Watt's in the Wind? A Comparative Analysis of Legal Currents in Offshore Wind Between China and the United States

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Abstract

This research paper compares offshore wind energy policies between the United States and China by highlighting the differences between their development trajectories. Offshore wind energy is undoubtedly a crucial component of the global transition towards renewable energy. So far, it has seen varying levels of success across different jurisdictions, with China significantly outpacing both the United States and the European nations which pioneered it. China's both rapid and efficient deployment of offshore wind capacity should be attributed to its centralized government approach; its strategy includes streamlined regulatory frameworks, notable financial incentives, and strong government support policies, among other initiatives. These measures have enabled China to both meet and exceed its ambitious renewable energy targets.

In contrast, despite recent efforts by the latest American presidential administration, development of the United States' offshore wind industry has been severely hampered by fragmented regulatory authorities. These institutions have implemented various bureaucratic obstacles, which ultimately results in a relative lack of aggressive legislative action to foster growth in the domestic American offshore wind sector.

This analysis delves into specific legal and regulatory frameworks that have shaped the offshore wind landscapes in both countries. It examines the roles of federal and state policies, financial incentives, regulatory decrees, as well as challenges posed by legal and jurisdictional complexities in the United States, juxtaposed against China's cohesive and supportive policy environment. Through such a comparison, this paper argues for a more centralized and streamlined approach in the United States by drawing lessons from China's extremely effective model of offshore wind development. It then concludes with recommendations regarding policy and legal enhancements which could significantly improve American offshore wind industry prospects.

About the Author

Mason F. Ye is a third-year J.D. student at UCLA School of Law, graduating in May 2025. His research into offshore wind energy was supervised by Professor William Boyd, whose enthusiasm for energy law and offshore wind inspired the author to explore the field in depth. He is deeply grateful for Professor Boyd's guidance throughout this project. Mason would like to extend his sincere appreciation to Maria Trubetskaya, Co-Editor-in-Chief of JELP, for their dedication, thoughtful feedback, and tireless efforts in refining this piece. He is also thankful to Nareg Kuyumjian, Lydia O'Connell, Archana Nair, and the entire JELP team for their editorial insights and support. Splitting his time between the United States and the People's Republic of China, the author holds great admiration and hope for both nations and aspires to see transformative technologies like offshore wind serve the people of both countries. This paper represents more than an academic endeavor—it is a personal investment in the future of clean energy and a commitment to ensuring a sustainable planet for his children, Damien and Annabella. 愿清洁能源如海上风电，为后代留下更清洁、更可持续的世界.

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I. Introduction

The offshore wind industry is a result of humanity's shift towards renewable resources. Offshore wind is a journey of innovation that has been affected by policy evolution while being intermixed with international collaboration that is undoubtedly rooted in the history and maturity of this technology.[1] Materially different from its terrestrial counterparts, whose origins can be traced to as early as 200 BC in Persia and the Middle East, where windmills adorned with blades fashioned from woven reeds facilitated grain milling,[2] the establishment of offshore wind as a commercially viable energy source is somewhat of a recent phenomenon. Hailing from Europe circa 1991, the world's first offshore wind farm was inaugurated off the coast of Vindeby, Denmark.[3] This venture, spearheaded by Ørsted (a true trailblazer in an industry that was yet to be defined), marked a seminal moment in renewable energy development. The project included 11 turbines housing a collective capacity of 5 megawatts (MW); this was sufficient to supply electricity to over 2,200 households.[4]

Ørsted's efforts truly laid the groundwork for what would eventually become a global effort to harness the wind's power at sea. European companies like Ørsted (Denmark), Siemens Gamesa (Spain and Germany), Vestas (Denmark), and GE Renewable Energy (France and the United Kingdom), to name a few, played crucial roles in transforming offshore wind from what was once a novel concept into a modern cornerstone of today's renewable energy portfolios.[5]

However, the development of offshore wind energy presents a contrasting picture when examining both the policies and progress made by the United States and China. This paper delves into these contrasts, exploring how differing governmental approaches, regulatory environments, and economic support mechanisms have shaped the offshore wind landscapes in these two countries. Through comparative analysis, this paper hopes to unravel some of the complexities and inherent lessons that can be gleaned from each nation's experience thus far.

Part I of the paper sets the stage by tracing the evolution of offshore wind energy and highlighting significant milestones and technological advancements that have propelled the industry forward. This section lays the foundational understanding necessary to appreciate the complexities and challenges of scaling offshore wind energy.

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1. *See* Int'l Renewable Energy Agency & Glob. Wind Energy Council, Enabling Frameworks for Offshore Wind Scale Up: Innovations in Permitting, (2023), https://www.irena.org/How-we-work/Collaborative-frameworks/Offshore-Renewables [https://perma.cc/M4CF-AGMP].

2. *See, e.g.*, *Wind explained: History of wind power*, EIA https://www.eia.gov/energyexplained/wind/history-of-wind-power.php (last updated Apr. 20, 2023) [https://perma.cc/BJ6T-5ZGD].

3. *See e.g.*, Line Braendstrup, *Celebrating 30 years of offshore adventure*, Siemens Gamesa (Aug. 26, 2021), https://www.siemensgamesa.com/en-int/explore/journal/2021/08/vindeby-30-anniversary-offshore [https://perma.cc/A35G-K8GB].

4. *Id.*

5. *The Companies Leading the Offshore Wind Race*, UTM Consultants (Sept. 21, 2021), https://www.utmconsultants.com/news/the-companies-leading-the-offshore-wind-race/42049/ [https://perma.cc/5FTK-XC2J].

Part II focuses on the development of offshore wind energy in China by detailing the country's ambitious approach to expanding their domestic industry's capacity and capability. Through an examination of China's legal frameworks, including the important role that feed-in tariffs, green energy certificates, and investment subsidies have played, this section emphasizes how centralized government policies along with the strategic implementation of five-year plans have been instrumental in achieving prompt national growth. The discussion further covers the implications of China's supply chain and domestic equipment advantage.

Part III shifts the lens to the United States by examining the nation's journey toward harnessing offshore wind energy. It explores the current status of offshore wind capacity before critiquing the federal government's role (or lack thereof). Notwithstanding, this examination also highlights recent initiatives by the Biden administration and concurrent legislative measures. Additionally, China's cohesive policy approach is contrasted with fragmented and state-level efforts observed in the United States via detailing key regulatory challenges and stakeholder oppositions that have impeded the American offshore wind industry's growth.

Part IV offers a comparative analysis by juxtaposing China's centralized approach with American federal-state dynamics. This section explores the divergent paths these two nations have taken regarding offshore wind development by drawing lessons from China's aggressive expansion and the United States' more cautious (and sometimes backwards) progression. By comparing financial incentives along with regulatory frameworks and supply chain strategies, this analysis hopes to uncover any potential policy adjustments which could have the effect of accelerating American offshore wind energy development by proposing some actionable recommendations for enhancing the American legal and regulatory environment to support the growth of its offshore wind industry by drawing on the successful strategies employed by its counterpart across the Pacific.

Finally, the conclusion, Part V, synthesizes the key findings of this paper by discussing the critical role of the various policies, incentives, and frameworks which seek to advance offshore wind energy that are noted above. This section's argument reminds the reader of the necessity of a more cohesive national strategy for the United States to catch up with and potentially match China's achievements.

All in all, this paper aims to contribute towards a deeper understanding of the potential and challenges facing offshore wind as an essential element of the global renewable energy landscape by examining the various considerations inherent in offshore wind energy development through the viewpoint of these two contrasting yet influential nations.

II. Offshore Wind Development in China

A. China's Rapid Ascent to Offshore Wind Dominance: An Overview of Offshore Wind Capacity

China's offshore wind industry is currently experiencing an incredible surge and has established itself as a global leader by outpacing both Europe (the cradle of offshore wind) and the United States.[6] This type of explosive growth is largely the result of the Chinese central government and its steadfast commitment to developing its domestic renewable energy industry over the last decade and a half.[7] By prioritizing the expansion of offshore wind capacity, China has set ambitious targets while also concurrently implementing a comprehensive strategy and approach for advancing their offshore wind industry through various legal frameworks.[8] Such measures are designed so as to stimulate the entire offshore wind ecosystem: from production and consumption all the way to developing a robust supply chain and the construction infrastructure that is required to support the scaling of large-scale renewable energy projects.[9] China's strategic approach is facilitating an unprecedented build-out of wind resources across the nation, thus proving the critical role of governmental vision and direct regulatory support in the evolution of China's renewable energy sector.

1. Operating Capacity and Growth Trends

Despite higher initial costs of offshore wind compared to onshore wind projects, the industry's trajectory is one of rapid expansion, especially due to the potential of floating offshore wind turbines.[10] According to the Pacific Northwest National Laboratory (an offshoot of the United States Department of Energy), these floating turbines capitalize on stronger, more consistent winds found offshore, and thus offer significantly higher power generation capabilities.[11] China's strategic focus on offshore wind is evident through its aggressive escalation of installed capacity and highlights its commitment to renewable energy as a priority of its central government.

By the end of 2021, even as China's installed offshore wind capacity reached an incredible 11.2 gigawatts (GW), it continued announcing ambitious projects that were underway to further this growth.[12] Among these, the China Three Gorges

6. Dorothy Mei et al., A Race to the Top: China 2023 at 4 (2023), https://globalenergymonitor.org/wp-content/uploads/2023/06/GEM-RTTT-China-2023-report-English.pdf [https://perma.cc/A6FJ-YK9N].

7. *Id.* at 8.

8. *Id.* at 15.

9. *Id.*

10. Anne-Marie Dedene, *China's Growing Offshore Wind Energy Drive*, The Diplomat (Oct. 31, 2023), https://thediplomat.com/2023/10/chinas-growing-offshore-wind-energy-drive/ [https://perma.cc/SDC2-W7MZ].

11. *Floating Offshore Wind*, Tethys, https://tethys.pnnl.gov/technology/floating-offshore-wind (last visited Mar. 15, 2024) [https://perma.cc/H3PR-B9WT].

12. *China Commissions Offshore Wind Power Giving It Largest Installed Base*, The Mar. Exec. (Dec. 31, 2021), https://maritime-executive.com/article/china-commissions-offshore-wind-power-giving-it-largest-installed-base [https://perma.cc/RJJ2-V5SY], (noting that China's offshore

Corporation's investment of $6.5 billion in three offshore wind farms in Guangdong is a prime example.[13] This investment allows the project to produce a total of 5 million kilowatts (KW) of wind power capacity.[14] China also initiated a pilot project in 2022, which integrated offshore wind with other energy industries in the Bohai Sea (namely offshore oil and gas facilities), demonstrating innovation in renewable energy utilization by establishing a benchmark for future low carbon emission offshore oilfield developments.[15] It is notable that these developments are not confined to China's wealthier coastal provinces; rather, they extend into more impoverished regions like Hebei, Liaoning, and Guangxi, and as a result, showcase the widespread national drive towards offshore wind energy for all eligible geographic areas.[16]

Despite certain central government subsidies ending at the end of 2021, China has continued to solidify its position in the global offshore wind arena. A clear example of this is China housing nearly half of the world's offshore wind energy capacity.[17] This massive expansion benefits Chinese offshore wind firms by allowing them to accumulate experience and achieve economies of scale at a pace that simply cannot be met by competitors from other nations.[18] China's move towards floating offshore wind projects also illustrates China's forward-thinking approach to overcoming geographical and technical challenges.[19]

Moreover, the evolution of the Chinese offshore wind turbine manufacturing market reflects intense competition and innovation, with companies like MingYang and CSSC Haizhuang Windpower breaking records by producing turbines of

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wind capacity exceeded that of legacy offshore wind leaders, such as the United Kingdom and Denmark, by more than fourfold)."

13. *China Three Gorges Power to invest $6.5bn in off-shore wind farms*, Arab News (Jan. 19, 2022), https://arab.news/gwfxf [https://perma.cc/DG8G-SPDQ].

14. *Id.*

15. Zheng Xin, *ConocoPhillips China, CNOOC Limited announce windfarm project*, China Daily (Nov. 6, 2022), https://www.chinadaily.com.cn/a/202211/06/WS636776c6a3105ca1f227449d.html [https://perma.cc/59A4-SAHA].

16. Neth. Enter. Agency, China offshore wind: Factsheet for Dutch companies 6 (2022), https://www.rvo.nl/files/file/2022/03/Rapport-Offshore-wind-China.pdf [https://perma.cc/Q4WM-GW5].

17. *See* discussion *infra* Part II.B.3.a; 赵靓, *我国各地海上风电电价补贴政策梳理!*, 北极星风力发电网 (Feb. 3, 2023), https://news.bjx.com.cn/html/20230203/1286287.shtml [https://perma.cc/7G9P-7NE7]; *China Now Has Nearly Half of the World's Offshore Wind Capacity*, The Mar. Exec. (Feb. 26, 2023), https://maritime-executive.com/article/china-now-has-nearly-half-of-the-world-s-offshore-wind-capacity [https://perma.cc/KR2S-9CVD].

18. Tim Ferry, *China's offshore wind boom drives costs down to match coal*, Recharge (June 12, 2023), https://www.rechargenews.com/wind/chinas-offshore-wind-boom-drives-costs-down-to-match-coal/2–1-1465110 [https://perma.cc/349P-XULZ].

19. Michelle Lewis, *This new 'world's largest' wind turbine makes power in severe typhoons*, Electrek (Dec. 13, 2023), https://electrek.co/2023/12/13/worlds-largest-wind-turbine-severe-typhoons-mingyang/ [https://perma.cc/5BZA-GRCW] (describing the MySE 18.X-20MW, capable of withstanding Category 17 typhoons, the most severe typhoon level with winds up to 56.1–61.2 m/s); 百度, *开建世界最大海上漂浮式风电场 外媒称中国可再生能源增长势头加快*, *百度* (Jan. 19, 2023), https://baijiahao.baidu.com/s?id=1755410869357629085&wfr=spider&for=pc [https://perma.cc/JR8K-M22Y] (describing the plant's total installed capacity of 1 gigawatt (GW)).

unprecedented size and capacity.[20] However, project developers have been cautiously adopting this trend towards larger turbines (primarily due to limited availability of supply chain materials).[21] Notwithstanding, this stance is gradually changing as evidenced by China Three Gorges Corporation having integrated the first 16 megawatt (MW) turbine into the power grid.[22] The need for specialized vessels that are capable of transporting and installing mega-turbines has spurred significant developments in Chinese shipbuilding, which further enhances China's competitive edge in the offshore wind sector.[23]

a. Comparison to Prospective Capacity in the United States

Reflecting on the insights from a 2016 paper by Professor Xi Lu of Tsinghua University's School of Environment and Senior Researcher at the Harvard-China Project, China's offshore wind industry was notably lagging behind the United States in several critical areas, shedding light upon a notable contrast to its current position as the leader in the global offshore wind market.[24] Professor Xi's paper highlighted that despite China having a greater installed wind capacity than the United States (114.7 vs. 65.9 gigawatts (GW)), it generated less wind electricity (153.4 vs. 181.8 terawatt-hours (TWh)).[25] This underperformance was attributed to various factors, including wind power curtailment, turbine quality, and delayed grid connections, rather than to the inherent wind resources available to each country.[26]

China's wind industry faced significant challenges in its early stages. Turbine quality was notably inferior, with a significant portion of installed turbines being smaller and less efficient, and thus contributing to a lower overall capacity factor compared to the United States.[27] Additionally, a substantial fraction of newly installed wind turbines in China were not immediately connected to the grid, which led to considerable idle capacity that could not contribute towards electricity generation.[28] Wind power curtailment rates in China were also alarmingly high due to inflexible power generation fleets dominated by coal, thereby exacerbating the inefficiency in harnessing wind resources.[29]

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20. Igor Todorović, *Chinese company CSSC Haizhuang unveils world's largest wind turbine prototype*, Balkan Green Energy News (Jan. 10, 2023) https://balkangreenenergynews.com/chinese-company-cssc-haizhuang-unveils-worlds-largest-wind-turbine-prototype [https://perma.cc/28C7-82MG].

21. *See* Xi Lu et al., *Challenges faced by China Compared with the US in Developing Wind Power*, Nature Energy, May 2016, at 2-3 [https://perma.cc/Y3LX-A3VW].

22. *Id.* at 14.

23. Ann Koh, *There Aren't Enough Ships to Install Giant Wind Turbines Across Asia*, Bloomberg (Feb. 1, 2023), https://www.bloomberg.com/news/articles/2023–02–01/asia-faces-shortage-of-ships-to-install-offshore-mega-wind-farms (noting China has 84 vessels capable of installing wind turbines as of 2023); *see* discussion *infra* Part II.B.4.b.

24. Xi et al., *supra* note 21, at 1.

25. *Id.*

26. *Id.*

27. *Id.* at 2-3.

28. *Id.* at 3.

29. *Id.*

When contrasting these challenges from 2016 with China's current status, it is clear the country has undergone a significant evolution. China has aggressively expanded its offshore wind capacity, now accounting for a significant portion globally.[30] The country has not only addressed turbine quality and grid connection delays but has also made substantial advancements in floating offshore wind technologies.[31] This progress includes the aforementioned construction of the world's largest offshore floating wind power project near Hainan province, which indicates a strategic pivot towards overcoming geographical limitations and thus tapping into deeper offshore potentials.[32]

Moreover, China's aggressive capacity expansion has led to a reduction in wind power curtailment rates by improving grid integration and policy adjustments.[33] The shift towards larger and more efficient turbines (such as the record-breaking 16-megawatt (MW) and 18-megawatt (MW) turbines by MingYang and CSSC Haizhuang Windpower, respectively, mentioned earlier) showcases China's technological leaps in turbine technology and manufacturing capabilities.[34]

This transformation from lagging behind in critical aspects of offshore wind development to leading the global market emphasizes China's focused and strategic approach to renewable energy. China's advancements in offshore wind capacity, technology, and infrastructure development are in striking contrast to its earlier position. This journey has not only reflected China's commitment to renewable energy but more importantly has resulted in China anchoring its position as the formidable competitor on the global stage by outpacing other nations, especially the United States, in the race towards a sustainable energy future.

