

Forever Clean Lake Erie Bill

(Support Document)

The following document is a comprehensive synopsis of the negative factors that would influence (or be influenced by) the placement of Industrial Wind Turbines in Lake Erie.

Table of Contents

Forward.....3

Introduction.....3

Findings.....4

Part 1—Existing Health Status of Lake Erie.....4

Part 2—Historic Plans for Wind Energy Industrialization of Lake Erie.....4

Part 3—Offshore Wind Turbines and Pollution of Lake Erie Drinking Water.....5

Part 4—Offshore Wind Turbines and Pollution of Lake Erie Aquatic Ecosystems7

Part 5—Offshore Wind Turbines and Threats to Birds, Bats and Butterflies Over Lake Erie.....8

Part 6--Cumulative Environmental Impacts.....9

Part 7--Physical Challenges to Wind Turbines in Lake Erie.....10

Part 8—Costs of Offshore Wind Energy in Lake Erie.....13

Part 9—Electricity Transmission Systems Limitations on Offshore Wind Turbines in Lake Erie to Meet NY
State Emissions Reduction Goals.....14

Conclusion15

Citations.....16

Forward

After the New York State Energy Research and Development Authority (NYSERDA) released its second version of a Great Lakes Wind Energy Feasibility Study in December, 2022 (1), concern for the health of Lake Erie remains the top priority of stakeholders including Citizens Against Wind Turbines in Lake Erie (1i) and conservationists statewide. The health of the Lake has improved since NYSEDA's first feasibility study ten years ago (2) despite continued man-made threats which are both historic and evolving. Industrialization and development of the Lake has left a legacy of toxic pollutants, invasive species and nutrient runoff from agricultural and municipal sources.

NYSERDA, in its 2022 Feasibility Study has concluded that: "Based on the totality of this analysis, this concludes that Great Lakes Wind currently does not offer a unique, critical, or cost-effective contribution toward the achievement of New York State's Climate Act goals beyond what existing, more cost-competitive programs are currently expected to deliver."

Therefore, placing offshore wind turbines in Lake Erie at this time would not offer significant advantages in contributing towards the goals of NY State's Climate Leadership and Community Protection Act (CLCPA). As also found in the 2011 feasibility study NYSEDA acknowledged many uncertainties in the effects of offshore wind turbines on the Lake's environment.

Introduction

This text is presented in several parts describing the challenges to Lake Erie as a site for offshore wind turbines. These parts are corresponding and supplemental to the 2022 NYSEDA report where noted. The NYSEDA report consists of a Main Report and its twelve Supporting Technical Reports, followed by a White Paper in summation. The parts of this text address many of the concerns which would be included in an Environmental Impact Statement required of a Lake Erie offshore wind turbine facility developer in order to be granted a Certificate of Environmental Compatibility and Public Need from the NY State Public Service Commission (NYS PSC). Neither of the NYSEDA studies takes the "hard look" at many concerns as required by NY State Environmental Quality Review Act (SEQRA). It is the intent of this text to provide support for NY State legislation to prevent further degradation of Lake Erie's life supporting ecology by adoption of a **Permanent Moratorium** on the installation of wind turbines in its waters as well as proposed Federal legislation excluding the application of the financial incentives including Investment Tax Credits, Production Tax Credits to be applied towards any offshore wind energy projects in the Great Lakes.

Findings

Part 1) Current Status of the Health of Lake Erie

The State of the Great Lakes (SOGL) Report 2022 (3) is published jointly by the US and Canadian governments in accordance with the 2012 International Water Quality Agreement. The SOGL report lists Lake Erie as the only one of the five Great Lakes to be rated as Poor in overall health. Many factors contribute to the Poor rating which is also characterized as Unchanging. Page 36 of the SOGL Report summarizes the categories used in determining Lake Erie's overall Poor rating. Of particular relevance to the consideration of offshore wind turbines is the Good rating for drinking water, the Fair ratings for industrial toxins and safe consumption of sportfish, and the Poor ratings for health of the lower food chain, presence of invasive species such as zebra and quagga mussels, and presence of other unstable influences such as microplastics. Also of note is the bright spot represented by the world's largest self-sustaining population of walleye, a migratory sportfish worth hundreds of millions of dollars in recreational and tourism value. A companion document to the SOGL Report also published jointly by the US and Canada in 2022 is the Progress Report of the Parties (4). This report details many of the restorative efforts taken in Lake Erie to remove bottom sediments of tributary streams containing legacy industrial pollutants such as mercury, PCBs and Dioxin. The results are encouraging as measurements of toxins in the Lake's water have steadily improved over the last couple of decades. The Progress Report contains no references to precise locations of toxic sediments or their removal from the lakebed of the Lake's open waters. In the early 1970's, the EPA and NOAA attempted to map where the toxins were on Lake Erie's bottom, but found the task impossible, as the currents had distributed the toxins lake wide. In 2010 the feasibility study mentioned it would be near-impossible to map where the toxins were to avoid those areas during construction. The 2022 study also states the same thing concerning surveying where the toxins are. This is not going to change, and we have understood that mapping where the toxins are and continues to be an impossible task, which will not change, as it hasn't changed since the early 1970s. This will not change in another 50 years. The Progress Report refers to the threat of emerging toxins such as bisphenol A (BPA) and polyfluoroalkyl substances (PFAS) which are commonly found in the chemical composition of wind turbine blades.

Part 2) Existing Plans for Wind Industrialization in Lake Erie

The Icebreaker Wind Project in Lake Erie off Cleveland's shore was proposed in 2009 and still awaits financial backing from the Ohio State Legislature. The six-turbine demonstration project is also being challenged in Federal court by conservationist groups for a refusal by the Norwegian wind developer to consider impacts to migratory birds. (5) In August, 2022, the Ohio Supreme Court ruled that the project's application was correctly approved by the Ohio State Siting Board, after the Siting Board reversed its previous condition that turbines be curtailed during seasonal bird migrations. The granting of US Department of Energy funds in support of the project is contingent upon the Ohio Legislature's approval of state funding.

