Ambition and Ambiguity: Expectations and imaginaries developing offshore wind in China

Abstract:

This paper investigates how future-orientation generates action in China's offshore wind industry. We might expect that, with an authoritarian government, China would be able to push through policies with ease. Using the sociology of expectations and sociotechnical imaginaries, this paper shows how the future is an important resource for not only coordinating government and industry actors but also calibrating and negotiating expectations of what can be achieved. On the one hand, sociotechnical imaginaries – as exemplified by government development targets – appear to spur action; on the other hand, local expectations modify the intended development targets. The paper describes a strategic waiting game in which the government is obscure about intentions and in which the industry, wanting a piece of a promising cake, is eager to get a head start. This paper finds that ambitiousness about the future, but ambiguity in implementation, is a strategy successfully employed by the government to ensure change. The paper shows how state intervention is productively managed so that it neither stifles nor exclusively drives offshore wind industry development in China.

Keywords:

Sociology of expectations, sociotechnical imaginaries, Chinese policymaking, offshore wind technology

1. Introduction

Since 2002, China has actively supported the development of large-scale renewable energy – particularly wind power. China's constant need for energy and energy security is a primary reason for the development; other reasons include the country's need for new industry and the mitigation of local pollution and climate impact (Ydersbond and Korsnes, 2016). In 2009, the Chinese government and relevant stakeholders met to plan the development of China's offshore wind industry (Korsnes, 2014a). In 2012, industry analysts at the Offshore Wind China conference registered a pipeline of 37,000 megawatts (MW) of offshore wind projects in China, suggesting a rather large development compared with the approximately 300 MW of offshore wind projects that were installed at the time. However, since the first turbine was installed in 2007, China's offshore wind industry has developed more slowly than expected. At the end of 2014, China had a total installed capacity of 670 MW (GWEC, 2015) – much less than the capacity set out in the government development plan, and at the same time the government announced that the intended 30,000 MW target planned installed by 2020 would be reduced to 10,000 MW (Smith 2014). This paper aims at understanding better the relation between ambitious government goals and promises on the one hand and actual industry development on the other.

As has become evident since the open-door policy was introduced in 1978, China seeks to fast-forward progress to reach certain characteristics that will qualify them as 'developed.' The future can therefore be viewed as big business in China, where project developers and government officials attempt to look a bit further over the horizon to be one step ahead (Dodson, 2012). At any given time in China, an industry can gain momentum or remain stagnant. Thus, large margins of error are necessary in predictions of the future. This feature can be illustrated through a review of China's onshore wind industry during the early 2000s. At that point, it was still unclear whether the industry would take shape. Lewis (2003, p. 84) wrote that 'today with more wind projects cancelled than new projects sited, expectations are less optimistic. National targets for wind power in 2000 were not met, and it is even less likely that China will meet the target of 1,500 MW by 2010.' Knowing that China installed 1,266 MW in 2005 and 2,599 MW the following year (Li et al., 2007), the expectations of professionals in 2003 proved erroneous only two years later. The comparison with the offshore wind industry of today is striking. This retrospection shows that, in spite of the divergence between government targets and other expectations of the future of the wind industry, the industry grew quickly. What role did government targets have in this development, and how did industry actors expect events to develop?

These questions highlight the various ways in which government involvement may influence industry development and innovation in China – a topic widely debated in research literature and media. This debate can roughly be grouped into, on the one hand, those who do not believe that innovation is occurring in Chinese firms in China, and that this is due to a cultural or systemic component or due to adverse government involvement (e.g., Baark, 2007; Gu et al., 2009; Serger, 2009). On the other hand, there are those who believe that innovation is happening but largely in private firms (i.e., in spite of adverse government involvement) (e.g., Breznitz and Murphree, 2011; Nee and Opper, 2012) or because the government can function as a 'state entrepreneur' that facilitates innovation (e.g., Shi et al., 2014; Sun, 2015). Thus, state intervention may on the one hand be perceived as beneficial in aligning development efforts; on the other hand, there is a risk that state intervention may inhibit innovation. By examining the interaction between industry and government future engagement, the paper draws attention to ways in which this tension may be productively managed.

This paper examines China's offshore wind industry, but one arguably cannot understand this industry without also involving China's onshore wind industry. Therefore, unless specified otherwise, in this paper 'wind' used alone refers to both onshore and offshore wind. Moreover, the paper draws an analytical difference between 'industry' and the 'government' as distinct but interdependent actors. Correspondingly, I employ literature on future-orientation and governance to denote a difference in expectation levels, namely 1) 'sociotechnical imaginaries' (Jasanoff and Kim, 2009) covering aspects of how governments employ the future as a resource for present-day change and 2) the 'sociology of expectations', theorising expectation processes connected to a specific technology and technology spokespeople. The role of the government is particularly relevant for two main reasons: First, renewable energy industries are dependent on government support globally (REN21, 2015); second, China has an authoritarian regime in which the role of government is prominent. Hence, we may ask, how does the capacity to imagine futures influence industry development in China? Is the Chinese government a sole influencer of how the future should look, or do industry actors also play a role?

