Fragmentation, Authoritarianism and Policy Learning: an Example from China's Wind Industry

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Abstract

This paper seeks to understand what government mechanisms have allowed China's wind industry to grow as fast as it has the past 10 years. I argue that a specific set of institutional conditions have been crucial in the process of high-speed implementation of renewable energy. These are in particular fragmentation and authoritarianism together with policy experimentation and learning that have been fundamental for policy flexibility and institutional adaptability. The paper concludes that fragmentation and coordination are tools that the Chinese Communist Party, at the very apex, is deploying strategically to steer the development of the wind industry.

Keywords

Chinese policy governance, wind energy policy, institutions

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1 Introduction

China's development of renewable energy technologies over the past ten years can be considered a start of a green energy journey. There are many intriguing aspects of this journey, yet one of central importance is China's ability to sustain a green transition without compromising the increasing energy needs of its citizens. China's wind industry has grown from 0.8 GW installed capacity in 2004 to 91GW installed in the beginning of 2014 (Li et al 2007; GWEC 2014). This represents a velocity never before witnessed, and has involved the coordination of interests and alignment of institutions to a massive scale. This 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 time lags in connecting wind farms to the electrical grid (Martinot, 2010). Several reports and studies agree that these challenges arise due to a lack of coordination between stakeholders in China's wind turbine industry (e.g. Jiang, 2011; Luo et al., 2012; REN21, 2009; Zhang et al., 2009). Nevertheless, a detailed understanding of the informal institutions behind such a rapid wind industry growth is still lacking.

This paper argues that a specific set of institutional conditions has been crucial for the high-speed implementation of renewable energy. In particular, fragmentation and authoritarianism, together with policy experimentation and 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 up scaling. Covering the period of 2011 to today, we present evidence that coordination and fragmentation are intentional policy-mechanisms used by the government to control industry growth. These features make China's energy governance system highly flexible and adaptive, enabling and constraining growth according to policy preferences.

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 et al., 2013), and some have looked at innovation (e.g. Gosens and Lu, 2013; Huang et al., 2011; Klagge et al.,

2012; Lewis, 2013; Ru et al., 2012; Urban et al., 2012; Zhou et al., 2012). Most of these studies highlight the explosive development of China's wind industry, and the considerable institutional challenges this has led to; nonetheless, few studies point out that China's flexible institutional framework has allowed the development to happen. Moreover, few have looked deeper than overarching legislative and administrative frameworks. Implementing legislation is a craft, and China's achievement in 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 have induced the rapid growth of China's wind power industry, beyond the formal laws and regulation.

The paper proceeds as follows: Section 2 summarises the most important approaches to China's institutions and governance. Section 3 introduces the methodology. Section 4 gives a brief overview of China's wind power policy framework and development, starting around ten years ago. Section 5 introduces aspects of fragmentation and policy learning that have benefitted the industry, and section 6 addresses the aspects of authoritarianism that have benefitted the industry. Section 7 discusses the findings, evaluates the usefulness of this institutional approach in understanding China's rapid wind industry development, and section 8 concludes.

2 Institutions and governance in China

2.1. Flexibility, learning and policy experiments

This paper looks at Chinas development of a wind energy industry in light of recent theoretical contributions on Chinese governance, and deliberately avoids using theories developed in a non-Chinese setting. We believe, as found for instance by Heilmann and Perry (2011), that Chinese institutions are unique, and need be studied in 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, rural and urban, or industrial and agricultural (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, 'fragmented authoritarianism'. Their main conclusion was that the energy policy process is protracted, disjointed and incremental (p. 24). Furthermore, the fragmentation of authority creates inter-ministerial competition and disjointed policy-making,

because respective ministries have a similar level of authority, but separate 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' (p. 22). Despite the fragmentation, the very top of the Chinese political system is still authoritarian and is able to push through directives (Lieberthal and Lampton, 1992). For the analysis in this paper, the concept authoritarianism will be understood as cases where an established authority is drawn on in some form, in order to push through a decision. This can occur in several forms, as section 7 higlights.