The Great Lakes Offshore Wind (GLOW) Project was a proposal sponsored by New York Power Authority in 2010 to develop offshore wind energy in the Great Lakes. NYSERDA performed a background study on its feasibility. Although several developers responded to the GLOW RFP, the NYPA Board terminated the proposal in 2011 without awarding a contract. NYPA cited

excessive costs of offshore wind turbines as the reason for abandoning the project. The cost of offshore wind development in 2011 was determined to be 2X-4X the cost of land based wind facilities. (6)

In 2019, Mitsubishi Corporation's subsidiary Diamond Wind announced their intention to place offshore wind turbines in Lake Erie. A map of the proposed installation shows a line of 50 wind turbines running parallel to the international boundary at a distance of 2 to 5 miles off the shores of Erie and Chautauqua Counties. Diamond Wind has not filed an application to obtain a Certificate from the PSC permitting construction. For about two years a request appeared on behalf of Diamond Wind LLC for grid interconnection on grid manager New York Independent Systems Operator's (NYISO) Interconnection Queue. But the request has not appeared on the queue for over a year. It was Diamond Wind's announcement that stimulated considerable citizen concern about offshore wind turbines in Lake Erie, including many who had voiced their concern about the preceding GLOW project, and the Icebreaker Project in Ohio.

In October 2020 the NYS PSC directed NYSERDA to conduct a second feasibility study of offshore wind energy in the Great Lakes. Beginning in February, 2021 NYSERDA conducted a series of four public webinars presenting the study and affording opportunities for public participation including questions and concerns. The last of these webinars was in November, 2021. NYSERDA released its second Great lakes Wind Energy Feasibility Study in December, 2022.

Part 3) Offshore Wind Turbines and Pollution of Lake Erie Drinking Water

Lake Erie serves as the drinking water source for the 11 million people who depend on its watershed. (7) On the American shore of Lake Erie, described by the proposed Diamond Wind Project, are three municipal water treatment facilities. (8). In November 2022, the Northern Chautauqua County Water District submitted to NYS Governor Kathy Hochul a letter detailing their opposition to installing offshore wind turbines which might impact the health of their 22,000 clients who depend on water drawn from Lake Erie.

All of the threats to drinking water quality resulting from wind turbines in the water impact the use of Lake Erie water for food and beverage processing as well. NYSERDA does not mention wind turbines in the waters of Lake Erie as a threat to drinking water quality. At this time, there appears to be no obvious reason for this important omission.

3a) Toxic Sediments

The Lakebed's sedimentary layers contain a century's worth of industrial waste including mercury, PCBs and Dioxin as noted by the 2022 Progress Report of the parties. Activities in the benthic (bottom) layers will result in resuspension of the sedimentary particles containing their toxins into the water column. Studies have revealed how offshore wind infrastructure such as wind turbine bases, interconnecting cables and onshore transmission cables will disturb the sediments. (9) Disturbance during construction of any type of wind turbine bases as well as the jet-plowing through sediments for placement of electrical cables would result in the suspension of accumulated toxins in the sediments. These suspended toxins would be carried by prevailing west to east currents into the municipal water intakes of larger population centers such as Buffalo and Niagara Falls.

Sediment resuspension is not limited to the effects of underwater wind turbine infrastructure as revealed by the November, 2022 report in the journal Nature. Above the water aerodynamic wind turbine wake effects disturb the natural stratification of temperature layers in the water which results in sediment displacement and lower dissolved oxygen concentration of the benthic (bottom) environment. (10)

The invasive mussels species are of great concern, as noted in the SOGL Report. Quagga mussels are the dominant benthic species as noted by NYSERDA. These mussels filter vast amounts of water and in the process excrete toxins in the form of pseudo feces into the sediment layer at the bottom of Lake Erie.

NYSERDA recognizes the possibility of sediment disturbance in generic terms but neglects to consider drinking water contamination as a specific concern, because the exact location of toxic sediments in relation to possible wind turbine infrastructure is undetermined. Yet NYSERDA contends that an onshore transmission cable at Dunkirk is a favorable location despite the presence of the intake of Dunkirk's municipal water supply directly in the shortest path of any infrastructure entering Dunkirk harbor.

3b) Microplastics/BPA (bisphenolA)

Water pollution from offshore wind turbines is not limited to disturbance of poisonous bottom sediments. Wind turbines introduce additional pollutants from their structural and mechanical functions. Wind turbines blades are composite structures of fiberglass and epoxy plastic which shed material into the environment in the form of microplastic particles by the process of Leading-Edge Erosion. A study by the University of Strathclyde in 2014 was used by Norwegian researchers to determine that giant blades weighing 20 tons shed up to 43 pounds of epoxy microplastics per blade per year. (11) Epoxy plastic contains the endocrine disrupting chemical BPA 40% by weight, which adds to the fact that any type of microplastic is harmful to life. BPA is a chemical of concern in the Progress Report of the Parties. The European Food Safety Authority in 2021 drafted an advisement that the safe daily intake of BPA be reduced by a factor of ten thousand compared to its 2015 advisement. (12)

Although the SOGL rates Lake Erie as "Poor" in presence of unstable influences, and the Progress Report of the Parties notes concern for BPA, NYSERDA does not refer to microplastic or chemical contamination from wind turbine blades.