B. Government Commitments, Support, and Legal Frameworks

1. Central Government Prioritization and Coastal Province Mobilization

In the dynamic landscape that is China's offshore wind industry, the central government's strategic commitments and targets are critical in the process of shaping the entire sector's development trajectory. This central prioritization is complemented through vigorously mobilizing coastal provinces, with Jiangsu and Guangdong

30. Rebecca Williams & Feng Zhao, Global Offshore Wind Report 2023 at 99 (2023), https://gwec.net/wp-content/uploads/2023/08/GWEC-Global-Offshore-Wind-Report-2023.pdf [https://perma.cc/QNA3-VRHT].

31. Dedene, *supra* note 10; Nwankwo Charles Uzondu & Dominic Dummene Lele, *Comprehensive Analysis of Advancements in Wind Turbine Design and Offshore Wind Energy Integration: Technological Innovations, Economic Viability, and Environmental Impacts*, 6 INT'L J. APPLIED RES. SOC. SCI. 1538, 1541-42 (2024) (noting advancements include the development of larger turbines with higher megawatt capacities, improved blade designs, and the integration of digital technologies for better performance monitoring) [https://perma.cc/4VZ3-RE5L].

32. 百度, *supra* note 19.

33. Hao Chen et al., *Winding Down the Wind Power Curtailment in China: What Made the Difference?* 167 Renewable and Sustainable Energy Rev. 112725, 12 (2022) (reducing China's wind power curtailment from a record-high of 17.1 percent in 2016 to 4 percent in 2019).

34. Todorović, *supra* note 20.

provinces emerging as significant players.[35] By the end of 2021, Jiangsu province boasted the largest installed capacity by having leveraged its early-mover advantage, favorable sea conditions, and mature regional infrastructure.[36] On the other hand, Guangdong province, despite its late start and challenging sea and weather conditions, has also witnessed prompt growth; it is poised to surpass Jiangsu in the coming five years, not only in total installed capacity but also as a leader in floating offshore wind technology.[37]

Collaborative efforts between the central government and coastal provinces have become more commonplace. This comprehensive strategy is significantly influenced by investment subsidies along with both state and private investors becoming involved and collectively driving the sector's expansion.[38] State-Owned Enterprises (SOEs) and regional players dominate the investment landscape in offshore wind projects across China, with Jiangsu exhibiting a higher propensity for private investment compared to Guangdong.[39] This competitive environment among provinces and developers becomes even more intense due to the absence of a national power market, which is currently under development through reforms and demonstration projects in various regions.[40]

The pricing mechanism for offshore wind electricity, which is no longer nationally reliant on fixed tariffs, anticipates national grid parity post-2025.[41] However, provinces like Jiangsu were expected to achieve grid parity by 2024 due to their advanced infrastructure and market readiness.[42] Additionally, in 2021, a notable policy intervention took place in the form of an announcement of a carbon emission reduction credit facility at an interest rate of 1.75 perfect for renewable energy projects; this would act as an indirect subsidy to lower the levelized cost of energy (LCOE).[43]

35. Neth. Enter. Agency, *supra* note 16.

36. *Id.*

37. *Id.*

38. *Id.* at 7.

39. *Id.*

40. *Id.* at 8; Chengyao Peng & Weixiao Qin, *Is China on track for a national unified power market by 2030?*, S&P Glob. Commodity Insights (Jan. 9, 2024), https://www.spglobal.com/commodityinsights/en/ci/research-analysis/is-china-on-track-for-a-national-unified-power-market-by-2030.html#:~:text=Power%20market%20reform%20in%20China,and%20liberalization%20of%20ancillary%20services. [https://perma.cc/7H86-F26R].

41. Neth. Enter. Agency, *supra* note 16, at 8 (achieving grid parity occurs when the levelized cost of electricity generated by an alternative energy source matches or falls below the cost of electricity from the conventional grid and signifies a pivotal moment where renewable energy sources become viable for broad-scale deployment independently of subsidies or governmental incentives, suggesting a potential significant shift in energy generation towards these renewable options).

42. *Id.* at 8; *see* Jiangsu Provincial People's Gov't, *New energy makes up about 40% of Jiangsu's installed power generation capacity*, Jiangsu Provincial People's Gov't (Feb. 2, 2025), https://en.jiangsu.gov.cn/art/2025/2/2/art_54122_11482014.html [https://perma.cc/R7VG-4NZ7] (last visited Feb. 21, 2025) (observing that, as of early 2025, publicly available data does not explicitly confirm whether this goal was met, however, renewable energy capacity reached 41.6% of the total energy capacity in 2024 in Jiangsu province).

43. 中国人民银行, *人民银行推出碳减排支持工具*, *中国人民银行* (Nov. 8, 2021), http://

This move by the People's Bank of China (PBOC) introduced a low-interest loan mechanism specifically designed to support renewable and low-carbon companies.[44] This unprecedented financial support is expected to bolster the sector significantly, with loan amounts potentially exceeding 1 trillion RMB.[45]

The offshore wind sector in China is comprised of a diverse array of who can only be called key players, including over 20 local developers—predominantly SOEs—and 10 Original Equipment Manufacturers (OEMs) actively shaping the industry's future.[46] Leading investors such as CHN Energy, Three Gorges, CGN, SPIC, and Hua Neng, alongside top OEMs like MingYang, Gold Wind, and Envision, have caused the offshore wind landscape to become extremely competitive.[47] While propelling China towards renewable energy self-sufficiency, this collective effort has also positioned the country as arguably *the* global leader in offshore wind energy development, innovation, and deployment.

2. Impacts of the Five-Year Plans

China's Five-Year Plans are a series of social and economic development initiatives issued since 1953 by the Chinese Communist Party (CCP) through the National People's Congress (NPC).[48] These plans are central when it comes to guiding the country's national agenda, setting growth targets, and outlining any strategic directions for social, environmental, technological, and especially economic development.[49] These plans serve as a medium-term blueprint for policy priorities and resource allocation over each five-year cycle.[50] It does so by reflecting the government's adaptive strategies to current global trends, domestic challenges, and its long-term vision for national rejuvenation.[51]

Historically, Five-Year Plans have been vital in transforming China from a primarily agrarian society into a global economic powerhouse.[52] Initially, the plans were heavily influenced by neighboring Soviet Russia and focused on industrialization and collectivization.[53] However, they have evolved and now address the complexities of modern economic management, environmental sustainability, and social welfare.[54] This adaptability emphasizes the importance of the Five-Year Plans'

www.pbc.gov.cn/goutongjiaoliu/113456/113469/4384182/index.html [https://perma.cc/V74D-TQ7L]; *see* discussion *infra* Part II.B.4.a.

44. 中国人民银行, *supra* note 43.

45. Neth. Enter. Agency, *supra* note 16, at 8.

46. *Id.* at 9.

47. *Id.*

48. Ma Chi, *Explainer: What is China's five-year plan?*, China Daily (Oct. 26, 2020), https://www.chinadaily.com.cn/a/202010/26/WS5f960a78a31024ad0ba80c76.html [https://perma.cc/UC8J-UCU6].

49. *Id.*

50. *Id.*

51. *Id.*

52. Rebecca Cairns, *The First Five Year Plan*, Alpha Hist. (2018), https://alphahistory.com/chineserevolution/first-five-year-plan/ [https://perma.cc/5GZ6-BL9F].

53. *Id.*

54. *Id.*

roles in China's governance model by allowing for centralized planning (along with a degree of flexibility) to meet changing internal and external conditions.[55]

The significance of the Five-Year Plans to China, as a whole, extends beyond just economic planning. They embody the CCP's leadership role in setting the country's long-term strategic goals and mobilizing resources to achieve them.[56] These plans are a critical mechanism through which the government signals its policy priorities to domestic and international audiences with the result of directing public and private investment into key sectors deemed vital for national development.[57] Thus, they play an essential role in shaping China's economic structure, technological advancement, and social development, and lead to profound implications for global markets and international relations.[58]

In recent decades, the focus of the Five-Year Plans has increasingly shifted towards sustainable development, technological innovation, and improving the quality of life for China's population.[59] This reflects a broader understanding of development by recognizing the importance of environmental protection, green energy, and addressing income disparities alongside traditional measures of economic growth.[60] The Five-Year Plans articulate China's commitment to playing a leading role in addressing global challenges such as climate change and sustainable development by setting ambitious targets for renewable energy, carbon emissions reduction, and technological self-reliance.[61]

Moreover, the Five-Year Plans are critical when it comes to fostering innovation and guiding China's ascent in the global technology hierarchy. The plans support China's strategic ambitions to become a world leader in high-tech industries, including renewable energy, information technology, and biotechnology via targeted investments in research and development.[62] China's focus on innovation, particularly in the renewable energy sector, is critical for maintaining the country's economic growth and competitive edge in the global economy.

a. Previous Five-Year Plan Developments

China's approach to integrating offshore wind energy into its national development and planning can be traced back to long before the (latest) 14th Five-Year

55. *Id.*

56. *Outline of the 14th Five-Year Plan (2021–2025) for National Economic and Social Development and Vision 2035 of the People's Republic of China*, The People's Gov't of Fujian Province (Aug. 9, 2021), https://www.fujian.gov.cn/english/news/202108/t20210809_5665713.htm [https://perma.cc/JV3W-9T6N].

57. *Id.*

58. *Id.*

59. Lin Zi & Cui Qiwen, *Two Sessions: What it means for China's climate policy in 2024*, China Dialogue (Mar. 14, 2024), https://chinadialogue.net/en/climate/two-sessions-what-it-means-for-chinas-climate-policy-in-2024/ [https://perma.cc/SE2V-RKRZ].

60. *Id;* Shantong Li & Zhaoyuan Xu, The Trend of Regional Income Disparity in the People's Republic of China at 14 (2008), https://www.adb.org/sites/default/files/publication/156724/adbi-dp85.pdf [https://perma.cc/WHD6-JAMT].

61. Lin Zi & Cui Qiwen, *supra* note 59.

62. *See Outline of the 14th Five-Year Plan (2021–2025), supra* note 56.

Plan (2021–2025), a fact which indicates a longstanding commitment to expanding its renewable energy sector.[63] While offshore wind energy has become a prominent feature in recent plans, including the technology in earlier Five-Year Plans highlights China's strategy of gradually evolving towards harnessing wind as a foundational component of its energy mix.[64]

Renewable energy's integration into China's national strategic planning notably escalated with the 11th Five-Year Plan which spanned from 2006 to 2010.[65] This era signified a crucial transition in China's developmental agenda by increasingly aligning economic growth with sustainability and environmental stewardship.[66] The period was marked by the establishment of specific renewable energy targets and the implementation of the Renewable Energy Law in 2005; such legislation sought to foster the growth and use of renewable sources through various incentives and mandates.[67] This law became foundational in steering China's renewable energy policies by demonstrating its commitments to enriching the country's energy portfolio all while mitigating carbon emissions.[68]

This shift towards renewable resources was propelled by a combination of internal and external factors. Domestically, escalating environmental issues such as air pollution and water shortages prompted a move towards cleaner energy alternatives.[69] Around the world, however, the motivation to partake in climate change mitigation efforts played a crucial role.[70] Furthermore, Chinese leadership identified renewable energy as a necessary avenue to reinforce national energy security through lessened reliance on imported fossil fuels all while carving out a leadership role in the flourishing market for clean technologies around the globe.[71]

China's energy policy structure can be broken down into two tiers, commencing with the central government outlining broad objectives in its Five-Year Plans.[72]

63. Nat'l Acad. of Eng'g and Nat'l Rsch. Council, The Power of Renewables: Opportunities and Challenges for China and the United States 114 (2010) (specifying China's 10th and 11th Five-Year Plans (2000–2005 and 2006–2010, respectively) were among the first to mention renewable energy development goals).

64. *Outline of the 14th Five-Year Plan (2021–2025)*, *supra* note 56; *12th Five Year Plan for National Strategic Emerging Industries*, Int'l Energy Agency (Apr. 16, 2021), https://www.iea.org/policies/5474–12th-five-year-plan-for-national-strategic-emerging-industries [https://perma.cc/MV4U-5D6X].

65. Qingfeng Zhang & Robert Crooks, Toward an Environmentally Sustainable Future: Country Environmental Analysis of the People's Republic of China 127-138 (2012), https://www.adb.org/sites/default/files/publication/29943/toward-environmentally-sustainable-future-prc.pdf [https://perma.cc/Z77P-JYKZ].

66. *Id.* at 4.

67. 中国人民代表大会, 中华人民共和国可再生能源法, 国家能源局, 国家能源局 (Dec. 26, 2009), https://www.nea.gov.cn/2017–11/02/c_136722869.htm [https://perma.cc/W6LC-Z6J7].

68. *Id.*

69. Zhang Junfeng (Jim) et al., *Environmental Health in China: Challenges to Achieving Clean Air and Safe Water*, Lancet, March 2010, at 1110. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4210128/pdf/nihms636903.pdf [https://perma.cc/UH37-THW8].

70. 中国人民代表大会, *supra* note 67.

71. *Id.*

72. Nat'l Acad. of Eng'g and Nat'l Rsch. Council, *supra* note 63, at 114.

These pronouncements serve as a blueprint for ministries, regulatory bodies, and the NPC to craft detailed, targeted policies.[73] Notably, including renewable energy objectives was initiated in the 10th and intensified in the aforementioned 11th Five-Year Plans, signaling a strategic pivot towards green energy development.[74]

Coordinating China's renewable energy agenda requires collaboration engagement between various governmental and non-governmental actors.[75] In a significant move towards more effective operational collaboration, the formation of the National Energy Commission (NEC) in January 2010 sought to consolidate the efforts of the National Energy Bureau (NEB) and the National Energy Administration (NEA), among others.[76] The goals of this consolidation were to eliminate overlapping functions, streamline energy strategies, enhance energy security, and foster international cooperation in energy programs.[77]

Central to China's renewable energy strategy was (and is) the dual aim of electrifying rural areas that are devoid of access to power while mitigating any environmental detriments that are natural byproducts of coal dependency.[78] China's proactive measures in renewable energy also react to public dissatisfaction regarding pollution at the same time it seizes any economic prospects presented by the worldwide demand for clean energy solutions.[79] Through such efforts, China has positioned itself as quite the force to be reckoned with in the transition towards a more sustainable and economically vibrant energy future.

This national strategy towards enhancing renewable energy has been further emphasized in subsequent Five-Year Plans by increasing targets for installing renewable energy capacity and emphasizing technological innovation and grid integration.[80] The 13th Five-Year Plan (2016–2020), for example, set ambitious goals for developing wind, solar, and hydroelectric power.[81] However, one of the pivotal moments for offshore wind in China's planning was during the 12th Five-Year Plan (2011–2015). This period acted as a turning point with the government explicitly including offshore wind power development as part of its renewable energy strategy.[82] By aiming to significantly increase the country's installed wind energy capacity, this plan set ambitious targets for wind power.[83] It emphasized the importance of developing offshore wind projects to diversify China's renewable energy sources,

73. *Id.*
74. *Id.*
75. *Id.*
76. *Id.*
77. *Id.*
78. *Id.*
79. *Id.*
80. 国务院, *国务院关于印发"十三五"国家战略性新兴产业发展规划的通知*, 中华人民共和国中央人民政府 (Dec. 19, 2016), https://www.gov.cn/zhengce/content/2016–12/19/content_5150090.htm [https://perma.cc/2WU6-R5FS].
81. *Id.*
82. Int'l Energy Agency, *supra* note 64.
83. *Id.*

reduce its carbon footprint, and stimulate technological innovation and economic growth within the renewable sector.[84]

The NEA, under the State Council's guidance, played a crucial role in formulating and implementing policies related to offshore wind energy development around this time.[85] The NEA, along with local governments and SOEs, spearheaded efforts to identify suitable offshore areas for wind farm construction, streamline approval processes, and establish supportive regulatory frameworks to encourage investment in the sector.[86]

The 13th Five-Year Plan (2016–2020) continued building on these foundations by setting more specific targets for offshore wind capacity and further integrating offshore wind into China's national energy strategy.[87] This plan not only aimed to increase installed capacity but also focused on technological innovation, grid integration, and improving the efficiency and reliability of wind power generation.[88] Offshore wind development was considered a key component of China's transition to a cleaner and more sustainable energy systems, resulting in substantial investments towards constructing offshore wind farms and developing related infrastructure.[89]

Throughout these plans, leadership from the Party and active participation from various ministries, including the Ministry of Finance (MoF) and the Ministry of Science and Technology (MST), alongside the NEA, emphasized the strategic importance of offshore wind.[90] These organizations' efforts were complemented by significant involvement from SOEs along with emerging private companies in the renewable energy sector, thereby driving China's offshore wind ambitions.[91]

b. Impact of the 14th (Latest) Five-Year Plan

The latest Five Year Plan – the 14th Five-Year Plan (2021–2025) –emphasizes the importance of renewable energy, particularly offshore wind, in China's future development.[92] This strategic blueprint was inaugurated in 2021 and continued the trend of setting ambitious goals for renewable energy capacity while also highlighting the technological advancement and international competitiveness of China's renewable energy sector (it should be noted that President Xi Jinping's commitment to achieving carbon neutrality by 2060 acted as the guiding light.)[93] Offshore wind energy has been identified as an area critical for the country's growth.[94] This latest plan even outlines strategies to enhance China's leadership in this field.[95] Such

84. Asia Pac. Energy, China: 12th Five-Year Plan for Energy Development (2013).
85. *Outline of the 14th Five-Year Plan (2021–2025), supra* note 56; Neth. Enter. Agency, *supra* note 16, at 6.
86. Neth. Enter. Agency, *supra* note 16, at 6.
87. 国务院, *supra* note 80.
88. *Id.*
89. *Id.*
90. *Id.*
91. *Id.*
92. *Outline of the 14th Five-Year Plan (2021–2025), supra* note 56.
93. *Id.*
94. *Id.*
95. *Id.*

strategies include expanding offshore wind capacity, improving grid integration technologies, and fostering innovation in floating wind turbines so as to exploit deeper sea locations.[96] The 14th Five-Year Plan is set to reinforce the development, deployment, and governmental backing of offshore wind energy.[97] It seeks to do so by reflecting a clear vision for renewable energy as a cornerstone of China's energy security, economic development, and environmental sustainability.[98] Through this plan, China's goal is to strengthen its position as a global leader in renewable energy by aligning its national development goals with a broader global agenda regarding sustainable development and climate change mitigation.[99]

China's 14th Five-Year Plan offers a comprehensive approach to developing offshore wind and reveals the country's deep-seated commitment to integrating renewable energy within the national legal framework through a centralized government strategy.[100] This approach is crucial when it comes to facilitating the large-scale implementation and regulation of offshore wind projects across the nation.[101] The plan introduces specific requirements and changes from previous policies; such changes include (1) enhanced support for research and development in wind turbine technology, (2) measures to streamline the process of grid integration for offshore wind farms, and (3) the promotion of international collaboration for the purpose of advancing technological standards and practices.[102]

A cornerstone to the plan's success is the leadership and organizational initiatives directed by the State Council, the executive authority of the country, and executed through agencies such as the NEA, the National Development and Reform Commission (NDRC), the Ministry of Ecology and Environment (MEE), and the Ministry of Industry and Information Technology (MIIT).[103] These bodies are tasked with overseeing the rollout of relevant objectives determined by the plan in a manner that ensures policy incentives align with the offshore wind sector's ambitious

96. *Id*; Hu Zhang et al., *China's Policy for the Marine Engineering Equipment Industry and Potential Challenges: An Appraisal of the New Developments under the 14th Five-year Plans*, 9 Frontiers Marine Sci. 1, 6 (2022), https://www.frontiersin.org/articles/10.3389/fmars.2022.1014959/full [https://perma.cc/V392-KYTV].

