



Journal of Current Chinese Affairs

China aktuell

Korsnes, Marius (2014), Fragmentation, Centralisation and Policy Learning: An Example from China's Wind Industry, in: *Journal of Current Chinese Affairs*, 43, 3, 175–205.

URN: <http://nbn-resolving.org/urn/resolver.pl?urn:nbn:de:gbv:18-4-7730>

ISSN: 1868-4874 (online), ISSN: 1868-1026 (print)

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Published by

GIGA German Institute of Global and Area Studies, Institute of Asian Studies in cooperation with the National Institute of Chinese Studies, White Rose East Asia Centre at the Universities of Leeds and Sheffield and Hamburg University Press.

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Fragmentation, Centralisation and Policy Learning: An Example from China's Wind Industry

Marius KORSNES

Abstract: This paper seeks to understand what government mechanisms have allowed China's wind industry to grow as fast as it has over the past ten years. Instead of formal rules and regulations, this paper focuses on specific sets of institutional conditions that have been crucial in the process of high-speed implementation of wind energy in China. Specifically, fragmentation and centralisation, together with policy experimentation and policy learning, have been fundamental for policy flexibility and institutional adaptability. The paper illustrates that there are benefits and disadvantages to these characteristics, and that inherent qualities of China's governing system that lead to rapid growth overlap with those that lead to challenges in terms of quality and long-term performance.

■ Manuscript received 25 February 2014; accepted 1 July 2014

Keywords: China, policy experimentation, renewable energy policy, governance

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Introduction

China's development of renewable energy technologies over the past ten years can be considered the start of a renewable energy journey. Since 80 per cent of China's electricity generation is fuelled by fossil fuels and electricity consumption is increasing rapidly (EIA 2014), the question arises of whether the People's Republic will be able to sustain the increasing energy needs of its citizens without causing irrevocable environmental damage. China's wind industry has grown from 0.8 gigawatt (GW) installed capacity in 2004 to 91 GW as of the beginning of 2014 (Li et al. 2007; GWEC 2014). This represents a velocity of capacity development never before witnessed, and has involved the coordination of interests and an alignment of institutions on a massive scale. The growth has led to many challenges, such as uncertainties over the long-term performance of Chinese turbines, transmission constraints for remote regions, lack of qualified personnel and delays in connecting wind farms to the electrical grid (Martinot 2010). Several reports and studies agree that these challenges have arisen due to a lack of coordination between stakeholders in China's wind turbine industry (e.g. Jiang 2011; Luo, Zhi, and Zhang 2012; REN21 2009; Zhang et al. 2009). Nevertheless, we still lack a detailed understanding of the governing mechanisms behind the rapid growth of the wind industry.

This paper argues that a specific set of institutional conditions has been crucial for the high-speed implementation of renewable energy. "Institutions", in this paper, refers not to government bodies, but to forces – regulations, norms and heuristics – that structure and coordinate human activity. Fragmentation and centralisation, together with policy experimentation and policy learning, have been fundamental for policy flexibility and institutional adaptability. Building on the work of Lema and Ruby (2007), who conclude that coordination has been important for the growth of China's wind industry, this study looks at the processes that have led to coordination, including experimentation and scaling up. Also covering the period of 2011 to 2014, a time with slower growth, I present evidence that coordination and fragmentation are mechanisms the government takes advantage of to control industry growth. These features make China's energy governance system highly flexible and adaptive, enabling and constraining growth according to policy preferences, but the same fea-

tures have also led to the considerable challenges the industry is facing.

Several recent works have addressed the relationship between institutions and renewable energy implementation in China. Some have provided general overviews and updates (e.g. Martinot and Li 2007, 2010), some have looked specifically at the policy regime and institutions (Cherni and Kentish 2007; García 2011, 2013; Schuman and Lin 2012; Wang 2007; Zhang, Andrews-Speed, and Zhao 2013) and some have looked at innovation and technology transfer (e.g. Gosens and Lu 2013; Huang et al. 2012; Klagge, Liu, and Campos Silva 2012; Lewis 2013; Ru et al. 2012; Urban, Nordensvärd, and Zhou 2012; Zhou et al. 2012). Most of these studies highlight the explosive development of China's wind industry and the considerable challenges this has led to. Certain notable exceptions look at the institutional mechanisms on a level deeper than the formal laws (i.e. Lema and Ruby 2007; Mah and Hills 2014), but few studies show how the same institutional framework has inherent advantages and disadvantages vis-à-vis the development of the wind industry. Implementing legislation is a craft, and China's achievement of growing the largest wind turbine industry in the world in only ten years cannot simply be reduced to a set of laws. In taking a broader institutional approach, this paper seeks to understand what institutional traits beyond the formal laws and regulations have induced the rapid growth of China's wind power industry.

The paper proceeds as follows: First I summarise the most relevant approaches to China's institutions and governance. I then introduce the methodology and proceed to give a brief overview of China's wind power policy framework and development over the last ten years. I then introduce aspects of fragmentation and policy learning that have benefitted the industry, and address the aspects of authoritarianism that have likewise benefitted the industry. Finally, I discuss the findings, evaluate the usefulness of this institutional approach in understanding China's rapid wind industry development and draw conclusions.

