A White Paper

SHORTCOMINGS OF THE CURRENT NEW JERSEY ENERGY MASTER PLAN (EMP)AND A NEW DIRECTION FOR IT

December 2025

Submitted by

Save Long Beach Island
www.savelbi.org
Email: info@savelbi.org

A White Paper

Shortcomings of the New Jersey's Energy Master Plan and a New Direction for it.

The material below lays out a pointed, evidence-based critique of the current EMP focused on (1) cost, (2) unrealistic mandated deadlines, and (3) its ineffectiveness in supplying reliable affordable electricity and for actually impacting climate change — followed by a recommendation for a new, cost-effective direction for the State's program.

Executive Summary

The current New Jersey energy Master Plan states lofty goals regarding lowering energy costs and addressing climate change. However, as shown herein numerically, the premise that NJ carbon emission reductions can do anything for global climate is delusional. The two goals are also in conflict and neither is met.

Its focus on offshore wind for electric supply will significantly increase Statewide electric bills, not provide reliable electric supply, incur significant NJ taxpayer cost and result in a host of environmental problems and other costs (Enclosures 4 and 5),

The computed cost of avoiding carbon emissions from NJ wind projects is greater than the alleged global benefit achieved (Enclosure 1). But because NJ will draw on higher carbon emitting sources from the PJM electric grid when the wind off NJ is not blowing, it is doubtful that any greenhouse gas (GHG) reductions will be achieved on a regional basis.(Enclosure 2).

It contains other GHG measures regarding climate change that are not cost-effective i.e. the cost per ton of greenhouse gas avoided is greater than the alleged global social benefit achieved.

It contains arbitrary deadlines for some measures that are not realistic.

The impact of all the NJ measures envisioned will have a vanishing small effect on the global climate change problem.

For example, the effect of an aggressive New Jersey GHG reduction program alone on sea level rise by 2100 would be a reduction of about one-hundredth of an inch from a current-trend sea level rise of 26 inches. In 1000 years, the effect of the NJ reductions would be about one-tenth of an inch from a current-trend rise of 300 inches.

Therefore, the current Plan is both costly and ineffective, and a new direction for it is needed as follows;

- Provide reliable, affordable and long-lasting electric energy supply to NJ -with a small carbon emission footprint - through utility-scale solar, nuclear and natural gas plants. Such plants could be brought online with confidence, while offshore wind faces significant

uncertainties from overseas supply chain problems, and federal government and shore community opposition and litigation.

- For New Jersey pursue only cost-effective GHG avoidance measures (on a cost per ton of GHG avoided basis) where the alleged social benefit of the measure exceeds its cost (See Enclosure 1 for options).

- Redirect effort and funding towards identifying, demonstrating, and then exporting GHG avoidance measures that can be deployed widely globally, which would have a significant impact on the global problem (See study framework in Enclosure 3), and create long-term economic opportunity for the State.

- Redirect resources towards beginning shore and other State resource protection and resiliency measures in recognition of the reality that, despite intentions and effort, some sea level rise and other climate impacts are coming, but that we do have time to deal with them.

For too long, State energy and climate plans have been based on slogans and unsupported statements of energy cost savings, job gains and climate change benefit. This Paper dispels those with numbers, facts, and the realities of supplying energy and addressing climate. It is our hope that it can spur a reasoned discussion based on those realities and lead the State to adopt sound, sensible electric supply and GHG avoidance options.

Current EMP Shortcomings

I. Supplying Electric Energy

Electric Cost and Affordability - The "flagship" for providing electricity to NJ in the current EMP is offshore wind projects. However, the wholesale cost of electricity from offshore wind is the highest of all the options, four times that from combined cycle natural gas, and twice that for nuclear reactors (with current law tax credits) and utility-scale solar which are all relatively clean sources as far as carbon dioxide emissions go. See updated Table 1 below from the 2025 Whitestrand Report, A Comparison of the Levelized Cost of Energy (LCOE) of Various Generating Sources.