The paper is structured as follows. Section 2 presents the concepts of the sociology of expectations and sociotechnical imaginaries, and section 3 describes the method and data. Section 4 explores how expectations to China's offshore wind industry development were generated. Section 5 examines the way in which government induced imaginaries and local expectations occur in the offshore wind industry and illustrates the interrelation between sociotechnical imaginaries and

expectations by describing a strategic waiting game that induces change despite uncertainty about the future. Section 6 concludes by highlighting the usefulness of thinking about China's future in terms of imaginaries that can manifest themselves as 'loose' plans.

2. Imaginaries and expectations

The literature on technology and future expectations is growing, and concepts span several disciplines. In addition to 'expectations' (Brown and Michael, 2003), there are 'visions' (Gjøen, 2001), 'promises' (van Lente, 2000), 'anticipation' (Gustafsson et al., 2014), 'imaginaries' (Jasanoff and Kim, 2009), 'foresight' (van Lente, 2012) and 'fantasies' (Sovacool and Ramana, 2015). Many of the concepts overlap, but I shall look in particular at the sociology of expectations and sociotechnical imaginaries. I aim at demonstrating how the two approaches can be useful analytical tools for highlighting different aspects of the future-orientation of offshore wind development in China.

The sociology of expectations explores the various dynamics of expectations relating to science, technology and society (Brown and Michael, 2003). Expectations and visions not only formulate but also constitute and accommodate a desired future (Borup et al., 2006). Expectations at once legitimise a technology, indicate a development direction and help coordinate interests that can materialise into technical and scientific activities and products (van Lente, 2012). Van Lente (2000) describes a dynamic of 'promise and requirement', implying that commitments become part of a shared agenda that requires action in itself. When promises are made, they subsequently become required achievements and, ultimately, necessary to complete or to continue working on the achievement; in other words, they become self-fulfilling prophecies (ibid.). This is not to say that any vision may become self-fulfilling on its own, but rather, there is often substantial and active work behind making the future and aligning expectations.

Although many visions fail to materialise (see, e.g., Geels and Smit, 2000), many visions do succeed. What characterises a successful vision, and how is it performed? Several researchers have addressed these questions. Berkhout (2006) describes expectations as bids for the future that offer a potentiality requiring endorsement from others to be actualised. In this manner, interpretive flexibility persists, increasing the likelihood of greater support and potentially becoming larger and more normative and collective visions located in 'art and literature, public and political discourses, statements and appeals from business, civil society and government' (ibid, p. 307). Skjølsvold (2014) stresses that futures are resources that spokespeople of a technology can draw on to reach

goals. These futures are performative in two ways: They enrol and convince new actors, and they gradually transform the idea of what a technology could mean for the future and nest it with more purposes than were inherent to the initial idea. In this sense, an offshore wind turbine, for instance, is not only 'electricity' but also a 'sustainable lifestyle', a 'green' image that China can show the world, etc.

Expectations may also be contradictory and may fight to conquer the future to stay relevant (Bakker et al., 2011; Eames et al., 2006), which is not necessarily a weakness, as scenarios are malleable and can be used to build support from various quarters (Sovacool and Ramana, 2015). Moreover, as has been noted by several expectations scholars (e.g., Geels and Smit, 2000; Gjøen, 2001), some promises are set unrealistically high to generate interest and a protected 'space' for a technology. Though unrealistic, these promises are useful for the spokespeople of a technology, as they may impact the way people think about a topic (Berkhout, 2006; Pollock and Williams, 2010). As Geels and Smit (2000, p. 883) put it, 'some future speculations do not strive for truth or accuracy, but are meant to influence specific social processes in technological developments.' These expectations are therefore part of strategic games, wherein the spokespeople risk that their 'bluff' will be called.

Expectations and visions are received and generated at different levels. Budde et al. (2012) show how governments typically refer to larger expectations of 'climate change' or related issues when making their decisions, whereas industry actors have more grounded expectations of the future of a specific technology. In addition, within governments there are competing expectations regarding what should be deemed the most suitable technology (Bakker et al., 2012). There is, therefore, a difference between collective and individual expectations (Konrad, 2006; Konrad et al., 2012). Individual expectations are limited to the individual, whereas collective expectations are taken for granted, depersonalised and universally accepted. Examples of collective expectations are 'progress' and 'development', and most people share a similar perception about what they mean for the future. In this way, collective expectations can be present in individual expectations and collective and individual expectations mutually inform each other (Gjøen, 2001). Bakker et al. (2012) note that the credibility of expectations depends on their similarity to the existing collective images. If the expectations are largely dissimilar, they will be regarded as incredible.

As expectations become taken for granted, they become able to mobilise a larger number of actors – even actors who do not necessarily benefit directly from the expectation (Konrad, 2006). Eames et al. (2006) use the word 'vision' to denote a coherent image of the future intended to generate

long-term action, whereas expectations of such images are less formal and include more fragmented beliefs about the future. The authors find that the overarching vision of a 'hydrogen economy' is justified by a range of narratives, varying from concerns of democracy, independence, environment and power to views of governments, businesses and research communities. As the vision is brought down to a local level, however, each narrative is drawn upon to generate interest or disinterest, impacting the way in which the guiding vision is perceived. Local expectations, therefore, impact the guiding vision. A vision such as the 'hydrogen economy', which has become so popular that it can be equated with nationhood and is supported by research and development programmes, also generates expectations about the vision itself.

