell and Phillips 2014). In general, renewable energy did not develop at the expense of fossil fuel energy and that is the real reason why these newly emergent energy sources developed in such a peaceful and enthusiastic way. Yet the political climate surrounding the incumbent fossil fuel power generation disappeared when energy demand hit a ceiling. The peaceful co-existence of the previous era is now being replaced by emerging competition and energy over-supply due to the economic downturn. As one interviewed wind farm developer said anxiously:

> *In the past, although on the surface renewables and thermal power stations were developing in parallel, in reality we all knew renewables were dependent on thermal or even in a way at its mercy. By law [Renewable Energy Law enacted in 2005], most of the state-owned utilities have a renewable energy quota that they have to meet in order to build up more thermal power stations. Therefore it is fair to say that without the development of thermal power sectors there will be no renewables development.* (Interviewee no. 12, December 2015)

But besides fossil fuel energy incumbents, there are other competitors from the non-fossil fuel segments, particularly from the nuclear energy sector. China's ambition to develop this sector was thwarted by the Fukushima accident in 2011, but it regained its momentum in 2014. China is currently the largest constructor of nuclear reactors in the world, with total capacities under construction of 28.5GW in 2015. Most of these projects will be completed around 2020, achieving 60GW generation capacity by then (Guo and Guo 2016; Zeng *et al.* 2016). Besides massive construction of nuclear reactors, the discourse around nuclear energy has been significantly elevated, describing it as a form of clean energy that is crucial for economic development, enhancing the energy mix, and improving people's living standards. Such discourse is surprisingly identical to that previously developed to promote wind and solar energies. The State Council and other government entities are increasingly endorsing such discourse, showing their commitment to supporting this industry. The strong emergence of the nuclear industry will almost inevitably further reduce the space for renewable energy in years to come.

In general, since the beginning of economic reform in the early 1980s, the shortage of energy supply to power the fast-growing economy has been a major worry for Chinese leaders and energy regulators. All the regulatory priorities and institutional arrangements were therefore designed to guarantee the energy supply and avoid power shortages. Now, for the first time, this major challenge is largely resolved, making it inevitable that shrinking energy demand will force a rebalancing of interests among the various energy sources. This in turn will eventually shape the institutions around energy governance, including renewable energies.

