The Illinois Power Agency's
Draft Energy Policy Study under P.A. 103-0580
Magellan Wind Comments Relating to HB 2132
February 12, 2024

Introduction and Overview

Magellan Wind LLC (Magellan) appreciates this opportunity to comment on the Illinois Power Agency's (IPA's) 2024 Policy Study, Draft for Public Comment (Draft Study) (Jan. 22, 2024).[1] Our comments focus on the Draft Study's analysis of HB 2132, the House-passed Rust Belt to Green Belt Pilot Program Act, one of three bills that the IPA has been directed to analyze. HB 2132 would establish a pilot program for the development of an offshore wind project in Illinois' Lake Michigan waters capable of producing 700,000 megawatt hours of electrical power per year.

Magellan is an early-stage offshore wind development company that focuses primarily on the development of wind farms on floating foundations in deep water locations selected to minimize effects on shoreline views, wildlife, and existing uses. We believe that carefully sited, commercial-scale offshore wind farms in Illinois' Lake Michigan waters can significantly advance the State's grid decarbonization and equitable economic development goals with minimal adverse effects on wildlife and existing uses of the Lake. A carefully structured pilot program, incorporating needed improvements on the House-passed version of HB 2132, could prepare Illinois for timely development of this resource and position the State to serve as a hub for offshore wind manufacturing, deployment, and technical services for projects across the Great Lakes region.

Our comments on the Draft Study emphasize the need for broader analysis of the benefits of a pilot program. As discussed in Section A, the Draft Study incorrectly assesses HB 2132 as if its only purpose was to provide financial support for a one-time increase in renewable power generation capacity. HB 2132 proposes a pilot program – a program to prove out a new concept and develop the knowledge and expertise needed to evaluate and, if justified, deploy later, commercial-scale deployment.

The final version of the IPA's study under 20 ILCS 3855/1-129 should analyze HB 2132 in relation to this broader objective of the House-passed bill. An offshore wind pilot program can allow Illinois to expand its options for securing the new supplies of renewable electricity that the Climate and Equitable Jobs Act (CEJA) will require. The

[1] The study mandate is set out in section 10 of Public Act 103-0580, codified at 20 ILCS 3855/1-129.

effort is well-founded in view of the costs and risks of a grid decarbonization strategy that relies wholly on siting new solar and onshore wind generation, together with new transmission lines covering growing distances between new generation and load centers. A carefully structured offshore wind pilot program, designed to create an efficient foundation for timely commercial-scale development of an abundant new source of in-State renewable power, can provide a valuable option for Illinois policy makers responsible for implementing CEJA's decarbonization mandate. The final study should recognize and evaluate this aspect of the bill.

The final study's analysis of HB 2132 as a pilot program initiative should include recommendations for revisions to the bill to improve its effectiveness. Section B of our comments describes four areas, summarized briefly here, in which HB 2132 should be revised to operate more effectively in laying the groundwork for commercial-scale offshore wind development in Illinois' Lake Michigan waters:

1. HB 2132's standards for pilot project selection should include a threshold requirement that the project deploy technology with a commercial future in Illinois waters. Illinois ratepayer support for an offshore wind pilot project makes sense only if that project puts the State on a path to potential deployment of cost-competitive commercial-scale offshore wind farms. Standards for selecting a winning pilot project in HB 2132 or a similar bill should therefore include a threshold requirement that the pilot project promote investment in technology, infrastructure, supply chain growth, and skill acquisition that accelerate development of subsequent commercial-scale wind farms. Such a requirement, as discussed in Section B.1 below, would ensure that a pilot project is built on floating foundations in deep waters rather than on bottom-fixed foundations in shallow waters because viable areas in shallow water are too limited to support commercial-scale projects.
2. Pilot project applications should not be collected and reviewed until the Department of Natural Resources (DNR) has completed a thorough, science-based screening of potential project sites and identified preferred lease areas. HB 2132, if enacted in its current form, would require the IPA to select a pilot project within 360 days of the bill's effective date. This deadline would not allow DNR to complete a thorough, science-based screening process to identify preferred wind energy areas and ensure protection of public trust resources before the IPA collected and reviewed project applications. The current bill's arbitrary 360-day deadline for project selection, as discussed in Section B.2 below, would increase costs and legal risks without shortening the time required to complete the pilot project. The final study should recommend that HB 2132 be revised to ensure that the IPA is not required to select a pilot project before it has the information needed to protect ratepayers and safeguard public trust resources.

3. Pilot project developers should compete for a predictable revenue stream. The Draft Study describes how the Indexed REC pricing mechanism, which would apply to a pilot project under the current version of HB 2132, creates uncertainty for projects dependent on Indexed REC revenues. Draft Study at 5. This avoidable uncertainty would raise the cost of capital for potential pilot project developers and deter some qualified developers from pursuing the project, driving up project costs and reducing competition. The final study should recommend that HB 2132 use a different funding mechanism or postpone project selection until the Indexed REC mechanism has been reformed.
4. HB 2132 should provide for financial penalties for developer non-performance. Recent defaults by East Coast offshore wind developers on commitments to deliver power highlight the importance of reasonable and proportionate penalties for non-performance. A developer that secures Illinois' commitment to provide a pilot project revenue stream and then fails to deliver power should pay a penalty commensurate with the State's losses resulting from a failed project. Appropriate penalties for non-performance will also help to ensure fair competition by deterring developers from pursuing a strategy of over-promising to win the project selection competition with hopes of renegotiating workable terms later.

Section C concludes our comments with suggestions for improvements to some technical aspects of the Draft Study and the modeling efforts it relies upon.

A. The Final Study Should Recognize and Evaluate Pilot Program Benefits Beyond Direct Energy System, Environmental, and Economic Gains from Construction and Operation of a Single 200 MW Offshore Wind Farm

The Draft Study evaluates HB 2132, the "Illinois Rust Belt to Green Belt Pilot Program Act," without regard to bill's pilot program objectives. The Draft Study reports model-generated estimates of how a single 200 MW offshore wind farm would affect generation reliability and resource adequacy (Draft Study at v, 139-40), transmission reliability and resilience (id. at v, 140), electricity costs (id. at v-vi, 141), air emissions (id. at vi, 141-42) and job creation (id. at vi, 143-44).[2] These topics track the list of illustrative topics set out in the legislation calling for the current study.[3]

[2] We are less concerned with the Draft Study's estimates of the pilot project's direct impacts than with its failure to discuss pilot project benefits relating to positioning for future development. Questions and comments relating to some modeling assumptions are set out in Section C.