In this paper, I use the concept 'sociotechnical imaginary' to denote these larger 'visions' and 'collective images', whilst 'expectations' pertain to more local, and industry-specific processes. Jasanoff and Kim (2009, p. 120) define sociotechnical imaginaries as 'collectively imagined forms of social life and social order reflected in the design and fulfilment of nation-specific scientific and/or technological projects.' The concept was originally coined by Marcus (1995), but I employ it here in the sense developed by Jasanoff and Kim (2009), who emphasise the importance of governments in simultaneously describing and prescribing an attainable and desirable future. Several recent studies have highlighted the different roles of the government in establishing collective images. For instance, Alkemade and Suurs (2012) argue that governments are more prominent in discourses and expectations related to sustainable technologies. Bakker et al. (2011, p. 159) describe an 'arena of expectations' wherein expectations are voiced and tested and spokespeople and potential receivers of a technology are 'confronted with experience, knowledge, and interests.' Within these 'arenas of expectations', state–industry arrangements function to make certain expectations more credible than others through exchanges between the government, industry and consultancies (Levidow et al., 2014).

The 'sociotechnical imaginaries' concept emerged from a growing recognition that expectations of future possibilities are embedded in the organisation and practice of science and technology (Jasanoff and Kim, 2009, p. 122). Imaginaries are characterised as less instrumental than policy agendas, but more instrumental than grand narratives, and they 'reside in the reservoir of norms and discourses, metaphors and cultural meanings out of which actors build their policy preferences' (ibid., p. 123). Imaginaries are futuristic and direct actors towards a desirable future. State power is a central 'director' of desirable futures through various means, such as the 'selection of development priorities, the allocation of funds, the investment in material infrastructures, and

the acceptance or suppression of political dissent' (ibid., p. 123). Moreover, 'the resulting politics of science and technology may shape not only the narrow issues surrounding those specific enterprises but also wider social and political understandings about a nation's past, present and future' (Jasanoff and Kim, 2009, p. 124). Thus, sociotechnical imaginaries involve direct state intervention and come into play when forms of nationhood are imagined together with a technological project, such as the development of wind power, as is the case in this paper.

In a Chinese context, sociotechnical imaginaries associated with wind power can be understood as part of a larger process of nation-building and plan-based governance. Since 1978, economic modernisation has been central to China's 'open-door' policy shift, and market forces have increasingly been allowed to influence the economy (Saich, 2011). Although China has a history of heavy government involvement and control under socialist planning, China has been able to change the governing regime by retaining certain governing mechanisms, such as development plans, and eliminating other more-detailed control-mechanisms (Naughton, 2007, 2010). Hence, governance in China is not only a result of planning and control but also a complex system in which uncertainty is embraced as a resource for change (Heilmann, 2009; Heilmann and Perry, 2011). Chinese sociotechnical imaginaries are typically present in five-year plans, medium to long-term plans, and Special Program Plans (Heilmann 2010) but also surface in school curricula, media, and other official government statements. Examples of prevailing sociotechnical imaginaries since 1978 can be 'economic modernisation', the 'moderately prosperous society', 'harmonious society', 'innovation-orientated nation', or the recent 'Chinese Dream' proclaimed by President Xi Jinping on a number of occasions since 2012 (Carlsson, 2015; Heilmann, 2010; Naughton, 2010; Saich, 2011). These imaginaries generally inform and influence decision makers and the general public alike, and they all share an aim of mobilising science and technology in a project of ultimately making China a developed nation. In recent years, environmental sustainability and 'sustainable development' have gained increasing space in such imaginaries (Economy, 2010; Li and Wang, 2012; Saich, 2011; Stensdal, 2014), and research shows that wind industry development has gained traction because of motivations such as sustainability and climate change (Lewis 2013, Ydersbond and Korsnes 2016).

To summarise, expectations as understood in this paper are connected more 'locally' to a specific technological project, whereas sociotechnical imaginaries are long-term, state-induced desirable futures. Expectations can work to break new ground, create protected spaces, be self-fulfilling and mobilise new actors to support or oppose a technology. We can assume that collective expectations

are malleable and can be drawn upon by governments. Expectations can also be contradictory, and we can expect the Chinese government and industry stakeholders to attempt to make certain expectations more credible than others. These expectations, in turn, impact the government supported imaginaries. We can expect sociotechnical imaginaries to be present as general understandings of good and desirable futures in the social world writ large. As we turn to look closer at China's offshore wind industry, we may ask what the important elements of successful visions are in this context. What is the relation between offshore wind industry expectations and imaginaries in China, and how do the different actors' perspectives on the future impact offshore wind development?