3c) PFAS (per-and polyfluoroalkyl substances)

Leading Edge Erosion is of great concern to the wind industry because it reduces the productive output of turbine blades. Blade manufacturers apply protective coatings to leading edges to reduce material loss. These coatings may contain the chemical PFAS, also of concern in the Progress Report of the Parties. The European Chemical Agency (ECHA) proposed a ban of PFAS in February of 2023. The protective coatings are themselves worn away within two to four years. (13) (14)

3d) Lubricant Leaking and Spills

Offshore wind turbines contain hundreds of gallons of various lubricating and hydraulic fluids which are frequently seen leaking down towers and blades. (15) Containment dams are routinely placed around the bases of terrestrial wind turbines near wetlands, but no such protection exists

offshore. Many of these fluids are highly specialized by the addition of PFAS for its physical properties of durability, water resistance and low coefficient of friction. As in oil pipelines, leakage from wind turbines is a “when, not if” consideration. NYSERDA notes that construction and post-construction shipping services for installation, maintenance and repair represents additional spillage risk for liquid transfers and materials handling, while at the same time ignoring leakage from the turbines themselves.

Part 4) Offshore Wind Turbines and Pollution of Lake Erie Aquatic Ecosystems

4a) Noise and Vibrations

Like other adverse environmental effects of offshore wind turbines, the effects of wind turbine noise on freshwater environments are little known due to lack of previous studies. The Journal of Fish Biology states that, “Exposure to intense sounds may have a wide range of effects on fishes...causing them to move away from migratory routes, leave favored habitats, interfere with communication, affect reproductive behavior, and prevent detection of other sounds.” (16). Noise from construction of offshore wind turbines includes intense pile driving and submerged cable installation. Operational noises and vibrations travel more easily through water after the turbines are installed. Vibrations from pile driving offshore wind turbine bases and operations of offshore wind turbines have been considered as detriments to organisms that reside in bottom sediments. (16i) (16v) Construction noise from offshore installations has shown to be disruptive to at least one species of cuttlefish. (17) Fish that contain swim bladder organs can be more sensitive to noise than those species lacking swim bladders. (16 *ibid*) Fish bladder species include walleye and perch, two of the most important gamefish found in Lake Erie.

Vibrations caused by seismic activity of operational wind facilities have been detected at distances many miles away from the wind turbines. (16iii) These vibrations may be strong enough to dislodge particles from the upper layer of sediments in Lake Erie and therefore affect the behavior of fish and invertebrates which are sensitive to particle motion, in addition to reintroducing toxic sediment particles into the water above the lake bed. (16iv)

The effects of wind turbine noise on human receptors is of great concern to NY State authorities in the permitting of onshore wind turbines. The NY State Department of Health is statutory to NYS PSC Article 10 wind turbine permitting regulations. The Department of Health has determined that allowing 2 MW, 500 feet tall wind turbines at a distance of a quarter mile from homes, will result in an acceptable average noise level of 45 decibels outside the home. (18) This level of wind turbine noise, because of its pulsating variability and low frequency content, results in complaints by wind turbine neighbors. NY State Article 10 wind facility conditions include noise complaint protocols, including monthly complaint log publication by the wind facility owner. Measurement of offshore wind turbines of similar 2MW size in Denmark resulted in noise levels over 60 decibels at the same quarter mile distance. (16ii) This level of wind turbine noise will carry farther over open water and be audible above ambient wind and wave sounds to sailors, kayakers and fishers using quiet trolling motors. The trend of ever larger offshore wind turbines has resulted in common installations of 6-8 MW units which create more noise than a 2 MW wind turbine. NYSERDA says nothing about impact of offshore wind turbine noise on human receptors.

4b) Electromagnetic Fields

The electromagnetic fields (EMF) surrounding underwater electric cables are well known to cause disruption in aquatic life. Lake sturgeon, a species of special concern in Lake Erie, are very sensitive to EMF. (19) Haddock fish larvae have been shown to suffer deformities in oceanic offshore wind electric cable vicinities. (20) Crustaceans and benthic organisms are also negatively impacted by EMFs.

4c) Light Pollution

The Federal Aviation Authority requires red flashing lights at the top of wind turbine towers as a safety measure for aircraft. Awareness of the importance of night sky viewing is revealed by proposed NY State Senate bill 7663 to amend the environmental conservation law by enacting a dark skies protection act. The night sky over Lake Erie is a prime resource for stargazing citizens enjoying the shoreline.

Another form of light pollution from offshore wind turbines in Lake Erie would be the shadow flicker effect created by the spinning blades at sunset. A large offshore wind turbine with a rotor diameter of 400 feet will cast a shadow/strobe effect extending out to 4,000 feet from the base of the tower. (21) This would have an obvious negative effect on anyone on or near the lake during the evening hours. NYSERDA says nothing about light pollution in either the 2011 or 2022 report.

Part 5) Offshore Wind Turbines and Threats to Birds, Bats and Butterflies Over Lake Erie

The threat to flying creatures is the most easily recognized environmental risk of offshore wind turbines in Lake Erie. One of the roadblocks to construction of the Icebreaker Project is a lawsuit filed in federal court by two bird conservation groups. The suit contends that the US Department of Energy and the US Army Corps of Engineers have not developed an Environmental Impact Statement in accordance with the National Environmental Policy Act and the US Clean Water Act. (5)

Migratory species of birds, bats and butterflies travel over the waters of Lake Erie. (22) Many year-round resident bird species also frequent the open waters. The mouth of the Niagara River and a stretch of Lake Erie's shoreline near Buffalo are less than five miles from a potential Offshore Wind Project and have been recognized as internationally important waterfowl habitat by the Ramsar Convention.

Environmental surveys of existing bird populations are standard procedure for wind energy developers in compliance with NYS SEQRA. Post-construction monitoring of bird and bat mortality is likewise ordered for onshore wind turbine facilities in NY State. An accurate pre-construction avian survey is difficult to conduct in the open waters, however existing migratory data from both American and Canadian terrestrial monitoring could be used to extrapolate how many birds of each species would be crossing the zones where wind turbines might be placed. In addition, existing annual bird mortality estimates from wind turbines could be used to further estimate the impact on those bird populations.