[3] The legislature's directive for this energy policy study states that the potential impacts to be evaluated by the IPA "*may include, but are not limited to*, support for Illinois' decarbonization goals, the environment, grid reliability, carbon and other pollutant emissions, resource adequacy, long-term and short-term electric rates, environmental justice communities, jobs, and the economy." 20 ILCS 3855/1-129(c) (emphasis supplied).

HB 2132, unlike the electricity storage and transmission proposals for which modeling results are also reported, proposes a *pilot program*. The HB 2132 pilot program would produce direct benefits, as would projects that deploy established green energy technologies. However, its central purpose, as a pilot program, is to produce experience, know-how, and preliminary infrastructure and supply chain investment that can lay the groundwork for later, commercial-scale deployment of a promising new form of renewable energy generation. The HB 2132 pilot program, like past pilot project programs that advanced the commercialization of power generation from solar cells, onshore wind farms, and offshore wind farms in waters not prone to ice formation, should be assessed not only for its immediate and environmental and economic effects but also for its potential to shorten development timelines and reduce costs for later, commercial-scale projects.

The policy rationale for investment in the development of Illinois' offshore wind resource is clear and compelling. CEJA has initiated a challenging transformation of the State's electricity sector. The Illinois Commerce Commission (ICC) outlines the scale of the challenge in the current draft of its first Renewable Energy Access Plan (Draft REAP).[4] The ICC estimates that, even if load growth from electrification of existing GHG emission sources is disregarded, Illinois will need at least 62 million MWh of renewable electricity by 2040 to meeting CEJA's 50% RPS requirement for that year. Reaching this goal, according to the ICC, will require "an in-state deployment rate of at least 3 TWh [that is, 3 million MWh] per year" over the next 16 years. Draft REAP at 13-14.

Meeting CEJA's further requirement that 100% of the State's electricity come from carbon-free sources by 2050 will require an estimated 90 million MWh per year of additional clean electricity (disregarding, again, load growth from electrification). Draft REAP at 14. Nuclear power from existing plants, which qualifies as clean energy under CEJA (though not as RPS-eligible renewable electricity), could meet much of this demand. However, reliance on undiminished output from the State's nuclear plants poses substantial risks due to the scheduled expiration of state price supports in 2027 and questions concerning whether Illinois' reactors, which began operation between 1969 and 1988, will be able to secure additional federal license extensions and manage age-related increases in operation and maintenance costs.

These baseline estimates of Illinois' need for additional renewable and clean energy substantially understate the scale of the State's challenge. In addition to setting new RPS and clean electricity mandates, CEJA established a goal of economy-wide decarbonization by 2050. If, as experts predict, eliminating carbon-dioxide emissions

[4] Illinois Commerce Commission Staff et al., Illinois Renewable Energy Access Plan: Enabling An Equitable, Reliable, and Affordable Transition to 100% Clean Electricity for Illinois, Second Draft for Commission Consideration (Dec. 2022), available at https://icc.illinois.gov/api/web-management/documents/downloads/_public/informal-processes/renewable-energy-access-plan/2022-12-15-final-second-draft-illinois-renewable-energy-access-plan.pdf.

from transportation and industrial processes will require widespread substitution of clean electricity for fossil fuels that currently power to these sectors, Illinois' need for new supplies of renewable and clean electricity will be even more acute. The ICC estimates that climate-driven electrification could result in annual clean electricity demand as high as 450 million MWh by 2050 – more than three times the State's total electricity consumption in 2021 (142 million MWh). Draft REAP at 14.[5]

The potential for Great Lakes offshore wind to supply significant quantities of renewable electricity is well documented. In 2012, the Illinois Department of Natural Resources (DNR), acting on instructions from the Illinois legislature, issued a report on opportunities and challenges relating to offshore wind development in Illinois' Lake Michigan waters. The DNR Offshore Wind Energy Report observed that "[f]ew places in the United States have so large a renewable energy resource positioned so accessibly close to metropolitan population centers"; that the generation of power from this resource would not add to "emissions of carbon dioxide, sulfur dioxide and nitrogen oxide" or environmental harms related to "fossil fuel byproduct waste disposal"; and that Illinois is well-positioned, because of its industrial base and transportation network, to leverage the supply chain of the wind energy industry for significant economic development."[6]

In March 2023, the National Renewable Energy Laboratory (NREL) published a report, funded by the U.S. Department of Energy (DOE), surveying Great Lakes wind energy challenges and opportunities.[7] The report described the enormous potential for Great

[5] The Draft REAP recognizes the need for better understanding of both demand and supply aspects of Illinois' decarbonization pathway. It proposes a study that would improve estimates of renewable and clean energy needs by examining "economy-wide [decarbonization] strategies and pace of electrification required to achieve 100% economy-wide decarbonization" and determine the "most cost-effective and reliable electricity resource mix for Illinois throughout the transition to 100% clean electricity under a range of uncertainty scenarios and accounting for neighboring states' various policies that must be simultaneously achieved." Draft REAP at 25.

[6] Illinois Department of Natural Resources, Lake Michigan Wind Energy Report at 5 (June 2012) (DNR Offshore Wind Report), available at https://dnr.illinois.gov/content/dam/soi/en/web/dnr/documents/lmowefinalreport62012.pdf. This DNR report formed the basis for the Illinois legislature's 2013 enactment of the Lake Michigan Wind Energy Act (LMWEA), 20 ILCS 896/1 to /99, which is discussed in Section B.1 below.

[7] National Renewable Energy Laboratory, Great Lakes Wind Energy Challenges and Opportunities Assessment at 22 (March 2023) (NREL Great Lakes Wind Report), available at https://www.nrel.gov/docs/fy23osti/84605.pdf.

For a similar DOE discussion of offshore wind potential in the Great Lakes, see U.S. Department of Energy, Offshore Wind Energy Strategies: Regional and National Strategies to Accelerate and Maximize the Effectiveness, Reliability, and Sustainability of US Offshore Wind Energy Deployment and Operation at 43 (Jan. 2022), available at https://www.energy.gov/sites/default/files/2022-01/offshore-wind-energy-strategies-report-january-2022.pdf.

