Wind Energy in Planning Visions and Practices in Contemporary China

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Abstract

China is the leading player in the wind energy market, with nearly half of the current global installed wind energy capacity. Literature on wind energy development is dominated by the energy policy and engineering sciences domains and focuses on the economic and decarbonization potential of wind turbines. This paper aims to bring the actual resource (the wind) and the land on which the turbines are placed to the forefront of discussion and explore how these three components relate to each other. While wind as a natural resource is atmospheric and aterritorial, the technology that facilitates conversion into electricity is rooted in the ground. By examining archival texts on climatic resources and analyzing the development of three early wind farms, the paper shows that wind energy in China was able to grow rapidly not only by way of strong state support, but also because regulations on natural reserve preservation were not strictly enforced, and wind farms were aestheticized as fitting into ecological landscapes. The paper concludes by looking forward to shifts in configurations of the resource, land, and technology prompting new path in wind energy development: turbines situated on nature reserves are mandated to be decommissioned under the concept of ecological civilisation, and various cultural meanings of wind continue to be used to rationalize the siting of wind turbines.

Keywords
wind energy, natural resources, ecology, renewables, atmosphere

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INTRODUCTION

China is the global leader in wind energy development, with 366 GW, or 41% of total global installed wind capacity in 2022[1]. Literature exploring the success of the industry tends to focus analysis on strong state support, a vast array of state-owned land, and the industrial opportunities in the manufacturing and engineering design of turbines. This paper hopes to bring forward underdiscussed, especially in the Chinese context, elements in the wind energy development nexus – the resource from which turbines convert into electricity, and the land on which the turbines are sited. The paper provides a historical contextualization of wind energy emerging from existing state attention to climatic resources (*qihou ziyuan*) and shows how normative political views on state-society- environment relations were at one point at the forefront of the discussion, then transitioned into a more scientific and rational understanding of natural resource extraction. While environmental protection measures existed, enforcement of nature reserves was lacking. This ambiguity in how ecological lands were meant to be preserved created an opportunity for a successful branding of turbines as fitting within these ecological lands, with emphasis on the abundance and progressive qualities of wind as energy. The combination of these parameters played a key part in the early successes of the wind energy development. While wind energy development has stalled in other contexts due to private landowner complaints on rights to views, and mature natural parks and preserve regulations, China appears to have bypassed these concerns within a unique property and state-society context.

I first examine two texts on natural resources which include sections on climatic resources, analysing how wind energy development emerged from existing institutions on climatic resources and nascent and disorganized spatial planning systems. I then offer three brief case studies of early wind farms in China, laying out the actors involved in the siting and development of the projects. Finally, as concluding remarks, I look towards the future with some remarks on how these early parameters facilitated the rise of wind energy development in China but are now undergoing changes. The emergence of ecological civilization is clear in its stance that turbines are not permitted on nature reserves, which has resulted in several instances of mandated decommissioning. Further, the meanings laden in and the specific spatial-temporal qualities of wind and climatic resources generally still figure into rationales that support wind energy development, and prior normative questions on attitudes towards attitudes and actions involving the atmosphere are not yet resolved.

EXTANT LITERATURE

The literature on wind energy development in China is mainly published by researchers in the energy policy domain. These scholars offer an overview of the growth of the Chinese wind energy industry by providing timelines of key legal and policy frameworks that laid down a path for the industry to grow and wind farms to be built[2]. The key attributable factors in explaining the rise of the wind power industry are the prioritization of decarbonization as a state goal, formal legal frameworks such as the “Renewable Energy Law” in 2005, subsidies and funding for fixed feed-in tariff wind electricity prices, and enthusiastic, cooperative local governments.