Many migratory species of bats depend on annual flyways in the Lake Erie region, but NYSERDA admits little is known about bats traversing the open waters of the Lake. Wind

turbines and white nose syndrome are now the world's leading killers of bats. (23) The US Fish and Wildlife Service listed the Northern Long Eared Bat as endangered in November, 2022. Northern Long Eared Bats inhabit forested areas adjacent to major water bodies. (24)

Radar detection systems have been developed in unsuccessful attempts to minimize bird mortality at wind turbine sites. These failures prompted the Ohio Siting Board On Electricity Generation to order a controversial condition on the proposed Icebreaker Project in 2020 which forced the developer to curtail the offshore turbines at night for eight months of each year to avoid migratory seasonal mortality. (25) This condition was withdrawn by Ohio Siting Board after pressure from the state legislature, and the Ohio Supreme Court upheld the Siting Board's right to decision making in August, 2022. (26) Meanwhile the failure of a radar system in Israel to prevent avian mortality at wind energy facilities has prompted the Energy Minister in July, 2022, to question wind energy's negligible contribution to the country's power generation in relation to its high toll on the environment. (27)

Concern for bat mortality is reflected in NY State's onshore permits for wind turbines. Pre-construction surveys of resident bat populations are conducted, and post-construction monitoring of bat mortality is ordered under conditions. Similar concern for bats over Lake Erie will be difficult or impossible to answer and institute. Wind turbines and White Nose Syndrome are the leading causes of bat mortality in Northeastern America. (28)

The monarch butterfly is now listed as an endangered species by the International Union for the Conservation of Nature. (29) Eastern US monarch populations have declined by 80% over the last three decades. Monarchs migrate over Lake Erie. (30) Loss of this valuable pollinating insect is part of the pattern of biodiversity threatened by wind turbines. (31) There are no turbine curtailment conditions in NY State permitting regulations specific to monarchs, and no means of monitoring their mortality in the open waters of Lake Erie. However, it is obvious that some type of estimates could be derived from existing terrestrial data in both the United States and Canada which would provide grounds for extrapolation of monarch population size in order to determine the impact on this species which is to be re assessed in 2024 in terms of its protected status. NYSERDA says nothing about impacts to insect populations.

Part 6) Cumulative Environmental Impacts

Under New York's SEQRA the cumulative impacts of multiple developments within a given area are to be evaluated. A single offshore wind turbine in the waters of Lake Erie is unlikely to make a measurable impact, even though it might contribute to all of the forestated environmental risks. But a single offshore wind energy facility or "farm", is much more likely to have measurable detrimental effects. NYS PSC regulators have not shown respect for the SEQRA's mandate to consider cumulative impacts regarding multiple onshore wind turbine facilities. This is illustrated in Northern Chautauqua County where three separate wind energy facilities are stretched across five continuous towns. The entire northern half of Chautauqua County is split into eastern and western portions by a hundred wind turbines. Following this example it is clear that NY State would do little to prevent all of its Lake Erie jurisdiction from hosting multiple offshore facilities to the extent of filling the Lake to saturation by hundreds of wind turbines.

Part 7 Physical Challenges to Offshore Wind Turbines in Lake Erie

7a) Ice

Ice up to 4 feet thick forms annually on Lake Erie. Shifting ice fields threaten structural damage to wind turbine bases with subsequent risk of tower collapse and release of lubricants and fluids into the water. Ice fields will complicate routine repair and maintenance missions to the wind turbines and could make emergency response missions impossible in the event of fire or blade damage. Similarly, ice could compromise repair missions to restore full capacity to damaged underwater transmission cables. (32) Frozen spray from waves crashing against wind turbine bases will also threaten the blades of the turbines. Ice accumulation on blades causes imbalances which force the machines to shut down. (33)

7b) Storms

The owner of the Steel Winds wind energy facility applied for a permit in 2022 to reinforce the shoreline adjacent to the onshore facility to protect the wind turbines and their access roads from seiche-driven waves and flooding. (34) This facility is located on the shores of Lake Erie, but wind turbines in the waters of Lake Erie would not benefit this same option for protection.

On Friday, December 23, 2022, a bomb cyclone struck Lake Erie with sustained winds gusting to 70 miles per hour and wave heights in the open waters predicted to be up to 20 feet high. (35) Any offshore wind turbines in Lake Erie would have been forced to shut down during this weather event, since damage to the machines occurs when wind speeds exceed high 40's to 50 miles per hour. (36)

7c) Navigational Restrictions

The placement of offshore wind turbines is influenced by the international boundary that runs down the middle of Lake Erie. "No Go" zones around the turbines would limit the navigational area of the lake and force all commercial and recreational traffic into a smaller space. This reduction would limit the range of water available for fishing and recreational boating.

7d) Sailing restrictions

Sailboats would be greatly impacted by regulations such as the one in England which prohibits sailing within 2 miles upwind of offshore wind facilities. (37) As the wind direction changes the area defined as upwind of the turbines also changes which greatly reduces the area of water available. Sailing downwind of offshore wind turbines is compromised by wake turbulence which trails offshore facilities for miles. This turbulence creates erratic airflow which negatively impacts sailboat performance. The combined effects of reduced navigational area with increased sharing of space with other water traffic, and restrictions imposed by changing wind directions and turbulent airflow would greatly harm the multi-million dollar sailing economy along the shores of Lake Erie. NYSERDA says nothing about downwind wake disturbance on sailboat performance.

7e) Radar Interference

Doppler weather radar systems are made less accurate due to interference from wind turbines. (38) The major types of interference are clutter, blockage and erroneous velocity measurements. Navigational radar aboard ships, moderate sized commercial vessels and charter boats is also

compromised by offshore wind facilities. (39) This includes radar used by waterborne and airborne search and rescue operations. Offshore wind turbines in Lake Erie would also interfere with customs and border patrol surveillance radar systems of the type used to monitor air and vessel traffic across the international boundary. (40) National security would be at risk from smugglers, traffickers and potential adversaries approaching the US from the north.