Lakes wind energy to contribute to climate mitigation efforts, estimating the technical resource potential of U.S. Great Lakes waters at 160 GW of bottom-fixed capacity and 415 GW of floating capacity.[8] The report reiterated earlier NREL findings "that the resource quantities in the Great Lakes are substantial and can potentially provide some states with a major clean energy option," but also emphasized that "unique deployment issues" in the Great Lakes will require region-specific research, infrastructure investment, and stakeholder engagement if the Great Lakes region is to match the progress of other offshore wind regions.[9]

One important development in the decade between publication of the DNR and NREL Great Lakes wind reports was the emergence of floating foundation technology. Although floating wind technology is less than 15 years old – the first floating turbine was deployed in 2009 – it is advancing rapidly. NREL's offshore wind database is tracking developer plans to deploy almost 40 GW of floating offshore wind capacity worldwide by 2030, almost 70 times the 600 MW in operation today.[10] Advances in floating-foundation technology are particularly relevant to offshore wind development in Lake Michigan, where winds blowing across deep water constitute the vast majority of the developable resource.[11]

In short, authoritative assessments of Illinois' electricity demand outlook and the potential of offshore wind energy generation strongly support the HB 2132 pilot program initiative. The Draft REAP establishes the importance of identifying and developing new sources of renewable energy. NREL and DOE assessments of Great Lakes offshore wind resources highlight the promise of this new resource and the need for investment to set the stage for commercial development. The IPA's final study should recognize and discuss this important dimension of the HB 2132 pilot program.

B. The Final Study Should Identify Provisions of HB 2132 That Undermine the Bill's Effectiveness and Recommend Suitable Revisions

In addition to assessing the value of an offshore wind pilot program to Illinois' energy transition, the final study should identify provisions of HB 2132 that will prevent it from operating as intended and suggest appropriate revisions. We have identified four areas where improvements are needed.

---

[8] NREL Great Lakes Wind Report at 8.

[9] NREL Great Lakes Wind Report at vi, 8.

[10] U.S. Department of Energy, Offshore Wind Market Report: 2023 Edition at 58 (Sept. 2023) (2023 DOE Offshore Wind Report), available at https://www.energy.gov/sites/default/files/2023-09/doe-offshore-wind-market-report-2023-edition.pdf.

[11] NREL has estimated that in areas of Lake Michigan that are at least 15 miles from shore, more than 90 GW of floating wind potential in comparison to roughly 2 GW of bottom-fixed potential. NREL Great Lakes Wind Report at 104.

1. HB 2132's pilot project selection criteria should include a threshold requirement that the project use foundation technology that could be relevant to commercial-scale development

For an offshore wind pilot program to advance Illinois' policy goals, it must provide experience and preliminary infrastructure and supply chain investment that are potentially relevant to future commercial-scale projects. An important threshold question is whether commercial-scale projects will be deployed in shallow water on bottom-fixed foundations or in deep water on floating foundations. Bottom-fixed and floating foundations draw on different supply chains and require different port facilities, deployment vessels, and workforce skills. As discussed below, a bottom-fixed pilot project would be ineffective in promoting investment in technology, infrastructure, supply chain growth, and skill acquisition relevant to later commercial-scale floating wind farms.

There are strong reasons, based on geographic, environmental, and policy considerations, to expect that commercial-scale projects in Illinois' Lake Michigan waters (and elsewhere in Lake Michigan) will be deployed in deep water on floating foundations. Siting offshore wind projects in deep water far from shore minimizes intrusions on shoreline views, increases power output by accessing stronger winds, and reduces the frequency and intensity of ice pressure on the wind turbines. It is likely that deepwater regions will also provide better options for minimizing adverse impacts on wildlife and the recirculation of contaminated sediments. (This is true both because there is far more deepwater area to choose from and because wildlife concentrations and lakebed contamination tend to decline with distance from shore.) A summary of key factors that favor floating foundation projects in Illinois waters underscores the importance of targeting pilot program investment on technology with a commercial future.[12]

The maps in Figures 1 and 2 delineate regions within Illinois' Lake Michigan waters that satisfy distance-from-shore criteria and depth requirements for bottom-fixed and floating wind farms. Figure 1 identifies bottom-fixed and floating regions at least 20 miles from shore. Figure 2 applies a less view-protective 15-mile minimum distance. Both maps assume a maximum depth of 50 meters for bottom-fixed projects and a minimum depth of 75 meters for floating projects. Under either of these minimum-distance screening criteria, the region suited to floating foundations contains far more space for the identification of preferred areas for wind farms than the region suited to bottom-fixed foundations. If the minimum distance from shore is set at 20 miles – a

[12] The Draft Study, citing NREL offshore wind market reports from 2021 and 2022, describes a global trend toward larger projects, farther from shore, increasingly in waters too deep for bottom-fixed foundations. Draft Study at 100-101. This global trend is driven in part by economies of scale, a growing scarcity of suitable shallow-water sites, and technological advances. We focus here on characteristics of Illinois' Lake Michigan waters and submerged lands that favor the use of floating turbines.

distance at which 15 MW offshore wind turbines (the size most commonly used in current project planning) are generally difficult to see – the region for potential floating foundation deployment is nearly 24 times larger than the region for potential bottom-fixed deployment – 381 square miles versus 16 square miles, before exclusions for shipping lanes, contaminated sediment, and environmentally sensitive areas. If the minimum distance from shore is set at 15 miles, the region for potential floating foundation deployment is nearly 5 times larger than the region for potential bottom-fixed deployment – 443 square miles versus 94 square miles, before additional exclusions.

Figure 1: Illinois' Lake Michigan Waters, Showing Potential Bottom-Fixed and Floating Areas at Least 20 Miles from Shore