Institutions and Governance in China

Flexibility, Learning and Policy Experiments

This paper examines the development of the wind energy industry in China in light of recent theoretical contributions on Chinese governance, and it deliberately avoids using theories developed in a non-Chinese setting. I believe, as found by, for instance, Heilmann and Perry (2011), that Chinese institutions are unique and need be studied on their own terms. Scholarly discussions of governance and politics in China often revolve around tensions between centralisation and decentralisation, plan and market, local and national levels, rural and urban environments, or industrial and agricultural settings (Dittmer and Liu 2006; Fewsmith 2010; Lieberthal 2004; Saich 2011). Observing similar tensions in China's energy sector in the 1980s, Lieberthal and Oksenberg (1988) developed the highly influential concept of "fragmented authoritarianism". Their main conclusion was that the energy policy process is protracted, disjointed and incremental. Furthermore, the fragmentation of authority creates inter-ministerial competition and disjointed policymaking, because respective ministries have a similar level of authority, but disparate goals. This means that any policy initiative or major project "need[s] to acquire the active cooperation of many bureaucratic units that are themselves nested in distinct chains of authority" (Lieberthal and Oksenberg 1988: 22). Despite the fragmentation, the very top of the Chinese political system is authoritarian and able to push through directives (Lieberthal and Lampton 1992).

Since Lieberthal and Oksenberg's thesis was developed, it has been increasingly acknowledged that flexibility, learning and adaptation have been central to China's massive transition process, and China scholars have put more emphasis on institutional capacities. For instance, Dulbecco and Renard argue that China's economic success resides in reconciling

the permanency of a well-established institutional order required for the coordination of individual plans, and the flexibility of institutions necessary for the move towards the market (Dulbecco and Renard 2003: 328).

Gu and Lundvall (2006) highlight the importance of policy learning for China's innovation performance and emphasise the benefits of a

simultaneously centralised and decentralised system. Recently, Heilmann and Perry (2011) termed China's governing method a "guerrilla policy style" – with reference to the governing methods adopted during Mao's reign – which explains how Chinese governing institutions have been able to manage sudden change and uncertainty throughout the decades.

Heilmann (2008a, 2008b, 2009) coined the concept of "experimentation under hierarchy" to describe the process by which China's institutional structure has innovated and adapted alongside large-scale economic change. Heilmann (2008b: 3) writes that this adaptability is due to a practice of policy experimentation in China that "precedes the enactment of many national policies". In short, he explains that policy experimentation, by delegating responsibility to local officials, "reduced the frictions and delays characteristic of top-level consensus-building and interagency accommodation, and helped to avoid protracted policy deadlock" (Heilmann 2008b: 21). By starting with a smaller policy area, and scaling up only when successful, policy experimentation was a useful way to gain consensus amongst top-level politicians, since it entailed placing the policy burden on local governments and attributing the national success to the given policy (Heilmann 2008b). This experimentation can therefore be considered one way in which the fragmentation of authority is lessened.

Moreover, policy experiments are initiated not only from the top down in China: Andrews-Speed points out that "fragmentation has allowed for *local policy initiatives*, some of which have been successful and have then been taken up by the central government" (Andrews-Speed 2012: 13, emphasis added). Some policies have therefore been introduced from the bottom up. Wang (2009) argues that experimental government policy, experience and practice have been important for fine-tuning China's policy machinery. Grassroots practices, in particular, have been an important source of policy learning for the central government. Fischer (2010) argues that a combination of top-down and bottom-up policies may be the best approach for sustainability transitions, especially with reference to rapidly changing institutions. At their base, most accounts of China's institutional flexibility are notions of learning and adaptation – crucial for any kind of rapid change. These notions provide a useful background to understanding governance in China, and as will become evident in the following sections of this paper, fragmentation, learning and adaptation

are concepts that resonate well with the analysis of China's wind industry.

Energy Governance in China and the Portfolio Approach

Governance of the energy sector is high-level politics in China. Li (2013) points out that all the members of China's newly elected Politburo Standing Committee, as well as several previous members, have important links to the energy sector. Many of them have either made a political career through the oil and gas industry, or have been CEOs of some of China's largest oil companies. The Chinese Communist Party (CCP) is the glue that changes and dictates the direction of development (Andrews-Speed 2011). Contrary to common perceptions, China's energy governance is not strictly organised from the top down. The perception that China, with an authoritarian government, both knows and easily gets what it wants has been challenged over the past decade (Cunningham 2010; Downs 2008; Kong 2009). Energy decisions are highly politicised in China because they involve many different actors with diverging interests and objectives. This has led to a state of affairs where there is

a "leadership vacuum" in China over energy policy and many decisions are driven by projects promoted by localities or industries rather than being guided by a coherent national energy policy (Kong 2009: 791).

Therefore, a change in energy policy amongst top-level leadership does not necessarily equate to smooth implementation throughout the system. Implementation can be constrained by vague or contradictory formulation of regulations, or because local government officials prioritise economic growth at the expense the environment (Meidan, Andrews-Speed, and Xin 2009). Thus, even though power is "centralised", this does not mean that it is concentrated in the centre.