The LCOE is a widely accepted metric for comparing diverse sources of generation which may vary in size, efficiency, capital and operating cost, useful life and commercial operating date. It allows an "apples to apples" comparison of the all-in cost of the output to the ultimate customer, the electric ratepayer, on a $/unit of energy delivered (a megawatt-hour (MWH)) basis among renewable and fossil generating units.

The LCOE in Table 1 was calculated and cited in various recognized and available public sources. Solar, wind, battery storage, nuclear, gas and coal units are compared with respect to their LCOE with and without currently available Federal tax credits. For intermittent sources, the cost of achieving equivalent reliability as dispatchable base load or peaking units is included by showing the added cost to back up these sources through capacity payments to the PJM grid. Finally, the estimated cost to interconnect each source to the grid which adds to the total LCOE borne by ratepayers is shown. The focus is primarily on requirements of the PJM grid and in particular the need for power in the state of New Jersey.

Wholesale Levelized Cost of NJ Electricity Supply Options ($ per MWH)

	Capacity (MW)	Capacity Factor (%)	Economic Life (yrs)	LCOE With Tax Credits	LCOE w/o Tax Credits	LCOE* with Grid Backup Cost	LCOE** With Interconnect Cost
Utility Solar	150	25%	35	**54**	**63**	**106**	**115**
Onshore Wind	250	42%	30	**25**	**44**	**69**	**72**
Offshore Wind	1000	42%	30	**190**	**250**	**275**	**300**
Battery Storage (4 Hour)	100	14%	10-20	**175**	**233**	**233**	**252**
Large Nuclear	2200	95%	60	**140**	**190**	**140#**	**141#**
Small Modular Nuclear (SMR)	300	95%	60	**140**	**190**	**140#**	**141#**
Gas Peaker	150	15%	20	**169**	**169**	**169**	**170**
Combined Cycle Gas (CCG)	550	90%	20	**77**	**77**	**77**	**78**

CCG with Carbon Capture	550	90%	20	**81**	**106**	**106**	**107**
Coal	600	75%	40	**119**	**119**	**119**	**120**

*LCOE w/o Tax Credits plus Grid Backup **LCOE w/o Tax Credits plus Grid Backup and Interconnect Cost # with current law tax credits

The Table shows that the wholesale cost of electricity from offshore wind is the highest of all the options, four times that from combined cycle natural gas, and twice that for nuclear reactors (with current law tax credits) and utility-scale solar which are all relatively clean sources as far as carbon dioxide emissions go.

Combining the offshore wind generation cost with other utility costs such as distribution and administration, a single offshore wind project would increase Statewide average electric bills by at least 15% and industrial bills by 18%. See Table 6-1 of the July, 2024 Whitestrand study, Economic Analysis of the Atlantic Shores South Offshore Wind Project.

The full 11,000-megawatt offshore wind program envisioned in the current Plan would increase electric bills by at least 89 %. See Table 3-2 of the May 2025 Whitestrand study, Analysis of the New Jersey Energy Master Plan.

Other significant costs accrue to the New Jersey taxpayer, for subsidies provided to the companies for turbine foundation construction, staging, transmission upgrades and ultimately for the removal of the turbines which is not required in current agreements for the wind company to do.

Electric Reliability - The strongest periods of offshore wind off the New Jersey coast at night time and early morning, do not match up well with New Jersey peak demand periods of later morning and earlier evening. So, most of the electric energy generated from New Jersey offshore wind projects will go into the PJM grid. That favor is returned to New Jersey by the grid to meet New Jersey peak demands, but often at higher "marginal" electric rates and potentially with higher carbon-emitting sources diminishing regional carbon reduction (Enclosure 2).

Negative Environmental and Social impacts of Offshore Wind - Notwithstanding lofty phrases, offshore wind projects are by no means clean or green or environmentally benign. See Enclosures 4 and 5 for major risks involved, including that to our onshore air defense radars.