5.2 Over-capacity and curtailments in renewable energy sectors

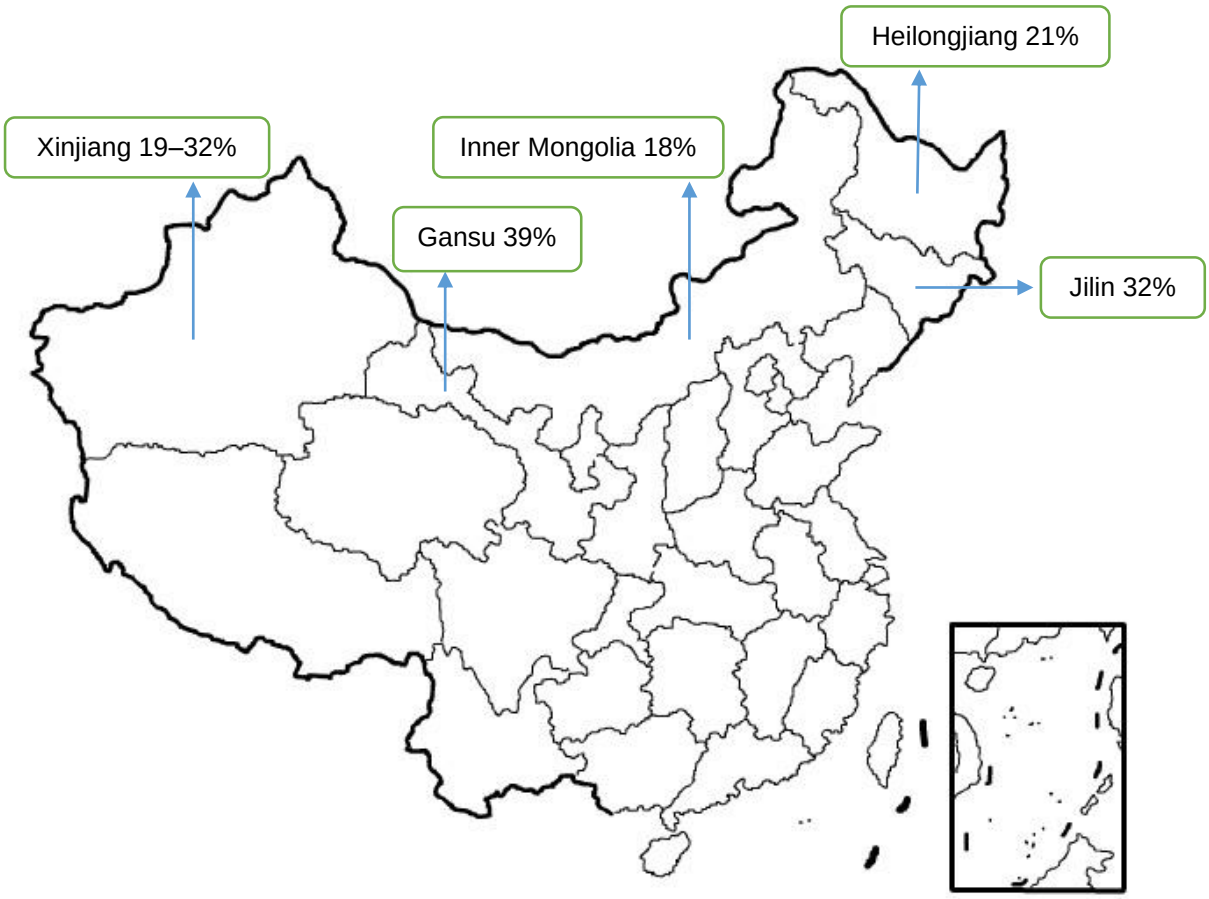
The increasing competition between different sources of the energy supply has exacerbated the problem of curtailments on wind and solar energy production in 2014 and 2015. This is because grid companies often prefer thermal and other forms of energy output to be connected to the networks. According to the NEA, the average operational hour for wind turbines hit a record low of 1,728 hours/year in 2015 (world average is 3,000 hours/year), and 15 per cent of the wind capacities were forced to remain idle (NEA 2015b). In some northern provinces like Jilin, Xijiang and Gansu, the grid curtailed more than 30 per cent of the capacities (Figure 5.1). These forced curtailments have become the biggest threat to the survival of the wind energy sector.

Previously, curtailments were mainly regarded as a technological issue. The development speed of wind and solar farms outpaced the development speed of the grid connection and accommodation capacity, so grid companies were not capable of taking large amounts of wind and solar energies into the grid system. However, the field investigation reveals that there are more deeply rooted political causes for these curtailments. At the heart of the problem is a divergence of political interests and understanding among the stakeholders regarding the environmental, political and economic values of renewable energy. In past decades, encouraged by the Renewable Energy Law and other favourable policies, local government treated renewable energy activities as a new engine for economic growth, while companies tried to seize the opportunity to grab the renewable resources and the early market entrant advantage for future competition. The result, as illustrated in the previous sections, was the swift concentration of interests towards the short-term economic value of investing in renewable energy projects. As many previous studies on China's renewable energy policies and politics have shown, various forms of government support are believed to have been the major factor for China achieving such stunning growth in its renewable energy sectors (Lewis 2013).

However, this research suggests there were some side effects to relentless government support, particularly those measures driven purely by short-term economic benefits at the

local level. In many local provinces it has been found that local government gave the land for project construction to project developers for free, that income tax from the projects was generously exempted, and that all the local regulatory supervision was carried out in a slack manner only to attract more investment into the locality. These 'supportive' measures distorted the market and price signals of renewable energy investment and created a significant over-capacity problem, which eventually sparked an unprecedented slew of curtailments and output controls on wind and solar energy.

Figure 5.1 The curtailments of wind energy production in 2015



Source: Author's own, based on data from NEA (2015a).