The most important body regulating wind energy policy centrally in China is the National Development and Reform Commission (NDRC). Within the NDRC, the National Energy Administration (NEA) is responsible for developing and implementing renewable energy policies, but the administration is too heavily understaffed to be completely on top of emerging developments (Downs 2008; Anonymous 3 2011). Provincial governments also have their own

Development and Reform Commissions that develop and implement local policies, sometimes in conflict with policies developed centrally (Mah and Hills 2014). Other important government actors are the “big five” state-owned power generation companies, and the two grid companies State Grid and Southern Grid. The grid companies and the “big five” have much influence in terms of what projects are developed and where, and often pursue their own agendas (Andrews-Speed 2012; Rosen and Houser 2007).

Fragmentation prevails in China's energy sector, but Cunningham's (2009) seminal research shows how the government uses liberalisation and consolidation as a means to control the growth in the coal and electric power industries, in what he terms a “portfolio approach to energy governance”. Cunningham finds that central ownership of the electric power industry has fluctuated over time, demonstrating less regulation in times of electricity supply shortage, and more in times of sufficient electricity supply. This has led to alternating periods of rapid expansion and contraction. Indeed, an alternating wave of consolidation and liberalisation has, over time, characterised China's electric power facilities, depending on the central government's concern at the moment. As we shall see below, something similar can be said about fragmentation and centralisation in the wind power industry.

Method

This paper is based on twelve semi-structured interviews conducted between August and December 2011, a substantial review of relevant literature and participation at wind energy events in China since 2011. Interview informants had varied backgrounds, ranging from government officials and technical wind industry experts to company employees from large, medium and small manufacturers of wind turbines. An overview of the informants can be found in the Appendix. Several informal conversations were held from 2011 to 2014 with domestic and foreign experts and people involved in the renewable energy industry. These include wind farm developers, researchers, wind industry experts and professionals, as well as private and state-owned wind turbine component manufacturers. Moreover, important insights were collected at the following conferences and industry exhibitions: China Wind Power 2011 and 2013, Offshore Wind China

2012 and 2013, and the 8th China (Shanghai) International Wind Energy Exhibition and Conference 2014. The analysis is also founded on a wide range of secondary sources such as reports and research articles. Many documents were accessed during the fieldwork – for instance, information from the Chinese Renewable Energy Industries Association (CREIA) or the various companies visited. Online news articles were especially useful for retrieving the latest information on China's rapidly developing wind industry.

Interview candidates were identified through online research, industry association lists and trade statistics and, most importantly, the snowball method. The underlying reasoning behind selecting particular interview candidates was to be able to map the opinions of central actors in order to paint a representative picture of important industry factors. Interviews, therefore, involved enquiry into the relevant stakeholders' perceptions of overall wind industry performance. Candidates perceived to be relevant were informed experts at universities, organisations, consultancy firms and the government, as well as wind turbine company employees. These groups were deemed relevant because of their industry knowledge and varied backgrounds in different segments of the industry. The transcribed interviews were analysed using the computer-assisted software NVivo. This software was of great assistance in coding and categorising material, allowing for systematic analysis. There are some considerations that need to be mentioned in regards to the interviews. First, nine interviews were conducted in English, while three were in Chinese, using an interpreter. Using an interpreter can make it difficult to ensure that the question has been understood as intended, and that the answer is correctly transmitted. Second, only three of the interviewees were native English speakers. Using a second language may cause people to say things they did not really mean, or it may tweak the meaning of what was originally intended. These two caveats have been taken into account and were dealt with – for instance, by repeating the question or clarifying meanings in cases where there was any doubt. I am therefore confident that the following analysis represents the views of the interviewees.

Formal Institutions Promoting Wind Power in China

This section provides an overview of the formal policies that have promoted China's wind power development, divided into two main areas: those that promote industry, and those that promote electricity generation. These regulations have been discussed extensively elsewhere (e.g. Lewis 2013; Zhang, Andrews-Speed, and Zhao 2013) and will be covered only briefly here.

Industry Development

At least three important factors have directly promoted the development of China's wind industry. First, the domestic content requirement of wind turbine manufacturing in China has led to the development of supply chain markets; second, speedy approval for wind power projects at a provincial level has resulted in a huge increase in the number of wind turbines each year (Yadav 2011); and third, in 2011, China attracted 52 billion USD in new renewable energy investments, 60 per cent of which went to wind projects (UNEP, FSFM, and BNEF 2012). In that year, China attracted the most new financial investments for new renewable energy in the world (UNEP, FSFM, and BNEF 2012).