II. Greenhouse Gas Measures

1) The cost problem: opaque, enormous, and offloaded to ratepayers

The EMP's transition pathway carries very large, under-accounted-for costs — and much of the public debate shows those costs are neither settled nor fairly distributed. Independent analyses and critics have produced eye-popping headline numbers (e.g., consumer-advocate estimates of

very large multi-hundred-billion to trillion-dollar price tags for large electrification scenarios), and several business and ratepayer groups warned that implementation could drive substantial utility-bill increases for households and businesses. At the same time, the State's technical studies (e.g., the Brattle Group ratepayer impact study) explicitly acknowledge they did not capture many capital and public-program subsidy costs, leaving a dangerous blind spot between headline targets and what families will actually pay. This combination — big outside estimates, skeptical business groups, and an official study that omits capital/subsidy burden — is a recipe for sticker shock and political backlash.

Why that matters: a plan that underestimates or hides the true cost transfers the burden onto low-income households (who spend a larger share of income on energy) or on future taxpayers, and creates political fragility that will slow or reverse decarbonization when bills arrive.

2) Unrealistic deadlines and One-Size mandates

The EMP (and related executive orders) sets accelerated, legally backed deadlines — for example, moving toward 100% clean energy and phasing in electrification and zero-emission vehicle targets on very tight timetables. Those mandates have been widely criticized as unrealistic because they fail to square with on-the-ground constraints: available clean generation capacity, grid upgrades and transmission build-out timelines, EV charging infrastructure rollouts, workforce training, and supply-chain realities. Business groups, utilities, and even some clean-energy advocates have warned that mandating rapid deadlines without a measured, sequenced build-out will lead to policy whiplash, reliability stress on the grid, higher costs, and unmet targets. Politically and operationally, chronically missed deadlines undermine credibility and make it easier for opponents to demand rollbacks.

Why that matters: deadlines without realistic delivery plans produce either empty promises (targets missed) or hasty, expensive fixes (emergency procurement, stopgap subsidies) that raise costs and risk system reliability.

3) Gaps between Ambition and Actual Emission Reductions

Ambition alone doesn't equal emissions reductions. Several structural weaknesses in the EMP risk making it more symbolic than transformative:

- **Dependency on technologies and markets that are still fragile** (for example, offshore wind development has experienced cost and supply-chain setbacks and some projects have been canceled or defunded), undermining projected clean generation additions. When flagship technologies stall, the pathway to the plan's targets becomes much harder, Politico, Feb 3,2025.
- **Permitting and parallel approval of fossil projects** — critics point out the state has approved or allowed pending fossil projects even while pushing the EMP, which creates a mixed signal and locks in emissions for decades unless explicitly blocked. This undermines near-term emissions reductions.
- **Insufficient attention to System Integration and Reliability** — electrifying buildings and transport massively increases electric demand; without commensurate upgrades to transmission, distribution, and firm (dispatchable) clean capacity, the plan risks grid stress, higher costs, and even higher emissions from backup fossil generation during

periods of low renewables output. The EMP's high-level modeling does not fully resolve these operational realities.

Collectively, these gaps mean the EMP may be great at setting long-range goals but weak at ensuring those goals translate into verifiable, near-term emissions reductions — the difference between aspirations and delivered tons of CO_2 avoided.

4) Ineffectiveness in Addressing the Global Climate Change Problem

A. Insignificant GHG reduction compared to global emissions

- New Jersey's emissions are about **98 million metric tons (Mt) CO_2e.**
- For illustrative purposes we assumed an ambitious reduction of 33 percent by 2030 the which corresponds to a reduction of **32.6 million metric tons (Mt) per year**.

B. Putting that in global perspective

- The world emits on the order of **42 billion metric tons of CO_2**-equivalent emissions per year.
- The NJ reduction of 32.6 Mt is only **0.03 billion tons** per year — in other words, roughly **0.07%** (or less) of global emissions.
- That's insignificant in the grand scheme — while NJ's EMP may be ambitious for a single U.S. state, its contribution to mitigating global climate change is **almost negligible**.