The worsening situation since 2014 indicates that the problems are far more complicated than just an overheated market. It is increasingly clear that local governments, once so fervent in promoting investment activities in the renewable energy sectors, are turning their backs now the crisis has come. Some local governments give preference to rescuing thermal power, which often represents larger economic and social benefits, such as employment and turnovers, than wind and solar farms. Some provinces such as Yunnan, Gansu and Xinjiang even issued measures to request that part of profits be transferred from renewable energy project owners to thermal power stations, if they want to maintain their connection to the grid. Such local measures obviously conflict with the Renewable Energy Law which requires that all power generation by renewable energy facilities is purchased unconditionally by the grid companies.

> *Before you invest, they [the local governments] gave you all sorts of promises: land, tax free, clearances and permits, etc. But when your investment got underway, you were then told that they would not help you selling the electricity – worse than that,*

> *you have to give way to fossil fuel power, which is essentially violating the Renewable Energy Law which guarantees the priority status of renewable energy to be purchased.*
> (Interviewee no. 8, December 2014)

One interviewee from the wind industry associations referred to these newly emergent local pro-thermal measures as a 'stabbing in the back', but admitted that this could be just the beginning as the energy over-supply has become a 'new normal'.

5.3 Electricity reform

Since 2014, Chinese central government decided to advance the long-halted electricity reform. The State Council issued guidelines in March 2015 as a landmark policy to kick off the reforms (State Council 2015). The fundamental objective of this round of electricity reform is to break up the monopolistic status of grid companies whose responsibility extends from transportation and distribution to the sales of electricity to all the industrial, commercial and household users across the country. In 2013, the overall income of China's grid companies account for 3.6 per cent of total gross domestic product (GDP) (*Financial Times China* 2014), making it a mammoth entity and interest group that could deter marketised price reform of electricity over the past decade. The immediate goal of the new reform is to open up the electricity sales market for other companies so that they can purchase energy directly from the energy producers and sell it to the energy end-users.

It is obvious that such reform would take years to be implemented due to its complexity and possible strong resistance from existing interest groups. But it will surely have a mixed impact on the development of renewable energy industries. The marketised price system is theoretically in favour of renewable energy as government subsidy would make renewable electricity more competitive in comparison with fossil fuel electricity. However, the notorious overdue payment of government subsidies may in reality significantly demotivate power purchasing entities from buying electricity from renewable power generation facilities. Therefore, new mechanisms for renewable subsidy and fund collection are crucial to maintain renewable energy's competitiveness. Previously, grid companies collected all of the additional renewable charges from energy end-users and handed them over to the MOF, which was responsible for distribution to the renewable energy producers. This system is highly inefficient and time-consuming. If the subsidy can be collected directly by the energy purchaser from the energy end-users then the competitiveness of renewable energies will be significantly enhanced ahead of other non-subsidised energy sources. On the contrary, if the subsidy has to be collected and redistributed via government agencies then the high transaction cost and bureaucratic risks would put renewable energies in a highly disadvantaged position.

The reform would also encourage the development of a distributed solar and wind energy system and locally consumed renewable energy facilities. Since 2013, how to promote the distributed solar power system has become a big challenge for Chinese regulators. Although various policies are designed to promote this segment, the progress made by the distributed solar system has been far below the development trajectory forecast for the past few years (NEA 2013a, 2014a; Shen 2016). One of the reasons for the slow progress is that major stakeholders, such as state utilities, banks or grid companies, are largely reluctant to develop distributed projects due to the minimum economic benefits associated with them. However, the reforms may allow surplus power from the distributed system to be sold to the independent power purchasing entities rather than to the grid companies. This would significantly reduce the transaction cost, as locally based power purchasers could take the surplus energy and resell it to local end-users through local distribution channels via the local grid. In the long run, such a local community-based energy system would be much more efficient than the current centrally planned transmission and distribution system, which

relies on very costly super high-voltage and long-distance transmission lines. A flexible and localised energy system will surely enhance the competitiveness of renewables, which will be explained in detail in the next sections.