7f) The Canadian Border

The Province of Ontario has maintained a moratorium on wind turbines in the Great Lakes since 2011. The Canadian government has stated its opposition to little understood environmental adversities involving noise impacts, icing loads, lakebed disturbances and threats to drinking water. (41) The International Joint Commission is the bi-national organization which oversees the health of Lake Erie as per agreement between the US and Canada. There is no record of IJC receiving a referral for consideration of impacts to Lake Erie from the proposed Icebreaker Project. The international boundary forms a barrier to development of offshore wind turbines in Lake Erie which NYSERDA recognizes in its consideration of wind turbines at a maximum distance of five miles from shore. The visibility of wind turbines at this distance is greater than the ten mile distance considered by NYSERDA for Lake Ontario.

7g) The Fishery and Tourism

Taken together the fishing and tourism value for all of Lake Erie's bordering states is placed at 12.9 billion dollars by the US Environmental Protection Agency.(42) Because two of Lake Erie's most prized sportfish, yellow perch and walleye, migrate the length of Lake Erie, the impact of offshore wind turbines anywhere in the Lake must be considered in the context of lake-wide health. The economic value of sportfish in these three states and the Province of Ontario are as follows: NY State \$ 26 million (43), Pennsylvania \$40.6 million (44) Ohio \$800 million (45), Ontario \$244 million. (46) The various forms of pollution and disturbance created by offshore wind turbines threatens not only the population of sportfish, but also the edibility of species such as walleye and perch. The SOGL report cited previously (2) rates edibility of Lake Erie fish as "Fair". Further contamination of migratory pathways, breeding and spawning grounds threatens to revert edibility ratings to "Poor" with attendant consumption warnings reminiscent of the 1960's when Lake Erie was declared "Dead". NYSERDA recognizes that fish behavior including migration is not well understood in relation to placement of offshore wind turbines.

Cruise ships on the Great Lakes belong to at least eight different companies offering Great Lakes cruises. (46i) Cruise passengers are likely to be as divided as beachgoers over the aesthetics of nearby wind turbines.

Tourism includes Lakeside activities other than boating and fishing. Many popular beaches line NY State's share of the Lake Erie shoreline and attract day visitors and cottage renters. Concern for negative impacts to beach tourism from offshore wind turbines is typical in many beach communities along the Atlantic coast where facilities are proposed. A North Carolina State University study of shoreside vacation cottage renters revealed that some renters would change their vacation plans if offshore wind turbines were visible.(47) In the same study even those renters who were amenable to seeing offshore wind turbines would not return to the same area if wind turbines were within 8 miles offshore. The North Carolina State University study also concluded that the presence of visible offshore wind turbines would not serve as a draw to day

visitors. In Ocean City, Maryland, the mayor and some councilmembers are requesting regulations prohibiting offshore wind turbines being seen from the beach, as opposed to the still-visible 15 miles offshore distance proposed. (48)

7h) Property Values and Aesthetics

The potential reduction in alongshore property values due to offshore wind turbines follows longstanding disputes about similar property value loss for onshore wind facilities. The London School of Economics found a 12% to 14% reduction of property values within 1 mile of onshore wind turbines. (49) Wealthy communities have a history of opposing offshore wind turbine projects in the US, beginning with the Kennedy family and neighbors who objected to losing their wide Cape Cod, Massachusetts ocean view. The proposed Cape Cod Offshore Wind would have been the first in the US. It was dropped by the developer in 2017. NY State's Hamptons community is divided over the hosting of an offshore transmission cable which is proposed to come ashore at one of their scenic beach areas. This concern reflects events in Rhode Island where an onshore cable from the Block Island Offshore Wind Farm became uncovered and resulted in beach closure with lengthy, intrusive and expensive repairs. (50) The opposition in the Hamptons has produced a lawsuit against the project even though the wind turbines themselves would not be visible from alongshore. (51) The community of Martha's Vineyard, Massachusetts, has expressed concerns with the loss of their non-industrial ocean viewshed from the proposed offshore Vineyard Wind Project. (52)

Properties on the shoreline are subject to loss of value due to shoreline erosion. The effects of offshore wind turbines on wave patterns and water currents in Lake Erie are unknown, but an attempt to model the impact of an ocean wind facility has been made. (53) The authors of this Danish North Sea study conclude that shoreline impacts must be considered in an Environmental Impact Statement. NYSERDA says nothing about shoreline impacts from wind turbines, but notes the difficulty in bringing offshore transmission cables to shore in areas of high coastal erosion which define much of the Lake Erie shoreline. The report also notes that the potential sites for bringing cables onshore is very limited.

Aesthetic issues related to offshore wind turbines in Lake Erie pertain to both property owners who reside alongshore and those who are visiting from distances away from sight of the lake. To dismiss aesthetic concerns as merely NIMBYism is therefore incorrect. The serenity provided by viewing the waters of Lake Erie and its unobstructed horizon is sought by many, with perhaps the Lake's renowned sunsets being the most recognized enjoyment. A legal definition of serenity is provided as follows by authors of *The Legal Landscape: Guidelines for Regulating Environmental and Aesthetic Quality*: that being the quality of the environment which provides for the greatest sense of wellbeing. (53i) The authors describe industrialization of the natural environment, such as would occur with placement of offshore wind turbines with their kinetics, noise and lights, as anathema to serenity. The serene quality of Lake Erie belongs to all people of NY State who wish to visit, and therefore is subject to the Public Trust Doctrine, and so should not to be destroyed by the motivations or benefits for some at the expense of all.