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 (2003) argue that China's economic success resides in reconciling 'the permanency of a well-established institutional order required for the co-ordination of individual plans, and the flexibility of institutions necessary for the move towards the market'. 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. Lately, Heilmann and Perry (2011) have termed China's governing method 'guerrilla policy style', with reference to the governing methods adopted during Mao's reign, and that explain how Chinese governing institutions until today have been able to manage sudden change and uncertainty.

Heilmann (2008a, 2008b, 2009) has 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, p. 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' (ibid., p. 21). In this way, by placing the policy burden on local governments and attributing the respective policy *national* success, policy experimentation was a useful way to gain consensus amongst top-level politicians (ibid.). This can therefore be considered one way in which fragmentation of authority is unified.

Moreover, policy experiments are not only initiated from the top down in China. Andrews-Speed (2012) 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' (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 base, in most accounts of China's institutional flexibility, are notions of learning and adaptation—crucial for any kind of rapid change. And as this paper finds, fragmentation and centralisation is an ingrained part of the framework.

2.2 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 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 considerably challenged over the past decade (Cunningham 2010; Downs 2008; B. 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. (B. Kong 2009:791)

Therefore, a change in energy policy amongst top-level leadership does not necessarily equate to smooth implementation throughout the system. Decisions face strong institutional constraints,

ranging from ‘the vague and contradictory nature of the relevant laws and regulations; the nature of economic incentives for local government officials to prioritize economic growth at the expense of energy efficiency and the environment’, to the expectations and beliefs of the Chinese people (Meidan, Andrews-Speed, and Xin 2009:615).

Edward Cunningham’s (2009) 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 periodisation of rapid expansions followed by contraction. Indeed, an alternating wave of consolidation and liberalisation has, over time, characterised China’s electric power facilities, depending on the central government concern at the moment. As we shall see below, something similar can be said about fragmentation and authoritarianism in the wind power industry as well.

3 Method

This paper is based on twelve semi-structured interviews conducted between August and December 2011, and a substantial review of relevant literature. Informants had varied backgrounds, ranging from government officials and technical wind industry experts to company employees from large, medium and small wind turbine manufacturers. Additionally, several informal conversations were conducted throughout the period with domestic and foreign experts and people involved in the renewable energy industry. These included wind farm developers, researchers, wind industry experts and professionals, as well as private and state-owned wind turbine component manufacturers. The analysis is founded on scientific and technical articles, books and anthologies, proceedings from the China Wind Power 2011 and 2013, and Offshore Wind China 2012 conferences, press releases and news articles, policy documents, technical reports, global wind market reports (e.g. from Mercom), statistics, popular magazine articles on renewable energy, annual reports and promotional material from manufacturers. 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 in 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 aim of the selection of interview candidates and conduction of interviews was 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. Nine interviews were conducted in English, and three were in Chinese using an interpreter. The interpreter also proved very useful in contacting and booking meetings with relevant informants. The interviews inform the analysis and contribute to the new insights on China's institutional governance.

4 Formal institutions promoting wind power in China

This section provides a brief 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.

4.1 Industry development

At least three important factors have directly promoted China's wind industry development. First, the domestic content requirement on 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 number of additions each year (Yadav, 2011); and third, in 2011, China attracted $52 billion in new renewable energy investments, 60 per cent of which went to wind projects (UNEP et al., 2012). In that year, China attracted the most new financial investments for new renewable energy in the world (ibid.).

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 of 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—a requirement that increased to 70 per cent in 2004 and was finally phased out in 2009 (Q. 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 build the prototypes for their larger turbines' (BNEF, 2010).

4.2 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, brought into force on 1 January 2006, and with 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 (M. Wang 2007). The law was drafted over a two-year period, and advice and comments were provided from international and domestic experts, organisations and governmental bodies, in order to calibrate the law to fit China's ambitions (Interview September 2011; Martinot and Junfeng Li 2007). The law was therefore the result of an international learning process, in which experiences from abroad were taken into consideration before enactment. This was also the case before the major revision 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). 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 2011, Guodian, Huaneng, Datang and Huadian were the largest wind farm developers, respectively, and CPI the sixth largest developer. These companies were mandated by the government, through the 11th Five-Year Plan for Renewable Energy, to install at least 3 per cent *non-hydro* renewable power as a portion of their total capacity in 2010, and 8 per cent in 2020, for all utilities with a capacity of more than 5 GW of thermal power electricity generation (ibid.). 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 demand 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 & Li 2010).