In 2002, the Chinese government decided to stimulate the development of wind energy through a national wind concession programme, allocating selected sites for wind farm construction to the company bidding the lowest electricity tariff (Recknagel 2010). Some prerequisites were made in order for projects to be accepted, such as restrictions on turbine size and local content. In effect, the price of electricity not only decided who won the bid, but also the extent to which the turbines were manufactured locally (Wang 2010). Because of a dependence on expensive, imported turbines, the Chinese government decided that a domestic content requirement pertaining to wind turbines was needed to facilitate domestic manufacturing of turbines and turbine parts (Howell et al. 2010). During the first concession round, which started in 2003, the local content requirement of turbines was set at 50 per cent; in 2004 this share was increased to 70 per cent, and in 2009 it was finally phased out (Wang 2010). In addition to content requirements, import tariffs on preassembled wind turbines were at 17 per cent in 2007, whilst tariffs on their

components were set to only 3 per cent (Martinot and Li 2007). This policy, together with the removal of local content requirements in 2009, is thought to have “allow[ed] domestic manufacturers to more easily access wind components from foreign suppliers as they built the prototypes for their larger turbines” (BNEF 2010).

Electricity Generation

Measures aimed at increasing the proportion of renewable electricity production in China are covered in the Renewable Energy Law (ReLaw) enacted in 2005, which initially came into force on 1 January 2006 (with subsequent amendments effective April 2010). The Central Committee enacted the law with overwhelming support, suggesting that Chinese legislators almost unanimously recognised the need for renewable energy (Wang 2007). The law was drafted over a two-year period, and advice and comments were provided by international and domestic experts, various types of organisations and governmental bodies in order to calibrate it to fit China’s ambitions (Anonymous 3 2011 and 4 2011; Martinot and Li 2007). The law was, therefore, the result of an international learning process, in which experiences from abroad were taken into consideration prior to enactment. This was also the case before each of the major revisions of the ReLaw in 2009 and 2010.

ReLaw measures include government installation goals, mandatory market shares, a tariff system, a cost-sharing principle and a special fund (Jiang 2011: 105). The largest investors in Chinese wind farms are state-owned power generation companies, notably the “big five”: Guodian, Huaneng, Datang, Huadian and China Power Investment Group (CPI) (Li et al. 2012). In 2013, these were the five-largest wind farm developers, with a combined share of almost 50 per cent of all projects (WWEA 2014). All utilities with a capacity of more than 5 GW of thermal power electricity generation were mandated by the government, through the 11th Five-Year Plan for Renewable Energy, to instal at least 3 per cent non-hydro renewable power as a portion of their total capacity by 2010, and 8 per cent by 2020 (Li et al. 2010: 39). These mandated market shares undoubtedly led to an increase in wind power investments. However, one downside was that the large power utilities only cared to fulfil their installed capacity criteria, and had less of an incentive to focus on the hourly production of electricity, which demanded more resources in terms

of operation and maintenance. Furthermore, in accordance with the ReLaw, electric utilities are obligated to purchase all wind power produced and, with the 2009 amendment of the ReLaw, this obligation applies even when there is insufficient power demand on the grid (Martinot and Li 2010).

Coordination, Fragmentation and Policy Experimentation

Concession Rounds as Policy Experiments

A central point made by Lema and Ruby (2007) is that the period prior to the national wind concession programme, which began in 2002, was dominated by an extensive fragmentation of authority – for instance, in deciding whether to establish a domestic industry or rely on imported turbines. With the concession strategy, however, this fragmentation changed, and the NDRC took a more active role in coordinating the supply of and demand for wind power. Lema and Ruby also note that coordination between the trade and industry departments is what sparked the domestic wind turbine industry. This change in the status of the NDRC was undoubtedly important; however, Lema and Ruby underestimate the importance of the concession projects as an experimental point for policy development. Between 2003 and 2007, there were five concession rounds totalling 2.6 GW of installed wind power capacity, against a total of 6 GW of installed wind power at the end of 2007 (Jiang et al. 2011), amounting to 43 per cent. Each concession round grew in size, starting at 200 megawatts (MW) and ending at 950 MW. Between each of these rounds, policy was changed and refined. For instance, in order to prevent developers from bidding at unacceptably low prices to secure the right to develop a wind farm, the criterion changed in 2005 from “lowest-price bid wins” to various factors outside of price being weighted. Initially, the price was weighted at 40 per cent; it was further reduced to 25 per cent in 2006 (Li et al. 2007). Other criteria became more important for winning a bid: domestic manufacturing content, overall capability, technical planning, grid price and economic benefit, each having been given a weighted score (Li et al. 2006). The concession rounds provided important lessons in shaping the pricing mechanisms of the Renewable Energy Law, where “govern-

ment-guided” prices were decided on the basis of the concession project pricing (Martinot 2010). These prices were, in turn, at the base of the nationwide feed-in tariff prices (implemented in August 2009), and determined prices for four different geographical zones sorted by wind resource quality (Martinot and Li 2010; Wang, Qin and Lewis 2012). As the interviewee from the Global Wind Energy Council pointed out:

The concessions are only a small share of the whole wind development. The government is using [the concessions] as small projects that demonstrate what the government wants the wind industry to be; they want it to be modernised, to be bigger, to rise and lead [...] the global trend (Anonymous 1 2011).