7i) Historic Impacts—Shipwrecks and the Seneca Nation

The lakebed of Lake Erie is home to one of the highest concentrations of shipwrecks in the world, with only 375 of the estimated 2000 wrecks documented. (54) The 1987 federal Abandoned Shipwrecks Act gives ownership of these sites to the states, with a NY State judge

ruling that shipwrecks are the property of the people of NY State and must be protected and preserved. (55) NYSERDA states there are no known shipwrecks in the Lake Erie area considered for offshore wind turbines. NYSERDA's evaluation of visual impacts on historic locations is limited to those that are listed on NY State or Federal registries. In doing so there is no accounting for many sites along the Lake Erie shore which are nonetheless historic, or have historic meaning only to the nearby population. One such site of historic significance however it is defined, is the Dunkirk Lighthouse, first constructed in 1827. Dunkirk Lighthouse hosts numerous annual events with hundreds of visitors.

The Seneca Nation of Indians occupy the Cattaraugus Indian Reservation lands on the shores of Lake Erie which would be impacted by offshore wind turbines in the NYSERDA study area. In 2021 the US EPA granted the Seneca Nation authority to administer water quality standards in a similar manner as NY State. (56) Should they decide to use their authority, the Seneca Nation could play a large role in determining the location of offshore wind turbines.

Part 8 Economic Factors of Offshore Wind Turbines in Lake Erie

Based on data provided in the March 2022 US Department of Energy Cost of New Generating Technologies Report, offshore wind generation is the highest cost renewable generation option with a total capital cost of \$6,041/KW (57). This would result in a total cost of \$54 Billion to install all of the 9,000 MW of offshore wind.

Also, based on data provided in the March 2021 US Department of Energy Levelized Costs of New Generation Report, the actual resultant production cost of offshore wind generation is forecasted at \$136.51/MWH (57a). This represents a 380% increase over the current New York State Independent System Operator (NYISO) wholesale pricing of \$35.60/MWH for electricity in the Western New York region. These above market costs will have to be borne by the Western New York taxpayers and electric ratepayers.

Additionally recognizing that the wind conditions vary significantly from day to the due to the ever-changing climate conditions, the impact of this wind variability coupled with normal equipment down time results in a overall capacity factor of 26%(57b) to 44% (57) for a typical offshore wind turbine. The result of this extremely low-capacity factor is that a typical 10 MW offshore wind turbine would have an annual output of only 2.6 to 4.4 MW. To obtain the desired capacity of a given wind farm would require the installation of significantly more wind turbine, thus adding additional costs and the negative impact these turbines will have on the Lake's ecology.

An economic analysis of wind energy in Minnesota (59) found that the Federal Production Tax Credit (PTC) for wind energy currently stands at \$18 per MWH, but only for the first ten years of the facility's service. Wind energy manufacturers and developers claim that wind turbines are designed to serve for twenty years, but the same study showed that the average service age of wind turbines as built in the US is eleven years before they are repowered. Repowering wind turbines involves placing new blades and new generators, but also enables facility owners to reclaim the PTC for another ten years.

The coupling of reduced productivity over a ten- year period plus the expiration of the original federal tax credit is observed in NY State in the case of the Steel Winds facility on the shores of

Lake Erie in Lackawanna, NY. (60) The Steel Winds developer received not only an extension of the PTC, but further subsidies from the two municipalities which host the facility through renegotiated Payment In Lieu Of Taxes (PILOT) agreements. In the case of an offshore wind energy facility in Lake Erie, the developer would claim not only the PTC but also generous subsidies from NY State in the disbursement of NYSERDA Clean Energy Funds derived from fees paid by consumers across NY State. (61)

The goals of the CLCPA include generating 70% of NY State's electricity from renewable energy sources by the year 2030 and a zero emissions New York Independent Systems Operator (NYISO) power grid by 2040. The huge majority of the 2040 effort centers on reducing emissions in the state's areas of highest electricity demand, NY City and Long Island, since the Western New York NYISO zone is already 90% free of emissions in generating electricity. The downstate NYISO high demand zones are meanwhile 89% dependent on fossil fuels for generating electricity (62). NYISO has long described NY's electricity transmission system as a "Tale of Two Grids" and has discussed the challenges and expenses of additional transmission to the upstate zones which would allow flow of renewable energy downstate. (63) One of four such proposed transmission construction projects is the 175 mile long Clean Path NY which costs \$11 Billion in order to bring Renewable Energy Credits (but not necessarily actual electricity) from Central NY State to NY City. (64) All NY State tax and ratepayers are expected to pay for the necessary transmission projects to meet the 2040 goal, including those from NYISO zones which are already 90% emissions free. New transmission costs will be greater for Western NY residents than those in NY City for whom the projects' benefits are designed. (65)

Part 9 Reliability of Offshore Wind Turbine Generation

The reliability of offshore wind turbine generation continues to be poor at best. Based on industry reports the average offshore wind turbine degrades at a rate of 4.2%/year (58). Utilizing this degradation factor at the end of 10 years the output of a given wind farm will be only 60% of its design rating, at which point a major upgrade would be required adding significantly to the operational costs of the offshore wind turbines. The cost for reclaiming this lost capability will be in the 10's of billions of dollars. Additionally, an evaluation of Danish offshore wind turbines has found that 60% of them experienced an equipment failure within the first 5 years of operation. (58i)

Part 10 Limitations of Offshore Wind Turbines in Lake Erie to meet NY State Emissions Reduction Goals

NYSERDA maintains that tens of millions of dollars in local transmission upgrades would be required to utilize existing Lake Erie points of intersection for offshore wind turbines. NYSERDA details these local improvements without explicitly describing the long- distance bulk transmission system upgrades needed to meet the 2040 goal. The fact remains that no proposed offshore wind energy facility in Lake Erie can contribute to that goal regardless of any recently planned major transmission projects. This remains as true today as it was two years ago when described by Save Ontario Shores, Inc. in using an evaluation by NYISO when commenting on the States Clean Energy Standard. (66). There is presently no application on the NYISO Interconnection Queue for the construction of a major bulk transmission line which would allow for Lake Erie offshore wind turbines to contribute to the 2040 goal. (67)