6 Recent policy changes and the future of Chinese renewable energy sectors

In the previous section, the exogenous factors are shown to illustrate the fundamental economic and political changes in the environment surrounding renewable energy industries. The slowing down of economic growth since 2014, the worsening over-capacity problems and the intensified competition among all forms of energy supply, plus the uncertainties associated with the ongoing electricity reforms, present unprecedented challenges for the future development of the renewable energy industries. It is noted that these exogenous shocks have sparked a number of internal struggles that pave the way for necessary policy adjustment and changes. Since 2014, the policy paradigms of renewable energy development have been undergoing significant changes as a consequence of these exogenous shocks.

6.1 A contested paradigm shift

At the outset, it is noted that there has been a gradual lessening of emphasis on the continuous expansion of renewable energy capacity in the energy mix. Capacity expansion is known as the most important policy goal and popular interest shared by most of the stakeholders in the past decade. Before 2014, most of the wind and solar policies were designed to meet the quantitative annual instalment target set by the NEA. The interviews with the wind and solar farm investors indicate that most of these companies are also using annual instalment capacity, instead of other common indicators for profit-oriented business such as investment returns or profitability, as their most important criteria to evaluate their business performance. This is often referred to by the interviewees as the 'bigger the better' strategy. But it has been gradually replaced as policymakers realised that the size of the market or the share of renewables in the energy mix is no longer the most crucial factor for future development. It is noted that for wind energy development the quantitative targets for annual instalment have become increasingly less important since 2012, and in 2015, they were completely removed from policy planning. In fact, most of the policies are addressing the issues of over-capacity, project maintenance, subsidy payment and grid connections. In the solar energy sector, although the quantitative target remains (17.8GW in 2015), the policy objective has been shifted to focus on promoting the distributed solar system instead of the large-scale grid-connected solar farms. For example, new policies prescribed a ceiling capacity for each province to develop large-scale solar farms, and some provinces with severe curtailments are no longer allowed to initiate new facilities, unless they are distributed and the produced energy can be locally consumed (NEA 2013b, 2015b).

In a more recent policy, the NDRC, as the NEA's parent institution, requires all the local provinces to work out a detailed plan to accommodate and consume locally produced renewable energies and avoid long-term transmission (NDRC 2015b). In 2016, the NEA also issued a new policy to guarantee the priority of renewable energies to be fully purchased and connected (NEA 2016). These policies convey a strong message of a paradigm shift to focus more on the actual difficulties of renewable energy generation and consumption, as one officer from the NEA reveals during the interviews that such difficulties are most likely to affect the competitiveness of renewable energy compared to other energy sources.

> *Previously it was generally accepted that a bigger market share meant stronger industry and bargaining power in the energy system. Such a concept needs to be changed now because if the capacities cannot be turned into consumable electricity, then the whole (renewable) industry will become an easy target for criticism of*

> *wasting resources and lacking an actual contribution to the national low-carbon transformation. If such an understanding prevails, renewable energy will lose its core competitiveness.*
> (Interviewee no. 10, December 2015)

The need to shift the policy paradigm to address the increasing problems of wind and solar curtailments can be viewed as the internal driver for policy change. One of the solutions to solve the over-capacities and curtailment crisis is to promote the distributed renewable energy generation system as a major deviation from previous policy emphasis on grid-connected large-scale wind and solar farms. Regulators have welcomed this approach. Since 2014, several important policies were issued to show the NEA's determination to promote the distributed renewable energy system as the main area for policy support (NEA 2014b, 2015b). While trying to slow down the development pace of grid-connected wind and solar farms in areas where curtailments are rampant, central regulators are openly encouraging distributed systems. More favourable subsidy programmes were launched and ambitious targets were announced. However, these policy efforts received very limited sympathy from business communities and local governments. In 2014, the NEA announced an ambitious target of 8GW of distributed solar energy capacity to be installed, with only around 2GW actually installed. It is believed that this figure may be exaggerated (China Energy News 2015).

The reason why the distributed system cannot be as swiftly expanded as previously grid-connected wind and solar farms is mainly because the economic return for the distributed system is very limited and uncertain. Not only is the overall size of each distributed project considerably smaller, but there are also high transaction costs associated with 'rooftop' solar systems or small-scale projects. For example, the ownership of the rooftop and revenue-sharing mechanism for large apartment buildings, the complicated financial model, and connection difficulties are major concerns that frustrate many investors. One small factory owner in Hebei expressed his disappointment during the interview and explained how his enthusiasm for the rooftop solar system finally wore out.