C. Estimates of Global Temperature and Sea Level Rise Impact

- Used the emissions reduction of **32.6 million metric tons of CO_2 per year**
- Assumed that reduction is achieved by 2030 and continues *each year* for the horizon considered (used 10-, 30- and 70-year (out to 2100) horizons as examples).
- Converted the cumulative avoided CO_2 into an avoided global temperature change using the commonly used **TCRE** (transient climate response to cumulative CO_2) central estimate of **0.44 °C per 1,000 GtCO_2 emitted** (0.44 °C / 1,000,000 Mt CO_2). Source: IPCC AR6 Report, Chapter 5.
- Converted avoided temperature rise to avoided sea-level rise by 2100 and much longer (millennia) using:

    - **Near-term (to ~2100)**: a conservative round approximation of **~0.2 meters(m) or 20 centimeters (cm) of sea-level rise per 1 °C** of warming (order-of-magnitude for century-scale response — IPCC AR6 Report Chapter 9 shows centennial responses are much smaller than multi-millennial commitments).
    - **Long-term (multi-century to millennia)**: the Levermann et al. result often cited of **~2.3 m of eventual sea-level rise per 1 °C** if warming is sustained for centuries–millennia (this captures committed, slow ice-sheet and ocean expansion contributions). AntarcticGlaciers.org

Using **32.6 Mt CO_2 per year avoided**:

- **Cumulative avoided CO_2**
  - 10 years → **326 Mt CO_2**
  - 30 years → **978 Mt CO_2**
  - 70 years → **2,282 Mt CO_2** (≈ 2.28 gigatons (Gt) CO_2)
- **Avoided global warming (using TCRE = 0.44 °C per 1000 $GtCO_2$)**
  - 10 years → **~0.00014 °C** (0.14 milli-°C)
  - 30 years → **~0.00043 °C** (0.43 milli-°C)
  - 70 years → **~0.0010 °C** (1.0 milli-°C, i.e., one thousandth of a degree)
- **Avoided sea-level rise**
  - Using **~0.2 m per °C** (near term century-scale):
    - 10 years → **~0.000029 m** = **0.029 millimeters (mm)=0.0011 inches**
    - 30 years → **~0.000086 m** = **0.086 mm=0.0034 inches**
    - 70 years → **~0.00020 m** = **0.20 mm=0.008 inches**
  - Using **~2.3 m per °C** (long-term committed, millennia):
    - 10 years → **~0.00033 m** = **0.33 mm=0.013 inches**
    - 30 years → **~0.00099 m** = **0.99 mm=0.039 inches**
    - 70 years → ~**0.00231 m = 2.31 mm=0.091 inches**

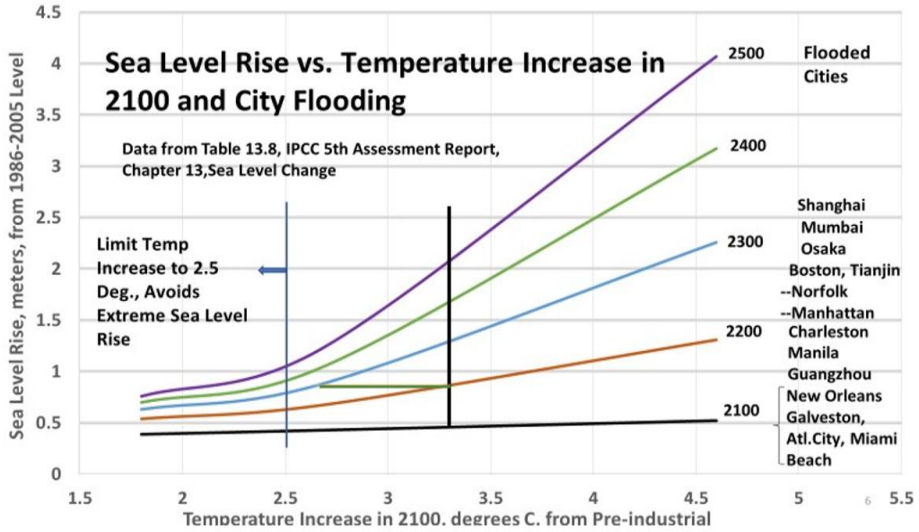
Therefore, the effect of an aggressive New Jersey program alone on sea level rise by 2100 would be only a **reduction of about one-hundredth of an inch from** a current-trend sea level rise of **26 inches**.(the latter based on the 0.2 meter per degree centigrade rate and current trends leading towards a 3.3 degree centigrade global temperature rise by 2100, see Enclosure 2) In 1000 years, the effect of the NJ program would be a minor **reduction of about one-tenth of an inch from** a rise of **300 inches (**the latter based on the 2.3 meter per degree centigrade rate and current trends leading towards a 3.3 degree centigrade global temperature rise by 2100, see Enclosure 2**).**