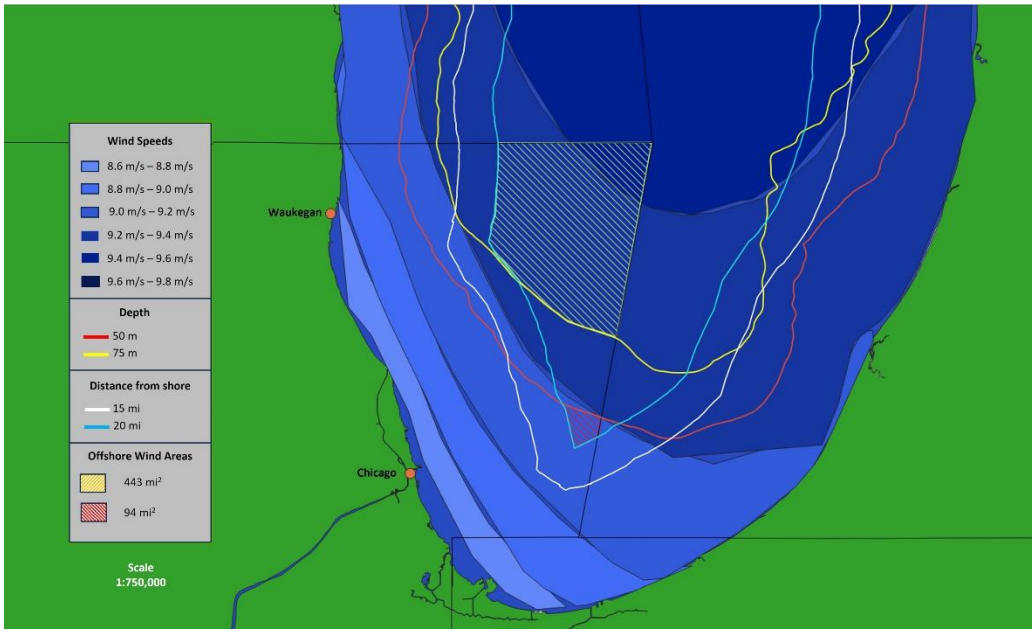
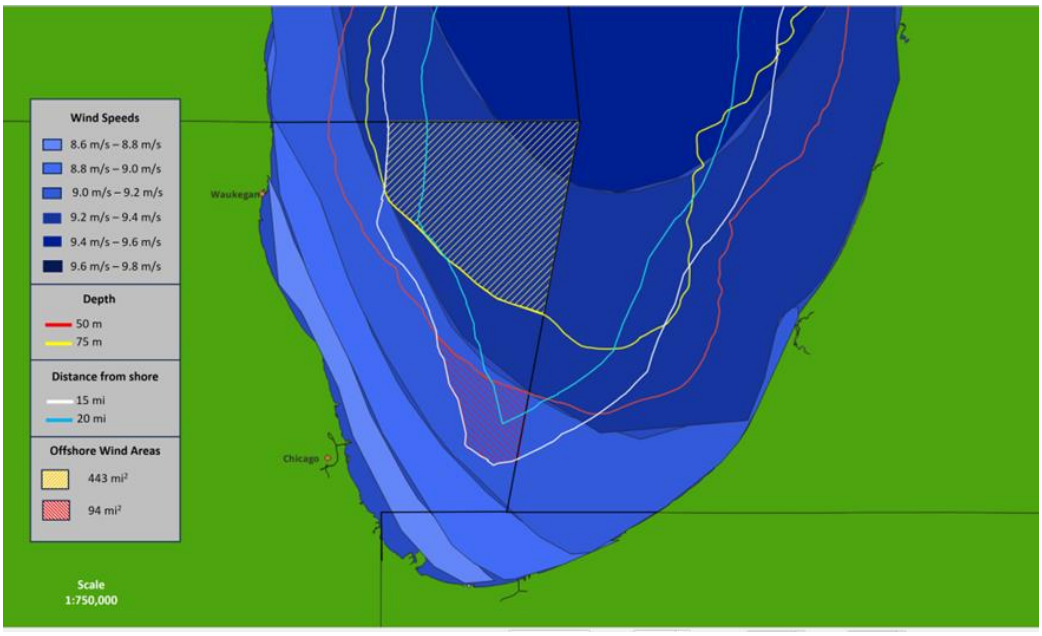


Figure 2: Illinois' Lake Michigan Waters, Showing Potential Bottom-Fixed and Floating Areas at Least 15 Miles from Shore



Figures 1 and 2 use distance from shore as a screening criterion because shoreline views are an important public amenity and view-based opposition has contributed to the defeat of numerous offshore wind projects. In its 2012 study of Lake Michigan offshore wind, DNR listed "visual impacts" as the first environmental factor to be considered in developing a lakebed leasing regime.[13] In its 2023 study of Great Lakes wind power prospects, NREL similarly listed "characterizing and minimizing viewshed impacts" as a key research priority.[14] The report observes that "[t]he strength of view-based opposition has implications for investment in technical solutions for fixed-bottom deployment in parts of the Great Lakes and may provide opportunities for floating wind farms that are further from shore."[15]

The importance that these studies assigned to visual amenities is borne out by experience. Concerns about visual impacts have figured prominently in successful campaigns to stop proposed bottom-fixed offshore wind projects in the Great Lakes:

[13] DNR Offshore Wind Report at 32.

[14] NREL Great Lakes Wind Report at x.

[15] NREL Great Lakes Wind Report at 84.

- In 2010, Scandia Wind Offshore and Havgul Clean Energy announced plans to develop bottom-fixed projects in Eastern Lake Michigan. The plans were quickly abandoned in the face of strong view-based opposition.[16]
- In 2011, the Province of Ontario adopted an offshore wind moratorium in response to view-based opposition to near-shore projects proposed by Trillium Power Wind and Windstream Energy at the east end of Lake Ontario.[17]
- Since 2018, owners of condos on Ohio's Lake Erie shoreline have opposed LEEDCo's proposed Icebreaker offshore wind project off the Cleveland lakefront in an effort to preserve their views of the Lake.[18]
- Since 2021, a group called Citizens Against Wind Turbines in Lake Erie has pushed for a New York State statutory moratorium on wind turbines in New York's Lake Erie waters in reaction to proposals for nearshore offshore wind development.[19]

A 15 MW offshore wind turbine extends 270 meters (about 835 feet) above the waterline – high enough for the top of the turbine to be visible on clear days even at a distance of 20 miles.[20] At 20 miles, however, the small angular size of the structure,

---

[16] Dave Alexander, MLive, Mason County Board Rejects Scandia Proposal for Offshore Wind Farm (June 9, 2010) ("The county board Tuesday voted 9-1 against a resolution from Scandia Wind Offshore asking the community to accept the view of the turbines 4 miles off the coast at the Mason-Oceana county line near Pentwater."), available at https://www.mlive.com/news/muskegon/2010/06/mason_county_board_rejects_sca.html.

[17] David Reevely, National Post, American Company Alleges Ontario Invented Pretexts to Stop Great Lakes Wind Farms (May 12, 2016) (quoting government email concerning the need for alternative justifications for a view-based offshore wind moratorium because "'this can't be about aesthetics, or there will be a similar cry for exclusion zones on land'"), available at https://nationalpost.com/news/canada/david-reevely-u-s-wind-power-company-seeks-475-million-in-nafta-claim.

[18] Nicole Pollack, Inside Climate News, An Offshore Wind Farm on Lake Erie Moves Closer to Reality, but Will It Ever Be Built? (Oct. 26, 2020), available at https://insideclimatenews.or/news/26102020/icebreaker-project-lake-erie-cleveland-wind-energy/.

[19] Nate Benson, WGRZ, Group Calls for a Moratorium on Offshore Lake Erie Turbines (July 13, 2022), available at https://www.wgrz.com/article/tech/science/environment/group-calls-for-moratorium-on-offshore-lake-erie-turbines/71-c965f627-d559-4e04-8db2-59ada3cf38cf. The group has opposed various proposals by Diamond Offshore Generating, which in 2019 submitted interconnection applications for three offshore wind farms offshore from Erie and Chautauqua Counties, New York, with a total proposed capacity of 700 MW.

