Draft: 02-16-2023

[redacted]

As environmentally aware citizens, we acknowledge the severity of climate change and recognize the urgency to act now and to act boldly; however, we question the promise of offshore wind. Although well-intentioned, the current administration's plan to develop over 22 million acres of the continental shelf (8%) along the Eastern Coastline with offshore wind farms [1] will cause potentially irreversible harm to the environment. Any effective climate change solution must weigh the benefits against the cost to biodiversity and the health of the environment, particularly the ocean. To assume the benefits will outweigh the costs could lead to irreversible destruction. We cannot afford to waste either the time or money on empty solutions that will erode the collective determination to protect our planet. I summarize my analysis below.

Is offshore wind green?

A. **Indirect sources of CO2:** BOEM does not consider indirect sources of CO2, such as cement production [3], plankton destruction [4,5,6] increased biofouling of artificial reefs [7], whale mortality [8], the overseas mining of rare earth metals [9], and resuspension of previously sequestered carbon from sediment plumes [10] in their calculations of the carbon offset, nor do they consider the CO2 emissions released during the decommissioning process [11]. The production of every ton of cement emits 1 ton of CO2 [12]. The indirect elevations of CO2 coupled with decommissioning emissions will likely offset all the CO2 benefits accrued over the entire lifetime of the project.

B. **Air pollution:** During operations, wind turbines release sulfur hexafluoride (SF6), the most potent greenhouse gas in the world. SF6 traps heat 23,500 times more than CO2 [13]. Emissions of SF6 may breach the *greenhouse gas regulations* under the *Clean Air Act* (42 U.S.C. § 7401 et seq.). Scotland has outlawed this gas after a serious leak occurred on a substation in June of this year [14]. Substations can contain several tons of SF6. In the RI development, Ørsted plans to use turbines containing SF6 in both the gear boxes and the two offshore substations [15]. Although most electrical substations on land utilize this gas for insulation, SF6 in substations exposed to the harsh offshore elements poses a greater risk of leakage into the environment. The BOEM DEIS does not address this significant threat to the environment [16].

C. **Cod:** Cod, the hallmark fishery of New England and the economic engine that propelled the Northeast into prosperity, will potentially suffer extinction under the current plan to develop the region around Coxes ledge [17]. The South Fork and Revolution Wind farm's footprint will surround this critical marine habitat. Cod spawn in the Cox ledge region and rely on acoustic communication during this ritualized and sensitive behavior [18]. Noise from construction and operations of turbines could interfere with their communication and have "population-level impacts on Southern New England Atlantic Cod," [19]. Despite warnings from scientists at the National Oceanic and Atmospheric Administration (NOAA), BOEM leased this area for development and has not restricted pile-driving even during critical spawning time-periods [20]. The DEIS does not consider the cumulative impact of Revolution Wind and South Fork in this analysis.

D. **Endangered Species:** The planned project violates the *Endangered Species Act* (16 U.S.C. §§1531-1544), the *Marine Mammal Protection Act* (16 U.S.C. §§ 1361 et seq.), the

Endangered Bald and Golden Eagles Act (16 U.S.C. §§ 668-668d), and the *Migratory Bird Treaty Act* (16 U.S.C. §§ 703 et seq.) by threatening the existence of fourteen (14) endangered species: four (4) whale species, two (2) turtle species, one (1) fish species [21], four (4) bird species, two eagle species, and 1 bat species [22]. Three whale species began to suffer from unabated unusual mortality events (UME's) that began in 2016-2017 [23,24,25]. The conduction of underwater seismic surveys in preparation of offshore wind farm construction coincides with the onset of these UMEs. The ESA and MMPA require agencies both to protect and *to promote the recovery* of the species. The BOEM DEIS does not adequately address the impact of offshore wind on endangered species mortality or recovery.