3.   Research method and data

This paper is based on interviews conducted during one year of fieldwork in China from 2013 to 2014. Important observations were also collected at the China Wind Power 2011 and 2013 conferences, the Offshore Wind China 2012 and 2013 conferences and the 8th China (Shanghai) International Wind Energy Exhibition and Conference in 2014. I also participated in workshops and meetings on offshore wind, at which I conversed with experts and professionals in the offshore wind industry in China and globally. The interviews focused on the participants' perspectives on the offshore wind industry, such as its challenges (including quality or management issues) and its comparison to the onshore wind industry. All interviewees were asked about the future prospects of the industry and whether or not the official government development targets for 2015 and 2020 would be reached. To present a broader view of the expectations made in the wind industry, this paper also includes twelve interviews from 2011 that focused on the development of China's *onshore* wind industry. These interviews were both relevant and helpful because they included clear aspects of how government officials and industry analysts would think about the future of the wind industry and the role of the government. The year 2011 is clearly specified whenever these interviews are used in the subsequent analysis. With these interviews included, I conducted 55 interviews with a total of 68 interviewees.

Below is an overview of the interviewees and their respective stakeholder segment in China's offshore wind industry. Interviewees from the government included persons working with offshore wind in industry associations, local governments, provincial governments and central government agencies. Each interview lasted, on average, 70 minutes. All interviews were conducted in English, but only three of the interviewees were native English speakers. I took several classes of intensive

language training while in China and thus acquired a basic knowledge of Mandarin, which was very useful in establishing a positive interview atmosphere. I used an interpreter for 20 of the 55 interviews. I employed four different interpreters during the whole stay in China: one mainly in Beijing, two mainly around Shanghai, and one around Guangzhou. Three of the interpreters were professional interpreters with previous experience in renewable energy industries, and one was an English language master's student. Use of an interpreter can make it difficult to ensure that a question is understood as intended and that the answer is correctly transmitted. Moreover, use of a second language may cause interviewees to say things they do not mean or may tweak the meaning of what was originally intended. These two caveats were taken into account and addressed by repeating questions or clarifying meanings in instances in which there was any doubt. I am therefore confident that the following analysis represents the views of the interviewees.

Table 1: Overview of interviewees

Industry segment	Interviews 2011	Interviews 2013-2014	Number and nationality of interviewees		
			Chinese	Foreign	Total
Government	3	8	14	1	15
Turbine manufacturer	4	7	11	2	13
Turbine suppliers*		3	2	1	3
Advisory and certification	4	12	8	8	16
Balance of plant**		7	9	0	9
Project developer	1	5	10	0	10
Research (university)		1	2	0	2
Total	12	43	56	12	68

*Turbine supply includes gearbox, pitch and yaw systems and control systems.
**Balance of plant includes forecasting, electricity grid, coating, cables, installation and foundation.

The interview data were analysed according to principles suggested by 'abductive reasoning', meaning that both field data and existing theory were allowed to influence the researcher, but ultimately, instead of forcing either the theory or the data into an uncomfortable framework, the researcher left space for his or her own logical reasoning (Reichertz, 2007). The analysis is also inspired by constructivist grounded theory (Charmaz, 2006; Clarke, 2005), implying that the analysis had already begun at the data collection stage, and the interview set-up changed as a better grasp of the topics to be pursued was developed. This approach enabled a greater focus on topics of interest throughout the data collection process, and it made coding easier, as all the data had been gathered. The data were analysed and coded using the computer-assisted analysis tool NVIVO. I coded through NVIVO after all the interview material had been gathered and before

much of the theoretical search had begun. The data analysis was guided by existing theories and was based on grounded concepts.

4.   How offshore wind expectations were generated

It became apparent during the fieldwork in China that the way in which people talked about offshore wind power was anchored in two main experiences: the existing *European* offshore wind industry and the domestic *onshore* wind industry. These two experiences were typically referred to in assessments of the speed and quality of the development of China's offshore wind industry. Europe frequently served as a basis for comparison regarding the quality of performance in China, which was evident, for instance, in a discussion of the tendering process for offshore wind projects with a Chinese employee of a European certification company:

> The Chinese tenders are not serious. In Europe, everything is prepared well, before a bid is made. But if you do that here, you lose! Sometimes the winner is already decided by the government. You can tell this if you read the tender documents; you can already know who they want to win the tender.

In this case, it is implied that the tender that was held for offshore wind projects in 2010 lacked sufficient preparatory work to ensure the feasibility of the projects, which was apparent even to the developers bidding on the projects. In fact, one larger developer justified the low bid prices and, hence, the low probability of starting the project by saying: 'If you jump from the 25th and the 20th floor it's the same, you are dead anyways.' In Europe, on the other hand, these tenders would have been organised differently, often supervised by an advisory agency to ensure that potential pitfalls were accounted for.

When thinking of the *speed* of offshore wind development in China, interviewees particularly looked to the development of the onshore wind industry. On the one hand, some interviewees hoped that the development of the offshore wind industry would not be as fast as that of the onshore wind industry; on the other hand, they were expecting it to develop with the same swiftness. A Chinese interviewee of the European certification company compared the development of the offshore and onshore wind industries in China, stating:

> I hope the government will take it slowly this time, as opposed to what happened in the onshore wind development, which developed far too fast. It was five, six years of dramatically rapid growth without control. And all the quality issues and everything happened because of that. So I believe the government needs to learn from onshore. The problem here in China is that when the top decides, it will have to happen. And they in turn

put pressure down to the developer, and to the industry. That's a kind of dilemma. Personally I would think a time-horizon of 20 to 30 years would be good [for the industry development]. This way I can keep my job for a longer time [laughter].