> *We thought it was a good idea [rooftop solar energy system] because the subsidy seems to be lucrative and we are a heavy energy user. But once we talked to the local grid companies, their managers were not at all interested and were trying to push us away or simply not responding to our requests. Then it was the banks. We went to several banks to talk about the possible financial arrangement. Again no response. We had to give it up.*
> (Interviewee no. 6, August 2015)

Banks, grid companies and local governments were previously united under the banner of renewable energy development for instrumental interests. But now these interests cannot be delivered by distributional systems. Consequently the indifference and uncooperative attitude of these entities is undermining the progress of the market, even though it has strong support from the central regulators. Local 'street-level bureaucrats' are effectively deterring favourable policies because they see no benefits in implementing them. The policy paradigm shift from a capacity-led development pattern to a more distributed and flexible system is consequently a highly contested one. Some actors such as local governments are reluctant to accept the changing policy priority and have shifted their attitude towards renewables as explained in previous sections. Another factor that drives local officers to support fossil fuel sectors are social stability concerns – there is a massive workforce that will need to be downsized due to the energy over-supply. The 13th Five-Year Plan estimated that more than 1.5 million workers in the coal industry would be made redundant between 2016 and 2018. In order to make this transition less painful, many local governments are trying to enhance the performance of thermal power stations to avoid a drastic shut-down of coal production. This would also put renewable energy in a disadvantaged position as social

stability is the paramount political priority for the Chinese Communist Party and its officials at all levels.

But local officers are not the only group to shy away from the distributed system. It has been particularly difficult to get financial support from lending institutions for distributed solar systems. The grid companies, who once declared their dedicated support for renewable energy development, are also found to lack the incentive to address the local energy consumption and accommodation challenges presented by the distributed system as requested by the NEA and other central entities. Local government, financial institutions and grid companies are typical peripheral actors in China's renewable energy subsystem who have gained tremendous power in the wake of the external economic shocks. This is largely because these actors by nature cut across various energy subsystems and governance structures. With the various energy sources competing with each other for local support, financial loans and priority connection to the grid, these actors have become crucial gatekeepers. In fact, most of these actors never give preferential treatment to renewable energy projects. Although most local governments showed great enthusiasm for attracting and supporting renewable energy investment, it is believed that other forms of investment are equally supported due to the entrepreneurial nature of local government in China (Dickson 2008; Oi 1995). As for the banks, interviews with project investors suggested that they are not getting discounted financial loans from banks for renewable energy projects. Crucial lending criteria such as the interest rate, tenure of the loan and collaterals are the same as for other energy projects.

The grid companies have the most ambivalent attitude. They have had a long and complicated relationship with the renewable energy policy community in the past decade. However, once thermal energy suppliers faced a surplus, they started to lobby the grid companies to maintain their priority connection to the grid. On the surface, it seems that the grid companies are trying to keep a balance between renewable energy and fossil fuel energy, because the provinces that experienced the most severe curtailments on renewable energy production are simultaneously seeing significant reductions of thermal power outputs. This suggests that grid companies are reluctant to prioritise either energy source and are currently attempting to strike a balance. However, under the Renewable Energy Law and other NEA policies, renewable energy should be given priority. The grid companies have already violated many regulatory requirements with this practice, which demonstrates both where their preferences lie and their ability to deter policies.

6.2 The rise of new political spaces

The previous section argues that the coalition that was organised around instrumental interests is falling apart, making the outlook for the paradigm shift uncertain. In addition, the old political spaces that once allowed peaceful development of renewable energies are diminishing due to intensifying competition from other energy sources. However, there are notable new political spaces emerging for renewable energy development. As a nascent policy subsystem, renewable energy needs to attract powerful peripheral actors by offering the possibility of meeting pragmatic or instrumental interests. This approach, described as an interests-bundling process by some researchers, is believed to be the major reason for a booming market and installed wind and solar capacity in the past decade (Harrison and Kostka 2013).