E. **North Atlantic Right Whales:** The US has designated the area planned for construction as a critical habitat for the North Atlantic Right Whale (NARW). With only 349 members alive today, the NARW faces extinction [26]. The unusual mortality event (UME) that began in 2017 has affected 20% of their population [27]. Deaths outpace births [28]. Pre-construction seismic surveys and impact drilling within whale habitats coincided with the onset of their UME. Seismic surveys have documented impact on whale morbidity and mortality [29]. Current media reports and the BOEM DEIS describe fishing gear entanglements and ship strikes as the greatest threat to the whales, but ignore the acoustic impairment from seismic surveys that have predisposed whales to these dangerous encounters. The joint BOEM and NOAA Atlantic Right Whale protection strategy depends largely on monitoring whale numbers [30]. Observation studies depend on comparisons with a valid baseline. Establishing a valid baseline for the NARW requires the resolution of their unusual mortality event prior to baseline data collection. The NARW Strategy recommends acquiring this data 3-5 years immediately prior to construction. As proposed in the DEIS, BOEM's monitoring mitigation strategies cannot ensure the safety of the species. Because whales sequester carbon, the loss of a single whale, let alone an entire whale species, will increase the carbon footprint of this project [31]. Offshore wind farms (OWFs) will inevitably drive threatened whale species closer to extinction [32]. The ESA and MMPA require agencies both to protect and *to promote the recovery* of the species. The BOEM DEIS does not adequately address the impact of RW on either the NARW's mortality or recovery.

F. **Bird Migration:** RW will occupy a site within the migratory Atlantic flyway region and will thereby add additional stress to four (4) endangered bird species, including the Piping Plover, the Red Knot, Roseate Tern, and the Black-capped Petrel [33,34]. Two threatened eagle species, the Golden Eagle and the Bald Eagle, reside in RI as well. RI is home to the Norman Bird Sanctuary, a 325-acre nature preserve overlooking Rhode Island Sound, as well as the adjacent 242-acre Sachuest Point National Wildlife Refuge. Both sanctuaries provide a vital stopover and wintering area for migratory birds; RW's first flank of turbines will be situated only 15 miles away. The continued development of this region with offshore wind farms could violate the *Endangered Species Act* (16 U.S.C. §§1531-1544), the *Migratory Bird Treaty Act* (16 U.S.C. §§ 703 et seq.) and the *Bald and Golden Eagle Protection Act* (16 U.S.C. §§ 668-668d). 432 bird species in North America risk extinction. Birds with coastal habitats are particularly vulnerable [35]. Current methods for assessing an offshore wind farm's risk to birds remain inadequate [36], underestimating the impact of wind farms on bird mortality [37]. The BOEM DEIS does not adequately address the impact of RW on bird mortality.

G. **Bats:** Wind turbines kill more bats than previously recognized [38], particularly during the autumn migratory season. Although bats roost on land, they will fly more than 25 miles offshore during migration [39]. Bats control insect populations. One brown bat can eat 1000 mosquitos per night. Bats follow the insects attracted to the lights illuminating the turbines at night, drawing the bats directly into the rotating blades. Decreasing bat numbers will allow mosquito populations to rise, thereby increasing the prevalence of mosquito-borne diseases, including Zika [40], West Nile [41] and Eastern Equine Encephalitis [42] viruses. One bat species native to Rhode Island, the northern long-eared bat, is protected under the *Endangered Species Act*. At a time when nations have pledged to decrease pesticides [43], we cannot allow wind farm developments to reduce bat populations. The BOEM does not adequately incorporate the latest scientific findings that recognize the true bat mortality associated with wind farms, nor does it address the public health consequences of decreasing bat populations in the DEIS.

H. **Biodiversity:** The World Health Organization afirms that biodiversity loss poses a greater risk to human health than climate change alone [44]. The mortality risk to endangered species, the introduction of invasive organisms, and the degradation of the coastal habitat will all contribute to a reduction of biodiversity. Wind energy has documented risks to biodiversity [44]. Given the health consequences of biodiversity loss, expansive wind farm installations could violate the internationally recognized *Human Right to Health* [46]. We cannot afford to ignore biodiversity loss in evaluating the cost benefit analysis of offshore wind farm development. The US government has an obligation under the international human rights law to protect biodiversity as important factor in human health [47]. The BOEM DEIS does not incorporate the latest scientific findings from the North Sea on biodiversity loss, nor does it address the relationship between biodiversity loss and human health.