What started as an experimental policy in 2003 was scaled up and laid the basis for both policy learning and further refinements in wind power development up until 2009. The NDRC’s coordinating role in the concession projects was important, but the concession rounds in themselves were useful for experimenting and gaining experience with pricing policies, which facilitated the coordination of further wind power projects through the national feed-in tariff. This policy development process therefore conforms to Heilmann’s (2008a, 2008b) policy experimentation thesis.

Speedy Approvals

Until 2011, China’s wind industry saw a rapid expansion; yet, since 2011, there has been a slowdown. This slowdown is highly relevant for the governance of the wind sector; as coordination premised its rapid development in 2003, it was also coordination that led the expansion to a halt in 2011, by centralising the approval of new wind farms.

Between 2003 and 2011, more than 90 per cent of constructed wind farms in China were approved by local governments – something that led to a mismatch between local wind farms and centrally planned power grid construction (Li et al. 2012). These local governments handled each tender application efficiently, and new projects were rolled out quickly. Included in the aforementioned concession rounds were projects of more than 50 MW, which needed approval from the central government (NDRC). Projects below 50 MW could typically be approved by local governments, and this led to large

numbers of projects sized at 49.5 MW, many of which were installed right next to each other, making their real sizes much larger (Jiang 2011). As of 2011, China centralised this decision, and all wind projects were then required to be approved by the National Energy Administration. This new legislation approved a total of approximately 27 GW for the 12th Five-Year period (up to 2015), 13 GW for state-approved projects and 14 GW for those locally approved (Li et al. 2012). In April 2012, a second group of approved projects totalled 15 GW. Any projects that were not approved through this bill were not accepted (Li et al. 2012). In addition to 18 new technical standards issued in 2011 – limiting access to turbine manufacturers that did not apply to these standards – the change in the approval process considerably altered the growth of new wind farms in China. Thus, decentralisation of authority was beneficial for the speedy growth of China's wind industry, and, by centralising this authority, growth slowed. In other words, fragmentation and centralisation are characteristics the government can draw on to reach development targets.

The reason local governments decided to approve projects so quickly can be attributed to their quest for economic growth. What we observe here is a divergence between provincial and central government interests that characterise Chinese politics. Local governments are increasingly concerned with stimulating local economic growth, and wind power projects were attractive to local economies looking for a boost (Anonymous 7 2011). Although provinces have become more economically independent from the centre (Saich 2011: 183), central government approval also shapes provinces' opinions on profitable investments. As a result, when a company or sector receives central support, they are considered a safer bet for provincial governments seeking to build up an industry. This makes a difference when local governments face the choice of whether to start a wind project or a thermal power project.

Legitimacy and Centralisation

In order for a new industry to come into existence, a certain level of legitimacy is required. In China, important policy measures have been directed at established energy companies that have pre-existing legitimacy. An example of this is the government's introduction of the mandated market share of non-hydro renewable energy for the estab-

lished power producers in China. This mandate was a clear signal that the road to renewables was to go through the existing power utilities, irrespective of their ties to coal and hydropower. Another strong signal of commitment comes when areas of priority are decided through long-term plans by central and local governments. The Five-Year Plan is the most important government document, and the attention given to new and renewable energy has increased over the course of twelve Five-Year Plans, beginning with the sixth and culminating with the latest plan, covering the period of 2011 to 2015 (Yuan and Zuo 2011). Without a doubt, these government indications play an important role in paving the way for emerging industries. This section highlights three more avenues that draw on central government authority and legitimacy in the development of the wind industry.

Control of Media

In the Chinese wind turbine industry, the role of the media was acutely observed in the context of the 2011 downturn. Several informants mentioned that in 2011, stories about quality issues and poorly functioning turbines started appearing in the media. As the Chinese media is largely state-controlled, the CCP can dictate what is allowed to be reported. This was highlighted by the informant from the Global Wind Energy Council:

[The government] can one day say that “we think this industry is very promising” and everything [is] good about it; [...] everything you can see related to wind in the news is good. This reinforces the industry to expand. Now, this year, it’s a time when some of the problems that were hidden started to get exposed [...]. Every problem was there two years ago; it’s just that people were not allowed to say it, so it didn’t seem to be there. But now we are suddenly allowed to say that [there are problems], and people get a feeling that wind started to show its side effects. But that’s not true; the side effects have always been there, it’s just that they are exposed at this stage (Anonymous 1 2011).

This quote illuminates the importance of the media in establishing the legitimacy of the wind industry. What we are basically observing is a government that uses legitimacy as a tool to increase or decrease interest in the wind industry, fluctuating with current development goals. To be sure, highlighting the challenges that the industry faces

regarding turbine quality or grid connection issues is important for the overall performance of the industry. Yet, that these issues were evident for some years prior to 2011 and there had not been any repercussions testifies to the importance of information control in China. This form of legitimation is, therefore, a well-trained muscle of China's institutional body, and its strength ultimately depends on the degree to which the government (the CCP) and industry goals are in sync. This well-trained muscle led to rapid growth in the period until 2011, and when a focus on quality finally emerged it contributed to slowing growth.