There is an emerging literature that focuses on the manufacturing component of the energy transition. These scholars point towards strong manufacturing coalitions that control the supply chains of the parts necessary for the energy transition – for example, wind nacelles, blades; or panels for solar energy- as the key to creating strong coalitions and a real impact on green growth[3]. Indeed, the trade discussions and malaise on the American and European side of the energy transition rest on China's growing dominance of the manufacturing end of the supply chain of wind turbine parts, which makes up a significant portion of its exports[4]. This group of literature focuses on the economic opportunities around the visible component of wind energy development, the turbines, while this paper aims to shift the attention to the wind, from which the turbines convert into electricity, and the land on which they are sited.

HISTORICAL SKETCH: WIND ENERGY EMERGING FROM CLIMATIC RESOURCES

To contextualize how wind fits into state logics I first examine two texts on natural resources to trace the evolution of discussions revolving around wind as emerging from climatic resources. These two texts are meant to provide a sampling to provide a sketch of how state attitudes toward wind changed. The first text presented is a pamphlet for youth on Chinese geography published in the mid-1970s; the second text is a 1994 national-scale natural resources survey and anthology, with volumes published for each natural resource and province. I then turn my attention to describing the existing institutions pertaining to the land regulation on which these early wind farms were sited.

"Concise Chinese Geography" (*jianming zhongguo dili*) was published by Shanghai Normal University in 1974. The book is part of a series whose audience is mainly urban youth sent down to the countryside to receive re- education from the rural peasantry. Chapter/Section Four details climatic resources (*qihou ziyuan*). The subsection "Climatic resources and agricultural production" describes wind as a carrier of atmospheric things important for agricultural production, which include light, warmth, and water[5]. What is particular about agriculture is its link to time: "...agricultural production does not only need to align with the land but also with time (*yinshi zhiyi*)"[6]. What is needed is to understand the order of the climate and weather, and to scientifically approach agricultural production. What follows is a politicized critique of what the sky represents and what the appropriate actions towards it should be: "But, for the relationship between sky and humans, this is then a question of whether the sky determines everything, or the human can overcome the sky, from ages ago Confucianism and Legalism were completely opposed, the battle between materialism (*weiwu zhuyi*) and idealism (*weixin zhuyi*) was intense." The author then goes on to lay out sayings attributed to Confucious and Mencius on the "Mandate of Heaven" (*tianming lun*), which is criticized as feudal and irrational. The legalists on the other hand see nature and the sky as having an objective order. Instead of following the sky, so to speak, it is encouraged for society to use it and to understand the underlying order and logic of the system[7].

Fig. 1. A diagram depicting monsoon seasons. The bold lines indicate frontal zones, while the dotted lines show monsoon season boundaries, with text indicating the time.

Wind in this publication is not yet seen as an extractable energy resource. The debates on wind are not so much about how to better extract it; rather they are about how wind more generally is a part of the climatic resource, which is an object to study and control, in the name of increasing agricultural productivity and criticizing feudal and Confucian normative ideals of state-society-environment relations.

Following the reform and opening period post-1978, the discourses and institutions on resources changed, and instead emphasized a rational utilization of resources in the context of growing population and decreasing arable land. Interest in the wind as an additional energy resource that could promote the self-sufficiency of electricity supply grew and was made a separate discussion apart from climatic resources.

The "Natural Resources Series," (*ziran ziyuan congshu*) published in 1994, contains a total of 42 volumes, with dedicated volumes to each type of resource (land, water, minerals, climate, forests, grasslands, fisheries, wildlife, oceans, and tourism) and each province. The first volume is a general volume that has chapters that provide summaries of the findings on the national scale. The origins of the series are explained in the preface of the first general volume. It was approved and directed by the State Planning Commission (SPC). The resulting work was a collaborative effort on the part of the Land and Regional Department (*guotu diqu si*) subordinate to the SPC, the Chinese Academy of Sciences, and the SPC Natural Resources General Survey Committee[8]. The beginning pages of the first volume are inscriptions of words by lead CCP officials, signalling the level of attention the project was given. For example, the first inscription by Song Ping [9] in January 1993 reads, "Rational development and utilization of land resources for the coordinated development of the economy and the ecological environment."