I. **Plankton:** Marine industrialization kills plankton. Phytoplankton, the trees of the ocean, sequester more CO2 than all of the world's plants The ocean supports life on this planet by sequestering 45% of the planet's CO2, storing 95% of the world's carbon, absorbing 90% of the heat, and generating 50-70% of the oxygen [48]. Any climate change remedy that harms the ocean could result in a net increase of atmospheric CO2 and ultimately an acceleration of global warming. According to NASA, the highest abundance of phytoplankton occurs in coastal regions, along continental shelves, particularly where currents meet [49]. The coast of New England has some of the highest phytoplankton counts in the world. Recent studies from the North Sea demonstrate that the presence of wind turbines decreases phytoplankton count by as much as 8% [50], redistributes plankton, and deoxygenates lower-level water [51]. A mere 1% decrease in phytoplankton will cause an increase in CO2 emissions that outweighs any possible benefit from renewable energy sources [52]. The Revolution Wind DEIS calculates that the installation of the cable alone will kill over 1 billion fish eggs and 8.5 billion zooplankton [53]. The DEIS does not adequately consider the cumulative effect of the entire development on primary production, nor does it incorporate the latest scientific findings from the North Sea.

J. **Cables:** The hundreds of miles of high voltage cables will heat the proximate area by as much as 36 degrees F [54] and radiate electromagnetic fields (EMF's) that can interfere with fish larvae viability [55]. The EMF's will also disorient migratory species such as sharks

[56], dolphins and whales [57]. The BOEM DEIS does not consider the latest scientific findings, nor does it adequately address this significant issue.

K. **Local Climate**: Wind farms can increase water and air temperatures, redistribute humidity, and alter atmospheric flow, thereby modifying local weather patterns and regional climate [58]. Raising ambient temperatures can affect fish larvae [59], ocean currents [60], and vegetation [61]. The BOEM DEIS does not consider the latest scientific findings, nor does it adequately address this significant issue.

L. **Water pollution:** The contamination of water in an area essential to fishing may violate the *Clean Water Act* (33 U.S.C §§ 1251 et seq.) and *Seafood Safety Regulations* (21 C.F.R. § 123*)*. The anti-corrosive coating on the wind turbines will leach significant levels of toxic heavy metals (lead and cadmium) [62] and harmful organic compounds [63] into the water that can contaminate the entire food chain in RI Sound. A total of 18 million gallons of toxic coolants, fuel, oil, and lubricants from the planned developments along the Atlantic coast, all of which have historically shown a propensity to leak or spill when used in ocean environments, could significantly contaminate the water [64] and threaten vulnerable species and the marine ecosystem. The BOEM DEIS does not adequately address this significant impact on the marine environment.

M. **Sediment plumes:** The tidal and estuary currents flowing across the underwater portion of the wind turbines will induce sediment plumes, decrease stratification, and increase turbidity [65]. Sediment plumes can resuspend toxic heavy metals [66], re-introducing them into the food supply chain, and threaten marine mammals [67]. The BOEM DEIS does not incorporate the latest scientific findings, nor does it consider the significant health consequences of degrading water quality.

N. **Toxic algal blooms:** Introducing "artificial reefs," in the form of both turbine monopiles and the scouring protection at their bases, will allow invasive filter feeders to alter the complex marine ecosystem [68]. Invasive filter feeders increase the risk of harmful algal blooms that deplete oxygen in the water, causing fish die-offs [69], and can release harmful toxins, including domoic acid, a deadly neurotoxin that induces seizures and permanent amnesia [70, 71]. Magnifying the likelihood of contaminating the marine food web and supply chain with a potent neurotoxin violates the *Clean Water Act* (33 U.S.C §§ 1251 et seq.), *Seafood Safety Regulations* (21 C.F.R. § 123), and the *Outer Continental Shelf Lands Act* (43 U.S.C. §§ 1331 et seq.). The BOEM DEIS does not incorporate the latest scientific findings on the relationship between invasive filter feeders and harmful algal blooms, and diminished water oxygenation, nor does it consider the significant health consequences of these negative impacts. The North Sea has experienced an increase in harmful and costly algal blooms in recent years. These blooms carry an approximate financial burden to the economy of over 900 million euros per year [72]. A toxic algal bloom caused an unusual and "catastrophic" die-off of crabs and lobsters in the late fall/early winter of 2021 along England's North Sea coast [73]. The increased prevalence of harmful algal blooms coincides with the North Sea build up of offshore wind farms.