We see that the onshore industry was used as a base for comparison, with the conclusion that *this time*, with the offshore wind industry, it would be better to take it slow. This concern over developing the offshore wind industry too quickly recurred in several interviews. For instance, a manager from a large wind turbine manufacturer believed the following: 'The government has observed some problems from the onshore industry, and now they will be more careful. The onshore industry was really booming, but the government has learned, step-by-step.' Again, we see that the government was perceived as the main actor for deciding the speed at which the industry would develop, and industry actors merely followed the tune of the government. Interviewees typically referred to concrete examples of companies that had developed too quickly, had overexpanded and were subsequently on the verge of bankruptcy. One such company was Sinovel, the largest onshore and offshore wind turbine manufacturer. As a Chinese manager of Siemens stated, 'Sinovel only focused on expanding their capacity, expanding their market share and did not think about quality that much. Today the situation is really bad there, and most of their employees are really frustrated.' Interviewees hoped that a greater focus on quality would be prioritised in the offshore wind industry. Hence, industry stakeholders constructed their own likely futures of offshore wind development based on their awareness of the pitfalls that had occurred in the onshore industry.

Some interviewees did not necessarily view the rapid development of the onshore industry as a learning experience that would slow the development of offshore wind energy. Rather, they assumed that the offshore wind industry would follow the same growth pattern. A spokesperson from a large developer said that they 'have an impression recently that the government wants to develop this industry fast. And we can use onshore as an example: after the onshore feed-in tariff was set the industry developed quite fast.' There were also other examples of people expecting the development to happen quickly, as had occurred in the onshore industry. An interviewee from a coating manufacturer expected things to 'go crazy' because of what had happened with the onshore industry:

> Interviewer: How fast do you think the offshore wind industry will develop in the next five or ten years?
> Interviewee: I don't know. It's usually quite crazy here. When it starts it just goes crazy. You know during 2011 we were really astonished about the speed of the onshore wind development. The amount of new projects… it was just tremendous.

Another interviewee from a wind farm developer thought that the offshore wind industry would 'copy the mode of the onshore industry.' He added that, over the next couple of years, many companies would enter the industry: 'When everything goes well everybody want to join together.' For these reasons, we may conclude that onshore wind experiences calibrated visions for the offshore industry, in the sense that the growth could be very quick, and, on the other hand, rapid growth could cause serious costs in terms of low performance, which had been well documented in relation to the onshore wind industry (e.g., Gosens and Lu, 2013, 2014).

Other interviewees were generally sceptical that the industry would develop quickly, simply because there were still too many obstacles for offshore projects and onshore resources were still abundant. In this manner, the onshore wind experience became a competing expectation for the immediate future. As a government policymaker put it:

> Interviewer: How do you think the offshore wind industry will develop in the future?
> Interviewee: I don't think it will be quick. So far it is inland, and not offshore wind (that has been fast). Because there are many, many things that should be done if you go to offshore wind. Seabed, resource assessments, and also dealing with the different groups, such as the fish industry, the ocean administration, and other coordinators. Yes, many things. So I don't think it will happen in the future three to five years. However, for onshore, we already have done a lot of detailed work.

The low wind speed areas onshore appeared to be direct competitions to offshore wind projects. An analyst from the China General Certification Agency put it this way:

> I know from the National Energy Administration that they would like to have more wind energy in the south. I mean, what's left to build out onshore has lower wind speeds than offshore, and for maybe the next two or three years people will still focus on these wind areas and not on offshore.

Several interviewees agreed on this point, and a professor from a high-standing university conducting research on offshore wind in China said that 'right now the most valuable resource is the low-speed wind onshore resource, and this is where the government and the industry are focusing right now.' However, the low wind speed areas were not the only competitors to offshore projects. Local governments, consistently concerned about economic growth in their areas, had other potential future uses for their coastlines. For example, a manager from a foundation manufacturer explained that the local government around Binhai, where one of the concession projects was located, was against the offshore wind projects:

> The Binhai new district expected to develop their shipping business there, and the accompanying logistics, and real estate, and also fishing. So obviously the offshore wind development will contribute negatively to this kind of plans.

As we can see from this quote, the various actors envisaged different futures. The future thus demonstrated interpretive flexibility that would bring intended futures more in line with the interests of the spokesperson, and negotiations were constantly ongoing in an attempt to determine whose future was more important.

The comparison with Europe was also used as an argument for inland wind resources. In Europe, it was claimed, offshore wind was necessary because of land constraints; however, this was not the case in China. This argument, for instance, was made by a high-standing government policymaker:

> This is the different situation here with Denmark, Germany and the UK: In Europe the inland almost does not have any more space for wind, but that's different in China. In the future we must use the ocean, but for now we still have some work to do [onshore].