The first volume, which is a master or summary volume, discusses "Climatic Resources" in Chapter 11. The first paragraph makes distinct climate (*qihou*) and climatic resources (*qihou ziyuan*), noting that there are two types of utilization. The first is direct utilization, under which wind energy falls. The second is intermittent utilization, which are the background conditions helping to facilitate the growth of plants and agriculture. The beginning paragraph makes clear that research and the potential of climatic resources is of the second category and also states that the unique characteristic of climatic resources is their seasonal quality[10]. Emerging metrics on wind energy are separately discussed in Chapter 10 "Energy Resources," which focuses on those resources that may be converted to energy to fuel industrial activities and electricity production. Wind energy is described as having the following characteristics: "high energy potential, but low concentration…easy to utilize, no pollution, renewable; much uncertainty, poor continuity, and stability; uneven across time and space. My country's wind energy is strong in the north but weak in the south, strong on the coast but weak inland, strong on plains but weak on mountains, strong in winter and spring but weak in the summer and fall"[11].

Wind at first was an important component of a scientific understanding of climatic resources, which was important for agricultural productivity. With the reform and opening up, new technologies and economic projects were encouraged across the board. Not only did this encourage the invitation of foreign technologies and expertise in emerging wind turbine technologies. With the increasing demand for energy and electrification, the newly created National Energy Administration (NEA) was on a mission to open up all sources of energy possible. Wind (and solar energy) were considered abundant and easily accessible. Subsidies from the central state poured in to help fund and facilitate the rise of these developments. Local governments participated to gain tax revenues and fulfil state mandates and wore the branding of a progressive, state-aligned province.

Meanwhile, the planning it related to how these aspatial statistics and missions were decentralized, fragmented, and disorganized. Nature reserves (NR) were in existence, but not well enforced. The first law for NRs was enacted in 1994, and there was a surge in the establishment of NRs following several severe natural disasters. But by 2007, NRs began to downsize, which usually would be boundary changes sometimes to extract mining and oil resources, indicating relative ambiguity and flexibility in the extent to which such boundaries were enforced[12]. Maine spatial planning was mainly done within the Marine Functional Zoning (MFZ) framework, which was established in 1989, split into four spatial hierarchical levels in 1998, then more clearly defined in 2012[13]. The MFZ was established in 1989 as a reaction to overlapping and disorganized planning, and the proliferation of many offshore development activities[14].

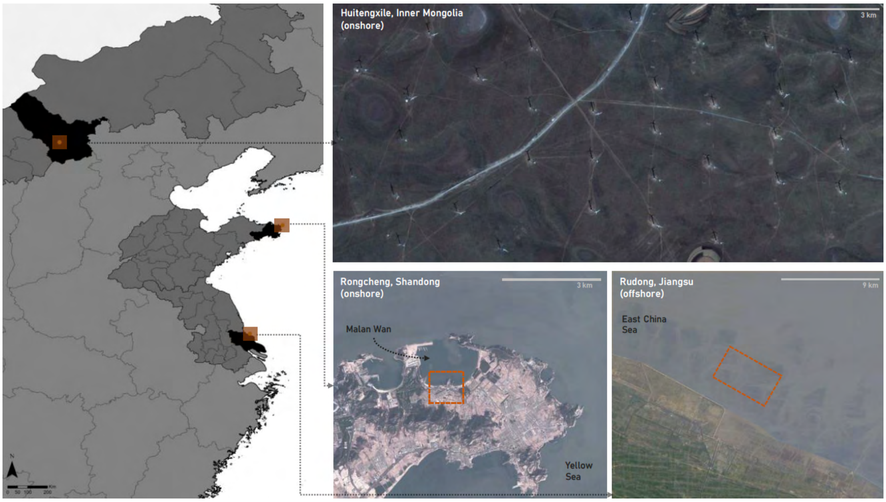

Fig. 2. Case study locations. The map on the left highlights in dark grey the relevant province-level areas; in black the relevant prefecture-level areas. The righthand images are satellite imagery retrieved from Google Earth Pro.