5 Coordination, fragmentation and policy experimentation

5.1 Concession rounds as policy experiments

A central point made by Lema and Ruby (2007) is that the period prior the national wind concession programme starting in 2002 was dominated by an extensive fragmentation of authority—for instance in deciding to establish a domestic industry or rely on turbine import. With the concession strategy, however, this fragmentation changed, and the National Development and Reform Commission (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 sparked a domestic wind turbine industry. This change in the status of the NDRC was undoubtedly important; however, Lema and Ruby appear to ignore 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 year-end 2007 (Jiang et al., 2011),

amounting to only 43 per cent. Each concession round grew in size, starting at 200 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 unacceptably low prices to secure the right to develop a wind farm, the criterion changed in 2005 from lowest-price bid to price-weighting 40 per cent of the bid-win decision; this was further reduced to 25 per cent in 2006 (Li et al., 2007). At that point, other criteria were more important for winning a bid, such as domestic manufacturing content, overall capability, technical planning, grid price and economic benefit, all with weighted scores (Li et al., 2006). The concession rounds provided important lessons in shaping the pricing mechanisms of the Renewable Energy Law, where 'government 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 et al., 2012). As the interviewee (September 2011) 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 want the wind industry to be; they want it to be modernised, to be bigger, to rise and lead […] the global trend.

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 until 2009. The NDRC's coordinating role in the concession projects was important, but the concession rounds, in themselves, were useful in 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 with Heilmann's (2008a, b) policy experimentation thesis.

5.2 Speedy approvals

Until 2011, China's wind industry saw a rapid expansion; yet, since 2011, there has been a slowdown. This slowdown is, in itself, highly relevant for the governance of the wind sector, for, 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 treated 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 obtain approval from the National Energy Administration. This new legislation approved a total of approximately 27 GW for the 12th Five-Year period (up to 2015), around 13 GW for state-approved projects and 14 GW for those that were 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 (ibid.). In addition to 18 new technical standards issued in 2011—limiting access to turbine manufacturers that did not apply to these standards—thechange in the approval process considerably altered the growth of new wind farms in China. Thus, the 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 coordination are instruments in China's policy spectrum, steering activity in a desirable direction.

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 increasingly care about local economic growth, and 'are enthusiastic about, and spare no effort in, starting thermal power plants, while renewable energy generation projects are often "pending discussion" ' (Wang, 2007). Although provinces have become more economically independent from the centre (Saich 2011, p. 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. This trait can therefore be attributed to normative institutions, because local governments simply followed up on their demand to create rapid economic growth.

6 Authoritarianism and legitimacy

In any country there are some stakeholders who have been in the game for several years, who have a certain influence, and who would like to keep things status-quo. In order for a new industry to be able to come into existence, a certain level of legitimacy is required. Therefore, in order to assemble a quick growth of China's wind industry, important policy measures have been directed at incumbent energy companies. An example of this is the government's introduction of the mandated market share of non-hydro renewable energy for the established power producers in China. This mandate was a clear signal that the road to renewables was to go through the established power utilities, irrespective of their previous ties to fossil and hydropower. Another strong signal of commitment is provided 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.

6.1 Control of media

In the Chinese wind turbine industry, the role of the media is particularly observed in the 2011 downturn. As the Chinese media is largely state-controlled, we again see the influence of the government, hence this is labelled under 'authoritarianism'. This was highlighted by the informant (September 2011) 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.

This quote illuminates the importance of the media in establishing the legitimacy of the wind industry. What we basically observe is a government that uses legitimation 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 without repercussion, testifies to the importance of information control in China. 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 Chinese Communist Party) and industry goals are in sync. This well-trained muscle has led to rapid growth in the period until 2011, and when the focus of quality finally emerged it contributed to slowing down the growth.

6.2 Politics over economics

The Chinese wind industry has gained legitimacy within established institutions by using the already existing legitimacy of energy incumbents to shape new outcomes. Many of the large, influential SOEs have engaged in wind turbine manufacturing, and their regional political influence has facilitated their growth. According to an 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 head of the Hunan province came from XEMC'. As a result of the company's political connections, it has been able to convince policy-makers of the benefits of wind turbines. Indeed, there is a well-documented link between state-owned companies, economic performance and political career (Andrews-Speed, 2011; Li et al., 2008; Xu, 2011). This relates to the Ministry of Personnel, who has the capacity to appoint or dismiss the senior executive leadership of large, state-owned enterprises. 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.