The development of offshore wind was therefore not considered pressing, and according to the above interviewee's own estimates, offshore wind would become more important in perhaps 'five or even ten years.' However, another participant from a large developer said that the reason offshore wind energy was preferable was precisely because there was too much land in China and the distance between people was too great:

> In China it's not like we don't have land anymore, like in Europe. I mean, in Inner Mongolia there is much land, but the problem is that the distances are too great there to the load centres, after the electricity is generated. In the southeast of China, like the Jiangsu, Zhejiang and Fujian, they are very industrially developed areas, and when we generate electricity there it is much easier to transport it. And also the wind resource offshore is better than onshore. So after some testing we think that we can produce some profit from the offshore wind industry.

Here we again observe that the same conditions were used in two diverging arguments. Above, we observed how the onshore wind industry created diverging expectations for the offshore industry. Here, on the one hand, we see that Europe's *lack* of land was viewed as the reason why offshore wind became important there, and on the other hand, China's *abundance* of land (i.e., the great distances between the onshore wind resource and the load centres) was the reason why offshore wind was deemed necessary. Although it appears that the industry stakeholders did not completely agree on the importance of either the onshore industry or the European industry for China's offshore wind industry, we may conclude that they drew heavily on previous experiences to adjust their expectations of the future. Indeed, actors drew on examples that supported their construction

of the future: Different actors had diverging intentions of how the future should look. This interpretive flexibility made people draw on experiences depending on their future interest. As we have seen, some wanted to keep their job longer, others wanted to make sure that they did not lose face and still others focused on ensuring high-quality products. The bottom line is that the different stakeholders used prior experience to tune their expectations in a desired direction according to their situation and the likelihood of achievement. The effects of these expectations therefore depended on the relation between the future and the actor 'reading' the future in question. In this sense, the sociotechnical imaginary was also affected, and the government would adjust development targets. This relation between sociotechnical imaginaries, expectations and actual industry development is examined further in the next section.

5. The interrelation between imaginaries and expectations in the offshore wind industry

The ambitious government targets for the development of China's offshore wind industry appeared to be strong indicators of the future for industry participants. If an industry receives attention from the central government, the legitimacy and status of the industry is elevated on a provincial and local level, and the likelihood of its success increases (Kong, 2009; Korsnes, 2014b; Shi et al., 2014). Government targets are also important for attracting new investors. A common perception in the industry was described, in 2011, by an interviewee from the Global Wind Energy Council based in Beijing: 'If I am an investor and I want to invest either in solar, biomass or wind in China, I would go to wind because it has a really high development target.' Chinese government officials tended to look many years into the future when formulating their vision, as explained by a high-standing government official in December 2013:

> We focus on the future, to 2050, so you know all these pollution issues you cannot change in one day, or one year. You must take a long time. You should be clear that by 2050, in 40 or 50 years, what is your challenge, your situation? So, if we are clear about the future, everybody can reach a common idea. Now, we come back, from now we should do some work. We must do some work. Otherwise, the future will not wait to come.

We see quite clearly here how the future was enacted in the present and how the government was convinced that ambitious action was required 'today.' These considerations were manifested in the sociotechnical imaginary envisaged by the government, and as the quote indicates, they were motivated by concerns of 'pollution issues.' Hence, government targets may in this case be

understood as rather concrete manifestations of a wind industry sociotechnical imaginary, a tool that would help the government reach their desired future.

Although *official* government development targets for offshore wind were high, interviews with policymakers and government agencies indicated that the expectations of government officials with respect to reaching the 2015 and 2020 targets were low. One policy advisor noted that the 2015 development target had been changed from 5 GW (5,000 MW) of 'installed' capacity to 5 GW of projects 'under construction', reflecting the acknowledgement of central government that the goals may not be reached. The new wording provided a much broader time span for the actual completion of projects, as the term 'under construction' was not defined and a project could therefore potentially continue for several years into the future. Hence, the government's ambitious prospects created the impression that more was happening and thus allowed government officials to save face regarding the official development targets. Moreover, the ambitious targets made the industry believe that things looked promising and therefore generated more interest.

The Chinese government overestimated the future, which might have been a strategic decision because government officials were less enthusiastic when addressed tête-à-tête. However, industry participants were aware of the government's overestimations. In effect, offshore wind industry participants in China referred to the industry as an unrealised idea that was likely to happen. As one manager of a certification company put it: 'Currently the Chinese offshore industry is like a cake. So far it's a really beautiful picture, but there is no real cake here. So everybody thinks "I have to be involved or can take some share of it".' The high expectations made the Chinese industry an attractive cake from which many wanted a slice. Although most industry actors agreed that the 2015 target would not be reached, they were certain that the industry would take off at one point, and at that time, they needed to be in the right position to receive a share of the cake. Government targets can be considered constitutive of sociotechnical imaginaries, thus explaining their ambitiousness, but this constitution was always locally negotiated. Futures were constructed based not only on the government's high promises but also on the local expectations of industry participants.