The bureaus that headed all these had conflicting and confusing rules. The regulations on environmental objectives to enforce environmental zones were in place but weakly enforced. At the local level, GDP considerations won out, and the horizontal fragmentation of competing initiatives usually leaned towards economic and development considerations promulgated by the Development and Reform Commission (DRC) aligned groups. Additionally, the cultural meanings laden with wind were used as tools to aestheticize turbines to fit into ecological landscapes. Given these ecological lands were state-owned, with proper state alignment and propaganda the turbines were progressive, green, ecological projects. They projected a sense of harmony with deserts and grasslands and mountains, ecological ideals. Compared to agricultural lands, ecological lands were untouched, had few residents living nearby, and were *de jure* state-owned. Wind turbine installations were thought to generate more productivity from otherwise underutilized territories. Agricultural lands by contrast often were owned by rural collectives and required more involved processes to claim lands.

The abundance of wind energy, and its progressive, ambitious cultural meanings, took advantage of unclear and ambiguous land use functions and rights concerning ecological and nature reserve lands, and projected wind turbines as fitting onto ecological landscapes. This described process, along with strong industrial policy support in terms of state subsidies which make way for profitable business opportunities, green lights from the NDRC, less complaints from civil society on turbines, made way for the staggering and successful rise in Chinese wind turbine installation capacity[15].

Fig. 3. Wind turbines in Rongcheng, Shandong.

CASE STUDIES: EARLY WIND FARMS

This paper presents as brief case studies three early wind farm projects that provide granularity in understanding the initial feasibility and site selection processes.

1986 RONGCHENG, SHANDONG: FIRST ONSHORE WIND FARM

These three turbines, totalling 165 kW, in the most eastern part of China reaching into the Yellow Sea, are cited as being the first onshore wind farm in China. It was heralded as the first successful example of "imported technologies, proving commercial feasibility" (*yinjing jizu, shangye shifanxing*), with extensive scientific and construction expertise from Denmark, and technology from Vestas[16].

The initial actors pushing for the development are recorded as being primarily the Shandong Provincial Government and the Ministry of Aviation Industry[17], with discussions beginning as early as 1983. Spearheaded by the Shandong State Planning Commission, the prime aim was to "learn from advanced foreign expertise to fill the gap in the practical production and application of domestic medium-sized wind turbines," and multiple feasibility groups task forces were created by the local bureaus involved in planning, technology, electricity, and energy research. The project welcomed 18 field visit groups, 37 higher education and research institute visits, 30 plus national-level committees, and provincial-level leaders[18]. Aviation industry interest may have been directed towards the turbine technology: The former head of the Rongcheng Electricity Power Bureau recalled thinking if the aviation companies could manufacture aircraft propellers, could they not make wind turbine blades as well[19]?

Fig. 4. Huitengxile wind farm.

Rongcheng, specifically Malan Bay, was selected as a prime location due to it being surrounded on three sides by the sea, with high average wind speeds[20]. Being the most eastern part of China, this tip of Shandong also held propitious fortune historically, known as the "Cape of Good Hope" (*haowang jiao*)[21].

The project received national attention, and land use requirements were minimal. Following the completion of a "Project Suggestion Book", a feasibility study was carried out, the equipment arrived, and by 1986 the turbines were constructed and connected to the grid. In total, the Shandong State Planning Commission and the Ministry of Aviation Industry invested 597,000 RMB. It was decommissioned in 2015 after operating for 29 years[22].

1995 HUITENGXILE, INNER MONGOLIA: UTILITY-SCALE ONSHORE WIND FARM

The Huitengxile wind farm was one of the first utility-scale onshore wind farms in China, received international attention and financing, and is considered a milestone in large-scale wind energy development in China.