Politics over Economics

The Chinese wind industry has gained legitimacy within established institutions by using the pre-existing influence of energy incumbents to shape outcomes. Many of the large, influential state-owned enterprises (SOEs) have engaged in wind turbine manufacturing, and their regional political influence has facilitated their growth. According to the informant from the wind turbine manufacturer XEMC Windpower, subsidiary of the large multi-industry conglomerate Xiangtan Electric Manufacturing Corporation (XEMC), the company "has a certain influence in Hunan Province, because the governor of Hunan Province came from XEMC". As a result of the company's political connections, it has been able to convince policymakers of the benefits of wind turbines. Indeed, there is a well-documented link between SOEs, economic performance and political careers (Andrews-Speed 2011; Li et al. 2008; Xu 2011). This relates to the Ministry of Personnel, which has the capacity to appoint or dismiss the senior executive leadership of even large SOEs. Often, industry professionals are appointed to these positions because of their technical insights, and these positions are, in turn, used as stepping stones for political careers, similar to that of the XEMC executive (Rosen and Houser 2007). This means that the leadership of large energy companies must be attentive to party politics, and balance central political demands against personal ambitions and provincial needs. All large, state-owned energy companies are mandated (through the Renewable Energy Law) to produce electricity from renewable energy sources, and failure to comply can hamper company advancement and political careers. One interviewee put it this way:

The incentive for the leaders of the power companies to fulfil this requirement is that they will be held accountable if targets are not reached [...] and this will directly impact their personal careers (Anonymous 2 2011).

Moreover, central government support often means more in terms of politics than in terms of economics. This was demonstrated in several interviews – for instance, with XEMC Windpower:

The company's own investment is larger than government funding, but state funding is also very important to us; it shows that the state encourages [us] to keep up. Especially for our group, a very large SOE with a long history, the state funds mean more [in terms of] encouragement than [...] real impact. After the state funding, we have more voice in Hunan Province, which means the Hunan provincial government would be more supportive to us (Anonymous 5 2011).

A similar line of argumentation was presented by a government official from the Energy Research Institute of the NDRC:

[The government] has promoted R&D a bit; some national research centres and test centres have been supported by the government. And that has been enough because it proved the legitimacy of the industry (Anonymous 8 2011).

Central government subsidies and support eliminate some of the risk local governments face in choosing their investment strategies, and allow large companies to be more confident in entering a new industry such as the wind industry. The central government, therefore, incentivises SOEs to follow its legislation by appealing to a company's success and the benefits to the political careers of managers, and by showing its support it also makes a company more likely to succeed.

Related Industries

The political power and legitimacy accumulated in other industries has also been marshalled for the wind industry. Most of the large turbine manufacturers in China have parent companies from related industries within machinery and equipment manufacturing, as well as direct links with electric power utilities. A case of the latter is Guodian United Power, a subsidiary of Guodian, which is one of the five state-owned electric power companies (the “big five”) and by far

China's largest wind power installer (Li et al. 2012). Since Guodian United Power was established in 2007, it has grown to become the third-largest Chinese turbine manufacturer (a milestone reached in 2013) and it is one of the fastest-growing companies in the wind industry (WWEA 2014; Li et al. 2012). The company has benefitted greatly from the unique position of its parent company in wind farm development, which was also emphasised in an interview with the Deputy Director of United Power's Chief Engineering Office, Mr. Xiao Jinsong:

United Power has the advantage of control throughout the entire supply chain. In addition to providing the complete machine, we also produce major components – blades, gearboxes, generators, pitch systems, inverters, etc. Furthermore, our parent company, Guodian, *is the largest wind power developer in Asia* (DNV 2011, emphasis added).

The experience of large industrial companies has been crucial for the advancement of many wind turbine manufacturers, many of which have come from the coal power equipment manufacturing industry. The three largest coal power equipment manufacturers, Shanghai Electric Group, Harbin Electric Corporation and Dongfang Electric Corporation, which provide nearly all the advanced coal power equipment in China (Yue 2012), all have subsidiaries in wind turbine manufacturing. For instance, the central government-administered Dongfang Electric, the fourth-largest Chinese wind turbine manufacturer in 2013 (WWEA 2014), has a history of more than 50 years in manufacturing heavy-duty machinery and equipment, such as steam and hydro-turbine generators (DEC 2012). This company, one of the largest steam turbine producers in China, did not engage with the wind industry until 2005, when it started cooperating with European turbine design companies (Zhao, Hu, and Zuo 2009). In addition, Shanghai Electric has signed strategic alliances with the Western firm Siemens. All these companies have become large actors within the Chinese wind industry by exploiting their established legitimacy within China's institutional framework. They have, indeed, taken advantage of their carbon-intensive backgrounds to diversify into low-carbon industries.

Discussion

The previous section has shown how the media, local politics and related industries have been drawn on to facilitate development of wind power in China. However, this choice of governance carries with it several “nuisances” that lead to goals being reached only partially or with several consequences. One recurrent topic is the priority of quantity over quality, and policies are often created without any enforcement mechanisms in place. Two major challenges associated with the renewable energy law are 1) the absence of functioning enforcement mechanisms and 2) a lack of clear formulation of responsibilities. These two problems together reduce the commitment of grid companies to acquire wind-generated electricity. For instance, the law requires grid companies to acquire all electricity they produce from renewable energy, but the wording “guaranteed acquisition” is not adequately defined. This leaves room for interpretation, and grid companies end up curtailing wind power without any repercussions (Li et al. 2012). Furthermore, wind power producers are also required to assist grid companies in ensuring power supply safety, which gives grid companies more arguments to curtail wind power when there is an oversupply.