97. Hu Zhang et al., *supra* note 96, at 5.

98. *Outline of the 14th Five-Year Plan (2021–2025), supra* note 56.

99. *Id.*

100. *Id.*

101. *Id.*

102. *Id*; Hongqiao Liu et al., *Q&A: What does China's 14th 'five year plan' mean for climate change?*, Carbon Brief (Mar. 12, 2021), https://www.carbonbrief.org/qa-what-does-chinas-14th-five-year-plan-mean-for-climate-change [https://perma.cc/9HMX-2WMG]; Bing Han, *China's renewables 14th Five-Year Plan: Official targets to be remarkably outpaced?*, S&P Glob. Commodity Insights (July 20, 2022), https://www.spglobal.com/commodityinsights/en/ci/research-analysis/chinas-renewables-14th-fiveyear-plan-official-targets.html [https://perma.cc/5F2L-MWZJ]; *The 14th Five-Year Plan for Scientific and Technological Innovation in the Energy Sector*, Nor. Energy and Env't Consortium (Apr. 4, 2022), https://neec.no/the-14th-five-year-plan-for-scientific-and-technological-innovation-in-the-energy-sector/ [https://perma.cc/Q7W9–89CL].

103. Hongqiao Liu, et al., *supra* note 102.

targets.[104] The plans emphasis regarding geographical considerations is also quite clear; this can be seen by the plan's particular focus on select regions which offer favorable sea conditions and mature infrastructure (such as Jiangsu and Guangdong provinces), which are expected to account for a significant portion of China's future offshore wind development.[105]

The 14th Five-Year Plan also addresses the main aspects of the supply chain and relevant raw materials by acknowledging the country's need for a robust domestic industry that is capable of supporting the expansive growth of its offshore wind energy ambitions.[106] Initiatives set for the express purpose of acquiring a steady supply of essential materials, like rare earth elements that are necessary for turbine manufacturing, are absolutely integral towards these efforts.[107] Furthermore, the plan recognizes how important technological development is, not just in terms of turbine innovation, but also the enhancement of power transmission and storage solution efficiency so as to properly accommodate and account for wind energy's variable nature.[108]

Ultimately, when looking towards the future, the plan lays a strong foundation for China continuing to expand its offshore wind capacity, while being mindful of necessary goals such as achieving grid parity while at the same time fostering a sustainable and competitive domestic market for renewable energy.[109] The national vision enshrined within the 14th Five-Year Plan presents an extremely comprehensive legal and policy framework that acts in support of Chinese offshore wind's growth, particularly from a centralized standpoint by highlighting the government's role in propelling China's renewable energy ambitions to reality. Through such a strategic and integrated approach, China is set to establish itself as the global leader in the offshore wind energy industry by contributing significantly to worldwide efforts in combatting against climate change and moving towards a more sustainable energy future.

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104. Jiang Yifan, *14th Five Year Plan: China's carbon-centred environmental blueprint*, China Dialogue (Mar. 25, 2021), https://chinadialogue.net/en/climate/14th-five-year-plan-china-carbon-centred-environmental-blueprint [https://perma.cc/3X9X-23HA].

105. Neth. Enter. Agency, *supra* note 16.

106. Ahmed Abbas, Wind Market Share – Executive Brief (Jan. 2024), https://www.enerdata.net/publications/executive-briefing/wind-turbines-manufacturers-market-share.pdf [https://perma.cc/L5GP-QQTF]; *2024 China New Energy Sector Outlook: A Pivotal Year*, Principal Fin. Servs. (Feb. 22, 2024), https://www.principal.com.hk/InvestBlog/market-insights/2024-china-new-energy-sector-outlook-a-pivotal-year [https://perma.cc/AB2U-SC5K].

107. *Development Direction of Offshore Wind Power in the "14th Five-Year Plan"*, China Offshore Wind Assoc. (Apr. 7, 2021), https://www.chinaoffshorewind.cn/html/en/POLICY/INDUSTRY_POLICY/20210806/132.html [https://perma.cc/AH74–9VV8].

108. *Wind turbine innovation conference held in Shandong*, China Daily (Apr. 11, 2023), https://global.chinadaily.com.cn/a/202304/11/WS64354d09a31057c47ebb98de_2.html [https://perma.cc/3JJS-2B2Z].

109. Shashi Barta, *Chinese offshore wind technology is accelerating – I expect 25MW turbines soon*, Recharge (Feb. 2, 2023), https://www.rechargenews.com/wind/-chinese-offshore-wind-technology-is-accelerating-i-expect-25mw-turbines-soon-/2–1-1397243 [https://perma.cc/U8J6-TVPF].

3. Financial Incentives and Subsidies

a. Feed-in Tariffs and Investment Subsidies

Regarding China's transformation towards a more sustainable and low-carbon future, feed-in tariffs (FITs) and investment subsidies have played a pivotal role, especially within the flourishing offshore wind industry. The legal frameworks established for these financial incentives have been critical when it comes to driving the industry's exponential growth, with results that far surpass that of the United States and Europe regarding both installed capacity and generation capacity.[110]

Feed-in tariffs are a policy mechanism designed to accelerate investment in renewable energy technologies by offering long-term contracts to renewable energy producers which are typically based on the cost of generation of each technology.[111] China's strategy has been to implement this approach through a series of legal and regulatory measures that define the prices at which power generated from offshore wind farms is purchased by utilities and fed into the national grid.[112] These tariffs were initially set above market rates so as to compensate for higher costs that are usually associated with renewable energy production; however, they have gradually decreased as the cost of wind technology has fallen, thereby reflecting the industry's maturation and increased competitiveness.[113]

The evolution of wind power FIT policies in China (including offshore wind power) began in earnest in 2009, a time marked by a transition from benchmark prices to guiding prices which eventually achieved price parity with conventional thermal power.[114] This progression was legislated and administered by the NDRC and the NEA and represented a strategic shift towards making renewable energy competitive without the need for subsidies.[115] Before 2021, the offshore wind sector received significant benefits from preferential FIT rates and government subsidies, which resulted in a dramatic increase in installed capacity.[116] However, having achieved cost parity, the Chinese government's focus has recently shifted from subsidizing

110. *See* discussion *supra* Abstract.

111. *How feed-in tariffs maximize the benefits of renewable energy*, The Pembina Inst., https://www.pembina.org/reports/feed-in-tariffs-factsheet.pdf [https://perma.cc/R378-ENTN] (last visited Mar. 21, 2024).

112. Fengyun Wang, et al., *Unleashing the wind: The role of carbon reduction revenue in Shanghai's distributed wind power investments*, 9 Heliyon e21490 at 4-5, 7 (Oct. 28, 2023), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10651464/pdf/main.pdf [https://perma.cc/3LDX-WXAP].

113. *Id.* at 12.

114. Qiang Tu, et al., *Achieving Grid Parity of Wind Power in China – Present Levelized Cost of Electricity and Future Evolution*, 250 Applied Energy 1053, 1053-64 (2019), https://www.sciencedirect.com/science/article/abs/pii/S0306261919308967 [https://perma.cc/AH4D-2Z2T]; Xiaohua Song, et al., *An Appraisal on China's Feed-In Tariff Policies for PV and Wind Power: Implementation Effects and Optimization*, 15(6) Sustainability 5137 (2023), https://www.mdpi.com/2071–1050/15/6/5137 [https://perma.cc/KZ86-XR62].

115. Qiang Tu, et al., *supra* note 114.

116. Xiaohua Song, et al., *supra* note 114.

project costs to adjusting FITs so that they align with the cost of thermal power, and thus promote a more sustainable and self-sufficient industry.[117]

Moreover, Chinese provinces have been active participants in this transformation by extending their own subsidies for wind energy development.[118] For example, Guangdong, Shandong, and Zhejiang provinces' substantial subsidy standards for grid-connected offshore wind projects are prime examples of current, active local government support that has complemented national policies.[119]

The legal mechanisms which act as a foundation for FITs in China have facilitated both the growth of offshore wind capacity as well as technological innovation and cost reduction in the industry. Gradually reducing subsidies have catalyzed a shift towards more international collaborations, resulting in Chinese enterprises working with global partners with a mutual goal of fostering innovation and expanding offshore wind development both domestically and internationally.[120] Notable among these partnerships is the strategic collaboration initiated at the 4th China International Import Expo in November 2021 between China Energy United Power (in conjunction with China Energy Investment Corporation) and Siemens Group.[121] This agreement aimed to deepen ties across several clean energy dimensions which include gas turbines, hydrogen energy, and of course, offshore wind power.[122] A memorandum of understanding was concurrently established between China Energy Investment Corporation and Siemens Gamesa, which held commitments from both entities to enhance their strategic collaboration in developing large-scale offshore wind power and low-carbon technologies.[123] Alliances such as these accentuate a potential pathway for international firms to navigate the competitive landscape laid by Chinese companies by offering a model for engagement not only within China's burgeoning market but also throughout the expanding global renewable energy sphere.[124]

The legal frameworks that have established FITs and investment subsidies in China are characterized by their adaptability and responsiveness to the changing dynamics of the energy market and technological advancements in wind power. As the costs of offshore wind generation gradually decreased, the Chinese government

117. *Id.*

118. Ruth Chen, *Is offshore wind development in Mainland China sustainable without subsidy?*, Offshore Mag. (Nov. 22, 2022), https://www.offshore-mag.com/renewable-energy/article/14286138/westwood-global-energy-group-is-offshore-wind-development-in-mainland-china-sustainable-without-subsidy [https://perma.cc/3MXR-T4VG].

119. *Id.*

120. Ronin Zong et al., *Life after subsidies in the offshore wind market in China*, Wikborg Rein (May 30, 2023), https://www.wr.no/en/news/life-after-subsidies-in-the-offshore-wind-market-in-china?utm_source=mondaq&utm_medium=syndication&utm_term=energy-and-natural-resources&utm_content=articleoriginal&utm_campaign=article [https://perma.cc/WE6L-PMGR].

121. *Id.*

122. *Id.*

123. *Id.*; Dongyi Chen, *Forging ahead in China: Siemens Gamesa signs MoU to license 11 MW Direct Drive offshore technology to China Energy United Power*, Siemens Gamesa Renewable Energy (Nov. 5, 2021), https://www.siemensgamesa.com/newsroom/2021/11/siemens-gamesa-mou-license-11-mw-technology-china [https://perma.cc/VE8E-9EPE].

124. Ronin Zong et al., *supra* note 120.

judiciously adjusted FIT rates downwards, thereby ensuring that the incentives remained effective yet fiscally sustainable.

b. Revenue Generation through Green Certificates

The recent "Notice on Full Coverage of Renewable Energy Green Power Certificates to Promote Renewable Energy Electricity Consumption" (also known as Document No. 1044), recently co-issued by the NDRC, MoF, and NEA on August 3, 2023, introduces an important enhancement regarding China's renewable energy landscape which has the potential to profoundly impact the offshore wind sector.[125] This development is intimately linked to China's ambitious clean energy future objectives mentioned earlier in the country's 14th Five-Year Plan, which, to recap, emphasizes renewable energy (particularly offshore wind) as a cornerstone for achieving energy security and both economic and environmental sustainability.[126] However, comprehensively including all renewable energy projects, especially offshore wind, under the Green Energy Certificate (GEC) scheme, clearly signals strategic steps towards realizing such goals by effectively expanding the offshore wind industry's capacity to contribute to China's green development trajectory.[127]

The broadened scope caused by the issuing of GECs fosters an environment conducive towards the growth of the offshore wind industry through the encouragement of investment.[128] Promoting this sort of renewable electricity consumption elevates China's position on the international stage as a leader in green development.[129] Specifically, by enabling all offshore wind projects to qualify for GECs, the notice enhances the financial attractiveness of such ventures, and thus encourages even broader investment in this sector.[130] It also drives demand for offshore wind energy by solidifying GECs as the *sole* certification option for renewable electricity, thus incentivizing both corporate and individual consumers towards partaking in green electricity consumption.[131] Additionally, moving towards a domestic-focused GEC framework distinguishes China's offshore wind industry as globally competitive, thereby potentially setting a precedent for renewable energy certification that can be emanated worldwide.[132]

125. 国家发展改革委, et al., *发改能源1044号:关于做好可再生能源绿色电力证书全覆盖工作促进可再生能源电力消费的通知*, 国家发展改革委 (Aug. 3, 2023), https://www.ndrc.gov.cn/xwdt/tzgg/202308/t20230803_1359093.html [https://perma.cc/W8BY-JHDU].

126. *See* discussion *supra* Part II.B.2.b.

127. *Expansion of Scope for Issuance of Renewable Energy Green Power Certificates*, China Carbon Disclosure Platform for Machinery and Elecs. (Aug. 7, 2023), https://www.ccdp-me.com/en/news/638d0ea0–9947–42e8-bbeb-72a18569b5b4.

128. Anders Hove & Gary Sipeng Xie, *Green certificates with Chinese characteristics: Will green certificates help China's clean energy transition?* 11, Oxford Inst. for Energy Stud. (July 2023), https://www.oxfordenergy.org/wpcms/wp-content/uploads/2023/08/CE9-Green-certificates-with-Chinese-characteristics.pdf [https://perma.cc/3DQN-LMW3].

129. *Id.* at iii.

130. *Id.* at 6.

131. *Id.*

132. *Id.* at 14.

The directive marks a clear shift away from International Renewable Energy Certificates (I-RECs) towards a more localized certification mechanism.[133] Until recently, multinational companies operating within China have favored I-RECs due to their global recognition and trading flexibility.[134] However, the policy outlined in Document 1044 precludes domestic generators from issuing I-RECs going forward and instead directs a transition towards the domestic GEC scheme.[135] This policy adjustment appears likely to streamline the renewable energy certification process, reduce reliance on international certificates, and foster innovation within China's renewable sector (particularly when it comes to offshore wind).[136] China has simplified compliance with its green development policies by consolidating certification under the GEC framework since this strategy encourages more localized investment and development in the offshore wind industry.[137] Moreover, this focus on GECs has the potential of stimulating domestic innovation as developers aim towards optimizing the benefits of the certification system.[138]

Internationally, China's consolidation of renewable energy certification through GECs may influence how multinational corporations engage with the Chinese renewable market.[139] This could have the effect of inspiring other nations to consider similar domestic-focused approaches.[140] Additionally, this could even increase China's influence in international climate discussions since it demonstrates a comprehensive, internally consistent system for promoting renewable energy consumption and reducing carbon emissions.[141]

4. Financing Mechanisms and Supply Chain Dominance

a. State-Owned Bank Loans

The China Development Bank (CDB) has been crucial in supporting the clean energy sector in China through significant financial commitments and innovative financing mechanisms—especially offshore wind development.[142] On June 9, 2021, CDB announced its plan to issue 100 billion yuan that year to support the construction of a clean, low-carbon, safe, and efficient energy system, along with a broader 500 billion yuan commitment to be deployed throughout the 14th Five-Year Plan

133. 国家发展改革委 et al., *supra* note 125.

134. Anders Hove & Gary Sipeng Xie, *supra* note 128, at 14.

135. *Chinese Green Energy Certificates (GECs): Just the FAQs*, The Lantau Grp. (Aug. 9, 2023), https://www.lantaugroup.com/file/FAQ_China_Green_aug23.pdf [https://perma.cc/6ZUD-MKZV].

136. China Carbon Disclosure Platform for Machinery and Elecs., *supra* note 127; 国家发展改革委 et al., *supra* note 125.

137. 国家发展改革委 et al., *supra* note 125.

138. China Carbon Disclosure Platform for Machinery and Elecs., *supra* note 127.

139. The Lantau Grp., *supra* note 135, at 1, 5.

140. *Id.*

141. *See id.* at 2-3.