O. **Critical ocean currents:** Wind turbines reduce downstream (leeward) wind by over 40% for a 40-60 mile expanse [74] and can reduce prevailing currents by 15% [75]. Any further slowing of the Gulf Stream and the Atlantic Meridional Overturning Circulation (AMOC) could send the planet beyond the tipping point into catastrophic sea-level rises and mass

extinction [76,77,78]. BOEM's own study found that the full build-out of the RI windfarms will decrease current magnitude, wave height, and temperature stratification [79]. The company conducting the analysis recommended further study. The Federal government's plan to develop over 22 million acres (8%) of the continental shelf will substantially increase the risk of altering key hydrodynamic, salinity, and temperature characteristics [80]. Although the BOEM DEIS considers how local current changes might alter water turbidity, it does not consider the potential effects on either the Gulf Stream or the AMOC. **The DEIS mentions that the OWFs will affect ocean currents, wave height, temperature stratification, sediment transport, and larvae settlement, but then only discusses all of these effects in the context of finfish, and conclude that these will help larval sediment in some areas and hurt it in other areas.[pg. 3.13-10]

P. **National Defense and Safety:** The offshore wind projects will interfere with strategic areas of national defense and transportation safety. The Congressional Committee on Transportation and Infrastructure reprimanded the Coast Guard for failing to adequately protect these interests [81]. The BOEM DEIS does not adequately address this significant impact.

Q. **Quotas:** Meeting renewable energy quotas is not equivalent to combatting climate change. As the energy companies admit themselves, *the wind farms will not necessarily help climate change*, they will merely allow states to meet their renewable energy quotas [82]. A single-minded adherence to meeting a quota does not justify permanently harming the ocean, the environment, biodiversity, and the food supply. The BOEM DEIS does not present a compelling argument to justify these costs.

R. **Commercial and Recreational Boating**: RI takes enormous pride in its boating and recreational fishing eminence. RW, and other OWFs will stress the fishing industry and substantially impact the boating industry, as fish stocks plummet and RI Sound becomes noisy and more difficult to navigate [83, 84]. The BOEM DEIS does not adequately address either the monetary or cultural impact of this adverse effect.

S. **Sound Pollution:** Wind farms increase environmentally significant ocean noise, both during planning, construction [85] and operation [86]. Seismic surveys, pile driving, increased vessel traffic, and operations all contribute to underwater noise pollution that harms marine animals [87] and drives them to abandon habitats [88]. Even seagrass and plankton die from sound pollution. The single detonation of a seismic survey gun can kill off zooplankton within a mile radius [88]. Recent marine mammal strandings have been associated with hearing loss [89]. Environmental groups have blamed the lobster industry for increased whale mortality, without acknowledging that noise pollution from offshore wind development most likely predisposed the animals to these tragic encounters. The BOEM DEIS does not incorporate the most recent scientific findings, nor do they adequately consider the significant impact of harmful sound pollution. [Pile-driving For example, more than 10,846 strikes are expected per pile with a rate of 50 strikes per minute. https://www.oregonlive.com/environment/2023/01/did-ocean-wind-turbine-work-deliver-fatal-blow-to-humpback-whale.html]

T. **Rare Earth Metals:** Wind turbines require rare earth metals sourced primarily from China. Mining these elements contaminates the water table, generates radioactive waste, risks harmful exposures, and generates CO2 emissions [91]. The new push for offshore turbines

has increased the demand for rare earth metals. The pressure for more supply may require ocean floor mining, which will incur another stress on the ocean and on global warming by resuspending carbon previously sequestered in marine sediments, heavy metal contamination of marine food webs, and biodiversity loss [92]. The BOEM DEIS does not adequately address these issues.