[20] Turbine dimensions in these comments are taken from the International Energy Agency's 15 MW reference turbine specifications. International Energy Agency, Wind TCP Task 37, Definition of the IEA Wind 15-Megawatt Offshore Reference Wind Turbine (March 2020) (IEA Reference Turbine Report), available at https://www.nrel.gov/docs/fy20osti/75698.pdf.

Smaller turbines might allow for shorter setbacks but would substantially increase the cost of power. See 2023 DOE Offshore Wind Report at 74-79 (discussing cost-driven trend toward larger offshore turbines).

especially on the horizontal axis, makes it extremely difficult to see in most lighting conditions.[21] When federal leasing authorities were setting the boundaries of the Kitty Hawk Wind Energy Area off the North Carolina Coast, view-based objections by the National Park Service led BOEM to increase the setback to 21 miles.[22] As the DNR has noted, intrusions on shoreline views from Indiana Dunes National Park would likely raise strong objections to a wind farm in Illinois waters that significantly affected views from the Park. DNR Offshore Wind Report at 15-16. Magellan believes that a 20-mile setback from the shoreline, particularly at the south end of Lake Michigan, represents a prudent planning guideline.

The depth criteria used in Figures 1 and 2 are based on current bottom-fixed and floating foundation technology. A bottom-fixed turbine was recently affixed to the seabed 58.6 meters below the surface of the Scottish North Sea – a record depth. However, this turbine, like almost all others installed at depths greater than 40 meters, uses a scaffold-like "jacket foundation." Jacket foundations have a large, complex cross-section at the surface, which makes them unsuitable for sites where freshwater ice can form. Future advances may extend the maximum depth for monopile foundations – essentially large poles that are driven into the lakebed and armored against ice pressure at the surface – and for similar bottom-fixed foundation designs that sit on suction caissons or massive "gravity bases." However, for current planning purposes, the limits of existing bottom-fixed foundation technology and the challenges posed by pressure from surface ice support the use of 50 meters as a practical depth limit for bottom-fixed wind turbine foundations in Lake Michigan.

Ice-capable floating foundations need water that is deep enough for substructure elements and mooring systems to sit below the maximum ice depth. While it may be possible to deploy floating foundations in shallower waters, 75 meters is a reasonable minimum depth requirement for an initial assessment of regions potentially suited to floating foundation deployment.[23]

---

[21] The U.S. Bureau of Ocean Energy Management (BOEM) has posted simulations of shoreline views of 15 MW turbines off the California Coast. The simulations show the appearance of proposed wind farms at different times of the day and year from distances of 15 to 20 miles. See https://www.boem.gov/renewable-energy/state-activities/california-visual-simulation.

[22] BOEM, Announcement of Area Identification: Commercial Wind Energy Leasing on the Outer Continental Shelf Offshore North Carolina (April 7, 2014), available at https://www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/NC/NC_AreaID_Announcement_.pdf.

[23] NREL has referred to 60 meters as "the approximate depth at which floating substructures become more cost-effective than fixed-bottom foundations." NREL Great Lakes Wind Report at 22. In view of the special challenges posed by freshwater ice, which may limit fixed foundation heights and require more space below the surface for floating foundation substructures and mooring systems, we have used the more conservative 50-meter and 75-meter limits.

Figures 1 and 2 incorporate average wind speed data but do not incorporate a minimum wind speed standard since winds are strong across all of Illinois' jurisdictional waters in the Lake. There is, however, a significant advantage to locating wind farms farther from shore where wind speeds are higher. In the range of wind speeds shown, 8.6 to 9.6 meters per second, each increase of 0.2 meters per second yields an increase of 6-7% in power produced.[24] In addition, increased distance from shore tends to correlate with decreased levels of wildlife activity and industrial contamination of benthic sediment. Rigorous screening to minimize wildlife impacts and disturbance of contaminated sediment will require careful investigation by DNR as it designs and creates the siting matrix required by section 15 of the LMWEA and identifies preferred areas where any pilot project must be sited.

This preliminary mapping of regions suited to the deployment of bottom-fixed and floating foundation wind turbines has important implications for pilot project selection. If developed at the average capacity density of East Coast offshore wind projects, the region of the Illinois lakebed that is shallow enough for bottom-fixed turbines and at least 20 miles from shore – that is, the red-shaded region in Figure 1 – could support a maximum of 184 MW of bottom-fixed capacity.[25] After additional exclusions for shipping lanes, areas with contaminated sediment, sensitive wildlife habitat, and other screening factors, it is doubtful that this area could support a pilot project capable of hitting the HB 2132 benchmark of 700,000 MWh per year. If the setback from shore is reduced to 15 miles, the region suited to bottom-fixed turbines (that is, the red-shaded region in Figure 2) would have an estimated maximum capacity of 1,081 MW. This region, after additional exclusions based on DNR's siting matrix and preferred area analysis, would support, at most, one HB 2132 pilot project and one commercial-scale wind farm. The use of floating foundations, as noted above, opens up much larger regions where preferred areas can be identified – 24 times larger in the case of a 20-mile setback and nearly 5 times larger in the case of a 15-mile setback.

Strategically timed investment in the commercialization of offshore wind in Lake Michigan can promote equitable economic development goals while growing and diversifying Illinois' in-state renewable energy resources. To fulfill these purposes, investment in a pilot project should promote the development of knowledge and skills relevant to future, commercial-scale installations. Based on the initial screening criteria reflected in Figures 1 and 2 – visual impacts, water depth, and wind speed – this means working toward the emergence of a floating rather than a bottom-fixed industry.

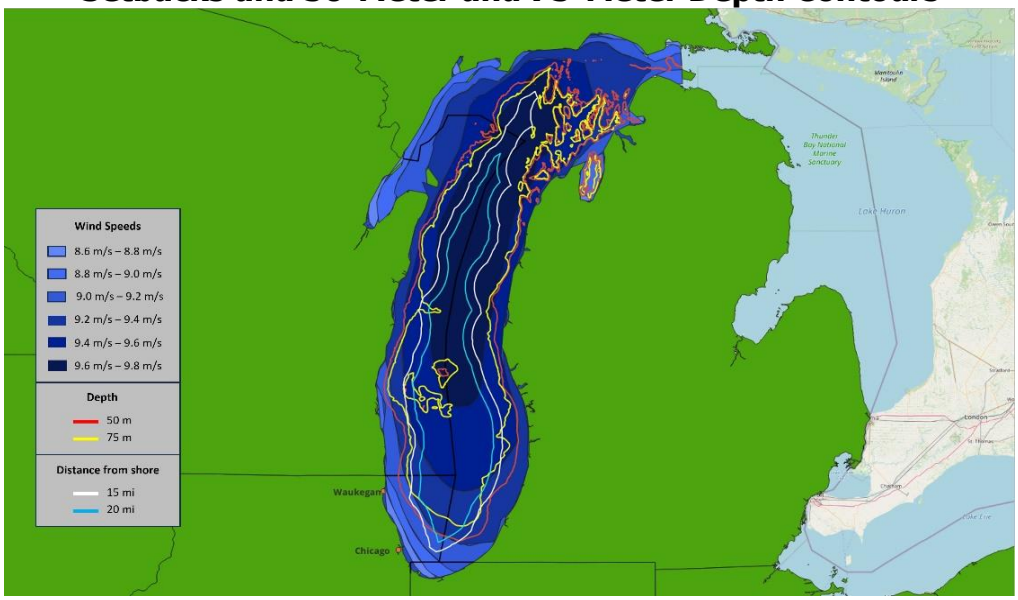
---

[24] Wind speeds shown are from the most recent NREL data on Great Lakes wind speed at 160 meters. Power output increases are estimated from the output curve for the IEA 15 MW reference turbine.