D. Transient Sea Level Rise Impact

Even the minuscule "century -scale" sea level rise changes described above are only transient as shown below because heat transfer is still occurring. Sea level rise is a complex process primarily resulting from the transfer of heat from elevated land and air temperatures levels to the ice caps melting them, and to the ocean expanding it. That process of heat transfer is fundamentally dependent on the product of the temperature difference times the time involved. Therefore, the same heat transfer. and sea level rise, can occur from a slightly lower temperature from a greenhouse gas reduction in a slightly longer time.

Sea Level Rise Analysis-with the Use of IPCC Data

- Sea level rise from greenhouse gases (GHG) is different than other air pollutants.
- GHG emissions raise the earth's land surface temperature, predicted in 2100
- Subsequent heat transfer to ice caps and oceans causes the sea level rise,
- The height of the seas level rise depends on both the 2100 land temperature rise and the time elapsed afterward.
- The earth is currently headed to a 3.3-degree Celsius rise by 2100
- In that regime, the chart below shows the effect of a lower temperature rise from a GHG reduction is to delay, not reduce or prevent, future seal level rise.



A 90 percent reduction (41 billion metric tons) of annual global GHG emissions is required to go from 3.3 degrees to a desired 2 degrees.

The Atlantic Shores project offered a GHG reduction of 2.6 million metric tons per the NJ BPU press release distributed in June 2021

Even accounting for an early reduction, the project will result only in a 0.00016-degree lower 2100 temperature rise.

The chart above shows a 0.65-degree reduction is needed to delay a given sea level rise by 100 years.

So, the only project impact is to lower the temperature rise by 0.00016 degrees and delay (not reduce) future sea level rise by about 9 days.

A nine-day delay in sea level rise is hardly a benefit worth a multi-billion-dollar investment.

This shows that the project has virtually no effect on sea level rise. In fact, it shows that the project does not reduce sea level rise at all. ***As long as heat transfer occurs, it only delays whatever sea level rise is coming by about 9 days.***

This estimate is confirmed by another study titled Estimation of Climate Change Damage Functions for 140 Regions in the GTAP9 Database by *Roberto Roson and Martina Sartori*
Development Economics, Development Prospects Group of June 2016.

Using their formula below for sea level rise (SLR):

$$SLR=[(\alpha+\beta\Delta t)(T-2000)] \quad (1)$$

where Δt is the change in average global temperature with respect to the baseline [1985-2005], and T is the year period. A panel estimation of equation (1) gives a value for the α coefficient of 0.000954281, whereas the corresponding value for β is 0.003421296.

This formula shows that when the change in global temperature goes down and the time period goes up you can get the same sea level rise.

Using their formula and the value of 3.3 Degree Centigrade for the expected change in temperature by 2100 used below, it **shows a delay of 2 days** in sea level rise from the project. Two to nine days of delay is hardly worth a $19 billion investment.

E. Conclusions Regarding Ineffectiveness of Climate Impact and Sea Level Rise

- Even sustained, ambitious New Jersey reductions of **32.6 Mt CO_2 per year** amount to **only a few gigatons of CO_2 avoided over many decades**. The corresponding avoided global warming is on the order of **10^{-3} °C** (i.e., one thousandth of a degree).
- The effect of an aggressive New Jersey GHG reduction program alone on sea level rise by 2100 would be a reduction of about one-hundredth of an inch from a current-trend sea level rise of 26 inches (the latter number based on the 0.2 meter per degree rate and current global trends leading towards a 3.3-degree centigrade rise by 2100, see chart in Enclosure 3)
- These minute differences in sea level rise are for a fixed future point in time. But even those negligible reductions are transient, the same sea level rise will occur a short time later as long as heat is being transferred from the land and air to the ocean and ice caps..
- In 1000 years, the effect of the NJ reductions would be about one-tenth of an inch from an expected rise of 300 inches (the latter number based on the 2.3 meter per degree rate and current global trends leading towards a 3.3-degree centigrade rise by 2100, see chart in Enclosure 3)