As early as 1986, wind energy specialists were conducting feasibility and locating potential sites for wind energy development in Inner Mongolia. In the particular case of the Huitengxile wind farm, a key figure in this development was the engineer Chen Tongmu. At the time, that area was known as Huitengliang (灰腾梁). *Huiteng* was the Han Chinese transliteration of the Mongolian word that meant "cold"; and *liang* was the Han Chinese translation of the Mongolian word "ridge". According to the local people, that was a place where "in the morning a cow might freeze to death, and by noon it will stink," which meant that due to extreme temperature differences between the day and the night the climate was unpredictable and unamenable[23]. After noticing the area on a plane ride, and recalling a previous field visit to the area, Chen brought it up as a potential site for wind energy development at a wind conference in 1992. By the next day's meeting, one of the conference panel leaders put forth Huitengliang, saying: "Yesterday we went to a new place, the wind is very strong, the terrain is flat, not far from Hohhot... it should be listed as the focus of national development"[24]. Funding for further feasibility and testing was mobilized rapidly soon after. 300,000 RMB was secured from the Inner Mongolia Electricity Administration for a wind measurement device. After one year of data collection, wind speed and wind power density were determined to be viable[25].

Ambitions for the project grew as it received national, and then international attention: a wind energy expert from the China Meteorological Administration shared the plan at a World Meteorological Organization meeting, which included experts from the US, Britain, India, Italy, and Japan, who remarked that "the wind here is even better than the wind in California, US"[26].

As more attention was directed to the area, Chen thought something was not quite matching up – the name of the place. The Han Chinese transliteration of the Mongolian word for "cold" used a character meaning "grey" (灰), which gave a rather desolate impression. Chen decided to replace this was a homophone "brilliance" (辉) which gave a more ambitious feel. He switched back to a Han transliteration of the Mongolia word for "ridge," and the name Huitengxile (辉腾锡勒) was born[27]. In this sense, the potential and the development activities of wind energy fundamentally altered the land and the place on which the turbines were constructed.

By 1994, the financing of the project was finally set, facilitated by the World Bank working with local authorities, including the Inner Mongolia Electricity Company and the China Fulin Wind Energy Company[28]. It included $4 million USD, 40% of which was a grant, and the remaining 60% a commercial loan. The procurement of the nine Danish Micon-600 kW WTGs was installed in 1995, a total of 5.4 MW as a trial operation, and was connected to the grid afterward. These were referred to affectionately as "old 9 units"[29].

The grasslands seemed to be vast landscapes with ambiguous boundaries and overlapping, shared uses. It is difficult to locate maps that indicate where the exact extent of the Huitengxile grasslands. Early developments refer to the grasslands on which the wind farms were constructed as the "Huitengxile stud," a place where horses were bred[30]. The wind farm was to pay a land compensation fee to the stud farm for use of the land; as well as administrative land transfer fees to the Chahar Right Middle Banner[31].

2009 RUDONG, JIANGSU: FIRST OFFSHORE WIND FARM

The Jiangsu intertidal offshore wind farm, along with the Shanghai Donghai offshore wind farm, were considered milestones in grid-connected offshore wind energy in China. The first test offshore wind turbine in China was constructed in the Bohai Sea by the China National Offshore Oil Corporation in 2007[32].

The project development of the Jiangsu intertidal offshore wind farm is described as pushed mainly by an emerging wind energy developer, Longyuan. The account (from the perspective of Longyuan) describes the neighbouring Donghai offshore wind farm as primarily a branding project by the Shanghai Government to coincide with the World Expo but was not commercially feasible due to high construction costs. Longyuan sought to make more breakthroughs in commercial feasibility, describing the business strategy as being “the first to eat a crab” [33]. As early as 2007, the former CEO of Longyuan was active in meeting with NDRC officials and even took a plane with the former Jiangsu Province Party Secretary to start a discussion on renewable energy. Looking out the plane window, the party secretary is quoted as saying, “Jiangsu should eagerly utilize resources and develop offshore wind energy, offshore wind energy can galvanize also other manufacturing industries.”