Interviews with various offshore wind industry-stakeholders revealed that their expectations were much lower than the official development target. Industry participants were generally struggling to gain an overview of the situation at hand, constantly assessing what had actually been done by other actors, what was under construction, what orders had been made, what was only at the planning stage, what the 'tone' was from the central and local government officials, and so on. One

Chinese consultant at a European certification company emphasised that it was important to constantly communicate with the various stakeholders to manage their expectations:

> All the international companies have the same questions. For example you receive the list from the offshore event organisation, that some projects will be kicked off next year. And at the workshop I talked with the director of [a design company] the whole evening. We discussed which project can be kicked off, and also which developer. We really went into detail. Each and every project has its reasons why they can kick off or not. Of course three years or maybe only three months later this will change. So basically you know that you should not really think that 'Oh it's really good, we have 10 projects to be kicked off and we can make our budget based on that!' There will be trouble for everyone if that happens.

This quote shows that the future professed by the government was checked and balanced against the reality of other industry participants, who felt it was important for them not to base their expectations on incorrect assumptions. Because it was difficult to know what and when things would happen, industry participants needed to exchange information. The list mentioned in the quote above was published by the government and outlined the projects that would be launched at what time. However, the timeline described in the list was much more ambitious than what actually occurred.

As reflected in the interviews and industry reports, the most common reason why things did not develop as quickly as expected in the offshore wind industry was the disagreement between the two departments responsible for the development: the National Energy Agency (NEA) and the State Oceanic Administration (SOA) (Guo, 2013; Korsnes, 2014a; Quartz+Co, 2013). This disagreement resided mainly in the procedures of project approval and project siting. Indeed, the necessary governing mechanisms were not in place to accommodate the government targets. As a turbine manufacturer said in 2013:

> Two years ago the government themselves didn't know how to approve the offshore projects. They didn't know how to do environment assessment for offshore, or what kinds of feasibility studies were needed. I have to say they are still learning.

A project developer agreed with this statement, adding that 'the procedures were not in place to support this kind of projects, so they had to discuss this with other national departments to develop the policies.' The central government needed to establish the procedures for project development, and looking further into the future and setting ambitious targets allowed them to quickly mobilise and coordinate actors internally as well as externally.

Most actors were waiting for the government to introduce an acceptable electricity price (feed-in tariff) so that offshore wind projects would pay off (Yang, 2014). All of the developers of offshore

wind projects were Chinese state-owned companies (Korsnes, 2016) and were therefore motivated to reach the development targets. However, as they did not receive funding for this, they had to use money from their internal budget, as explained by a manager from one of the largest developers:

> We cooperate with the NEA [National Energy Administration], but actually we are the ones who pay for [a demo project close to Shanghai]. We proposed the project to the NEA, and they approved it, so in terms of technology support, opportunities and policies we got many benefits from the government.

In other words, the NEA supported the company in a non-financial way, but the company had to pay for the actual development. In this manner, the government was able to ensure that prices were not unrealistically high. Moreover, it was clear that the government depended on the industry to make the initiative and start development. The industry actors were also aware of this reasoning, and used it to gain increased support from the government when needed. This leverage was particularly clear with the four concession projects, totalling 1,000 MW, that were initiated in 2010 but had not yet started construction in 2014. An official from the Jiangsu provincial government renewable energy industry association explained the situation:

> The reasons the government gives to the public of why the projects have been postponed is because of the disagreements between government agencies. However, those are just public reasons. The real reasons, actually, I have met with all the related companies for these four concession projects last week, and they say that the main reason is because of the technology. They do not think the technology is mature yet, and the cost is very high.

In other words, the developers did not start constructing the projects because they were too expensive, and they were waiting for the government to increase funding.

However, who is the 'government' in this respect? In fact, few appeared to know exactly who the decisive actors were. This uncertainty with respect to the government was prevalent in much of the interview feedback. For instance, one interviewee from a government-organised renewable energy industry association that was quite close to the politicians making decisions, and which informed the government of policies to be implemented, answered in 2011 that 'no one really knows these things' when asked at what time she believed the top-level government would start developing offshore wind projects. Only a few select individuals knew about the 'top-level' plans. An energy consultant who had been working with wind energy in China since 2002 made a similar point. In 2011, he said the following when asked how policy had been set for the onshore wind industry in China:

> A lot of these things are run by the ERI [Energy Research Institute] and people in the wind energy association, or the renewable energy association. These people often have dual roles, they're either professors or industry association people and they are relied on to advice the NEA [National Energy Administration], and write draft policies. The problem is you never know who has the final word. I mean the academics draft the stuff and then politically it is expedient. But does it happen or does some big guy just walk in the room and say, "No, it has got to be this way"? Nobody knows.

Industry actors were therefore in the dark as to exactly what would happen and when. Everyone apparently was prepared to 'jump on the train', as the government had announced ambitious development targets, but few knew exactly when the train would depart and in what direction it would head. Thus, the government remained obscure, and industry actors had the impression that things could change at any moment. This uncertainty affected expectations; people needed to be open to both rapid change and no change. Small offices could grow large literally overnight but could also stay small. The government remained ambiguous because it needed to sort out the internal organisation of projects. However, the mysteriousness kept industry actors alert and ready to make a move when the signal was right. Industry participants needed patience, and they needed to believe that something would happen at one point in the future. The relationship between government and industry became a strategic waiting game – a waiting game that was characterised by ambitious government intentions but ambiguous signals in terms of implementation.