142. *See China Development Bank sets up special loans to help build a clean energy system*, Seetao (June 9, 2021), https://www.seetao.com/details/88137.html [https://perma.cc/6WKZ-2MM5].

period.[143] This strategic allocation emphasizes the bank's commitment to facilitating the transition towards the sustainable clean energy future envisioned by China and its leaders by aligning with the country's "carbon peak and carbon neutral" objectives across various clean energy projects.[144]

CDB's initiative is a testament to China's broader energy strategy, which aims for a revolutionary transformation within its energy sector to achieve its "carbon peak and carbon neutrality" goals.[145] By focusing on financing projects like offshore wind power, CDB is fostering the development of renewable energy infrastructure that is undoubtedly vital in the race to reduce carbon emissions while concurrently enhancing energy security.[146] This approach reflects a holistic vision by promoting the development of low-carbon technologies and ultimately contributes to the green and low-carbon transformation of China's economy.[147]

CDB's innovative financing models, along with those of the Industrial and Commercial Bank of China ("ICBC"), indicate a forward-looking approach to cultivating a robust carbon financial system, especially around the value of carbon assets.[148] These models include leveraging green financing mechanisms, such as special loans and green bonds, to support projects that have significant potential for carbon reduction, such as offshore wind farms.[149] For instance, CDB received funds from the PBOC through a supporting tool for carbon reduction—a relationship that serves to demonstrate a collaborative effort across Chinese financial institutions to channel low-cost loans towards carbon emission reduction projects.[150]

Moreover, in November 2021, the PBOC initiated the Carbon Emissions Reduction Facility (CERF) to provide low-interest loans which would cover 60 percent of the loan principal at a rate of 1.75 percent for one year with the goal of supporting carbon emission reduction efforts.[151] Through this mechanism, the central bank has allocated an inaugural 85.5 billion yuan to aid financial institutions in offering loans totaling 142.5 billion yuan.[152] This funding is expected to assist

143. *Id.*

144. *Id.*

145. *Id.*; s*ee* discussion *supra* Section II.B.2.

146. *See* discussion *supra* Section II.B.2.b.

147. Seetao, *supra* note 142.

148. *See id.*

149. S*ee* China Dev. Bank, Annual Report on China Development Bank's 2017 Green Bond 3 (2017), https://www.climatebonds.net/files/files/China%20Development%20Bank%20Annual%20Report%20.pdf [https://perma.cc/Z863-9FBX]; *see* June Choi et al., Climate Pol'y Initiative, Green Banking in China – Emerging Trends 23 (2020), https://www.climatepolicyinitiative.org/wp-content/uploads/2020/08/081220Green-Bankin-trends.pdf [https://perma.cc/8MZR-QQN3].

150. Xinhua News, *China Development Bank receives first funds through carbon reduction tool*, China Daily (Jan. 14, 2022, 9:49 AM), https://global.chinadaily.com.cn/a/202201/14/WS61e0d6aca310cdd39bc8100c.html [https://perma.cc/F7TJ-BHBN].

151. *The People's Bank of China Launches the Carbon Emission Reduction Facility*, The People's Bank of China, http://www.pbc.gov.cn/en/3688110/3688172/4157443/4385345/index.html [https://perma.cc/7MXV-FQBP] (last updated Nov. 9, 2021).

152. China Daily, *Banks Get Funds to Help Cut Carbon Emissions*, The St. Council, https://english.www.gov.cn/statecouncil/ministries/202201/28/content_WS61f341b2c6d09c94e48a464b.

2,817 companies in reducing carbon emissions by an estimated 28.76 million tons.[153] For example, one of the major projects funded by the CERF is the Zhanjiang Xuwen offshore wind farm; with its 600-megawatt (MW) capacity, it is projected to reduce annual carbon emissions by 3.43 million metric tons. That same month, the project's 94 turbines were connected to the grid, significantly bolstering China's goal of attaining carbon neutrality by 2060.[154]

b. Supply Chain and Domestic Equipment Advantage

China's dominance in the offshore wind supply chain noticeably contrasts with the rest of the world as it maintains its position as the global leader in producing key components and assembly capacities.[155] Indeed, China has become the leading sovereign when it comes to offering the most affordable wind turbines; in sum, the country's surplus production capacity in steel, unique control over rare earth elements, and deployment of an undoubtedly efficient supply chain allow it to maintain gross profit margins that are, on average, 14 percent higher than those of its international competitors in the turbine market.[156] Notably, China's stronghold extends to over 70 percent of the market share in critical components such as gearboxes, generators, slewing bearings, castings, forgings, towers, and flanges.[157] This soup-to-nuts control positions China as the epicenter of offshore wind manufacturing, a status that is further cemented by its substantial nacelle assembly facilities. As of 2023, China boasts more than 100 operational nacelle assembly plants (not counting an additional 60 under construction), clearly demonstrating its capacity to meet the soaring demand for offshore wind energy.[158] With an annual production capability of 16 gigawatts (GW) from turbine nacelles alone, China accounts for 58 percent of the global market share, thereby dwarfing the capacities of other regions and establishing itself as the world's preeminent offshore turbine nacelle manufacturing hub.[159]

Additionally, Chinese shipyards have emerged as frontrunners in the engineering, procurement, and construction domains for offshore wind turbine installation vessels (WTIVs) and showcase remarkable leadership in this specialized sector in record time.[160] By July 2022, China had already established itself as the global leader

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html (last updated Jan. 28, 2022, 9:06 AM) [https://perma.cc/3NXL-82QP].

153. *Id.*

154. *Id.*; *see* discussion, *supra* Section II.B.2.b.

155. *See* Norman Waite, *China's offshore wind industry giant stimulates global growth*, Inst. For Energy Econ. and Fin. Analysis (Sept. 5, 2022), https://ieefa.org/articles/chinas-offshore-wind-industry-giant-stimulates-global-growth [https://perma.cc/5PP4-HPP6].

156. *Id.*

157. Sofia Okun, *Offshore wind industry in need of rare earth magnets*, Fastmarkets (Sept. 19, 2023), https://www.fastmarkets.com/insights/offshore-wind-industry-in-need-of-rare-earth-magnets/ [https://perma.cc/9XT9-HNU9].

158. Edward White, *How China cornered the market for clean tech*, Fin. Times (Aug. 8, 2023), https://www.ft.com/content/6d2ed4d3-c6d3–4dbd-8566–3b0df9e9c5c6 [https://perma.cc/TJ6S-MD5S].

159. Rebecca Williams & Feng Zhao, *supra* note 30, at 29.

160. Xu Yihe, *Dominance: China building 90% of wind installation vessels*, Upstream (Nov. 30, 2023), https://www.upstreamonline.com/energy-transition/

in the WTIV market, possessing 28 units that represented 62 percent of the worldwide deployment of such vessels.[161] China's dominance in this space has only continued to grow; by November 2023, the China Shipbuilding Industry Association reported that, of the 37 WTIVs then under construction across the world, an impressive 90 percent were being fabricated within China.[162] A notable highlight of this flourishing sector is the recent launch of the "Boqiang 3060," one of China's self-developed wind power installation vessels, built in the coastal city of Yantai in Shandong Province.[163]

Manufactured by CIMC Raffles for Boqiang Heavy Industry Group, the "Boqiang 3060" represents the next generation of offshore wind turbine installation vessels.[164] This vessel is distinguished due to its operational capacity in water depths of up to 70 meters, thereby leading the field in China in terms of deck variable load and crane lifting capacity.[165] The Boqiang 3060 is uniquely equipped to transport and install three sets of 16 megawatt (MW) offshore wind turbines; this means the vessel has set a new benchmark as the *only* contemporary wind power installation ship in China capable of transporting an entire tower barrel.[166] Also, it substantially elevates the installation efficiency and adaptability of wind power installation vessels, particularly in challenging sea conditions, and thus ensures an operational capacity of over 200 days annually.[167] This milestone achievement marks a significant advancement in enhancing China's wind power while concurrently emphasizing China's commitment to advancing its renewable energy capabilities and the country's pivotal role in shaping the future of global wind power infrastructure.

C. Key Takeaways from China's Offshore Wind Industry

In sum, China's offshore wind industry has experienced remarkable growth. In the short time (compared to its European counterparts) in which it has had the opportunity to flourish, China has established itself as a global leader in the sector and surpassed the developmental strides of both Europe and the United States. The Chinese central government's strategic commitment and foresight are largely responsible for this rapid expansion as it has been instrumental in promoting its domestic renewable energy sector over the past decade and a half. China has essentially

dominance-china-building-90-of-wind-installation-vessels/2–1-1562904 [https://perma.cc/63WF-GBEG].

161. *China Reaches 45 Per Cent of Global Offshore Wind Capacity, New Report Reveals*, Baird Mar. (July 13, 2022, 10:34 PM), https://www.bairdmaritime.com/work-boat-world/offshore-world/offshore-renewables/offshore-wind/china-reaches-45-per-cent-of-global-offshore-wind-capacity-new-report-reveals/ [https://perma.cc/TH9J-ZJ8M].

162. Xu Yihe, *supra* note 160.

163. *China's New Offshore Wind Power Installation Ship Starts Trial Voyage,* China Glob. Television Network (Dec. 27, 2023, 5:41 PM), https://news.cgtn.com/news/2023–12–27/China-s-new-offshore-wind-power-installation-ship-starts-trial-voyage-1pSocRmcotW/p.html#:~:text=The%20vessel%2C%20the%20first%20of,of%20the%20crane%20in%20China. [https://perma.cc/Z7TM-BAJA].

164. *Id.*

165. *Id.*

166. *Id.*

167. *Id.*

successfully stimulated its offshore wind ecosystem through a series of targeted legal frameworks, which have encompassed everything from production and consumption to the development of a robust supply chain and construction infrastructure crucial for the growth of large-scale energy projects. The central government's approach has resulted in a nationwide build-out of wind resources (both onshore and offshore) while demonstrating how essential the role of governmental vision and direct regulatory support is in advancing its own domestic renewable energy capabilities.

When it comes to operating capacity and growth trends, China's focus on offshore wind has led to a notable increase in installed capacity—a result which emphasizes China's central government's commitment to its renewable energy priorities. Notwithstanding the ceasing of central government subsidies in 2021 (namely the aforementioned FITs), China's offshore wind capacity had reached an extremely impressive 11.2 gigawatts (GW) by the end of that year, not including multiple ambitious projects on the assembly line which continue to push this growth further. Additionally, innovations such as integrating offshore wind with various other energy sectors in the Bohai Sea and pioneering companies such as MingYang and CSSC Haizhuang Windpower developing mega-turbines serve as prime examples of China's leadership regarding technological advancement and its ability to overcome geographical and technical challenges. It is incredible to witness developments such as these as it reflects China's strategic evolution in this space, originating from initial challenges such as those related to turbine quality and grid connectivity to now as it currently leads the global market in the offshore wind development space. Assuming China can continue this trajectory (which it undoubtedly will), the country will continue to maintain its dominance on the global stage.

III. Offshore Wind Development in the United States

A. The American Offshore Wind Path from Experimentation to Scale – An Overview of Offshore Wind Capacity and Development Projects

The journey of American offshore wind began in November 2001, initiated by the proposal from developers of the Cape Wind project, which would locate a large-scale wind farm on Horseshoe Shoal in Nantucket Sound off the coast of Massachusetts.[168] This project would have been the first offshore wind farm in the United States and have included 130 wind turbines set approximately over 25 square miles.[169] Cape Wind would have a maximum electrical output of 468 megawatts (MW), with an average output of 174 megawatts (MW), while electricity produced from the wind farm would be carried to the mainland through underwater cables.[170] However, over the next decade, the project encountered significant legal, financial, and political challenges, eventually leading to the scrapping of power purchase

168. *Case Study: Cape Wind Project*, Nat'l Geographic, https://education.nationalgeographic.org/resource/case-study-cape-wind-project/ [https://perma.cc/LKD3-US88] (last visited Apr. 23, 2024).

169. *Id.*

170. *Id.*

agreements that supported more than three quarters of the project's capacity, and finally its ultimate cancellation in 2017.[171]

Despite this setback, the Cape Wind project sparked a broader interest and debate about offshore wind in the United States and had the effect of launching conversations about the various stakeholder issues and legal contradictions which cropped up because of this endeavor. Aside from environmental impact concerns by conservation groups, the usual suspects in halting domestic American offshore wind development also came to light: permanent residents and vacation homeowners' concerns regarding visibility of the wind turbines disturbing their aesthetic (and thereby their property values), along with what could accurately be described as the major legal hurdle in this situation—the project required approval from both state and federal authorities as the turbines would be situated in federal waters, but the transmission cables would cross land in Massachusetts.[172]

Moving forward, the first successful offshore wind project in the United States was the Block Island Wind Farm, which became operational in December 2016.[173] Located off the coast of Rhode Island, this small-scale project consists of five turbines with a total capacity of 30 megawatts (MW).[174] It marked a significant milestone as it demonstrated the legal and environmental feasibility and potential benefits of offshore wind energy in the United States.

Since Block Island, there has been a significant push to expand offshore wind capacity and a number of experimental offshore wind farms, each one larger and offering greater capacity than the last. The Coastal Virginia Offshore Wind Project (CVOW) was initiated by Dominion Energy (a major player in the space here in the United States) by starting with a pilot phase that featured two turbines which collectively produced a grid-connected 12 megawatts (MW) approximately 27 miles off the coast of Virginia Beach.[175] The full-scale development of this project, which has been approved to commence construction through 2026, will significantly expand the capacity to deliver impressive 9.5 million megawatt-hours (MwH), which has the potential of powering over 660,000 homes.[176] Vineyard Wind, located off the coast of Massachusetts, is set to become the first utility-scale offshore wind energy project in

171. *See* Robert Walton, *Cape Wind Developers Call It Quits*, Util. Dive (Dec. 4, 2017), https://www.utilitydive.com/news/cape-wind-developers-call-it-quits/512203/ [https://perma.cc/UR6B-4ZKF].

172. Nat'l Geographic, *supra* note 168.

173. *The Starting Five: Stories from America's First Offshore Wind Farm*, Ørsted, https://us.orsted.com/renewable-energy-solutions/offshore-wind/block-island-wind-farm [https://perma.cc/N6V6-MY6S] (last visited Apr. 23, 2024).

174. *Id.*

175. Bureau of Ocean Energy Mgmt., *Coastal Virginia Offshore Wind Project (CVOW) Research Project*, U.S. Dep't of the Interior, https://www.boem.gov/renewable-energy/state-activities/coastal-virginia-offshore-wind-project-cvow-research-project [https://perma.cc/HH3T-7N5B] (last visited Apr. 23, 2024).

176. *Coastal Virginia Offshore Wind*, Dominion Energy, https://www.dominionenergy.com/projects-and-facilities/wind-power-facilities-and-projects/coastal-virginia-offshore-wind [https://perma.cc/N67M-QBB6] (last visited Apr. 23, 2024).

the United States. Once completed, it will consist of 84 turbines and have a capacity of 806 megawatts (MW), enough to power over 400,000 homes and businesses.[177]

This project represents a major step forward in scale compared to previous U.S. projects as it is already active and providing power to populated areas. Developed by Ørsted and Eversource, the South Fork Wind Farm is situated off the coast of Rhode Island and New York, with 12 turbines in operation, delivering 130 megawatts of sustainable clean wind energy to Long Island.[178] Governor Kathy Hochul recently declared the completion of the South Fork Wind Farm, cementing New York's role as the launchpad for America's inaugural utility-scale offshore wind project..[179] Also developed by Ørsted and Eversource, Revolution Wind will be located in federal waters between Block Island, Rhode Island, and Martha's Vineyard, Massachusetts. This larger project is expected to have a capacity of 704 megawatts (MW), potentially generating enough energy to power more than 350,000 homes between Rhode Island and Connecticut.[180]

All in all, notwithstanding the many great developments by the United States in the offshore wind industry in recent years, as discussed earlier, when compared to China (who is light years ahead in the sector), there is still significant process that remains to be had by the United States.[181]

B. Legal and Regulatory Framework

1. Federal Government's Role and Recent Initiatives

a. Biden Administration's 30-Gigawatt (GW) by 2030 Target

With notable contrast to the previous Trump administration (which harbored an anti-renewable energy stance while escalating its rhetoric so far as to even allege windmills being carcinogenic and accuse offshore wind turbines of distressing marine life), the Biden administration has distinctly embraced a supportive viewpoint on renewable energy, along with a pronounced emphasis towards advancing offshore wind energy.[182] An example of this fundamental change in approach can be clearly

177. Maura Healey & Kim Driscoll, *Vineyard Wind, America's First Large-Scale Offshore Wind Farm, Delivers Full Power from 5 Turbines to the New England Grid*, MASS.GOV (Feb. 22, 2024), https://www.mass.gov/news/vineyard-wind-americas-first-large-scale-offshore-wind-farm-delivers-full-power-from-5-turbines-to-the-new-england-grid.

178. *Governor Hochul Announces Completion of South Fork Wind, First Utility-Scale Offshore Wind Farm in the United States*, GOVERNOR KATHY HOCHUL (Mar. 14, 2024), https://www.governor.ny.gov/news/governor-hochul-announces-completion-south-fork-wind-first-utility-scale-offshore-wind-farm [https://perma.cc/4H2D-K5JF].

179. *Id.*

180. Adnan Memija, *US Gives Revolution Wind Green Light to Start Offshore Construction*, OFFSHOREWIND.BIZ (Nov. 21, 2023), https://www.offshorewind.biz/2023/11/21/us-gives-revolution-wind-green-light-to-start-offshore-construction/ [https://perma.cc/XTF7-LX6C].

181. *See* discussion *supra* Section II.A.1.b.