[25] NREL recently analyzed the capacity density of 15 proposed offshore wind projects off the East Coast and calculated a weighted average of about 11.5 MW/mi^2 (4.42 MW/km^2). National Renewable Energy Laboratory, Summary Analysis of Different Offshore Wind Capacity Density Drivers in Proposed U.S. Projects and Impacts on Progress Toward State and Federal Deployment Targets (Oct. 2023), available at https://www.nrel.gov/docs/fy24osti/87947.pdf.

Broadening the analysis to consider benefits that Illinois could realize by leading on offshore wind at the regional level reinforces the case for focusing on floating foundation deployment. In Wisconsin and Michigan waters, as in Illinois waters, strong winds offer a promising source of renewable electricity. Conditions in Wisconsin and Michigan waters are even less favorable to bottom-fixed foundations than conditions in Illinois waters. As Figure 3 shows, there is very little acreage in Lake Michigan, apart from the southern end of Illinois' waters, where a bottom-fixed turbine could be installed in waters no deeper than 50 meters and no closer than 15 or 20 miles to shore. Leadership on floating wind in Lake Michigan could position Illinois to provide foundation components and high-value-added services, including turbine assembly at a suitably equipped port, for commercial-scale projects elsewhere in Lake Michigan. A bottom-fixed pilot project would not help to create these opportunities.

Figure 3: Lake Michigan with 15-Mile and 20-Mile Setbacks and 50-Meter and 75-Meter Depth Contours



2. HB 2132 procurement provisions should be revised to clarify that a pilot project cannot be selected until DNR has identified eligible project sites and to extend the 360-day deadline for the IPA to complete the selection

HB 2132, as passed by the Illinois House, would require the IPA to "conduct at least one utility-scale offshore wind procurement within 360 days of the effective date" of the pilot program statute. This 360-day deadline is unworkable and counterproductive. Under the bill, a pilot project must be built on a site within a DNR-designated "preferred area."[26] Proper designation of these preferred areas, followed by the preparation of applications to build pilot projects in these areas and IPA selection of a winning application, will take far longer than 360 days. Completing a pilot project procurement on the fast track set out in the bill would pose unwarranted risks to public trust resources and to the effectiveness of the pilot program.

DNR designation of "preferred areas" for offshore wind development is governed by the LMWEA. The LMWEA includes legislative findings that leasing public trust lands and waters for sustainable production of renewable energy can "serve a public purpose" and "be consistent with the public trust." 20 ILCS 896/5(7). To ensure stewardship of public trust resources, section 15 of the Act directs DNR to "develop a detailed offshore wind energy siting matrix for the public trust lands of Lake Michigan." 20 ILCS 896/15. This work includes identification of "preferred areas" – that is, areas within Illinois' Lake Michigan waters "that are most appropriate for wind energy development." Id. In creating the siting matrix, DNR is instructed to consider "existing environmental, marine, public infrastructure, transportation, and security uses," as well as other factors that DNR "identifies as appropriate."

Some of the relevant screening criteria were discussed in DNR's 2012 offshore wind report.[27] Foreshadowing section 15 of the LMWEA, the report called for creation of "a detailed offshore wind siting matrix that provides a clear process to identify which

---

[26] The bill's definition of a "new utility-scale offshore wind project" eligible to receive REC support includes a requirement that the pilot project have "a permit pursuant to the Rivers, Lakes, and Streams Act from the Department of Natural Resources for a site that is in a preferred area pursuant to Section 15 of the Lake Michigan Wind Energy Act." HB 2132 section 100 (language proposed for codification in 20 ILCS 3855/1-75(c)(1)(C)(iii)).

[27] DNR Offshore Wind Report at 32. Similar criteria were identified by a multi-jurisdictional working group on Great Lakes offshore wind, which recommended procedures for addressing potential adverse effects on fish habitat and fisheries; birds; bats; the acoustic environment; lake floor and lakeshore habitats; vessel traffic safety; and scenic, historical, and cultural resources. Great Lakes Commission Great Lakes Wind Collaborative, Offshore Siting Principles and Guidelines for Wind Development on the Great Lakes (Oct. 2009), available at https://www.glc.org/wp-content/uploads/2016/10/2009-offshore-siting-principles-guidelines-for-wind-development.pdf.

portions of Lake Michigan are acceptable for offshore wind development." It also provided a list of siting criteria, which include:

- "Environmental Factors," such as effects on fish spawning and avian nesting areas, effects on habitat for protected species, effects on migratory flyways and bats, and effects on benthic and aquatic habitats
- "Marine Factors," encompassing effects on boating and fishing, and effects on offshore historical and cultural resources, and effects on other existing uses of the Lake
- "Public Infrastructure" factors, relating to effects on the grid, water supply infrastructure and the littoral zone; and
- "Transportation Security" factors, relating to commercial shipping lanes and aviation safety.[28]

In its 2023 Great Lakes Wind Report, NREL discusses research needed for proper siting of offshore wind farms in the Great Lakes. The NREL report lists wildlife-related priority research topics including:

- "assessing and minimizing risk of potential bat and bird collisions,"
- "effects on fish ecology and aquatic resources," and
- "ecosystem-level effects of various stressors (including food webs and contaminants)."[29]

The NREL report also lists priority research topics relating to human use, including:

- "characterizing and minimizing viewshed impacts,"
- "mitigating drinking water impacts (including assessing sediment disturbance and mapping of known sediment contamination)," and
- "mitigating recreational and commercial use impacts."[30]

The DNR and NREL reports outline an ambitious agenda for research and consultation before the DNR designates preferred areas for offshore wind development. Critical site-screening tasks include understanding how birds and bats use the airspace over the Lake throughout the year and how potential harm to birds and bats can be mitigated, documenting the locations of contaminated and ecologically sensitive areas of the lakebed, and determining the best strategies for minimizing effects on shipping and fishing. The Draft Study touches on the need for additional research in some of these areas, but does not address the critical issues in relation to HR 2132 – the time required

[28] See DNR Offshore Wind Report at 10.