U. **Trust:** Recent articles have reported on the fossil fuel industry's self-serving support of OWF opponents, but few mention that the offshore wind companies have donated millions of dollars to conservation groups, aquariums, and marine research facilities that now support their efforts [93], including the Woods Hole Oceanographic Institute, the Audubon Society, and the New England Aquarium. By donating significant sums to these organizations and to the scientists examining the environmental impacts of OWFs, the companies are potentially biasing the conversation in favor of wind farm development. By minimizing the environmental hazards, ignoring the adverse impacts on local economies, and obscuring the economic realities and true CO2 cost of the projects; the offshore wind companies and BOEM are violating the Public Trust Doctrine [94]. Our government officials should not be favoring an industry over the best interests of its people.

V. **Who are the wind companies?** Fossil fuel companies, who obscured the evidence of climate change for decades, have now begun to reinvent themselves as environmentally responsible wind companies. Ørsted, previously Danish Oil and Natural Gas, is developing Revolution Wind. Shell Oil backs the Mayflower Wind project. Irving oil, British Petroleum, ExxonMobil, and Chevron are also investing in wind developments [95]. In doing so, they are capitalizing on federal subsidies, advantageous tax structures, and lopsided power purchase agreements created by states shortsightedly trying to meet their renewable energy infrastructure investment goals.

W. **Ørsted:** The Danish government holds the majority of Ørsted's shares (50%), a stake valued at approximately 60 billion kroner (7.9 billion USD) [96]. This investment represents about 7% of the total state pension fund value and creates a potential conflict of interest. Over thirty-five percent of the population in Denmark works for the state. The state of Denmark employs every university-based scientist in the country [97]. If Ørsted's share prices fall, due to negative press about the environmental consequences of offshore wind, the pensions of over 35% of the population would suffer. Currently, the financial incentives in Denmark would not encourage studies that could potentially expose the environmental impact of offshore wind.

X. **BOEM**: The Bureau of Ocean Energy Management (BOEM), formerly the department of energy's offshore lease granting agency to the oil and gas industry, does not prioritize either biodiversity or the climate crisis. It has the mandate to develop the ocean's resources for power, regardless of either the benefits or the costs to the environment. As a result, BOEM overlooks [98] and even conceals [99] major negative impacts on the environment, even against the recommendations of the US's own scientists.

Y. **Seismic Surveys**: Although offshore wind companies may not use the traditional airguns to collect their high resolution geophysical maps of the seabed, they do employ high voltage, boomers (3000 V), sparkers (20-200Hz), and multi-beam echosounders, side scan sonars (100-500 kHz), shallow and mid penetration sub-bottom profilers, ultra short baseline positioning equipment, and marine magnetometers. They plan to operate 4 vessels,

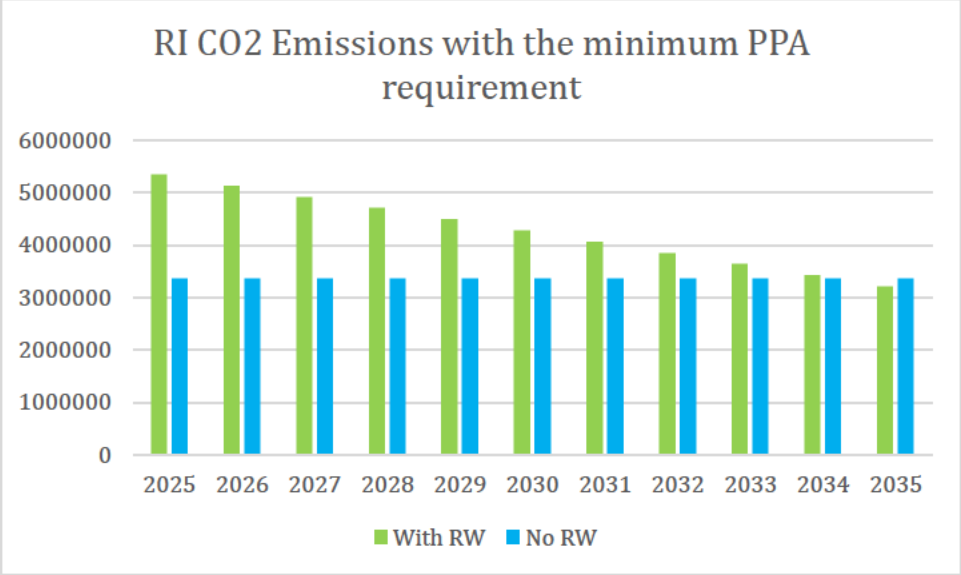
potentially 24/7, at any time of year. These mid-frequency seismic ranges can cause rectified diffusion.