Moreover, central government–owned companies take part in shaping government policy, and thereby closing the circle of influence (Andrews-Speed and Dannreuther, 2011; Downs, 2008; Kennedy, 2005; Meidan et al., 2009). Thus, state support often means more in terms of politics than in terms of economics. This was demonstrated in several of the interviews; for instance, the interview (October 2011) 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 [for the] encouragement than the 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.

A similar line of argument was presented by a government official (November 2011) 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.

Central government support therefore takes away some of the risk local governments face in choosing their investment strategies, and it allows large companies to be more confident in entering a new industry such as the wind industry. This state support as well as the quest of CEOs of state-owned enterprises in increasing their career opportunities

6.3 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, one of the five state-owned electric power companies (the 'big five'), and, by far, the largest wind

power installer (Li et al., 2012). Since Guodian United Power was established in 2007, it has grown to become the fourth largest Chinese turbine manufacturer (in 2011)—and is now one of the fastest growing companies in the wind industry (ibid.). The company has benefitted greatly from the unique position its parent company has 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*. (Emphasis added) (DNV, 2011)

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 third largest Chinese wind turbine manufacturer, 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, which is 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 et al., 2009). As well, Shanghai Electric has signed strategic alliances with the Western firm Siemens. All these companies have become large actors within the Chinese industry by means of exploiting their established legitimacy within China's institutional framework. They have, indeed, taken advantage of their carbon-intense background to diversify into low-carbon industries.

7 Discussion

Chinas 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 the absence of functioning enforcement mechanisms; and 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 produced 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 oversupply.

One of the drawback of authoritarianism in China 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 (ibid.). 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. According to a China wind analyst (interview, November 2011) from Bloomberg New Energy Finance, one key measure the government uses to control the market is the deposit reserve ratio. The deposit reserve ratio is the minimum reserve amount each bank must hold of customer deposits, and it was increased several times before 2011, making it more difficult for the banks to lend out money.

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 one interviewee: 'In general for such kind of agreements [the SOEs] will order in large quantities and of course this will give them an advantage in negotiating the components price, and that of course will get the price down.' 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 (interview, November 2011), 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.

We thus see that the preference of 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 below shows, there are both drawbacks and benefits of authoritarianism and fragmentation respectively. The successful orchestration of both these characteristics of China's policy governance is what determines the final outcome.

Table 1: Impacts of fragmentation and authoritarianism

	Benefit	**Disadvantage**
Fragmentation	Rapid growth	Low grid connection
Authoritarianism	Legitimacy	Quality Technology import

Source: Author

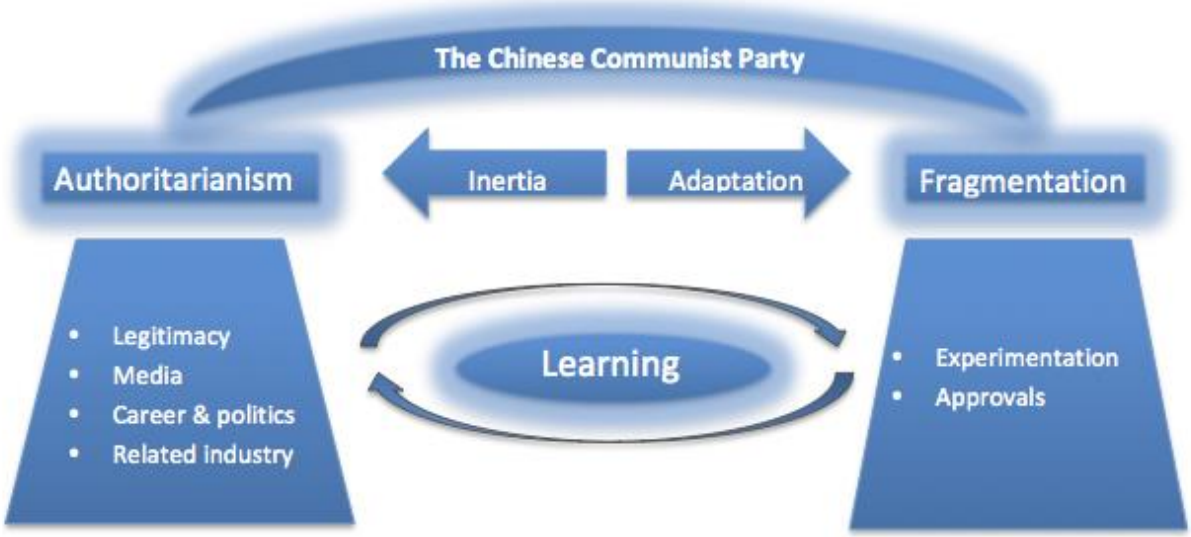
Garcia (2011: 8048) argues that gradualism, consisting of experimental and incremental policy-making, creates barriers in China such as 'legal insecurity, fragmentation of bureaucracy; targets that remain non-binding […]', and so on. In the case of China's wind industry, the opposite is observed: experimentation 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 merely 43 per cent of the total installed wind power capacity by the end of the last centrally given concession, meaning that they were not important in terms of total installation of