- Global emissions are **about 42 billion metric tons (42,000 Mt) CO_2 per year**. A single-state reduction of 32.6 Mt per year is 0.07% of annual world emissions. When converted to cumulative emissions and then to temperature and sea level changes , the global climate and sea-level impact from New Jersey's EMP alone is **negligible** — the plan's effect on global mean temperature and future sea level is essentially undetectable.
- If the goal is **direct, measurable global climate benefit** (avoided °C or avoided sea-level rise) the effect of a NJ Program alone is ***vanishingly small*** — a thousandth of a degree of warming avoided and one-hundredth of an inch of sea-level avoidance by 2100 compared to a 26-inch rise. That numerical reality is a useful factual anchor when evaluating whether the plan's local costs and mandated timelines are proportionate to its global climate contribution.

Uncertainties & Caveats

- TCRE and sea-level sensitivity have uncertainty ranges. Central/representative values (TCRE ≈ 0.44 °C per 1000 $GtCO_2$ were used; Levermann ~2.3 m/°C long-run). But even using the upper end of TCRE estimates the numbers remain trivially small.
- These calculations capture **direct** avoided CO_2 warming effects. They do **not** try to value co-benefits (local air quality, health, technical innovation spillovers, jobs) or leverage/multiplier effects (policies that encourage deeper federal action or spur large technologies). If New Jersey's policy catalyzes much larger national or global action, the aggregate impact could become meaningful — but that's unlikely and is a different (political/strategic) argument, not a single-state carbon accounting one.
- Sea-level rise is path-dependent and has strong long-time lags: even avoiding a small fraction of a degree now mainly changes multi-century to millennial commitments. Short-term (through 2100) differences are much smaller.

5) Equity and Distributional Fairness are Underdeveloped.

Multiple reviews (including academic/health-equity perspectives) show the EMP can disproportionately burden low-income and frontline communities unless there's a funded, enforceable compensation and protection plan. The Brattle study itself and State commentary acknowledged savings aren't universal; implementation without explicit, well-funded support will leave vulnerable households worse off. A climate plan that exacerbates inequality is both unethical and politically unsustainable.

6) Political and Implementation Fragility: one unfulfilled assumption can unravel years of plans

The EMP depends on coordinated federal funding, continuing private capital availability, stable regulatory support, and cooperative local permitting. When offshore wind projects, for example, lose financial backing or when federal approvals stall or are rescinded, entire supply

chains and job promises evaporate. Recent cancellations and policy reversals demonstrate that the EMP's success is brittle to realistic political and economic shock.

III. Overall Conclusions regarding the Current EMP;

- Its focus on **offshore wind** for electric supply will **significantly increase Statewide electric bills**, not provide reliable electric supply or long-term jobs and result in a host of environmental problems and other costs.

- The Plan overlooks the major environmental, job loss, defense and other risks and costs associated with offshore wind projects (Enclosures 4 and 5).

- The effect of a NJ GHG reduction program alone is **insignificant compared to the global emissions scale (42 billion tons/year)** — only on the order of 0.07% of global emissions.

- Its **effect** on **sea level rise** is **insignificant**: by 2100 a **reduction of about one-hundredth of an inch from** a current-trend sea level rise of **26 inches**, in 1000 years a **reduction of about one-tenth of an inch from** a current-trend rise of **300 inches.**

- Therefore, the EMP's **climate impact is vanishing small**, raising serious questions about whether its high cost and aggressive, potentially risky mandates are justified by the **actual climate benefits.**

- **Symbolic versus substantive climate impact**: Given how small NJ's emissions are relative to global emissions (and how modest the reductions are relative to global needs), the EMP risks being more symbolic than materially impactful on climate change. Critics can argue that the plan's high cost and aggressive mandates may not justify the **very limited contribution** to global emissions reduction.