Z. **Pile driving**: Will occur 24 hours a day, and includes

Will offshore wind benefit RI?

A. **Electricity output:** The Power Purchase Agreement (PPA) requires little accountability [100]. In fact, the agreement allows RW to deliver less than ¼ (94 MW) of the total capacity (440 MW) before incurring any liability for damages [101]. Under this provision, the projected CO2 savings will not offset the emissions from the construction of the RWF until after 2035 [Figure 2].

Figure 2. *Rhode Island's CO2 Emissions Savings under the PPA provisions (93 MW).*



Legend. The histogram depicts CO2 emissions in RI both with (green) and without (blue) the benefit of the Revolution Wind farm under the PPA. The PPA requires only 50% delivery of a 46% load factor, allowing the company to meet its obligations with only 93 MW/year. Under this condition, the CO2 savings would not offset the construction emissions until 2035. RW's CO2 contributions and construction emissions are prorated based on the percentage of the electricity dedicated to RI (57%).

B. **Decommissioning:** Large wind turbines in the inhospitable offshore environment frequently fail and have a finite lifespan due to metal fatigue (approximately 20 years) [102]. The 350-foot-long blades require frequent replacement and cannot be recycled. Projections estimate that decommissioning will cost 70% of the installation price [103]; yet, Ørsted does not disclose the amount of money allocated for this aspect of the project and BOEM does not require such a disclosure. RI taxpayers may be responsible for paying the millions (or billions) of dollars required for decommissioning [104] and the turbines will remain a blight on the seascape, both above and below the ocean's surface, for generations.

C. **Maintenance:** After construction, Ørsted and Eversource are no longer responsible for maintaining the Revolution Wind Farm [105, 106]. Instead, the developers will pass off the legal and financial liability to a shell company, Revolution Wind, LLC, whose only assets will be the turbines themselves and the electricity they produce. Should RW become

insolvent, all damages, unanticipated expenses, (such as reburying the cables, turbine failures, and potentially even decommissioning) may fall on RI taxpayers [107].

D. **Price:** Offshore wind electricity will cost more than any other form generated —over three times more than solar by 2027 [108]. RI citizens already pay some of the highest electricity rates in the nation [109]. A greater reliance on offshore wind will most likely result in higher rates [110].

E. **Food Insecurity:** 25% of RI households suffered from food insecurity in 2020 [111]. Higher electricity rates and diminished fishing resources may exacerbate this problem. Many economically challenged families rely on the availability of locally sourced and affordable seafood, such as scup, squid, and a variety of shellfish. Any diminishment of fish stocks will negatively impact these families. The BOEM DEIS does not adequately address this negative impact on human well-being.

F. **Fishing:** The turbine-induced sediment plumes, EMFs, underwater noise, and ocean floor temperature elevations will all harm squid [112], RI's most important commercial fishery [113]. They will also alter larval transport and settlement, thereby potentially changing fish population numbers [BOEM]. OWF development may cripple this culturally and economically important industry, perhaps even critically [114, 115]. Construction noise can impact sea bass [116], scallops [117] and tuna [118], among other species. The BOEM DEIS does not adequately address either the short-term or long-term consequences of this issue.

G. **Tourism:** RI hosts 21 million tourists every year. Tourism provides 11% of RI's jobs and supplies the state with 1.3 billion dollars of tax revenue [119]. RW turbines will dominate the horizon from nearly every public beach in RI and will be visible from a distance of 40 miles [120]. Although some visitors may be comforted by the sight of turbines stretching 20 miles across the horizon, others may prefer the pristine beauty of a natural ocean view and will choose to travel elsewhere, harming the economy. The visual impact will affect over 600 popular destinations, including 178 public beaches in MA and RI [121]. Contrary to the government's hopeful projections, a survey in England indicates that 37% of tourism-related business owners affirm that wind farms have negatively impacted their businesses [122]. The BOEM DEIS minimizes the impact on tourism.