182. Lisa Friedman, *No, Wind Farms Aren't 'Driving Whales Crazy'*, N.Y. TIMES, https://www.nytimes.com/2024/02/16/climate/trump-clean-energy-fact-check.html (Feb. 21, 2024) [https://perma.cc/AX66-X3D6]; *see* Teresa R. Christopher, et al., *The Road to 30 Gigawatts: Key Actions to Scale an Offshore Wind Industry in the United States*, CTR. FOR AM. PROGRESS, https://

seen through the Biden administration's ambitious objective to deploy 30 gigawatts of offshore wind energy capacity by the year 2030; this strategy signals a robust commitment to fostering sustainable energy development and mitigating climate change impacts throughout America and the world.[183]

Despite a steady decline in approval ratings since assuming office, it seems important to acknowledge the Biden Administration's achievements where they are warranted, particularly when it comes to renewable energy and domestic development of the American offshore wind industry.[184] In recent months, the Biden-Harris administration emphasized its commitment to renewable energy through actions such as granting approval to the CVOW project.[185] This project is a significant milestone and represents the fifth commercial-scale offshore wind energy project to be green-lit under President Biden's tenure and directly aligns with the administration's 30 gigawatts (GW) of offshore wind energy capacity by 2030 objective.[186] The administration's series of approvals, which includes Vineyard Wind 1, South Fork Wind, Ocean Wind 1, and Revolution Wind, was followed soon after by the announcement of the Empire Wind project, which marked the sixth commercial-scale offshore wind initiative to be established under President Biden's leadership.[187]

Notwithstanding the considerable ground the United States will have to cover to match China and Europe's achievements in the offshore wind space, the Biden Administration's various proactive measures clearly demonstrate the caliber of impact that presidential commitments can have on revitalizing stagnant sectors of industry. Through strategic actions, such as the approval of key commercial-scale offshore wind projects, the administration has essentially kick-started domestic offshore wind development here in the United States. Beyond these initial steps, the Biden administration has further enhanced the offshore wind sector's growth through legislative support and policy initiatives, which include the Inflation Reduction Act's (IRA) leasing, transmission, and tax credit provisions and the Infrastructure Investment and Jobs Act (IIJA). Efforts such as these collectively highlight the transformative potential that political leadership has in advancing renewable energy infrastructure when focused in an effective manner.

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www.americanprogress.org/article/the-road-to-30-gigawatts-key-actions-to-scale-an-offshore-wind-industry-in-the-united-states [https://perma.cc/J9VZ-92TF] (last updated Mar. 14, 2022).

183. Teresa R. Christopher et al., *supra* note 182.

184. *How (Un)Popular is Joe Biden?*, FIVETHIRTYEIGHT.COM, https://projects.fivethirtyeight.com/biden-approval-rating [https://perma.cc/GB39–6BC8] (last visited Mar. 6, 2024).

185. *See Biden-Harris Administration Approves Largest Offshore Wind Project in the Nation*, U.S. DEP'T OF THE INTERIOR (Oct. 31, 2023), https://www.doi.gov/pressreleases/biden-harris-administration-approves-largest-offshore-wind-project-nation [https://perma.cc/7Z24-RF3Q].

186. *Id.*

187. *Id.*; *Biden-Harris Administration Approves Sixth Offshore Wind Project*, U.S. DEP'T OF THE INTERIOR (Nov. 21, 2023), https://www.doi.gov/pressreleases/biden-harris-administration-approves-sixth-offshore-wind-project [https://perma.cc/JWF8-LG3G].

b. Infrastructure Investment and Jobs Act

The IIJA plays a pivotal role in President Biden's agenda, particularly as it relates to the domestic offshore wind sector as part of a broader effort to rejuvenate the nation's deteriorating infrastructure and to advance climate resilience projects.[188] Specifically, the IIJA earmarks substantial amounts of funding for the enhancement of clean energy transmission while also empowering the Federal Energy Regulatory Commission (FERC) with "backstop" transmission siting authority (a development with significant ramifications for the offshore wind industry).[189]

Historically, FERC has been unable to address cases where state commissions have outright denied transmission project applications (instead of merely neglecting them), which has become a substantial barrier. A 2009 ruling by a federal appeals court held that FERC did not possess the authority to override state rejections of transmission projects within Department of Energy (DOE)-designated corridors, thereby effectively rendering FERC powerless in situations where a state disapproved of a transmission expansion proposal.[190] The IIJA would rectify this gap by expressly affirming FERC's backstop siting authority and thus enabling it to supersede state denials.[191] Such enhanced authority should result in streamlining the integration of offshore wind facilities with the grid, especially for those projects that require connections to regional or interregional transmission lines for market access or are critical for maintaining grid reliability with new interconnections. The IIJA directly addresses and overturns the limitations imposed by the Fourth Circuit in *Piedmont Environmental Council v. FERC* by amending Section 216 of the Federal Power Act (FPA) and thus granting FERC the conclusive ability to take action when states reject applications for essential transmission facilities.[192] Somewhat recently, FERC announced a notice of proposed rulemaking, further detailing the conditions under which its backstop authority can be applied.[193] It is developments such as these that mark significant steps forward in support of expanding and integrating offshore wind energy infrastructure.

c. Trump Administration's Offshore Wind Rollbacks and Fossil Fuel-First Policy Shifts (2025–Present)

The reinstatement of a Trump Administration in 2025 has resulted in a notable reversal of federal offshore wind policy. This marks a deliberate departure from the

188. *See* Am. Clean Power, *The Infrastructure Investment and Jobs Act at One Year: Where Are We Now?*, The Power Line (Nov. 29, 2022), https://cleanpower.org/blog/the-infrastructure-investment-and-jobs-act-at-one-year-where-are-we-now/ [https://perma.cc/56XA-86JY].

189. Catherine P. McCarthy & Boris Shkuta, *FERC Proposes Reforms to Backstop Transmission Siting Authority, Implementing Changes Required by 2021 Bipartisan Infrastructure Bill*, Bracewell (Dec. 20, 2022), https://bracewell.com/insights/ferc-proposes-reforms-backstop-transmission-siting-authority-implementing-changes-required [https://perma.cc/GHP7-5BHM].

190. *Piedmont Env't Council v. FERC*, 558 F.3d 304, 313 (4th Cir. 2009).

191. *See* Infrastructure Investment and Jobs Act § 40105, 16 U.S.C. § 824p(B)(1)(C)(iii).

192. *See id.*

193. Applications for Permits to Site Interstate Electric Transmission Facilities, 89 Fed. Reg 46682 (May 29, 2024) (to be codified at 18 C.F.R. pts. 50, 380).

Biden administration's renewable energy agenda. On January 20, 2025, President Trump issued a presidential memorandum temporarily withdrawing all areas of the OCS from offshore wind leasing.[194] This directive further mandates that the Secretary of the Interior conducts a comprehensive review of federal wind leasing and permitting practices and bases such concerns on environmental impacts, economic feasibility, legal deficiencies, as well as national security risks.[195] Furthermore, any new approvals, rights-of-way, permits, leases, and loans for onshore and offshore wind projects are suspended pending the completion of this review.[196]

President Trump's policy reinforces his broader strategic priority of expanding fossil fuel infrastructure while at the same time dismantling the offshore wind sector to boost domestic oil, natural gas, and coal production.[197] These efforts are in line with his campaign commitments. This memorandum does not affect leasing for oil, gas, minerals, or environmental conservation, however, it directs the Secretary of the Interior to assess the legal bases for terminating (or amending) existing wind energy leases.[198]

That said, the immediate effects of this presidential memorandum include substantial uncertainty surrounding the plethora of offshore wind capacity that is currently under development. It is worth noting that the legal authority of the Trump administration to unilaterally obstruct offshore wind projects is likely to be contested in court, similar to many of Trump's other recent Executive Orders.[199] Notwithstanding, this presidential-level retreat from offshore wind support could likely create a regulatory void at the federal level. The Biden administration leveraged legislative tools such as the IRA and IIJA to support offshore wind development via financial incentives, leasing reforms, as well as investments in transmission infrastructure.[200] With the federal government stepping back, the burden of sustaining offshore wind initiatives will likely shift to state governments and private-sector entities. States with ambitious renewable energy targets (such as New York and California) may attempt to bypass federal opposition through state-led policies and

194. Donald J. Trump, President, *Temporary Withdrawal of All Areas on the Outer Continental Shelf from Offshore Wind Leasing and Review of the Federal Government's Leasing and Permitting Practices for Wind Projects*, White House (Jan. 20, 2025), https://www.whitehouse.gov/presidential-actions/2025/01/temporary-withdrawal-of-all-areas-on-the-outer-continental-shelf-from-offshore-wind-leasing-and-review-of-the-federal-governments-leasing-and-permitting-practices-for-wind-projects/ [https://perma.cc/9Z23-3Z9M].

195. *Id.*

196. *Id.*

197. Ed Crooks, *President Trump's Executive Orders on Energy*, Wood Mckenzie: Energy Pulse (Jan. 23, 2025), https://www.woodmac.com/blogs/energy-pulse/president-trumps-orders-on-energy/ [https://perma.cc/2ZWZ-Y6MQ].

198. Donald J. Trump, President, *supra* note 194.

199. Cecelia Smith-Schoenwalder & Laura Mannweiler, *Tracking the Legal Showdown Over Trump's Executive Orders*, U.S. News & World Rep. (Feb. 20, 2025), https://www.usnews.com/news/national-news/articles/tracking-the-legal-challenges-to-trumps-executive-orders.

200. *See* discussion *supra* III.B.1.a and III.B.1.b.

financial incentives.[201] Nonetheless, in the absence of the unified federal backing, any long-term economic viability of such state efforts will remain uncertain.

Notably, President Trump's withdrawal from offshore wind development risks diminishing American competitiveness in the global renewable energy sector overall on an international front. Countries like China, along with those in the European Union, will continue to expand their offshore wind infrastructure at an aggressive pace, thereby establishing their dominance in an ever-evolving energy market. Considering the strong likelihood that this policy shift under Trump will undermine investor confidence in the American renewable sector, financial institutions, as well as energy developers, will likely favor jurisdictions with more stable regulatory environments when determining how to deploy capital for their long-term renewable energy infrastructure projects.

2. State-Level Efforts and Coastal State Mobilization

a. California's Offshore Wind Initiatives

California maintains a proactive approach to offshore wind development at the state level, within the unique context of American federalism where states have a considerable amount of autonomy in energy policy.[202] One could even say that California's approach almost mirrors that of the type of provincial mobilization discussed above that is seen in China. This section explores how California has embraced offshore wind as part of its broader climate and energy strategy by emphasizing state-led initiatives and regulatory frameworks that facilitate these ambitions and developments.

California has set ambitious renewable energy targets, aiming for 100 percent clean energy by 2045.[203] Offshore wind is an important component of the state's strategy due to its bountiful coastal resources and the potential for high energy yield from wind.[204] The California Energy Commission (CEC) has recognized the strategic importance of offshore wind and is actively planning to integrate offshore wind into the state's energy portfolio.[205] This proactive approach at the state level is somewhat

201. *See* discussion *infra* III.B.2.

202. *See Offshore Wind Energy Development*, Cal. State Lands Comm'n, https://www.slc.ca.gov/renewable-energy/offshore-wind-energy-development/ [https://perma.cc/Z5BL-YH9G] (last visited Apr. 23, 2024); *see* Alexandra B. Klass, *Federalism "Collisions" in Energy Policy*, The Regul. Rev. (Nov. 19, 2018), https://www.theregreview.org/2018/11/19/klass-federalism-collisions-energy-policy/ [https://perma.cc/GBX4-DBG5].

203. *California Releases World's First Plan to Achieve Net Zero Carbon Pollution*, Governor Gavin Newsom https://www.gov.ca.gov/2022/11/16/california-releases-worlds-first-plan-to-achieve-net-zero-carbon-pollution/ [https://perma.cc/D3VX-P3RQ].

204. *See* Cal. Energy Comm'n, California Offshore Wind Fact Sheet 1(2023), https://www.energy.ca.gov/sites/default/files/2023–11/California_Offshore_Wind_Fact_Sheet_ada.pdf [https://perma.cc/P8C5-HGPF].

205. *See* Scott Flint et al., Cal. Energy Comm'n, Publ'n No. CEC-800-2022-001-REV, Offshore Wind Energy Development off the California Coast 5–8, (2022), https://www.energy.ca.gov/filebrowser/download/4361[https://perma.cc/T46P-K7EY].

analogous to the way Chinese provinces have been tasked with expanding renewable capacities, albeit under the directive of China's central government.[206]

A major step taken by California has been the state's forming of strategic partnerships and task forces which involve a variety of stakeholders that include federal agencies, local governments, and the private sector.[207] For example, since 2016 the Bureau of Ocean Energy Management (BOEM) and the State of California have formed a task force to explore the feasibility of offshore wind projects.[208] This task force is crucial for navigating the complex offshore wind regulatory landscape especially as it involves both federal and state jurisdictions.[209] As described earlier, in China, similar provincial initiatives often involve local governments and state-owned enterprises working under the broader umbrella of national policy but with significant local adaptations at play.[210]

California has also been quite active in addressing specific challenges related to offshore wind such as environmental concerns and the integration of new energy sources into the existing grid infrastructure.[211] The state has conducted extensive environmental impact studies to assess the potential effects of offshore wind farms on marine ecosystems and coastal communities.[212] These studies are vital for gaining public support and ensuring sustainable development practices, reflecting a more bottom-up approach to environmental governance, compared to China's more top-down method.[213]

Furthermore, California's efforts also extend to economic incentives for offshore wind development. The state provides various forms of financial support for renewable energy projects, including grants, tax incentives, and funding for research and development.[214] These incentives are designed to attract investment in offshore

206. *See* discussion *supra* Section II.B.1.

207. *See* Scott Flint et al., *supra* note 197, at ii.

208. *Id.* at 15.

209. *See* Melissa Jones et al., Cal. Energy Comm'n, Publ'n No. CEC-700-2023-004, Assembly Bill 525 Offshore Wind Energy Permitting Roadmap 39 (2023), https://efiling.energy.ca.gov/GetDocument.aspx?tn=249906&DocumentContentId=84599 [https://perma.cc/2C7B-89C6].

210. *See* discussion *supra* Section II.B.1.

211. *See* Robert Collier, et al., UC Berkeley Lab. Ctr., California Offshore Wind: Workforce Impacts and Grid Integration 55 (2019), https://laborcenter.berkeley.edu/pdf/2019/CA-Offshore-Wind-Workforce-Impacts-and-Grid-Integration.pdf [https://perma.cc/9H7G-XSCJ].

212. *See* Benjamin Ruttenberg, *Potential Environmental Impacts of Offshore Renewable Energy Deployment: Knowledge Gaps and the Importance of Proxies, Models, and Monitoring*, Cal. Coastal Comm'n (May 11, 2023), https://documents.coastal.ca.gov/assets/upcoming-projects/offshore-wind/Th4/Th4-Ruttenberg.pdf [https://perma.cc/ECH3-BR6E].

213. *See* Stéphanie Monjon & Élodie René, *The New Tools of Environmental Governance in China: Top Down Control and Environmental Credit*, Groupe d'études géopolitiques (Sept. 2021), https://geopolitique.eu/en/articles/the-new-tools-of-environmental-governance-in-china-top-down-control-and-environmental-credit/ [https://perma.cc/4TAM-Z8LX].

214. Melissa Jones et al., *supra* note 201 at 7.

wind technology and infrastructure, similar to the subsidies provided by Chinese provincial governments to stimulate local renewable energy industries.[215]

Additionally, California's active role in international and national forums on renewable energy is a representation of its leadership and commitment to advancing offshore wind development.[216] The state's high-ranking representatives have participated in global renewable energy discussions by advocating for supportive policies and sharing best practices.[217] Such an outward-looking approach complements the state's internal efforts in mobilizing resources and regulatory support for offshore wind, thereby positioning California not just as a national leader but also as an international advocate for sustainable energy development.

b. New York's Offshore Wind Projects

Similar to California, New York's initiatives in offshore wind development provide a clear example of how state-level efforts and coastal state mobilization can heavily influence the expansion of renewable energy within a federal system, and also like California's approach, is also comparable in some ways to the provincial mobilization seen in China.[218] New York's strategic approach displays the state's commitment to both environmental sustainability and economic growth through the development of offshore wind as a major component of its energy plan.

One of New York's primary components to its offshore wind strategy is through its Climate Leadership and Community Protection Act (CLCPA) which mandates 100 percent carbon-free electricity by 2040 while also including specific targets for offshore wind energy production.[219] The state has committed to developing 9,000 megawatts (MW) of offshore wind power by 2035, clearly indicating its dedication to the transition towards renewable energy. This type of target-setting is reminiscent of the way Chinese provinces are directed under the national Five-Year Plans, although New York's initiatives are self-imposed and tailored to its specific environmental and economic contexts.[220]

To achieve these goals, New York has established detailed frameworks and policies that facilitate its state's offshore wind development. For example, The New York State Energy Research and Development Authority (NYSERDA) plays a crucial role in developing and overseeing how the state will reach its clean energy and climate goals as they have been set forth by the CLCPA (one could even say this group functions similarly to how provincial development agencies in China

215. *Id.*; *see* discussion *supra* Section II.B.1.

216. *See, e.g.*, *California Joins Global Offshore Wind Alliance in Ambitious Commitment*, Cal. Energy Comm'n (Dec. 5, 2023), https://www.energy.ca.gov/news/2023–12/california-joins-global-offshore-wind-alliance-ambitious-commitment [https://perma.cc/46T8-GCKR].

217. *See id.*

218. *See* discussion *supra* Section III.B.2.a.

219. *See* N.Y. League of Conservation Voters, 2024 New York State Policy Agenda 2–3, 9–10 (2024) https://nylcv.org/wp-content/uploads/NYLCV-2024-State-Policy-Agenda.pdf [https://perma.cc/LUE3-G3WZ].