Fig. 5. Construction of the Rudong offshore wind farm.

The design, engineering, and construction process was technically intensive and the team experienced many difficulties[34]. In 2009 October, the first 1.5 MW turbines were constructed. In 2010 September, 32 MW was installed[35].

The following table summarizes findings from the three selected wind farms.

	Rongcheng	**Huitengxile**	**Rudong**
Type	Onshore	Onshore	Offshore
Location: Province-level; Prefecture-level; County-level	Shandong; Weihai; Rongcheng	Inner Mongolia; Ulanqab; Chahar Right Middle Banner	Jiangsu; Nantong; Rudong
Year; Initial installed capacity	1986; 165 kW	1996; 100 MW	2008; 32 MW
Discovery/Initial mandate (resource)	Shandong Province; Aviation Industry	China Meteorological Administration; Inner Mongolia Electricity Industry	National Development and Reform Commission; Local developers getting involved
Siting consideration (land)	Not discussed, likely unused land; land use was minimal as the project was small	Technically considered a stud farm, state-owned, and followed procedures for land use right transfer	Intertidal region off the coast of Jiangsu shoreline, likely available marine area with no other fishing or oil activities

Table 1. Initial siting and project development processes of early wind farms.

CONCLUSION

The three case studies of early wind farms indicate that the lands on which turbines were sited were either unclearly defined or simply considered underutilized land that could be put to productive use. The information available appears to indicate that the alignment of national or provincial interests, especially from the DRC, facilitated ease of land use. In the case of Huitengxile, the arrival of wind energy interest even prompted significant reworking of the grasslands. Turbines complemented these changes and were branded as fitting onto these landscapes, as progressive and clean projects that were harmonious with nature and the sky. The case studies also show that meeting a threshold of certainty on wind resources is relatively easily met to facilitate rapid feasibility studies and the start of construction. A curious thread that emerges is how aviation is part of the story: In Shandong, the aviation industry may have promoted the project because there were similarities in engineering technologies with wind turbines to facilitate learning; and in Inner Mongolia and Jiangsu, both sites were "discovered" aboard a plane.

The conclusion looks towards recent shifts that are changing the parameters for wind energy development in China. Most significant is the emergence of ecological civilization, which is clearly prohibiting turbine installations on nature reserves, leading to the formally mandated decommissioning of turbines[36]. Even though the state narrative on ecological civilization is pushing forward a view of wind turbines as no longer fitting in these landscapes, how substantive these results are yet to be determined. All onshore wind turbines in Changdao, Shandong were dismantled rapidly and dramatically through a civil lawsuit in 2017[37]. The wind turbines on the Huitengxile grasslands are mandated to be decommissioned, and while dismantling of a few turbines started in 2020, progress has been slow[38].

Additionally, narratives and meanings associated with wind are continually recycled to promote and fit turbines back into the picture to rationalize wind energy development. For example, the title of the 2019 memoir by the former CEO of the lead wind energy developer Longyuan is "A Strong Wind is Blowing," which invokes directly the first verse of the "Song of the Great Wind" by Liu Bang, the first emperor of the Han Dynasty. The original song was a reflection on war efforts and securing empire borders after defeating a rebellion; this serves to cast an ambitious and grandiose vision of wind energy development. A 2023 promotional overview of wind energy published by the China Energy Engineering Group (CEEC) still sees wind turbines as fitting within ecological landscapes. Starting with lines from a poem by Li Bai on a bird rising with the wind, giving an ambitious tone, the text pushes a positive narrative of the combination of wind, turbines, and ecological lands: "People constantly refresh their imagination of wind on mountain tops, in the clouds, in deserts, and in the sea. Wind power generation is a perfect masterpiece of the combination of man and nature"[39].