H. **Jobs:** The press inflates the number of jobs that the OWF will generate. The governor's office stated the project will create 50 permanent jobs [123]. Ørsted does not promise to source these employees from RI and may import a specialized workforce.

I. **Subsidies:** Tax incentives will pay for 30% of Ørsted's investment costs, subsidizing the project for a foreign national profit-making entity [124]. Ørsted will not disclose the total cost, but projections [125] suggest the price of the development could reach between $5-6 billion. Taxpayer subsidies would then amount to approximately $1.5-2 billion. A component of the risk-benefit analysis should include alternative, more effective, less damaging ways to spend these tax dollars.

J. **Scale:** The planned 873-foot-tall turbines will tower over any other ocean structure in the world. These trigger the FFA safety concerns on height and proximity to heavily traveled air routes. For scale, only 21 buildings in New York City stand above 800 feet. If RW gains approval and begins construction, the other developments may pass through the regulatory approval process with relative ease, leaving RI with 1700-2000 turbines over an area *one and*

a half times the size of its entire land mass [126], with no clear plans or budget for decommissioning.

K. **Visibility:** The 873-foot-tall wind turbines will be much more visible than the company's simulations imply and will flash red lights during the night. Human visual processing enlarges objects on the horizon. This phenomenon, called the Ponzo illusion, explains why a full moon rising on the horizon appears much larger than the same moon, once it is overhead [127]. Humans will experience the turbines as far more sizable than the simulations convey. Human visual processing also pays more attention to moving objects than stationary ones. As a result, humans will be keenly aware of these structures on the horizon. The RW turbines will stand almost six times the height of Cuttyhunk, which reaches 154 feet at its tallest point [128] and is approximately the same distance from RI's shore. The visual impact on historic properties requires a section 106 review process under the *Historic Preservation Act* (Public Law 89-665; 54 U.S.C. 300101 et seq.) that has not been adequately completed.

L. **Well-being:** RI and the nation as a whole suffer from a mental health crisis and increased drug abuse. Encounters with nature improve both mental and physical health by providing a sense of awe [129,130,131]. Compromising the ocean's natural state will potentially exacerbate the mental health problems by destroying a source of visual peace and open space.

M. **Financial and Economic benefits:** The Draft environmental statement asserts that the "Overall beneficial impacts of future offshore wind energy development would be short term during construction and long term during O&M; these beneficial impacts would be **minor**."[p. 3.11-18]. or "BOEM expects the Proposed Action to have an overall long-term **minor** beneficial impact on demographic, employment, and economic conditions,"[3.11-33].

N. **Environmental Justice:** "Project construction and installation, O&M, and decommissioning would have short-term to long-term **adverse impacts** on environmental justice populations,"[3.12-39].

Alternatives

A. **No Action Alternative**: Ørsted compares all of the environmental impacts to a "no action alternative." This assumption allows them to deem all resulting damages "negligible" in comparison [132]. Less environmentally harmful alternatives do exist however, and, by law, must be compared to offshore wind.

B. **Coal to Natural Gas (NG):** Immediately converting coal plants in the US to natural gas would save 500,000,000 metric tons of CO2 every year, 100 times the amount of CO2 that Revolution Wind will save during its entire projected 20-year lifespan [133, Figure 1]. The US produces more natural gas than we use, (some of which we export to the Middle East), thus availability does not limit our use of this fuel for electricity production. Coal-generated electricity emits 100% more CO2 per MW than natural gas. Although NG presents another set of environmental concerns [134], an immediate transition to NG would significantly reduce CO2 and, unlike offshore wind, would combat climate change during this critical decade. The immediate benefit, as opposed to OWF's delayed savings, would allow us to properly evaluate all renewable options rather than jumping to invest in permanent infrastructures that will irreparably harm the marine and coastal environments and the people who live there.

C. **Solar**: Solar requires only 1/10th the space of wind power and will be 1/3 the cost per MW by 2027 [135, 136]. Wind turbines have almost reached their maximum capacity (Betz law [137]); whereas, the cost effectiveness and performance of solar cells continues to improve (Moore's law [138]).