- The **cost burden** (on ratepayers or taxpayers) is very hard to justify when the climate payoff is comparatively small at the global level.

- The **tight deadlines** (e.g., 2030) appear even more problematic if the net climate benefit is limited: accelerating investment and infrastructure at high cost for relatively small absolute reductions is not the most efficient path.

- Its **effectiveness** on climate, in a global sense, is weak; regardless of how "green" NJ becomes, global emissions will continue to rise unless major emitters (or many more states/countries) take similarly aggressive action which is currently unlikely.

- **Equity and justice concerns**: Given its relatively small global contribution, imposing very high costs on New Jersey residents — especially lower-income households — raises questions of fairness. Are local residents bearing a disproportionate burden of costs for a benefit that is globally marginal?

- **Combined with the earlier criticisms** about *high cost*, *unrealistic mandates*, and *implementation risk*, the modest GHG reductions make the EMP look less like a leverage effect for global climate change and more like an expensive, politically risky domestic signaling exercise.

IV. Recommendations - A New EMP Direction

Reliable, affordable and long-duration electric energy can be supplied to NJ through utility-scale solar, nuclear and natural gas plants- with a small carbon footprint.

Such plants can be brought online with confidence while offshore wind projects face significant uncertainties from overseas supply chain problems, and federal and shore community opposition and litigation. A utility-scale solar plant typically takes two to five years from initial planning to commercial operation. The time for small modular nuclear reactor construction is 3 to 5 years, with the entire project potentially taking 6 to 8 years from the initial decision to commercial operation, though this can be reduced significantly depending on the specific project, regulatory hurdles, and licensing processes. A larger nuclear plant will take longer, but modern plants such as the Westinghouse AP1000 have already been constructed. A realistic timeframe for a new combined cycle natural gas plant is 3 to 5 years, though current supply chain issues may cause delays.

Since New Jersey GHG reductions by themselves will have virtually no effect on the climate change problem, a better **State resource allocation strategy** would involve the following:

- Pursuit of modest, relatively inexpensive (on a cost per ton of GHG avoided basis) NJ GHG avoidance measures (See Enclosure 1 for suggested cost-effective options).

- Redirection of other effort and funding towards identifying, demonstrating, and then exporting specific GHG avoidance measures that can be deployed widely globally, which would have a significant impact on the global problem (See Study Framework in Enclosure 3) and create long-term economic opportunities for the State.

- Redirection of resources towards beginning shore and other State resource protection and resiliency measures in recognition of the reality that some sea level rise and other impacts are coming, but that we do have time to deal with them.

Enclosure 1

Potential NJ GHG Avoidance Measures — Median Cost Per Ton of GHG-equivalent Avoided Estimates

The Tables below show measures New Jersey could use to avoid greenhouse gas emissions from all sectors, electric generation, buildings, commercial, industrial , agricultural, and energy conservation. The first column of the table is the measure to be used. The second column is the cost per short-ton of Greenhouse gas avoided. The third column shows the calculation used and the source material.

For electric generation measures the formula used to derive the cost per ton of GHG avoided was:

(LCOE of Generating Source- Cost of Energy Displaced, both in $ per MWH)/ Tons of GHG Displaced per MWH

The LCOE of the generating source was taken from the Whitestrand Table 1 above. It was assumed that those measures would displace energy from the PJM grid at a cost of $68 per megawatt hour and emitting 0.41 tons of GHG per megawatt hour based on PJM trends data.