220. *See* discussion *supra* Section II.B.2.

oversee local energy projects).[221] NYSERDA has been instrumental when it comes to funding research, fostering public-private partnerships, and conducting extensive environmental and infrastructural studies so as to ensure viability and sustainability of offshore wind projects on the agenda.[222]

Additionally, New York has actively engaged in offshore wind development project procurement processes—actions which reflect a proactive state-level mobilization for the nascent industry.[223] As an example, the state has conducted multiple large-scale solicitations for offshore wind projects, which have led to significant private investment.[224] This type of solicitation is structured so that it includes energy generation along with broader economic considerations, such as job creation and infrastructure development, thereby ensuring that the growth in the offshore wind industry also brings economic benefits to the state.[225]

New York's strategic approach includes addressing major challenges commonly associated with offshore wind development. For example, New York has been a leader in tackling issues like grid integration by investing in and upgrading transmission networks to handle the increased load from offshore wind farms.[226] These initiatives mirror the kind of infrastructural investments seen in Chinese provinces like Guangdong and Jiangsu, where local governments have similarly prioritized accommodating renewable energy within their existing systems.[227]

New York's offshore wind initiatives also extend to community engagement and environmental justice to ensure that the benefits of renewable energy are shared broadly and equitably with local communities.[228] This strategic approach involves public consultations and regulatory reviews that consider the impact of offshore wind projects on local communities and ecosystems through a governance model that values transparency and public participation.[229]

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221. *Energy Research and Development Authority, New York State*, Div. of the Budget (May 11, 2020), https://www.budget.ny.gov/pubs/archive/fy23/ex/agencies/appropdata/EnergyResearchandDevelopmentAuthorityNewYorkState.html [https://perma.cc/6PJQ-VTLQ].

222. *See Siting Offshore Wind*, NYSERDA, https://www.nyserda.ny.gov/All-Programs/Offshore-Wind/Focus-Areas/Leading-a-Regional-Industry/Siting-Offshore-Wind [https://perma.cc/26TP-W98F] (last visited Apr. 24, 2024).

223. *See* N.Y. League of Conservation Voters, *supra* Note 211 at 9.

224. *Id.* at 2.

225. *Id.* at 5.

226. *See, e.g.*, Johannes Pfeifenberger et al., The Brattle Grp., Offshore Wind Transmission: An Analysis of Options for New York 5–10 (2020), https://www.brattle.com/wp-content/uploads/2021/05/19747_offshore_wind_transmission_-_an_analysis_of_options_for_new_york_lcv_virtual_policy_forum_presentation.pdf [https://perma.cc/XN2S-NKF9].

227. *See* discussion *supra* Section II.B.1.

228. *See New York State Offshore Wind Master Plan*, Am. Plan. Ass'n, https://www.planning.org/awards/2020/achievement/offshore-wind/ [https://perma.cc/L52N-WREX] (last visited Apr. 24, 2024).

229. *See Connecting with New Yorkers: Working Together to Responsibly Develop Offshore Wind Energy*, NYSERDA, https://www.nyserda.ny.gov/All-Programs/Offshore-Wind/Focus-Areas/Connecting-With-New-Yorkers [https://perma.cc/5XAD-9SWT] (last visited Apr. 24, 2024).

3. Federal Regulations and Agency Roles

a. Energy Policy Act Section 388 and its Implications

Section 388 of the Energy Policy Act (EPA) gave authority to the United States Department of the Interior (DOI) through the BOEM, to grant leases, easements, and rights-of-way on the outer continental shelf (OCS) for any activities that produce or support production, transportation, or transmission of energy from sources other than oil and gas by amending the Outer Continental Shelf Lands Act (OCSLA).[230] Under this legal framework includes the development of offshore wind projects.[231]

This legislative framework is critical because it effectively enables the federal government to manage offshore wind energy development in federal waters, which is a necessity considering the inherent complexities usually associated with maritime and environmental regulations.[232] The BOEM plays a central role under this act by overseeing the leasing process, a complicated endeavor which includes site assessment, construction, operation plans, and environmental impact analyses.[233] Such detailed regulatory oversight ensures that upcoming offshore wind projects satisfy national environmental standards and maritime safety regulations.

The Act's purpose of establishing a structured leasing process is absolutely critical for the growth of the offshore wind industry since it provides clarity and certainty for investors and developers about the rules which govern the development of offshore wind resources. By instituting a clear trajectory for obtaining necessary permits and leases, Section 388 reduces the kind of bureaucratic uncertainty which tends to stifle innovation and investment. It establishes a framework within which offshore wind projects must operate, akin to the central directives seen in China's regulatory approach, although here, it is distinctly shaped by the American legal and political context.

The strategic importance of Section 388 goes way beyond mere regulatory facilitation; it reinforces the federal government's commitment to sustaining a viable offshore wind industry in the United States as part of its broader strategy to transition to a more sustainable energy mix. Such commitment is critical if the United States hopes to compete globally in the renewable energy sector, and to a certain degree draws parallels to China's state-driven efforts in dominating the global offshore wind market through centralized planning and support.

However, it is worth noting that the Trump administration's recent January 2025 executive order halting offshore wind leasing and permitting has cast uncertainty over

230. Pub. L. No. 109-58, § 388, 119 Stat. 744–47 (2005) (codified as amended at 43 U.S.C. § 1337(p)).

231. Adam Vann, Cong. Rsch. Serv., R40175, Offshore Wind Energy Development: Legal Framework 3–6 (2023).

232. *See id.*

233. Desray Reeb & Donna Schroeder, U.S. Dep't of the Interior, Bureau of Ocean Energy Mgmt, Offshore Wind Lease Issuance, Site Characterization, and Site Assessment: Central and Northern California 2–3 (2022), https://www.boem.gov/renewable-energy/state-activities/final-ca-ren-lease-issuance-baefh07222022clean508-compliant-final [https://perma.cc/Y7WJ-TTEL].

Section 388's role in facilitating federal oversight.[234] By directing the DOI to freeze new lease sales and reassess existing permits, the administration is effectively undermining BOEM's statutory mandate to manage offshore wind development under the EPA.[235] This shift results in regulatory ambiguity and essentially jeopardizes the investor certainty that Section 388 was designed to provide.

b. Rivers and Harbors Act (Army Corps of Engineers)

The Rivers and Harbors Act (the oldest federal environmental law in the United States) was enacted in 1899 and administered by the United States Army Corps of Engineers which to this date has profound implications for the development of offshore wind energy projects in this country.[236] The primary purpose of this Act is to govern the construction of any structures and the execution of dredging activities within navigable waters of the United States and to ensure that these actions do not obstruct navigable waters without explicit federal authorization.[237]

The primary provision of the Rivers and Harbors Act that is relevant to offshore wind development is Section 10, which prohibits the unauthorized obstruction or alteration of any navigable water of the United States.[238] For offshore wind projects, this means that any construction activities, including the installation of turbines, transmission cables, or substations within or affecting navigable waters, must receive a permit from the Army Corps of Engineers.[239] This requirement ensures that all offshore wind developments are carefully reviewed for any potential impacts on navigation and the marine environment, thus satisfying the nation's commitment to maintaining safety within and utility of its navigable waters.[240]

The Army Corps of Engineers' role under the Rivers and Harbors Act is critical to facilitating and regulating offshore wind projects. The Corps is responsible for evaluating permit applications for offshore wind installations, assessing their potential impacts on public waterways, and ensuring that these projects do not compromise marine traffic, fishery patterns, or ecosystem health.[241] The permitting process includes extensive environmental assessments and, often, public consultations to address any ecological or societal concerns associated with the proposed developments.[242]

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234. *See* discussion *supra* III.B.1.c.

235. *Id.*

236. Ch. 425, 30 Stat. 1121 (1899) (current version in scattered sections of 33 U.S.C).

237. *Id.* at § 10 (current version at 33 U.S.C. § 403).

238. *Id.*

239. *See* Luke Feinberg et al., Univ. of Cal., Santa Barbara Bren Sch. of Env't Sci. & Mgmt., Appendix C: Navigating the Offshore Wind Energy Permitting Pathway 30–32 (2014), https://tethys.pnnl.gov/sites/default/files/publications/Appendix-C-CalWindProject.pdf [https://perma.cc/854Q-W5NY].

240. *See id.*

241. *See, e.g.*, *PN-23–44 NAB-2020–60863-M34 (US Wind, Inc. - MD Offshore Wind Energy)*, U.S. Army Corps of Eng'rs (Oct. 6, 2023), https://www.nab.usace.army.mil/Missions/Regulatory/Public-Notices/Public-Notice-View/Article/3547512/pn-23–44-nab-2020–60863-m34-us-wind-inc-md-offshore-wind-energy/ [https://perma.cc/P3P3-DYG5].

242. *See, e.g., id.*

The Rivers and Harbors Act also collaborates with other regulatory frameworks, such as the Marine Mammal Protection Act and the Clean Water Act, requiring the Army Corps of Engineers to coordinate with other federal agencies like the National Marine Fisheries Service.[243] This inter-agency collaboration ensures that offshore wind projects comply with a wide array of interconnected environmental regulations, thus reinforcing the United States' holistic approach to sustainable clean energy development.[244]

c. Bureau of Ocean Energy Management January 2023 – Proposed Rulemaking for Offshore Wind Leasing System Similar to Offshore Oil and Gas

In January 2023, BOEM released a Notice of Proposed Rulemaking, signaling a significant update to its regulations governing offshore wind on the OCS.[245] This initiative was known as the Renewable Energy Modernization Rule and its purpose is to modernize and streamline the current regulatory framework so that it becomes more conducive to the development of offshore wind projects.[246] The proposed modifications are designed to align regulatory practices more closely with the technological advances and operational experiences gained since the original regulations were enacted.[247]

This rulemaking was part of a broader effort by the Biden Administration to expand offshore wind energy as a major component of its national strategy to achieve a clean energy economy.[248] The proposed changes are expected to simplify the leasing process, reduce costs for developers, and enhance safety and environmental protections. By updating these regulations, BOEM intended to facilitate a safer, more economically viable, and environmentally sound approach to offshore wind energy production, which is essential for meeting the administration's aforementioned goal of deploying 30 gigawatts (GW) of offshore wind capacity by 2030.[249]

However, as mentioned earlier, the regulatory landscape for offshore wind in the United States has been drastically altered by the return of President Trump's administration. On January 20, 2025, President Trump signed the Wind Energy

243. *See id.*; *see Summaries of the Laws We Administer*, U.S. Army Corps of Eng'rs, https://www.spn.usace.army.mil/Missions/Regulatory/Regulatory-Overview/Summaries-of-the-laws-we-administer/ [https://perma.cc/T5D9-YQEF] (last visited Apr. 24, 2024).

244. *See, e.g.*, *Biden-Harris Administration Approves First Major Offshore Wind Project in U.S. Waters*, U.S. Dep't of the Interior (May 11, 2021), https://www.doi.gov/pressreleases/biden-harris-administration-approves-first-major-offshore-wind-project-us-waters [https://perma.cc/K5W7-WUZ5].

245. Renewable Energy Modernization Rule, 89 Fed. Reg. 42602 (May 15, 2024) (to be codified at 30 C.F.R. pts. 285, 585) (noting that a final rule was published at 89 Fed. Reg. 42602 (May 15, 2024)) [https://perma.cc/8F23-EY7N].

246. *Id.*

247. *Id.*

248. S*ee* U.S. Dep't of the Interior, *supra* Note 234.

249. *See US BOEM Proposes Modernized Offshore Wind Regulations*, Mayer Brown (Jan. 17, 2023), https://www.mayerbrown.com/en/insights/publications/2023/01/us-boem-proposes-modernized-offshore-wind-regulations [https://perma.cc/H7AQ-ZK37].

Executive Order, which indefinitely withdrew all OCS areas from new or renewed wind energy leasing while simultaneously placing a moratorium on federal approvals, permits, and funding for both onshore and offshore wind projects.[250] This executive order effectively halts the progress initiated under BOEM's Renewable Energy Modernization Rule by essentially placing existing offshore wind leases under review for potential termination or amendment.[251]

Going forward, offshore wind developers are about to face a period of significant regulatory uncertainty; the Wind Energy Executive Order does not specify any timeline for the completion of the mandated federal review, thus leaving current lessees in a state of regulatory purgatory.[252] It is worth noting that federal agencies such as the DOI, DOE, and the Environmental Protection Agency are prohibited rom issuing any new approvals until this review is complete.[253] This directly affects and includes critical permits associated with environmental compliance (such as Clean Water Act authorizations and approvals for air emissions and endangered species protections), all of which are essential for the development of American offshore wind projects.[254]

This regulatory upheaval resulting from Trump's Wind Energy Executive Order will likely have far-reaching consequences, considering developers will now have to carefully evaluate the terms of their leases and monitor BOEM's regulatory processes.[255] Even more unpredictable is the assessment of possible legal challenges if the federal government proceeds with suspending, or even canceling, existing leases. Although the OCSLA provides certain statutory protections, which include possible financial compensation for cancelled leases, legal disputes are very likely to arise due to the validity and enforcement of such provisions.[256]

C. Financial Incentives and Market Development

1. Inflation Reduction Act and its Impact on Offshore Wind

In the United States, federal incentives and tax credits are important when it comes to driving the expansion of this clean energy technology by aligning economic strategies alongside environmental goals so that the country can foster a robust renewable energy market. This section discusses some of the core components of federal financial support and examines the transformative impact caused by the IRA on the domestic offshore wind industry. Moreover, this section will touch upon various subsidies and support mechanisms on the state level which further promote

250. *See* Donald J. Trump, President, *supra* note 194; Joshua L. Belcheret al., *Potential Implications of President Trump's Wind Energy EO on Offshore Leasing, Development*, Holland & Knight (Feb. 4, 2025), https://www.hklaw.com/en/insights/publications/2025/02/potential-implications-of-president-trumps-wind-energy-eo [https://perma.cc/8S4B-7E2R].

251. Belcheret, *supra* note 250.

252. *Id.*

253. *Id.*

254. *Id.*

255. *Id.*

256. *Id.*

the domestic industry's capacity to scale through innovation. Incentives such as these emphasize both the federal and state government's commitments to renewable energy while concurrently reinforcing strategic measures that are designed to bolster the United States' competitive edge in the global renewable energy, and thereby offshore wind, landscape.

The importance of the IRA as it relates to offshore wind cannot be stated enough. The IRA is a significant legislative milestone that embodies arguably the most substantial federal investment in combating climate change to date.[257] This legislative package earmarks approximately $369 billion for energy and climate reform and aims to drive down emissions by as much as 40 percent by 2030.[258] The broad scope of this Act includes multiple provisions for clean energy development with specific provisions specifically for accelerating the development and viability of offshore wind energy through leasing, transmission planning, and tax credits.[259]

The IRA presents several key financial incentives with the potential to severely transform the offshore wind industry as it currently stands in the United States. One of the primary mechanisms that can be utilized by offshore wind developers is an extension of the Investment Tax Credit (ITC), which was previously set to decrease and eventually phase out.[260] By extending financial incentives such as these, stability is created for long-term planning and investment towards significant offshore wind projects. Additionally, the ITC extension introduces additional credits for clean energy projects that can attain certain domestic content requirements as well as for those located in energy communities, thereby leading to greater domestic manufacturing and job creation.[261] Further, the IRA extends the existing Renewable Electricity Production Tax Credit (PTC) to be replaced by the Clean Electricity PTC.[262] Shifting towards a production-based incentive will comport ongoing operational benefits with production, which encourages maximizing energy generation and efficiency in offshore wind farms. This is especially beneficial because of the large scale and higher initial capital costs that are common with offshore wind projects. The PTC essentially provides a base rate, which can increase if offshore wind projects meet certain criteria such as domestic content requirements and labor standards (including payment of prevailing wages and the use of qualified apprentices).[263] By revitalizing and accelerating domestic supply chains, the IRA places the United States in a positive trajectory in the offshore wind component manufacturing arena and, with time, could possibly reach China's level.

257. Inflation Reduction Act of 2022, Pub. L. No. 117-169, 136 Stat. 1818 (2022).

258. *Game-changing Policies in the Inflation Reduction Act*, Fresh Energy (Aug. 8, 2022), https://fresh-energy.org/game-changing-policies-in-the-inflation-reduction-act [https://perma.cc/LG23-N4CA].

259. Laura B. Comay et al., Cong. Rsch. Serv., IN11980, Offshore Wind Provisions in the Inflation Reduction Act 1–2 (2022).

260. *See* 26 U.S.C. § 48(a)(5)(F).

261. *See id.* at § 48(12), (14).

262. Inflation Reduction Act §§ 13101, 13701, Pub. L. No. 117-169, 136 Stat. 1906, 1982 (codified as amended at 26 U.S.C. §§ 45(b)(5), 45(Y)).

263. 26 U.S.C. § 45(b)(7)–(9).

2. State-Level Subsidies and Support Mechanisms

State-level subsidies and their support mechanisms play a crucial role in the United States' transition to offshore wind energy because, unlike federal initiatives, state-level incentives can be tailored to local conditions and needs, thereby enabling support that is more targeted while concurrently giving deference to specific regional energy goals and economic priorities.