D. **Rare Earth Metals**: As stated previously, wind turbines require the mining of rare earth metals (Lanthanides, Neodymium, praseodymium, dysprosium and to some extent terbium) that harm the environment [139]. Manufacturing solar cells requires minor metals [140] (silicon, indium, gallium, selenium, cadmium, and tellurium) that are generally byproducts of refining other metals and cause less environmental damage [141]. A false assumption exists that solar cells require rare earth metals and that wind turbines do not—the opposite is true.

E. **Highways:** The Federal government owns millions of miles of clear-cut highways [142]. We could line our highways with solar arrays without engaging in land use struggles, exacerbating climate change, limiting biodiversity, contributing to CO2 production, slowing ocean currents, harming vulnerable ecosystems, damaging valuable habitat, impacting human livelihoods, or contaminating the food system.

F. **Floating solar cells:** This new technology can be safely installed on reservoirs. Such installations improve efficiency (through cooling), diminish evaporation pf fresh water, and decrease CO2 emissions by inhibiting algae blooms. Covering 10% of the world's reservoirs with floating solar cells could replace all of the world's fossil fuel power plants [143].

G. **Nuclear:** We must reconsider modern nuclear power, especially in light of recent developments in nuclear fusion. Nuclear is more efficient than any other type of power. It has the smallest footprint, generates no emissions, is highly regulated, and has a better workplace safety record than both wind and fossil fuel plants [144]. Unlike the intermittent nature of wind and solar, nuclear power provides a constant flow of energy.

H. **Small-scale nuclear:** Small-scale nuclear and even micro-nuclear reactors promise to become less expensive in the near future. These versatile systems could provide important backup energy to solar powered generators and offer a realistic alternative [145].

I. **Fusion:** New nuclear fusion technology is developing quickly and may soon make OWF obsolete [146]. This might take a decade or more, but RW will not offset CO2 until 2030 or later. Pausing to evaluate the environmental impact of offshore wind farms would prevent us from making a grave, irremediable error and allow us to then take advantage of fusion when it becomes commercially viable.

J. **Geothermal:** Geothermal has undeveloped potential.

Conclusion

We support measures that can sustainably achieve the Inflation Reduction Act's goal to cut 40% of our CO2 emissions by 2030. Based on our research, however, the plan to industrialize 22 million acres of coastal waters with offshore wind farms will not accomplish this objective. Instead, the planned wind farms will elevate CO2 emissions, harm critical aspects of the environment, ensure biodiversity loss, contaminate the food supply chain, and violate numerous Federal environmental protection laws. We should learn from Europe's mistakes. Europe is only now beginning to study in earnest the harmful consequences of their offshore wind farm developments [147, 148] that had been previously minimized or overlooked [149], and to understand that wind and the ocean are not limitless resources [150]. Neither wind nor the ocean

are inexhaustible, and our willful ignorance of these limitations could drive climate change beyond the tipping point.

The expansive wind farms proposed for Rhode Island Sound externalize the cost of energy production to the marine environment, the signature asset of the "Ocean State," and to the residents of RI. Revolution Wind's plan to install up to 100 turbines, each potentially 873-feet-tall, 13 miles off the coast of RI**,** has no precedent. The proposed farm's environmental consequences could undermine decades of protection efforts in Narragansett Bay, New England's largest estuary, and accelerate climate change. A trade-off that sacrifices the ocean's health, biodiversity, and primary productivity for the sake of meeting a renewable energy mandate that ignores the true CO2 equation will only worsen global warming over time and threaten our own survival. Meeting an arbitrary quota does not justify endangering the health of our oceans. Currently, the data fails to demonstrate offshore wind's ability to combat climate change. In fact, the predominance of the scientific findings suggests offshore wind farms will increase net CO2 emissions, violate environmental and species protection laws, and trigger unanticipated, irreparable consequences. Gaining momentum in the fight against climate change is crucial; yet, we must not blindly accept profit-driven remedies that will harm the environment and jeopardize our children's future.

Endnotes:

1. NOAA Fisheries and BOEM, *North Atlantic Right Whale and Offshore Wind Strategy.*, https://www.regulations.gov/document/BOEM-2022-0066-0003, (return to doc here).
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