One of the drawbacks of the central government’s strategic usage of SOEs and established companies is related to the preference of industry creation, and hence quantity before quality. This affects the wind industry through the Chinese banking system, which is government-controlled: In 2009 four major commercial banks accounted for more than 70 per cent of China’s financial assets (Walter and Howie 2011). The main task for Chinese banks has largely been to support the SOEs, even after economic reforms of the banking and finance sectors (Walter and Howie 2011). According to Saich (2011), commercial banks are directed to lend to state-owned enterprises, even though three so-called “policy banks”, which specifically look after government-mandated lending, were created in 1994. In effect, this means that the banks are instruments that the government can use to achieve development goals. One key measure the government uses to control the market is the deposit reserve ratio (Anonymous 6 2011): the minimum reserve amount each bank must hold of customer deposits. This ratio had been increased several times before 2011, making it more difficult for the banks to lend out money, contributing to the 2011 slowdown of the wind industry.

In order to fully grasp what this means for the wind industry, recall that the largest investors in wind power projects are large energy investment companies owned by the central government. These SOEs obtain loans more easily than private competitors, and this preference for SOEs may, in turn, cause scale advantages, as pointed out by the interviewee from GWEC:

In general [...] [the SOEs] will order in large quantities and of course this will give them an advantage in negotiating the component's price, and that of course will get the price down (Anonymous 1 2011).

Even though the support of large SOEs has created rapid growth thus far, their preference could lead to a lack of project evaluation behind credit decisions. This concern was expressed by an experienced wind energy consultant in China, who commented:

The government approves the projects and the money is going to state-owned companies, so within the state sector there is no major perception of risk. On the one hand, there is no technical and commercial diligence, or specifically what we would call "project finance" behind most wind farms. But on the other hand, when the signal is alright, every loan officer or every bank knows it's not a bad idea to lend money to wind projects, and that has enabled the wind industry to flourish (Anonymous 7 2011).

We thus see that the preference for low-quality, state-owned projects, induced by government investment, is potentially destructive. The strategy of supporting SOEs will likely continue, although the slowdown since 2011 has impacted these companies.

As Table 1 shows, there are both drawbacks to and benefits to be gained from fragmentation and centralisation. The successful orchestration of both of these characteristics of China's policy governance is what determines the final outcome.

Table 1: Impacts of Fragmentation and Centralisation

	Benefit	Disadvantage
Fragmentation	Rapid growth	Low grid connection
Centralisation	Legitimacy	Quality

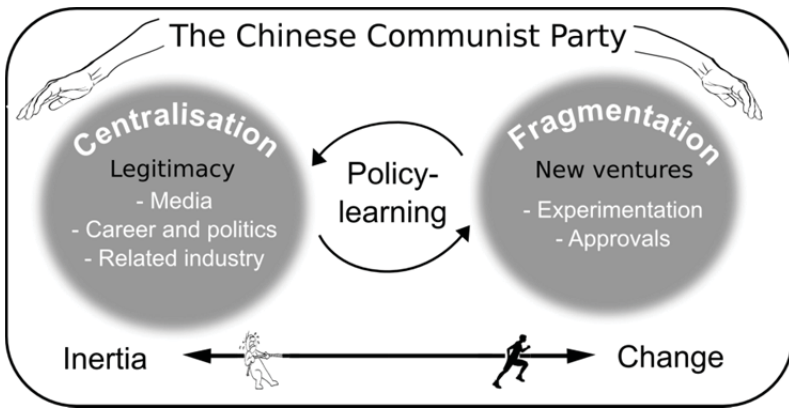
Source: Author's own compilation.

García argues that gradualism, consisting of experimental and incremental policymaking, creates barriers in China such as “legal insecurity, fragmentation of bureaucracy[,] targets that remain non-binding” (García 2011: 8048), and so on. This paper has shown that gradualism and fragmentation are not entirely negative: Experimentation has paved the way for new policies, contributing to a quality check of policies with a smaller impact area, which have then been scaled up. The concession rounds amounted to 43 per cent of the total installed wind power capacity by the end of the last centrally given concession, meaning that they were not the largest source of turbine installations at that point. However, the concession rounds predated the Renewable Energy Law and provided useful experience for fine-tuning the legislative measures.

The policy choice has not been innovative. In fact, successful wind policies have tended to be very similar, globally (Lewis and Wiser 2007). But the way policy has been implemented – by combining experiments, which are then scaled up, with a fluctuation of central government involvement in the industry – has proved effective. Fragmented authority in China’s policymaking system has been conducive to implementing renewable power sources, as shown in the example of speedy approvals of wind farms. Local governments conducted these approvals, and when misalignments occurred between central and provincial government development goals, centralisation of decision-making slowed development. At the same time, the experimental basis of policy development has gradually developed a larger framework for domestic and foreign wind industry actors in China. We can therefore say that this alternation between centralisation and fragmentation is similar to Cunningham’s (2009) “portfolio approach” thesis.