But the side effects of the approach of over-emphasising the economic purposes of renewable energy development in the past decade have also become obvious over the past few years, with the frequent curtailments and severe subsidy shortages. Perhaps the most serious side effect has been that renewable energy's unique contribution to decarbonise China's energy system has been downplayed.

Addressing the climate change crisis is the ultimate premise to develop renewable energy industries. Decarbonisation is the fundamental rationale for designing a proper government subsidy system and a supportive policy mix to help the renewable industries compete with fossil fuel industries. But in the previous decade, without direct confrontation or competition from the fossil fuel incumbents in China, low-carbon ideologies and beliefs have played a very limited role in promoting renewable energy development. However, in the new era where energy shortages are no longer the biggest challenge for China's energy system, the top priority for energy policies will be shifted to the task of decarbonisation, hence opening up new political spaces for renewables to grow in the future. Yet, it should be noted that in China renewable energy is not the only segment that is claiming a clean energy label. Other non-fossil fuel energy segments such as nuclear power are also highlighting their contribution towards decarbonising the energy system by providing clean energy sources (State Council 2015; China Daily 2016). Consequently, how to maintain the 'moral high ground' is an urgent task for renewable energies. The future development of renewable energy, as the smallest segment in the current energy mix, largely depends on the solidarity of core values among the key public and private policy actors, rather than the instrumental interests that once played a vital role in the previous era.

The 13th Five-Year Plan published in March 2016 has sent some positive signals about this transformation, claiming as it does that building up a clean and low-carbon energy system is a top priority between 2016 and 2020. It also announced that the previous core conflict between energy shortage and economic development has been largely resolved, and in the next stage of energy modernisation the core conflict is becoming the low-emission and high-emission energy segments. Such a statement indicates that at least top state regulators in Beijing have realised a new era has begun and that there is a need for a paradigm shift to decarbonise China's energy system. The challenge, however, is to nurture these beliefs among a wide range of stakeholders that might be reluctant to change the current paradigm – a much more complicated task than combining instrumental interests.

7 Conclusion

This report has investigated the rise of a new policy paradigm in China's renewable energy sectors. It firstly presents the institutional arrangements and decision-making processes in the previous era, which are characterised by a vertically and horizontally connected policy coalition comprised of a wide range of central, local, private and public actors. At that time, promoting renewable energy production capacity in the national energy mix was the top policy priority as it accorded with coalition members' various instrumental interests. The economic returns or instrumental benefits of renewable energy investment attracted local governments, financial institutions and grid companies to support the newly emergent energy segment. This strategy created a tremendous push of renewable energy activities across the country, making China the largest investor in renewable energy production since 2010 (IEA 2015).

Yet the era of capacity expansion came to an end due largely to a series of exogenous factors and internal struggles, resulting in notable policy changes. Since 2014, when faced with a sudden economic slowdown and withering energy demand, the policy priority in the renewable energy sector shifted from pursuing renewable capacity expansion to dealing with over-capacity and curtailment problems. However, such policy changes have not been fully welcomed by local governments, banks and grid companies. These actors are withdrawing their support from renewable energies as the instrumental interests brought by the renewable investments appear to be waning. The split among the previous coalition is fundamental, as the instrumental benefits that once drove spectacular growth in China's renewable energy sectors no longer hold the coalition together.

The new era of China's renewable energy development therefore requires a paradigm shift to address the problems from the previous era and focus on the value system that can open up new political spaces by tackling climate change, air pollution and energy security challenges in China. This paradigm shift replaces the previous policy priority that centred on instrumental interests or short-term benefits and it will help renewable energies to survive the challenges from other energy sources including nuclear, thermal and hydro power stations. The recent policy before and after the 13th Five-Year Plan has already demonstrated the intention to prioritise renewable energy's low-carbon benefits, but promoting and synergising decarbonisation values among policy and private actors will be a much more difficult task than the 'interests-bundling' process (Harrison and Kostka 2013). Whether and how the renewable energy sector can continuously grow and contribute substantially to reaching the non-fossil fuel targets in China's energy mix (15 per cent in 2020 and 20 per cent in 2030), remains contentious at present.

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