wind turbines. However, the concession rounds predated the Renewable Energy Law, and were useful experience for fine-tuning the law's 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 policy-making 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. This can be considered a novel policy innovation. However, still some time remains before Chinese turbine manufacturers will have developed radically novel technology, per se.

The Chinese institutional framework is unique in its ability to draw from established actors and networks, as well as create avenues for new initiatives. These avenues often take the shape of experimentation with policies, which are later scaled up. Fragmentation pervades China's socio-technical regime, yet, at the very apex of Chinese governing institutions, the Chinese Communist Party, 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: The processes behind change and inertia in China's wind industry



Source: Author

Some impulses emanate from fragmentation and help induce change, and some from authoritarianism, 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 career are all contingent on already existing authority. These processes are more inert, and are capable of constraining as much as aiding change.

8 Conclusion

Surrounded by a dominating coal power industry, a wind power industry has grown in record time over the past ten years in China. Not only has this led to an increase in green electricity production in the country, but the wind turbine industry also has supplied jobs and new technologies. Where other countries have failed to fine-tune their policy mechanisms to induce the growth of renewable energy technologies, China has mustered an impressive ingenuity in nurturing a new industry. To be sure, the industry is facing considerable challenges, but understanding how it has come into existence contains several interesting lessons. This paper has argued that there is more to the story than a set of laws and regulations; the Chinese government's navigational skills managing to attract foreign technology, to induce Chinese companies to assimilate the technology, and avoiding a collapse due to overcapacity issues is a remarkable story that deserves a closer look in its own right.

Fragmentation in China's energy governance has allowed for a quickly growing wind turbine market. In times when an 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 focussed 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 Chinese Communist Party uses fragmentation and coordination strategically to steer the pace of development in the wind industry.

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 SOEs. These, in turn, have influenced both locally and nationally, and have lobbied towards increased policy support for wind energy. We can therefore conclude that China's fragmented authority, on the one hand, has helped to avoid a lock-in, whilst experimentation, on the other hand, has helped to increase legitimacy and internal cooperation, sustaining industry growth. Likewise, the Chinese Communist Party has been able to take effective measures against overcapacity by centralising decisions on wind farm developments. In this way coordination has restrained the development when necessary, whilst fragmentation has given leeway to new, regional initiatives.

China's quest for rapid growth has come at the expense of a concern for high-quality products. 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 Chinese institutions, and it will likely remain a concern for Chinese companies seeking to export their products (Gosens 2013). Future research should be directed at exactly how these institutional traits influence current industry development in China.

What does this analysis mean for the future of renewables in China? One interesting aspect at the moment is the development of China's offshore wind industry, which faces similar problems to what was faced by the onshore industry in 2006. Offshore wind industry development has been slowed down because of inter-ministerial disagreements between the National Energy Administration, the State Oceanic Administration and the Ministry of National Defence (Li et al., 2012). Before things can move on, these diverging voices need to align and coordinate their interests, ultimately decided by the Chinese Communist Party.

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