Drawing together the insights on experimentation and the “portfolio approach”, we see that the Chinese institutional framework is able to draw from established actors and networks, as well as to create avenues for new ventures. These avenues often take the shape of experimentation with policies which are later scaled up. Fragmentation pervades China’s governing institutions, yet at the very apex, the CCP, by means of steering and guiding, shapes the direction and pace of new industry developments. These various processes behind change and inertia appear in Figure 1.

Figure 1: Processes behind Change and Inertia in China's Wind Industry



Source: Author's own compilation.

Some impulses emanate from fragmentation and help induce change, and some originate from centralisation, drawing on hierarchy and accumulated status. The legitimacy held by state-owned enterprises, the invaluable experience accumulated in established firms, and the alluring prospects of political careers are all contingent on pre-existing authority. These processes are more inert and are capable of constraining as much as aiding change.

Conclusions

Surrounded by a dominating coal power industry, a wind power industry has grown in record time over the past ten years in China and the country has mustered an impressive ingenuity in fine-tuning policy mechanisms to induce the growth of a new industry. To be sure, the industry is facing considerable challenges; a quick industry build-up comes with a price. This contribution has tried to understand what mechanisms apart from the laws and regulations have allowed for the rapid growth of China's wind industry. The paper started out by describing the relevant policies for wind industry development, then it showed how policy experimentation and speedy approvals were useful for the rapid wind farm expansion. Later sections clarified how the media, legitimacy and experience of existing and related industries sustained the decisions of the central government. I argue

that the Chinese government's navigational skills in growing a domestic wind industry are remarkable and that this feat must be understood within a larger institutional framework.

Fragmentation in China's energy governance has allowed for a fast-growing wind turbine market. In times when industry development was sorely needed in order to create domestic wind turbine manufacturers, local governments were allowed to approve wind farm projects, and the media and other actors focused solely on non-critical issues with development. In times of overcapacity, the tune changed radically. This was especially evident after 2011, when the full force of centralising power was levied onto the industry and the wind industry growth rate declined. The government is indeed flexing all the muscles in its institutional body in order to navigate the development.

The institutional traits inducing the rapid growth of China's wind power industry are based on legitimacy, alignment of expectations, and visions of incumbent and upcoming actors. China has managed to leverage space for wind energy, and the processes behind the change from fragmentation to alignment have been dominated by considerable policy flexibility. In practice, the government has induced policy experiments, which have set in motion some of the large state-owned enterprises (SOEs). These, in turn, have had an influence both locally and nationally, and have lobbied towards increased policy support for wind energy. We can therefore conclude that the CCP takes strategic advantage of fragmentation and coordination to steer the pace of development in the wind industry.

These conclusions have implications for other industries as well. The offshore wind industry in China is currently experiencing a similar stalemate to that faced by the onshore industry in 2006, and we can expect developments as soon as interests between the different, relevant authorities have been aligned. Furthermore, China's quest for rapid growth has come at the expense of quality. For instance, the development goals set by the government have consistently been measured in terms of installed capacity, and not in terms of total electricity generated and delivered to the grid. A lack of incentive to ensure long-term electricity generation permeates the whole industry chain from component suppliers to local governments approving wind farms, SOEs investing in the wind farms and grid utilities managing the wind farms. This lack of quality control is inherent in Chi-

nese institutions, and it will likely remain a concern for Chinese companies seeking to export their products (Gosens and Lu 2013, 2014). Future research should be directed at determining exactly how these institutional traits influence current industry development in China, and if there is a necessary trade-off between rapid catch-up and sufficient quality control.

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Appendix: List of Interviewees

Company / Organisation	Date	Background of interviewee	Affiliation
Global Wind Energy Council (GWEC)	Sep. 2011	China Director	Policy/ Research
Hanergy Holding Group Limited (wind power developer)	Sep. 2011	Representative	Industry
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH	Sep. 2011	Project Manager, Renewable Energy Programme	Policy/ Research
Chinese Renewable Energy Industry Association (CREIA)	Sep. 2011	Vice-Secretary-General	Policy/ Research
Energy Research Institute (ERI) of the National Development and Reform Commission (NDRC)	Sep. 2011	Deputy Director-General	Government/ Policy
XEMC Windpower	Oct. 2011	Key Account Manager	Industry
China Creative Wind Energy Co. Ltd.	Oct. 2011	Sales Manager	Industry
Bloomberg New Energy Finance (BNEF)	Nov. 2011	Wind Analyst	Policy/ Research
Nordex China	Nov. 2011	Marketing Manager	Industry
Azure International	Nov. 2011	China Wind Expert, Director Research and Advisory	Policy/ Research
Energy Research Institute (ERI) of the National Development and Reform Commission (NDRC)	Nov. 2011	Research Associate on Economy and Energy Policy	Government/ Policy
Goldwind Science and Technology Co.	Nov. 2011	Technical Support Engineer	Industry

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