Aside from the state-specific efforts and mobilization discussed earlier with respect to California and New York, state subsidies for offshore wind typically come in various forms, including tax credits, grants, and guaranteed market prices through instruments like Offshore Renewable Energy Certificates (ORECs).[264] ORECs are financial incentives that were designed to reduce capital and operational costs when it comes to maintaining and then developing offshore wind farms.[265] ORECs can provide a stable market for offshore wind providers since under this system some states, such as New York, will purchase ORECs from project developers as they deliver renewable energy to the state's electricity grid.[266] Proposed prices will be kept in mind since ORECs can be sold to utilities and other load-serving entities (LSEs) that may be required to purchase clean energy credits, depending on the state's goals.[267] State-level support can also be found when it comes to regulatory facilitation and infrastructure development. States such as Massachusetts and New Jersey have established comprehensive offshore wind strategic plans that include streamlining the permitting processes and coordinating between various governmental and regulatory bodies.[268]

D. Supply Chain and Infrastructure

Supply chain and infrastructure form an essential backbone in the complex ecosystem that is the offshore wind industry as these components are crucial towards both operational and economic viability of wind projects. By optimizing supply chain and infrastructure, much like how China already has, the United States will not only be able to successfully deploy and maintain its offshore wind farms but also achieve its broader goals of energy security and economic sustainability.[269] This section will discuss intricacies of the offshore wind supply chain and infrastructure that is necessary to support a growing American offshore wind sector by delving into the Jones Act and its implications for logistics and transportation within the

264. *See* discussion *supra* Section III.B.2,

265. *See RECs FAQ*, NYC [https://perma.cc/M9J4-ULVZ] (last visited Apr. 26, 2024).

266. *Offshore Wind Solicitations: How NYSERDA Competitively Selects Offshore Wind Projects*, NYSERDA, https://www.nyserda.ny.gov/All-Programs/Offshore-Wind/Focus-Areas/Offshore-Wind-Solicitations [https://perma.cc/RKN9-BXLC] (last visited Apr. 26, 2024).

267. *Id.*

268. S*ee* Ramboll US Corp., New Jersey Offshore Wind Strategic Plan: Navigating Our Future (2020), https://www.nj.gov/bpu/pdf/Draft_NJ_OWSP_7–13–20_highres.pdf [https://perma.cc/2NBE-YMB3]; *see Offshore Wind*, Mass.gov, https://www.mass.gov/info-details/offshore-wind [https://perma.cc/UGR6-QBGD] (last visited Apr. 26, 2024).

269. *See* discussion *supra* Section II.B.4.b.

industry. Additionally, the role of grid connectivity and transmission infrastructure in integrating offshore wind energy into the national grid will be examined.

1. Jones Act Implications and Logistics Challenges

The Jones Act is also known as the Merchant Marine Act of 1920 and was a piece of legislation originally enacted for the purpose of regulating maritime commerce in American waters and between American ports in hopes of ensuring a robust American merchant marine industry.[270] The act requires that goods transported by water between American ports be carried on ships that are American-built, American-owned, and predominantly crewed by American citizens. The purpose of the Jones Act was to support national security by maintaining a robust domestic shipbuilding industry and a capable merchant marine fleet so that the nation could be ready to operate during times of war or national emergencies.[271]

The Jones Act represents a major logistical and financial hurdle for domestic offshore wind projects because it restricts the transportation of components such as turbines, towers, and blades between American ports to WTIVs that can meet its strict requirements.[272] This type of limitation is extremely impactful considering the specialized nature of offshore wind installation vessels, of which there are few in the world and are mostly built and registered abroad by virtue of their high costs and specialized technologies.[273] The lack of Jones Act-compliant vessels that are capable of supporting offshore wind farm construction and maintenance undoubtedly leads to increased operational costs; developers often have to employ workarounds such as operating out of foreign ports (Canada) or for the WTIV to position itself at the turbine construction site and have required hardware transported to it via feeder barges that are Jones Act-compliant.[274] Although these strategies have worked, the costs are astronomical—Canadian ports are usually located hundreds of miles away from the most recently constructed East Coast-based offshore wind farms and feeder vessel usage introduces complexity and risk to any project.[275]

Paradoxically, the Jones Act impacts the competitiveness of the American offshore wind industry, although its originally stated purpose was to protect and foster domestic maritime industries. Not only does it make American offshore wind projects less competitive compared to those in countries with fewer shipping restrictions, such as those in Europe and Asia where offshore wind markets are rapidly expanding without such domestic shipping constraints, the Act also influences strategic decisions that

270. Merchant Marine Act of 1920, Pub. L. 66–261, 41 Stat. 988 (codified as amended at 46 U.S.C. §§ 861–889).

271. Colin Grabow et al., *The Jones Act: A Burden American Can No Longer Bear*, Cato Inst. (June 28, 2018), https://www.cato.org/publications/policy-analysis/jones-act-burden-america-can-no-longer-bear [https://perma.cc/S5UA-KTB2].

272. *See id.*

273. *See id.*

274. Colin Grabow, *Recent Articles Highlight Jones Act Contributions to Offshore Wind Difficulties*, Cato Inst. (Jan. 2, 2024, 1:05 PM), https://www.cato.org/blog/jones-act-contributes-offshore-wind-growing-pains.

275. *Id.*

are made regarding investment and development in the sector by potentially deterring investors due to the increased capital expenditures and prolonged project timelines driven by Jones Act logistical challenges.[276] Focusing on this latter consideration, an example from just recently within the last half a year of this paper being written, Ørsted, the aforementioned leader in offshore wind development, has withdrawn from two major projects in Maryland and New Jersey primarily due to cost issues.[277] On a positive note, the DOI recently announced that the first American-built and Jones Act-qualified WTIV is currently under construction in the southern United States, set to be completed by later this year or next year, and is capable of handling next generation wind energy turbine sizes of 14.7 megawatts (MW).[278]

2. Manufacturing, Grid Connectivity, and Transmission Infrastructure

The United States should be considered as being at a supply chain developmental crossroads when compared to China, especially as it lacks operating offshore nacelle manufacturing facilities, of which China has plenty. However, leading Western turbine OEMs—Vestas, Siemens Gamesa, and GE—are pioneering a shift as can be seen by the announcement of turbine component factory investment plans for New York and New Jersey in Q1 of 2023.[279] Such a move is critical, especially when considering the United States' need to comport with local content requirements (LCRs), leverage tax credits, and incentives under the IRA, not to mention the two-year lead time necessary from the beginning of manufacturing to installation.[280]

Regarding grid connectivity and transmission infrastructure, such systems are crucial to ensure electricity generated by offshore wind farms can be transported to wherever it is needed, then stabilized, and before being distributed efficiently. This is a significantly more difficult problem than energy production by traditional power plants because of the remote and variable nature of offshore wind farms.[281] In the

276. *See generally* Jeff St. John, *The US Offshore Wind Industry Faces a Moment of Reckoning*, Canary Media (Nov. 2, 2023), https://www.canarymedia.com/articles/wind/the-us-offshore-wind-industry-faces-a-moment-of-reckoning [https://perma.cc/MG24-94AN] (for background on the financial state of the U.S. offshore wind industry).

277. Will Mathis & Josh Saul, *Orsted Withdraws From Contract for Maryland Offshore Wind Farm*, Bloomberg (Jan. 25, 2024, 2:24 PM), https://www.bloomberg.com/news/articles/2024–01–25/orsted-orsted-withdraws-from-power-contract-for-maryland-offshore-wind-farm [https://perma.cc/V3PV-JRFR]; Katie Sobko & Colleen Wilson, Ørsted Pulls Out of Billion-dollar Project to Build Wind Turbines Off New Jersey Coast, USA Today (Nov. 1, 2023, 7:10 AM), https://www.usatoday.com/story/money/2023/11/01/orsted-offshore-wind-nj/71404989007/ [https://perma.cc/FG77-3SLC].

278. *Interior Department Leaders Tour First Offshore Wind Turbine Installation Vessel*, U.S. Dep't of the Interior (Mar. 20, 2024), https://www.doi.gov/pressreleases/interior-department-leaders-tour-first-offshore-wind-turbine-installation-vessel [https://perma.cc/2HV5-UEV5].

279. Bob Woods, *From GE to Siemens, the wind energy industry hopes billions in losses are about to end*, CNBC, https://www.cnbc.com/2023/04/17/from-ge-to-siemens-wind-energy-hopes-its-crisis-is-about-to-end.html [https://perma.cc/ZCA8-PSW6] (Nov. 27, 2023, 11:46 AM).

280. Matt Shields et al., Nat'l Renewable Energy Lab'y, TP-5000-84710, A Supply Chain Road Map for Offshore Wind Energy in the United States 63, 101 (2023), https://www.nrel.gov/docs/fy23osti/84710.pdf [https://perma.cc/46P4-L657].

281. *See* C.L. Archer et al., *The Challenge of Integrating Offshore Wind Power in the U.S.*

context of the United States, offshore wind development has brought to light several challenges and bottlenecks that relate to grid connectivity and transmission infrastructure. The American grid infrastructure is complex and regionally fragmented as it was not originally designed to accommodate large-scale intermittent power sources such as offshore wind.[282] Thus, integrating this new type of energy would require substantial upgrades and expansions of currently existing infrastructure so as to handle the unique characteristics inherent in wind power like its variability or sudden changes in output.[283] One of the primary issues faced by the burgeoning offshore wind industry in the United States is a dearth of sufficient high-voltage transmissions lines that are capable of transporting electricity to the onshore grid from offshore wind farms that are typically located far from main consumption centers (offshore wind farms tend to be situated approximately 10 miles or more from the coastline).[284]

E. Stakeholder Engagement and Environmental Considerations

Stakeholder engagement and environmental considerations are crucial factors in offshore wind development due to their ability to shape project outcomes and, when handled properly, ensure sustainable integration into local ecosystems. As the domestic offshore wind industry experiences surges in growth, it has encountered arguments regarding community and environmental interests. This section discusses critical processes and challenges that are commonly associated with navigating stakeholder opposition as well as the effect of the National Environmental Policy Act (NEPA) upon the development of offshore wind in the United States. Upon examining the concerns of major stakeholders such as fishermen and coastal residents, while also keeping in mind strategies for addressing ecological impacts caused by offshore wind projects, offshore wind developers have had to maintain a balance between technological advancements and responsible environmental stewardship. Only by obtaining a social license to operate with the broader community can developers be successful.

1. Navigating Stakeholder Opposition (Fishermen, Coastal Residents)

Legal challenges to offshore wind projects and their approval bodies are not unique to the United States but also prevalent in other nations heavily reliant on fishing, such as Japan.[285] Concerns from fishermen and fisheries about the possible adverse effects on their livelihoods caused by offshore wind farms are a widespread phenomenon. Regardless of whether these concerns are potentially legitimate or not, measures can and have been enacted so as to not automatically preclude offshore wind

Electric Grid. Part I: Wind Forecast Error, 101 Renewable Energy 346, 346 (2017).

282. *See id at 346-47.*

283. *See id.*

284. *See* Cullen Howe, *DOE Report Provides a Road Map for Coordinated Offshore Transmission Planning*, NRDC (Mar. 21, 2024), https://www.nrdc.org/bio/cullen-howe/doe-report-provides-road-map-coordinated-offshore-transmission-planning [https://perma.cc/8G8X-FZLL].

285. *See Offshore Wind Worldwide: Regulatory Framework in Selected Countries* at 162 (Aug. 2023), Hogan Lovells, https://www.hoganlovells.com/-/media/hogan-lovells/pdf/2023-pdfs/offshore-wind-handbook-2023.pdf [https://perma.cc/26P4-X3ED].

project development. For instance, CVOW's Record of Decision outlines specific actions designed to avoid, minimize, and mitigate potential adverse effects from its construction and operation.[286] Furthermore, Dominion Energy has pledged to create fishery mitigation funds to compensate both recreational and commercial fisheries for any direct losses stemming from the project.[287] In addition, Dominion Energy has also introduced protective measures, including speed restrictions for vessels and designated construction exclusion zones, with the goal in mind of safeguarding marine species such as marine mammals, sea turtles, and Atlantic sturgeon.[288] Similarly, measures included in the Record of Decision for the Empire Wind project—another recent announcement—also reflect a commitment to mitigating potential construction and operational impacts.[289] Empire Wind, LLC has agreed to establish mitigation funds with the aim to compensate affected commercial and recreational fishing entities, thereby demonstrating a strategic effort to address environmental and economic impacts in offshore wind project planning and execution.[290]

2. National Environmental Policy Act

NEPA was enacted in 1969 for the purpose of establishing a national policy that encourages productive and enjoyable harmony between "man and his environment," promotes efforts that prevent or eliminate damage to the environment while stimulating the health and welfare of people, and to enrich the understanding of ecological systems as well as natural resources that are crucial to the country.[291] Nowadays, it establishes a framework for environmental analysis and public participation, which are crucial in the process of assessing and mitigating any potential environmental impacts caused by offshore wind projects. Under NEPA, major federal actions, undoubtedly including those related to offshore wind, require a comprehensive examination of the proposed actions and alternatives, which includes the possibility of taking no action at all.[292]

For offshore wind projects, NEPA requires that Environmental Assessments (EAs) determine whether the project has the potential to significantly affect the environment; this determination makes way for whether a more detailed Environmental Impact Statement (EIS) is necessary.[293] The EA examines how necessary the proposed

286. *Record of Decision: Coastal Virginia Offshore Wind Commercial Project* at 11–26 (Oct. 30, 2023), Bureau of Ocean Energy Mgmt., https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/CVOW-C-ROD.pdf [https://perma.cc/3PU5-AMES].

287. *Id.* at 32–33.

288. *Id.* at Appendix A § 5.9.6.

289. *Record of Decision: Empire Offshore Wind: Empire Wind Project (EW1 and EW2)* at 13–32 (Nov. 20, 2023), Bureau of Ocean Energy Mgmt., https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Empire-Wind-OCA-A-0512-ROD.pdf [https://perma.cc/8Q2C-DYRA].

290. *Id.* at 41.

291. National Environmental Policy Act of 1969 § 2, Pub. L. 91–190, 83 Stat. 852, 852 (codified at 42 U.S.C. 4321).

292. Adam Vann, *supra* Note 223 at 6–7.

293. *Id.*

project is, assesses any reasonable alternatives, and evaluates potential impacts of the project on wildlife, habitats, cultural resources, socio-economic conditions, and air and water quality.[294] If an EA finds significant environmental impacts, BOEM, acting as the lead agency, proceeds with an EIS, which involves public review and interagency coordination to ensure compliance with all pertinent federal and state regulations.[295]

The Biden administration made updates to NEPA procedures, which emphasized how important environmental stewardship was when it came to federal decision-making. These updates included directives to reassess and possibly expand the scope of environmental reviews, especially regarding the impacts caused by greenhouse gas emissions and climate change.[296] However, the recent Trump administration has enacted what can essentially be construed as a sea change as far as NEPA is concerned.

President Trump recently revoked the Council on Environmental Quality's (CEQ) regulatory authority, which reflects a fundamental shift in the application and enforcement of NEPA in the United States.[297] This decision effectively eliminates nearly five decades of binding CEQ regulations and drastically alters the framework which governs federal environmental reviews and falls in line with a recent executive order titled "Unleashing American Energy".[298] Moreover, the impact of this policy shift is further compounded as a result of ongoing judicial developments, particularly in *Marin Audubon Society v. Federal Aviation Administration* and *Seven County Infrastructure Coalition v. Eagle County*. Both cases have the potential to redefine the scope and effectiveness of NEPA's environmental review requirements.

CEQ has played a historical role in establishing uniform NEPA procedures across federal agencies by ensuring consistency with regards to environmental assessments and impact statements. However, the Trump administration's recent interim final rules plan to rescind the 1977 Carter-era directive (Executive Order 11,991) which had granted CEQ the authority to promulgate regulations under NEPA. This decision somewhat follows a 2024 ruling by the United States Court of Appeals for the D.C. Circuit in *Marin Audubon Society*, which found that CEQ's rulemaking authority lacked a statutory basis and was thus ultra vires.[299] This ruling concluded that CEQ's regulations could not be considered legally binding absent

294. *Id.* at 7.

295. Seth Kerschner, *Environmental Laws and Regulations Affecting US Offshore Wind*, White & Case (June 25, 2021), https://www.whitecase.com/insight-our-thinking/environmental-laws-and-regulations-affecting-us-offshore-wind [https://perma.cc/GUY6-BUE7].

296. *Id.*

297. Hannah Northey, Trump Moves to Claw Back Almost 50 Years of NEPA Regs, E&E News (Feb. 18, 2025), https://www.eenews.net/articles/trump-moves-to-claw-back-almost-50-years-of-nepa-regs/ [https://perma.cc/XXM5-U8ZH].

298. *Id.*; Donald J. Trump, President, *Unleashing American Energy*, White House (Jan. 20, 2025), https://www.whitehouse.gov/presidential-actions/2025/01/unleashing-american-energy/ [https://perma.cc/Z3YD-L4WS].

299. *Marin Audubon Soc'y v. Fed. Aviation Admin.*, No. 23-1067 at 8 (D.C. Cir. Nov. 12, 2024) [https://perma.cc/J8MG-RG56].

express congressional delegation because it was created as an advisory entity within the Executive Office of the President rather than as an agency with independent regulatory authority.[300]

Due to this revocation, each federal agency will now likely be independently responsible for developing and implementing its own NEPA compliance procedures. Such a fragmented approach can be expected to result in regulatory uncertainty. The aftermath of such effects could consist of inconsistent environmental reviews across various agencies, thereby complicating legal challenges against agency decisions. The potential consequences for offshore wind projects are particularly severe, since developers could very well face a plethora of inconsistent and unpredictable environmental review standards.

Additionally, the Supreme Court's review of *Seven County Infrastructure Coalition v. Eagle County* appears to be another critical development as far as NEPA's scope is concerned and has the likely effect of further threatening to weaken NEPA's effectiveness. The central issue in this case is whether NEPA requires federal agencies to evaluate the environmental effects of their decision, and in particular those beyond their direct regulatory control.[301] This case arises from a dispute over an 88-mile railway project in Utah's Uinta Basin that was designed to facilitate the transportation of crude oil. Environmental groups and local governments argued that the Surface Transportation Board (STB) failed to adequately consider the railway's downstream effects, which include an increase in oil refining and greenhouse gas emissions.[302] Although the argument has been heard and an opinion has not yet been delivered, it is worth noting that the Solicitor General of the United States formally notified the Supreme Court of this aforementioned revocation in a January 24, 2025 letter regarding this case. The letter emphasizes that the federal government no longer considers CEQ regulations as binding authority in NEPA litigation, which further reinforces the administration's shift towards deregulation.[303]

Dismantling CEQ's authority will likely create significant regulatory uncertainty and lead to inconsistent environmental reviews across agencies while at the same time complicating legal challenges against any agency decisions. For offshore wind projects, such a change should increase the likelihood of inconsistent environmental assessments and legal disputes regarding the sufficiency of project approvals. This combined effect of President Trump's regulatory rollback and the likely outcome in *Seven County Infrastructure Coalition* truly threatens to reduce NEPA's effectiveness

300. *Id.* at 15-16.