The impetus to utilize what is a vast, abundant energy resource is the main rationale for continued wind energy development. The Three Gorges Dam, the largest power station in the world, is continually upheld as a standard for energy developers vying to achieve something on a similar scale. The CEEC promotional material compares total exploitable wind energy in China equivalent to 45 Three Gorges Dams[40]. Inner Mongolia brands itself as the "Wind Power Three Gorges,"[41] and Jiangsu also envisioned a similar vision for its offshore development plans[42]. Wind is atmospheric and aterritorial, but the technology that facilitates conversion into electricity is rooted in the ground, and this is where these complexities and ambiguities play out.

The paper aims to contribute to an understanding of wind energy development as not singularly only about technology, but about the combination of the resource and land as well, and how they are configured. The wind's specific qualities allow for the aestheticization of turbines as fitting into various "ideal landscapes" to change. Wind energy development got off the ground in China not only because of strong state support, but also because ecological preservation rules were not yet strictly enforced, and thus wind turbines became part of ecological landscapes, and the intensive habitat fragmentation effects of the technologies were brushed aside. The extent to which the state is restructuring and more strictly enforcing nature reserves under ecological civilization, and how the cultural meaning of wind and prior questions on rights to climatic resources figure into rationalization of wind energy development in China, present productive pathways to explore and keep abreast of.

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DISCLOSURE STATEMENT

No potential conflict of interest was reported by the author.

NOTES ON CONTRIBUTOR(S)

Yuan (Yvonne) He holds a BA in Economics from Columbia University and a Master in Urban Planning (MUP) degree with a concentration in International and Comparative Planning from the Harvard GSD. She is an incoming Geography PhD student at the National University Singapore.

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8. China Natural Resources Series Compilation Committee, 中国自然资源丛书*[China Natural Resources Series],* 1:iii.
9. Song Ping was a former member of the Politburo Standing Committee of the CCP and is considered to be part of the "Second Generation" of Chinese leadership.
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12. Huang et al., "Development of China's Nature Reserves over the Past 60 Years."
13. Lu et al., "A Comparison of Marine Spatial Planning Approaches in China," 95.
14. Teng et al., "Implementing Marine Functional Zoning in China," 103484.
15. It should be noted that wind energy integration into the grid is lagging, which is a pressing issue for the integration of all types of variable energy resources, including solar, into the electricity grid and markets. This paper focuses however on the upstream processes of the resource, technology, and land in the early siting of the wind farms.
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25. Yu, 33.
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28. Xie, 大风起兮: 龙源电力发展历程回顾*[The Great Wind Rises: Looking Back at Longyuan Power Group's Development History],* 82.
29. Xie, 35.
30. While I could not find original documentation supplanting this designation, an article on the *Soviet Changhuan Horse* breed indicated it originated from the Soviet Union and was brought into Heilongjiang in China in 1952. Some of these were then bred in the "Huitengliang stud farm" China Horse Racing Network, "苏维埃重挽马 [Soviet Chonghuan Horse]-大陆赛马网.".
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IMAGE SOURCES

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Figure 2 Polygons used in the map are from GADM. The satellite imagery is from Copernicus Landsat retrieved via Google Earth Pro. Further details are presented in brackets: [Windfarm: satellite image date; the source of the geocoordinates] [Huitengxile: 2011 Sep; from a CDM document] "Inner Mongolia North Longyuan Huitengxile Wind Farm Project Design Document Form (Version 11.0) - CDM," 2019. https://cdm.unfccc.int/UserManagement/FileStorage/K3OIR2DGC7VABT8SWUYLE0FH1Z6NMJ. [Rongcheng: 2012 Nov; best guess of location based on satellite imagery in Malan Wan] [Rudong: 2011 Dec; from Global Energy Monitor]

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Figure 5 Xie, Changjun 谢长军. 大风起兮: 龙源电力发展历程回顾 *[The Great Wind Rises: Looking Back at Longyuan Power Group's Development History]*. 中国环境出版集团 [China Environmental Science Press], 2019, 44.