Conclusion

The potential negative environmental impacts of placing offshore wind turbines in Lake Erie cannot be assessed without actually constructing an unprecedented, major wind energy facility in its waters and then hoping it will not be devastating to the entire ecology of the Lake and surrounding communities. Both the financial burdens and risks are much too high for the nominal gains to be achieved by such a project. This shall remain true regardless of future economic costs and potential availability of adequate electricity transmission to meet state mandated emissions reductions. In 2021 a bill was introduced in the NY State Senate by Senators Borrello and Ortt to place a moratorium on offshore wind turbines in the freshwaters of NY State. (68) A companion NY State Assembly bill was introduced by assemblymembers Manktelow and Jensen. In January 2023 Congressman Nick Langworthy of the Congressional 23rd District proposed the Lakes Before Turbines Act which prohibits Great Lakes offshore wind energy developers from claiming the federal Production Tax Credit. (69) Removing this vital tax incentive would hinder and likely preclude any Great Lakes wind energy development at the federal level. NYSERDA has released studies in 2011 and 2022 which find the costs and environmental uncertainties of offshore wind in NY's Great Lakes do not justify any interest in this bad idea moving forward at this time. NYSERDA's 2022 report presents an even stronger case against Great Lakes offshore wind energy development relative to NY State climate legislation adopted since 2011.

Before any further waste of time and resources are devoted to this deeply flawed concept, now is the time for the NY State legislature to adopt a **Permanent Moratorium** on developing wind energy in Lake Erie.

Citations

- (1) NYSDORA 2022 Feasibility Report <https://www.nysdora.ny.gov/-/media/Project/Nyserda/Files/About/Publications/Energy-Analysis-Technical-Reports-and-Studies/GLWEFS/22-12wp-New-York-State-Great-Lakes-Wind-Energy-Feasibility-Study-white-paper.pdf>
- (1i) CAWTILE.com
- (2) NYSDORA 2011 Feasibility Report <https://www.nysdora.ny.gov/-/media/Project/Nyserda/Files/About/Publications/Energy-Analysis-Technical-Reports-and-Studies/GLWEFS/22-12wp-New-York-State-Great-Lakes-Wind-Energy-Feasibility-Study-white-paper.pdf>
- (3) epa.gov/newsreleases/united-states-and-canada-release-state-great-lakes-2022-report
- (4) epa.gov/newsreleases/united-states-and-canada-release-state-great-lakes-2022-report-and-2022-progress
- (5) windpowerengineering.com/bird-groups-file-suit-against-planned-lake-erie-offshore-wind-farm
- (6) nypa.gov/news/press-releases/2011/20110927-end-offshore-wind
- (7) greatlakes.guide/watersheds-erie
- (8) City of Dunkirk Water Filtration Plant, Erie County Water Authority Filtration Plant at Sturgeon Point, Buffalo Water Authority Filtration Plant at Porter Avenue
- (9) [Tethys.pnnl.gov/summaries/benthic-disturbance-offshore-wind-foundations-anchors-cables](https://tethys.pnnl.gov/summaries/benthic-disturbance-offshore-wind-foundations-anchors-cables)
- (10) nature.com/articles/s41560-022-0194-7
- (11) docs.wind-watch.org/Leading-Edge-erosion-and-pollution-from-wind-turbine-blades
- (12) canr.msu.edu/cris/research/EFSA%20Draft%20opinion%20BPA.pdf
- (13) An overview of the uses of per-and polyfluoroalkyl substances (PFAS), *Environ Sci Process Impacts* 2020 Dec.1: 22 (12) 2345-2373
- (14) *Science Direct Renewable Energy* Volume 178, November 2021, 1435-1455
- (15) surgeaccelerator.com/do-wind-turbines-leak-oil/
- (16) *Journal of Fish Biology* onlinelibrary.wiley.com/doi/full/10.1111/jfb.13948
- (16i) *International Journal of Engineering Research and Technology*, ISSN 2278-0181, Mitigation of Underwater Vibrations Due To Offshore Wind Turbines
- (16ii) Impacts of Seabed Vibration on Sediment Structure and Infaunal Organisms, auracdt.hull.ac.uk/research-projects/impacts-of-seabed-vibrations-on-sediment-structure-and-infaunal-organisms
- (17) [Tethys.pnnl.gov/publications/commercial-cuttlefish-exposed-noise-offshore-windmill-construction-show-short-range](https://tethys.pnnl.gov/publications/commercial-cuttlefish-exposed-noise-offshore-windmill-construction-show-short-range)
- (18) NYS DPS DMM Case 14-F-0490 written testimony of NYSDOH staff at evidentiary hearing for Cassadaga Wind, LLC July, 2017
- (16ii) osti.gov/etdweb/servlets/purl/20675379 page 23, figure 9