[29] NREL Great Lakes Wind Report at x, 73-81.

[30] NREL Great Lakes Wind Report at x, 82-88.

for DNR to complete a thorough, science-based siting matrix and the implications of selecting a pilot project before the matrix has been completed.

We have seen no indication that DNR, federal agencies, or academics have made substantial progress on the needed site-screening information. Experience with comparable site-screening efforts indicates that this will be a lengthy process. The federal offshore wind leasing program includes an initial site-screening process that culminates in the designation of a "wind energy area." (The federal leasing agency delineates lease areas within a wind energy area on the basis of further analysis and auctions those lease areas to developers.) Designation of a wind energy area is typically a multi-year effort during which federal and state officials engage with a wide range of experts and stakeholders.

HB 2132 should be revised to ensure that DNR completes a similarly thorough, science-based site screening process before the IPA solicits pilot project applications and selects a winning applicant. Preparation of a rigorous, science-based siting matrix will ensure that public trust values, including effects on shoreline views, wildlife, and sensitive areas of the lakebed, are fully considered in DNR's designation of areas suitable for wind farm deployment.

Defenders of the 360-day deadline for project selection may suggest that the pilot program can advance more quickly if the IPA collects project applications and selects a project developer before preferred areas have been identified, an approach that is not expressly prohibited by the House-passed version of HB 2132. This approach would increase risks of selection mistakes and legal challenges without shortening the timeline to pilot project completion. Until DNR designates preferred sites, pilot project applicants cannot know where their projects can be located. Without this basic information, an applicant cannot submit a credible, concrete "rationale for a site for its new utility-scale wind project," project labor agreement, economic development plan, power price, "plan to mitigate local landward impacts," financing plan, or "plan to obtain a permit pursuant to the Rivers, Lakes, and Streams Act."[31] The IPA would have to select a winning project based on applicants' statements of general intent to develop hypothetical projects in locations to be named later. A selection process of this nature would fuel claims by offshore wind opponents that the State had neglected its obligation to protect public trust resources.

One possible approach to ensuring proper protection of public trust resources and an informed selection among pilot project proposals would be to create two deadlines – one for DNR completion of the siting matrix, timed from enactment of the legislation, and one for IPA solicitation and evaluation of pilot project applications, timed from DNR publication of the final siting matrix. The deadline for DNR completion of the siting

[31] These are all pilot project selection criteria that HB 2132 proposes to codify in 20 ILCS 3855/1-75(c)(1)(G)(iii-5)(1).

matrix should allow adequate time for data collection, stakeholder consultations, and adherence to relevant notice-and-comment procedures. Based on the history of site selection efforts in other jurisdictions, 18 months would be an ambitious timeline for this work even if sufficient resources were made available.[32] Publication of the final siting matrix, including supporting documentation, would trigger a separate deadline for submission and evaluation of pilot project applications. The statute could, for example, provide a total of 9 to 12 months for the IPA to issue a solicitation for pilot project applications (incorporating lessons of DNR's siting work), applicants to prepare responsive applications, and the IPA to select the winning application.[33]

The final study should discuss the deficiencies in HB 2132's procurement provisions and recommend revisions to the bill to ensure that preferred areas are designated before a pilot project is selected and that deadlines for DNR and the IPA action afford sufficient time for the research, analysis, stakeholder interactions, and other steps that will be needed.

3. HB 2132 should be revised to eliminate revenue uncertainty associated with the Indexed REC pricing mechanism

The Draft Study points out that under the current version of HB 2132 the value of RECs sold by the pilot project would be governed by the Indexed REC pricing mechanism.[34] Under the Indexed REC mechanism, a decrease in energy prices triggers a corresponding increase in REC values. However, increases in the value of Indexed RECs can exhaust the REC budget, which is limited by the rate cap formula. Hitting the rate impact cap results in mandatory reductions in REC payments and revenue shortfalls for projects dependent on sales of Indexed RECs. Thus, as the Draft Study recognizes, the

[32] For a description of a site screening efforts that preceded construction of the pilot-scale Block Island Offshore Wind Farm in Rhode Island state waters, see the lead state agency's overview of the Rhode Island Special Area Management Plan, which was adopted after 12 months of study and 14½ months of follow-on review and consultation. Rhode Island Coastal Resources Management Council, Ocean Zoning: The Regulatory Jigsaw Puzzle (undated), available at https://seagrant.gso.uri.edu/oceansamp/pdf/documents/doc_regulatory_factsheet.pdf.

[33] In considering deadlines for DNR designation of preferred areas and IPA selection of a pilot project, it is important to consider interconnection delays, which are outside the control of the Illinois legislature. The Draft REAP observes that "[c]urrent RTO interconnection processes are one of several immediate barriers to achievement of Illinois' CEJA mandates, particularly for resources seeking development in PJM," and that "PJM queue delays are likely to limit the ability to rapidly deploy resources for Illinois and other PJM states' needs." Draft REAP at x-xi. Illinois pilot program legislation should not set aggressive deadlines for agency action that will not be effective in shortening the timeline for completion of the pilot project.

[34] Draft Study at 27.

Indexed REC mechanism, which was established by CEJA, has "created a new type of funding uncertainty."[35]

This uncertainty as to the availability of REC payments will raise capital costs for developers competing to build a pilot project. Some well-qualified potential competitors may decline to apply because their financial partners consider a project backed by the Indexed REC revenue stream to be unfinanceable. Risks inherent in the Indexed REC mechanism, as currently configured, would result in unwarranted increases in pilot project costs and a possible reduction in competition among developers.

The Draft Study suggests that this problem with the Indexed REC mechanism may be "solved through future legislative action."[36] However, pilot project selection should not proceed with the issue unresolved. The final study should recommend that HB 2132 either use a different, more secure funding mechanism or postpone selection of a pilot project until the State has modified the Indexed REC mechanism to reduce revenue uncertainty.

4. HB 2132 should require an appropriate penalty for a pilot project developer that secures the State's funding commitment and then fails to deliver the promised pilot project

HB 2132, as passed by the Illinois House, does not require that the State's award of pilot project RECs be conditioned on a stipulated financial penalty for failure to complete the pilot project and deliver power. Recent defaults by East Coast offshore wind developers highlight the need for appropriate penalties for non-performance. The penalty for a developer that secures Illinois' commitment to provide pilot project RECs and then fails to deliver power should accurately reflect the cost to the State, in both lost time and wasted effort, of a failed project. Appropriate penalties for non-performance will also help to ensure fair competition among interested developers by discouraging pilot project applicants from making unrealistic promises in hopes of negotiating higher prices later.