301. Ann D. Navaro et al., *The Reasonably Foreseeable Effects of Seven County Infrastructure Coalition*, Westlaw Today (Jan. 7, 2025), https://today.westlaw.com/Document/I870ddba9cd1e11ef8ebdaae853c5b5db/View/FullText.html [https://perma.cc/EN6D-8WCS].

302. *Id.*

303. Sarah Harris, Acting Solicitor Gen., *Letter from Sarah Harris, Acting Solicitor General, to Scott S. Harris, Clerk of the Court (Jan. 24, 2025), Seven Cnty. Infrastructure Coal. v. Eagle Cnty.*, No. 23-975 (U.S. Jan. 24, 2025), https://www.supremecourt.gov/DocketPDF/23/23-975/340111/20250124141050484_letter%2023-975.pdf [https://perma.cc/PM4G-H62N].

as a tool for environmental oversight. The elimination of CEQ's authority removes standardized procedures and weakens public participation in environmental reviews.

Regarding offshore wind projects, project opponents such as fossil fuel interests and fishing industry groups could find it more difficult to challenge developments based on cumulative or indirect environmental effects. However, more likely such changes introduce greater challenges for offshore wind developers. Removing CEQ's regulations leads to uncertainty about the standards that agencies must follow when approving projects. This has the potential to lead towards litigation over the adequacy of agency-specific environmental assessments.

F. Key Takeaways from the United States' Offshore Wind Industry

In sum, the offshore wind industry in the United States has seen both significant progress and notable challenges. Beginning with the failed Cape Wind project in 2001, which faced legal and financial obstacles, the American offshore wind energy sector initiated broader interest despite its earlier setbacks. Cape Wind was followed by the successful Block Island Wind Farm in 2016, which was tangible proof of a shift towards more viable offshore wind projects like CVOW and the larger Vineyard Wind project. Concurrently, state-level efforts, particularly in California and New York, have evolved their offshore wind agendas with ambitious clean energy targets and strategic partnerships by efforts to incorporate offshore wind into their energy portfolios (efforts that parallel some provincial dynamics observed in China).

On the federal level, initiatives under the Biden administration have sought to expand offshore wind capacity with aggressive haste, an endeavor supported by the Infrastructure Investment and Jobs Act and the Inflation Reduction Act, both of which provide critical funding and tax incentives. These efforts emphasize a much more cohesive approach to enhancing the American offshore wind industry's infrastructure while concurrently addressing complex regulatory environments. However, challenges such as those posed by the Jones Act, which affects logistics and costs, bring to light ongoing obstacles in aligning national capabilities with the ambitious growth targets that are needed to match the rapid developments in global offshore wind energy, particularly if compared to China.

IV. Comparative Analysis

A. Comparative Overview of Legal Frameworks and Government Roles

China and the United States have experienced significantly contrasting trajectories in their respective offshore wind development industries, a fact that can be attributed to their divergent legal frameworks and roles of government. China has taken a strategic and centralized approach which has resulted in large-scale deployment of offshore wind technologies in record time. The Chinese government has utilized extremely comprehensive legal frameworks that explicitly incorporate offshore wind initiatives and targets, resulting in features such as FITs and five-year plans. Such plans are not simply guidelines but actually serve as robust policy

tools which in turn drive sector-specific infrastructural and financial developments. Additionally, active coordination has been a characteristic of China's approach—coordination among both national and provincial governments—which has taken full advantage of leveraging both public and private investments so as to maximize the Chinese offshore wind sector's growth.

Contrastingly, the United States' approach has been much more decentralized and fragmented, as can be seen by its reliance on state-level initiatives caused by a lack of aggressive federal mandates or cohesive national strategies that can be compared to China's five-year plans. Although the Biden administration has displayed its dedication in pivoting towards renewable energy (examples include lofty goals of 30 gigawatts (GW) of offshore wind by 2030), such policy targets are still recent announcements and rigorous legislative support from other branches of the American government are needed if the United States is to match China's speed and scale of offshore wind deployment. Federal laws like the NEPA, or influential bills such as the IRA, have been positive steps in the right direction as they provide a sort of foundational support for tax incentives, transmission planning, and leasing—factors that are pivotal in development of a healthy offshore wind industry. However, just how effective these initiatives become hinges significantly on state-level implementation, which can vary widely, thereby impacting the overall momentum of American offshore wind development.

California and New York are prime examples of proactive state-level engagement of support and policy, especially given their ambitious clean energy targets and strategic partnerships, many of which are akin to the provincial dynamics that are witnessed in China. However, the United States still faces major challenges such as the Jones Act, which severely complicates logistics and raises costs for offshore wind developers since it restricts to American vessels the transporting of necessary components between American ports. It is legislation such as this that underscores the broader challenge throughout the American legal and regulatory landscapes since restrictive and outdated laws further inhibit rather than facilitate efficient scaling of offshore wind and renewable energies in general.

The benefits derived from a unified regulatory and legal framework that is solidly aligned with centralized governmental support can be found in the Chinese model. This approach enables expedited development and streamlines growth of offshore wind projects. China's legal frameworks have been shown to specifically lower, or even remove, entry and expansion barriers so that the regulations can accommodate efficient evolution of this renewable technology and implementation on a broader national scale. This strategy simplifies the extremely complicated process of both grid integration and project approval while concurrently reinforcing the supply chain.

B. Analysis of Financial Incentives and Subsidies

The Chinese government has taken a varied approach regarding financial incentives for the development of offshore wind by leveraging direct as well as indirect

financial mechanisms when encouraging growth of this technology and the overall sector. A central feature of their strategy has been to guarantee fixed premium pricing for offshore wind-generated electricity through FITs. Originally, these Chinese offshore wind FITs were set at rates significantly higher than those in the market since they were specifically designed to offset the inherent higher initial costs that are usually associated with offshore wind projects while also hoping to lure investment prospects through establishing stable (and lucrative) revenue streams. As time went on and the costs of offshore wind technology naturally decreased due to industry maturation, the Chinese government has been strategic in their approach by adjusting FIT rates downward so as to reflect lower production costs while encouraging industry efficiency (it should be noted that national-level FITs for offshore wind in China have now expired, leaving provinces to establish such strategies if they wish).

In addition to FITs, the Chinese government has deployed investment subsidies by providing upfront capital (either directly or through SOE banks) in efforts to reduce the initial financial burden on developers. These subsidies have been necessary, especially in the earlier years of the industry, due to the original higher costs of setting up offshore wind farms, especially when located in deeper waters that require much more advanced (and naturally much more expensive) technologies. Just how effective these subsidies are is clearly evident in the extremely rapid escalation of installed capacity of offshore wind energy, which has displayed staggering growth, especially in recent years.

Lastly, a major component of China's financial incentive structure is the implementation of GECs, which allow developers to earn additional revenues through selling these GECs to other companies that seek to offset their carbon footprint. This results in the addition of an indirect financial revenue stream which further enhances the attraction towards investing in China's offshore wind energy sector.

Comparatively, the United States' financial incentive approach towards its offshore wind sector has taken a markedly different trajectory. The primary financial mechanism through which American offshore wind development is built on has been the utilization of ITCs and PTCs, both of which provide tax relief to offshore wind project developers as calculated by their capital expenditure or the quantity of electricity generated, respectively. Although these tax credits have spurred significant development, especially within the last few years under the Biden administration's greater focus on clean energy development, such credits have generally offered less direct incentives as compared to China's FITs.

Furthermore, only recently has the United States began exploring more aggressive forms of financial incentives, such as grants or loan guarantees. The IRA should be commended as representing a crucial step forward towards providing even more enhanced tax credits along with funding opportunities for renewable energy development. However, due to the fragmented nature of implementing national-level policies across different states, all of which possess the right to legislate their own unique approaches, along with the absence of a truly unified national strategy similar

to China's centralized approach, results in the impact of these incentives becoming uneven amongst states, or possibly even delayed.

It should be noted that the scope and scale of financial incentives have been pivotal in shaping the development trajectories of both nations' respective offshore wind industries. China's incentive programs—comprehensive and coordinated—have caused the growing nation to scale its offshore wind capacity efficiently and rapidly while also reducing costs via accelerated technological development and basic economies of scale. In comparison, the United States has been hampered by the complex web of dated and difficult to navigate regulations along with a lack of consistent support at the federal level, thereby leading to a much more slower and incremental growth pattern.

C. Supply Chain Management and Technological Advancements

China's offshore wind sector presents a robust approach in supply chain management which has the benefit of additional support via governmental policies and inherently efficient and significant domestic manufacturing capabilities. From raw materials such as rare earth elements that are essential for manufacturing turbines to final assembly facilities, a cornerstone of China's strategy is its ability to maintain control over its entire supply chain. This control is further enhanced through a comprehensive industrial policy that considers the development of full supply chain capabilities all within its national borders as a priority.

The central Chinese government has been strategic in its approach in fostering competition within the domestic environment of wind turbine and related components production. China has reduced overall costs while concurrently accelerating technological advancements with turbine efficiency and design by incentivizing local manufacturing. An aforementioned example included Chinese companies such as MingYang and CSSC Haizhuang Windpower, two offshore wind behemoths that have been crucial in developing turbines that are both larger and more efficient than any seen prior, thereby solving energy output and operational stability issues especially in the realm of challenging offshore development conditions.

Additionally, China's ability to effectively and rapidly construct specialized WTIV ocean vessels used for turbine installation reflects the country's quick response when it comes to logistically challenged experiences in the offshore wind sector. Developing these vessels themselves requires substantial investment in shipbuilding facilities, reflecting an overall holistic approach in growing the domestic offshore wind industry.

In contrast, the American offshore wind supply chain has faced multiple challenges, primarily due to complex regulatory matters and its own nature as a nascent industry in the United States. The American offshore wind supply chain is still developing; thus, it heavily relies on foreign suppliers for key components such as installation vessels and turbines. This dependency is further compounded by legislative obstacles such as the Jones Act, naturally complicating logistics and increasing gross costs.

On the bright side, however, recent developments do indicate that recognition of these challenges is growing and there have been concerted efforts to overcome them. Certain initiatives such as establishing turbine assembly plants in east coast states like New York and New Jersey are positive steps towards building a localized supply chain. Such efforts are becoming supported by state and federal incentives that are specifically aimed at bolstering domestic manufacturing capabilities (and thereby reducing reliance on international suppliers).

D. Challenges and Solutions: Lessons from China for the United States

1. Federal Coordination and State Mobilization

One of the major lessons that the United States can learn from China's offshore wind development is the value that comes with strong federal coordination paired alongside active state mobilization. Unlike the United States, where federal efforts have been mostly inconsistent, and thus largely reliant on state-led initiatives, China's centralized approach has resulted in streamlined decision-making and efficient development and deployment of offshore wind technologies. Avoiding the patchwork of policies that currently exists would require improving federal coordination for the United States, which can lead to a more unified direction that in turn complements state efforts. Enhancing such coordination would also lead to more standardized regulations that would have the effect of reducing administrative burdens while concurrently nurturing a more conducive environment for offshore wind project developers to evolve in.

2. Advancing Grid Infrastructure and Integration

Another valuable insight offered by China's efforts is the country's proactive investment in its grid infrastructure to accommodate its growing national offshore wind capacity. Some of the notable challenges that the United States faces regarding its grid integration include aging infrastructure and an overall dearth of unified national grid policies which cohesively align with rapid scaling of domestic renewable energy sources. By drawing from China's example, the United States could benefit from increased federal investment in its own grid infrastructure by focusing on integrating renewable energy with the grid as it currently stands and through enhancing the grid's resilience. Such an approach would not only support the current needs of developing offshore wind farms but also "future-proof" the entire system against inevitable increased demand, especially when considering the intermittent nature of many renewable energy sources.

3. Fostering Innovation and International Collaboration

Finally, the United can learn from China's emphasis on international collaboration and innovation. Through the prioritization of research and development and engagement in international partnerships which enhance its technological capabilities, China has become a global leader in offshore wind technology. If the United States were to foster a similar innovative environment by enacting supportive

policies, funding research, and promoting international collaboration, technological advancements in the American offshore wind sector could accelerate exponentially. Additionally, these efforts could result in positioning the United States as a competitive player in the global offshore wind market through attracting investments while creating innumerable domestic jobs.

E. Policy Recommendations for the United States

1. Adopting Best Practices from China's Centralized Approach

Several strategic policy recommendations for promoting American offshore wind emerge after considering the comparative analysis between China's successful offshore wind framework and the United States' slower-paced development. By drawing from China's centralized and streamlined model, the United States can bridge the gap in development speeds and efficiencies between China and itself by capitalizing on the strengths of American federalism while also being mindful of its inherent legal complexities.

As mentioned above, China's success in the offshore wind space can be largely attributed to its centralized governance structure. This structure allows for cohesive policy enforcement and prompt deployment of offshore wind technology across various regions under China's administrative care. The United States can learn from this strategy by adopting a more coordinated national strategy of its own as far as offshore wind is concerned. What this looks like is up for debate: it could involve the creation of a federal body that is explicitly dedicated to overseeing and unifying offshore wind development across the country. An agency such as this could reduce bureaucratic overlap, streamline federal and state efforts, and all while ensuring that states and the federal government can align their initiatives—such an approach would draw clear lessons from China's ability to mobilize both resources and enact regulatory frameworks swiftly and effectively, as they've been shown to do. Such a governmental body could also be responsible for crafting a nationwide offshore wind strategic plan comprised of specific targets and timelines to further reinforce accountability and establish measurable milestones for progress toward expanding the country's offshore wind capacity.

2. Streamlining Regulatory Processes

Moreover, just how complex the regulatory frameworks currently are in the United States can significantly hamper the speed and efficiency of domestic offshore wind development. A strategy to mitigate these challenges could look like the United States implementing a sort of consolidated permitting process which mirrors China's efficient regulatory environment. By establishing a "one-stop shop" for regulatory framework related to offshore wind energy projects, the United States could minimize any procedural delays that are known to commonly hinder the industry's growth. Such a streamlined process should integrate any and all required state and federal reviews, permitting, and approval, thereby reducing the normally elongated timeline between projection conception to actual implementation. This type of approach

would not only have the effect of lowering the barriers to entry for new offshore wind projects, but it could also attract significantly greater investment through risk and cost reduction that is normally associated with lengthy (and therefore uncertain) regulatory processes.

3. Enhancing Federal and State Synergies

The enhancement of federal and state synergies is another relevant area where the United States can drastically improve. Although credit is due to the American government for setting ambitious nationwide clean energy goals (e.g. the Biden administration's 30 gigawatts (GW) of offshore wind by 2030 target), actually deploying offshore wind projects is often managed at the state level. This incongruency easily leads to misalignments and, even worse, inefficiencies. China's model of central and provincial government collaboration can serve as an inspiration for the United States to foster a more collaborative approach between the federal government and amongst its coastal states that are primarily affected. Such an endeavor could be achieved through federal matching grants that would incentivize states to invest in offshore wind projects. Another strategy would be coordinating planning sessions which align state and federal policies and funding. Most importantly, increased regular interactions between a national offshore wind authority and state energy offices would synchronize their mutual efforts and therefore ensure that state-specific challenges and opportunities are fully addressed, all within a national framework.

V. Conclusion

This comparative analysis of offshore wind development between China and United States has been able to shed more light on the distinct approaches taken by both countries: China has made rapid and effective strides whereas the United States has engaged in a more cautious and fragmented progression. China's offshore wind capacity growth can be attributed to its centralized governance, cohesive policy strategies, robust governmental support, and streamlined regulatory frameworks. Such a model has not only facilitated expeditious advancements in offshore wind technology along with having strengthened China's domestic supply chain, but at the same time, it has positioned China as quite the formidable leader in the global renewable energy industry overall.

The United States has been marred with notable hurdles because it has lacked a cohesive national policy and is home to a complex regulatory environment—both of these factors have stifled both growth and the potential for growth of its own offshore wind industry. While previous federal initiatives, such as those under the Biden administration, sought to advance offshore wind through investment and policy reforms, the transition back to a Trump administration has resulted in an uncertain environment and future concerning offshore wind development in the United States. The Trump administration's early executive actions have already established a clear rollback of offshore wind initiatives, which includes revoking regulatory frameworks, pausing federal leasing, and dismantling the CEQ's authority to oversee

environmental assessments. These policies, combined with a pending Supreme Court decision that could narrow the scope of environmental review under NEPA, create significant uncertainty for American offshore wind development.

Notwithstanding, the United States currently stands at a critical juncture: it absolutely must streamline its approach and also enhance federal-state coordination so as to harness the full potential that offshore wind energy has not only towards enhancing the lives of its citizens through the grid but also towards the bolstering of national security through reducing reliance on other alternative or foreign sources of energy. Now, more than ever, it is imperative that the United States reconciles its political instability with an urgent need towards developing a competitive offshore wind sector. The regulatory upheaval under President Trump threatens to deter investment, slow project development, and weaken the nation's ability to compete in the rapidly expanding global offshore wind market. The United States can draw lessons from China's great success and revitalize its own offshore wind strategy by centralizing planning, simplifying regulations, and strengthening synergies across all its governmental levels. Reforms such as these are not merely beneficial, but rather, they are essential for the United States to achieve its renewable energy goals and ensure its own energy security, all while fostering sustainable economic growth in what is bound to be an increasingly competitive global renewable clean energy landscape.