- (16iii) Ground Motions Induced by Wind Turbines,
onlinelibrary.wiley.com/doi/full/10.10021/cend.202100015 September, 2021
- (16iv) Substrate Vibrations and Their potential Effects upon Fish and Invertebrates,
asa.scitation.org/doi/10.1121/10.0004773 American Acoustical Society 2021
- (19) ontario.ca/page/lake-sturgeon-species-risk
- (20) fishfocus.co.uk/exposure-to-magnetic-fields-from-subsea-cables-slows-down-haddock-larvae.
- (21) wkcgroup.com/news/wind-turbines-and-shadow-flicker-impacts
- (22) birds.eros.usgs.gov/dorremote-sensing-activities/2012/usgs/airspace-use-night-migrating-landbirds
- (23) onlinelibrary.wiley.com/doi/full/10.1111/mam.12064
- (24) portal.nifa.usda.gov/web/crisprojectpages/1011336-fall-migration-swarming-and-hibernation-ecology-of-northern-long-eared-bats-at-cape-cod-national-seashore
- (25) energynews.us/2020/08/31/Ohio-lawmakers-challenge-siting-board-over-poison-pill-for-offshore-wind
- (26) 4coffshore.com/news/supreme-court-rules-in-favor-of-icebreaker-wind-farm
- (27) wind-watch.org/news/2022/07/19/Israel-skeptical-about-its-wind-farms-due-to-ecological-risks
- (28) see (23)
- (29) worldwildlife.org/stories/migratory-monarch-butterfly-now-classified-as-endangered
- (29i) urbanbird.org/monarch-butterfly-population-witnesses-alarming-decline/
- (30) maps.journeynorth.org/map/?/map=monarch-peak-migration
- (31) [Tethys.pnni.gov/publications/insect-fatalities-wind-turbines-biodiversity-sinks](https://tethys.pnni.gov/publications/insect-fatalities-wind-turbines-biodiversity-sinks)
- (32) windpowerengineering.com/5-mw-turbine-intended-for-on-and-off-shore
- (31) wkcgroup.com/news/wind-turbines-and-shadow-flicker-impacts
- (32) pmiind.com/damage-to-subsea-cables-a-huge-risk-to-offshore-wind-farms
- (33) greenbuildingadvisor.com/article/the-science-behind-frozen-wind-turbines
- (34) buffalonews.com/news/local/berm-will-protect-wind-turbines-from-lake-erie-storms
- (35) weather.com/storms/winter/news/2022-12-23-winter-storm-elliott-bomb-cyclone-midwest-northeast-winds-snow
- (36) energy.gov/eere/articles/how-do-wind-turbines-survive-severe-storms
- (37) yachtingmonthly.com/news/sailor-prosecuted-for-wind-farm-sabotage
- (38) researchgate.net/publication/224829986_Doppler_Weather_Radars
- (39) nationalacademies.org/news/2022/02/offshore-wind-farms-can-interfere-with-ship-radar-and-navigation-says-new-report
- (40) pagerpower.com/radar-interference-2/#:November,2018
- (41) renewableenergyworld.com/baseload/ontario-closes-the-door-to-offshore-wind-farmsagain

- (42) epa.gov/greatlakes/lake-erie
- (43) sharetheoutdoors.com/2018/01/26/record-walley-fishing-in-new-york's-eastern-lake-erie-during-2017/
- (44) seagrant.psu.edu/topics/research/assessing-economic-impact-and-value-recreational-fishing-lake-erie-waters
- (45) cleveland.com/sports/2019/07/lake-erie-walley-boom-cause-is-a-mystery
- (46) windsorstar.com/uncategorized/244m-economic-impact-shows-importance-of-lake-erie-commercial-fishery
- (46i) greatlakescruises.com/great-lakes-cruises-2022.html
- (47) docs.wind-watch.org/NC-Offshore-Wind-Amenity-Costs.pdf
- (48) Bill Barlow, The Press of Atlantic City, October 16, 2022 pressofatlanticcity.com
- (49) theguardian.com/money/2014/apr/08/wind-farms-reduce-house-prices-compensation
- (50) instituteforenergyresearch.org/renewable/offshore-wind-experiences-problems-with-transmission-cables
- (51) theguardian.com/us-news/2021/mar/17/wainscot-new-york-hampton-offshore-wind-farm
- (52) bostonherald.com/2021/08/25/group-files-lawsuit-to-try-to-block-construction-of-wind-farm-off-nantucket
- (53) Coastal Engineering Proceedings, January, 2014, 1 (34) 87
- (53i) The Legal Landscape: Guidelines for Regulating Environmental and Aesthetic Quality, Smardon and Karp, 1992, Pub. John Wiley and Sons, Inc. Special thanks to Robert J. Holland
- (54) rockthelake.com/buzz/2017/10/lake-erie-hides-secrets-2000-shipwrecks
- (55) syracuse.com/nes/2011/03/judge-says-lake-erie-shipwrecks.html
- (55i) dunkirkighthouse.com/history.htm
- (56) epa.gov/wqs-tech/water-quality-standards-regulations-seneca-nation-indians
- (57) US Energy Information Administration – Cost and Performance Characteristics of New Generation Technologies – March 2022
- (57a) US Energy Information Administration – Levelized Cost of New Generation Resources – March 2022
- (57b) New York State Independent System Operator Power Trends 2019(58) [Manhattan-institute.org/dismal-economics-offshore-wind-energy](http://manhattan-institute.org/dismal-economics-offshore-wind-energy)
- (58i) ref.org.uk/ref-blog/365-wind-power-economics-rhetoric-and-reality
- (59) americanexperiment.org/wind-turbines-don't-even-last-20-years
- (60) wivb.com/news/lackawanna-wind-turbines-need-21-million-overhaul
- (61) nyserda.ny.gov/About/Funding
- (62) NYISO Power Trends 2022 nyiso.com/power-trends

(63) nyiso.com/-/new-transmission-investments-add-a-new-chapter-to-the-tale-of-two-grids

(64) cleanpathny.com

(65) NYS DPS DMM Case 15-E-0302 Line 138 comments of Save Ontario Shores, Inc

(66) NYS DPS DMM Case 15-E-0302 Line 495 Comments of Save Ontario Shores, Inc.

(67) [NYISO.com/interconnections](https://nyiso.com/interconnections)

(68) nysenate.gov/legislation/bills/2021/S6314

(69) observertoday.com/news/top-stories/2023/01/Langworthy-bill-would-ban-offshore-wind-tax-credits