The quintessence of the strategic games was rooted in conflicting expectations: The government could, at any point, introduce a feed-in tariff, and companies who wanted a piece of the cake had to be prepared to seize the opportunity. It was, however, not a waiting game of 'wait and see' but rather 'wait and prepare.' Thus, the character of the game was different from the way in which it was portrayed by other empirical examples and in the expectations literature (e.g., Geels and Smit, 2000). Interviewees from Chinese industry appeared to have a reflexive attitude to government imaginaries: They knew that something would happen, just not when. The performativity of expectations was not located in the circulation of expectations as such but rather in expectations about the performativity of imaginaries. Following this line of reasoning, we arrive at a new interpretation of the ambitious government targets. The government depended on industry input to develop procedures, assess costs and get things done. Industry actors, however, did not accept the validity of the vision in its entirety and were able to convey their version of what was possible and affordable. The government then modified its targets accordingly, for instance, by changing 'installed capacity' to 'under construction' or by actually reducing the development targets. The relation between sociotechnical imaginaries and industry expectations as defined in this paper could thus be considered a planning tool – a litmus test of what was feasible – that the Chinese

government could take strategic advantage of to achieve intended futures. Ambitions shaped the road ahead and ambiguity became a space for negotiation – a reality check for plan-fixated technocrats and cost-concerned companies.

6.   Ambitious yet ambiguous futures

This paper has examined the role of sociotechnical imaginaries and expectations in China's offshore wind industry to better understand the role they play in industry development in a Chinese context. In particular, the paper has looked at how sociotechnical imaginaries were negotiated by local expectations, how expectations were generated from experiences with the onshore wind industry and Europe's offshore wind industry and how strategic waiting games characterised industry development. The paper first described the manner in which government targets were set and later negotiated between the government and industry. Given that the early developments of the onshore wind industry continually missed development targets, there is a fairly strong indication that development targets were set rather ambitiously in China. This ambitiousness generated interest in the industry and government, pushing policymakers to move the issue up the agenda. In this manner, a promise and requirement cycle, as van Lente (2000) describes, was generated, and industry participants expected the government to follow through with support schemes for developing the industry.

In general, the basic tenets of the sociology of expectations appear to resonate well with the Chinese offshore wind industry with respect to promise and requirement cycles and strategic games between technology spokespeople and others. However, the interaction between government-induced sociotechnical imaginaries and industry expectations provides new perspectives on how nation-specific and industry-specific expectations can merge into quite concrete actions and plans. By describing a strategic waiting game between the government and industry actors, this analysis has emphasised the fact that Chinese industry actors had to be prepared for both change and inertia. In China, companies and politicians were future-orientated and looked at what the various long-term plans had in store for them. Things could change quickly from one day to the next, and companies therefore had to be prepared to be taken by surprise.

I identified two characteristic components of the waiting game: First, companies delegated responsibility for their future activity to 'the government' and waited for its call. Second, the government remained obscure, leaving industry participants on their toes about what would happen next. More importantly, however, keeping the future ambitious but the implementation ambiguous

appeared to be a strategy employed by the government to ensure change without detailing the road ahead. Thus, the dynamic relation between the government-induced sociotechnical imaginary and industry expectations functioned as an important planning tool that helped calibrate industry development.

The paper has established that the government played an important role in constructing successful visions in China. By describing a novel nuance between expectations and imaginaries, this paper has contributed to a better understanding of the dynamics of future-orientation in China: As industry actors typically expected something to happen, the negotiation centred on *the extent to which* government imaginaries could and should be performative. Expectations in China materialised more concretely than indicated by both the sociotechnical imaginaries approach (Jasanoff and Kim, 2009) and the sociology of expectations (Borup et al., 2006). With a plan-based economic history, China's visions were bordering on loose plans, and the theoretical distinction made here between imaginaries and expectations help us understand better how the government was able to make use of conflicting understandings of the future to attain more realistic plans. Government targets that 'failed' to be reached were therefore not failures per se but indicators of what industry actors could tolerate in terms of costs and development speed, which in turn were used to set new and more realistic targets.

In practical terms, the described dynamics of future-orientation in China have several implications. For instance, the waiting game appeared to be biased towards larger companies that had the means to keep large capacities idle over time and could jump on the train when the right government signals were given. In China, these companies typically included the large state-owned enterprises. The waiting game could therefore be used strategically to ensure that domestic (state-owned) companies gained a larger market share than did other (private or foreign) companies. In effect, the waiting game can be considered a protective mechanism that may have given domestic companies a buffer zone to help them acquire the technologies of frontier companies. Another implication is that, as these concrete expectations were negotiated and manifested, the initial imaginary set by the government had a big impact in terms of the direction in which the industry developed in China. Had the Chinese Communist Party not wished to develop renewable energy technologies in the first place, nothing would have developed. In a sense, the solidity of expectations in China rests on the legitimacy of previously fulfilled expectations in other industries. Ironically, therefore, the success of Chinese companies in developing coal power industries, for example, may be a reason why expectations and ambitions are so high for China's offshore wind industry today.

Acknowledgements

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