The final study should address the risk of developer non-performance and recommend that HB 2132 be revised to require meaningful penalties, commensurate with the State's interest in timely completion, proper operation, and satisfactory decommissioning of the pilot project.

[35] Draft Study at 5.

[36] Draft Study at 5.

C. Magellan Comments on Technical Aspects of the Draft Study

Floating foundation technology is far more advanced than the Draft Study suggests.

- *Draft Study content*: The Draft Study states that the DemoSATH demonstration project was expected "to be the first floating offshore wind project in the world," and that "[a]s it currently stands, there is no commercial scale floating offshore wind under development and no freshwater wind farms energized in the world." Draft Study at 102, 103.

  This account of the status of floating wind technology appears to have informed the Draft Study's projection that "[i]mmediate construction of a floating wind project in the Great Lakes is unlikely in the short run" (id. at 102-103), and assessment that "[g]iven the constraints of the St. Lawrence Seaway (explained further in the construction challenges section [relating to bottom-fixed turbine installation]), any turbine to be installed in the near future within Lake Michigan is unlikely to be larger than 6 MW" (id. at 128).

  - *Comment* The Draft Study's account of the status of floating wind technology is incorrect. The first floating turbine, the initial Hywind project deployed by Statoil (now known as Equinor), began operation in 2009. Since then, floating technology has advanced rapidly. As noted in section A above, in 2023, NREL's database listed 600 MW of floating wind capacity in operation and 40 GW under development. 2023 DOE Offshore Wind Report at 58. Projects under development include recently announced plans by developers to build four commercial-scale floating offshore wind projects with a total of over 8 GW of capacity in ice-prone waters of the Baltic Sea off Finland and Sweden.[37] The Biden Administration has set a U.S. floating wind deployment target of 15 GW by 2035 and California and Maine have likewise set ambitious goals at the state level.[38]

---

[37] The proposed Wellamo and Navakka floating wind farms, both planned for deployment in Finnish waters by Sweden-based Eolus Vind, are described in ReNewsBiz, Eolus Kicks Off EIA Process for 2GW Finnish Floating Wind (Oct. 17, 2023), available at https://renews.biz/88880/eolus-kicks-off-eia-process-for-2gw-finnish-floating-wind/, and Power Technology, Power Plant Profile: Navaaka Offshore Wind Project Finland (updated July 29, 2023), available at https://www.power-technology.com/data-insights/power-plant-profile-navakka-offshore-wind-project-finland/?cf-view.

The proposed Dyning and Kultie floating wind farms, both in Swedish waters, are described on the website of Freja Offshore, a joint venture of Ireland-based Mainstream Renewable Power and Sweden-based Hexicon A/B. https://www.frejaoffshore.com/home/#our-projects.

[38] The statement that there are no freshwater wind farms in operation is also incorrect. A 380 MW wind farm began operating in the Netherlands' Lake Ijssel in 2021. See Michelle Lewis, Electrk, The World's Largest Freshwater Wind Farm is Now Online (Dec. 9, 2021) https://electrek.co/2021/12/09/the-worlds-largest-freshwater-wind-farm-is-now-online/.

The offshore wind industry's extensive and rapidly growing experience with floating wind technology supports a different assessment of the comparative readiness of bottom-fixed and floating technology for deployment in Lake Michigan. The Draft Study's assessment that the size of the St. Lawrence Seaway Locks can limit turbine size applies only to bottom-fixed turbines, which require large, specialized installation vessels. Modular components for full-scale floating wind turbines (15 MW and larger) can easily and economically be delivered to ports in Lake Michigan for assembly and deployment by tugboat. The ability to install floating turbines at full scale gives floating technology a substantial cost advantage. Moreover, engineering work to adapt floating foundation designs to ice-prone waters is already underway. We believe, in view of these considerations, that the Draft Study's suggestion that floating foundations are less ready than fixed foundations for deployment in Lake Michigan is unfounded.

<u>The Draft Study's discussion of potential impacts on bird and bat populations should be augmented with a discussion of the potential for mitigation to complement avoidance.</u>

- *Draft Study content*: The Draft Study recites that Lake Michigan is located within major migration routes and states that "[t]herefore, wind turbines in Lake Michigan will have to be sited in an area that avoids migratory bird flight paths." Draft Study at 133.

    - *Comment:* It is clear that research on the use of air space over Lake Michigan by birds and bats will be needed, and that the site selection process should steer development away from high traffic areas. However, mitigation should also be recognized as an important siting tool. A location where birds or bats are sometimes found may be acceptable if mitigation measures, such as acoustic detection and curtailment systems to limit impacts and habitat protection and restoration programs to offset losses, are put in place.

<u>The Draft Study's suggestion that Illinois consider copying the Bureau of Ocean Energy Management's auction structure should be retracted or analyzed at length</u>.

- *Draft Study content*: The Draft Study recounts the Advisory Council's 2012 recommendation that the Illinois legislature clarify DNR's authority "to develop a phased approach to leasing the bed of Lake Michigan for offshore wind energy development." The Draft Study then suggests that "[t]his could look like an auction similar to BOEM's current auction structure." Draft Study at 130.

    - *Comment:* The federal cash auction model for allocating offshore wind leases has many detractors and few, if any, imitators in the world. Under that approach developers bid for the right to control lease sites and attempt to negotiate agreements for the purchase of power generated at those sites.

The cash bids increase project costs, which are ultimately paid by ratepayers. Other countries, as well as U.S. states that have leased sites in state waters, have generally preferred to allocate leases on the basis of benefits to ratepayers, with winning bidders selected on the basis of factors such as price, reliability, job creation, and local content. A decision by Illinois policy makers to follow the BOEM cash auction model would be unusual and controversial. It should not be advanced without much more extensive consideration of the pros and cons.

<u>The Draft Study's description of the 2018 leak of insulating oil from an electrical transmission cable across the Straits of Mackinac should be revised to clarify that modern transmission cables do not use insulating oil</u>.

- *Draft Study content*: The Draft Study's discussion of ice hazards includes a description of the 2018 leak of insulating oil from the Consumers Energy transmission cable across the Straits of Mackinac. Draft Study at 136-137.

    - *Comment:* This well-known incident, caused by an anchor strike on a decades old transmission cable that had been taken out of service in 1990, has triggered concern that inter-array and power export cables for offshore wind farms could lead to additional oil leaks. Modern transmission cables use solid state insulation, which eliminates the possibility of oil leakage from ice damage or any other cause. If the final study includes the story of the Mackinac cable oil leak, it should clarify that modern cable technology eliminates any threat that damage to the cable will result in a release of insulating oil.