Cost-Effective Options with Cost per Ton of GHG Avoided Less than the Social Benefit

(Based on (a liberal) global social benefit of a ton of GHG avoided of $190 adopted by the EPA in November, 2023)

Measure	Cost per short-ton avoided ($/short-ton)	Calculation / Source / Notes
Utility-scale solar	$139	LCOE = $125/MWh; displaces PJM grid $68/MWh; avoids 0.41 tCO_2/MWh → ($125−$68)/0.41 = $139/short-ton. Source: Table 1 LCOE estimates, PJM grid data.
Small modular nuclear reactor	178	LCOE = $141/MWh; same PJM displacement → ($141−$68)/0.41 = $178/short-ton. Source: Table 1, PJM grid emission factor.
LED lighting (residential/commercial)	-75	Cost-negative: savings greater than cost. Range: -$43 (residential) to -$108 (commercial), average ≈ −$75. Sources: LBNL, DOE, EPA.
High-efficiency new construction / building codes	-217	Net savings from reduced energy cost over lifetime. Sources: LBNL, DOE/PNNL. Depends on baseline building.
Current Hybrid Vehicle	-131	Net savings over lifetime from reduced energy cost. Sources: ICCT for incremental cost, EPA CO2 emissions, EIA, FHA.
Advanced hybrid vehicle (HEV)	-144	Net savings over lifetime from reduced energy cost. Sources: ICCT, DOE, EPA, FHWA.

Measure	Cost per short-ton avoided ($/short-ton)	Calculation / Source / Notes
Mid-range battery electric vehicle (BEV)	-136	Net savings over lifetime from reduced fuel cost. Sources: ICCT, DOE, EPA, IEA.
Electric transit / fleet buses	160	Sources: American Enterprise Institute, Alternate Fuels data center, EPA, NREL. Costs depend on subsidy, electricity source, lifecycle.
Combined heat & power / waste heat recovery (industrial)	75	Range 0–150; median ≈ 75. Source: DOE, ORNL, EPA industrial energy-efficiency studies. Reduces fuel consumption & grid electricity use.
Industrial electrification / process heat	77	Range $40–160 per metric ton. Sources: LBNL, CARB, DOE electrification studies, IPCC, OSTI. Depends on baseline fuel and electricity carbon intensity.
Anaerobic digesters (manure)	30	Range = $20-100 per short-ton. Sources: Rural and SKS Development, Penn state.
Precision nitrogen / fertilizer management	-58	Net cost savings over lifetime from less fertilizer use. Practices reduce N_2O emissions efficiently, a strong GHG. Sources: McKinsey, USDA, EPA, WRI.

Measure	Cost per short-ton avoided ($/short-ton)	Calculation / Source / Notes
Cover cropping / no-till / soil carbon practices	120	Sources: USDA, Science Direct. Depends on crop, soil, and incentive payment.
Commercial building energy efficiency (HVAC retrofits, insulation)	63	Range $32—169 per short ton. Sources: DOE commercial building retrofit program reports, ACEEE evaluations, EPA egrid.
Energy conservation programs (behavioral, smart thermostats, load management)	42	Range $32-85 per short ton. Sources: ACEEE, LBNL, EPA egrid. Many programs are cost-neutral or slight net savings.

Cost-Ineffective Options with a Cost per Ton of GHG-equivalent Avoided Greater than the Social Benefit

(Based on (a liberal) global social benefit of a ton of GHG avoided of $190 adopted by the EPA in November, 2023)

Measure	Cost per short-ton avoided ($/short-ton)	Calculation / Source / Notes
Offshore wind	566	LCOE = $300/MWh; same PJM displacement → ($300−$68)/0.41 = $566/short-ton. Source: Table 1, PJM grid emission factor.

Measure	Cost per short-ton avoided ($/short-ton)	Calculation / Source / Notes
Residential weatherization / home efficiency	233-299	Sources: Fowlie et al., NBER Working Paper: Evaluating the Weatherization Assistance Program. Median estimate from program evaluation of U.S. homes.

Key Notes:

1. **Electric generation measures**: incremental cost divided by avoided PJM grid emissions (0.41 tCO_2/MWH).
2. **Transportation measures**: Argonne National Lab cost-of-avoided-GHG studies are useful I..
3. **Buildings / commercial / industrial / agriculture**: literature ranges reported; median used for cost per ton estimate.
4. **Negative costs**: imply net savings to the program or system.
5. **All estimates** are reasonable for **New Jersey context**, using U.S.-based literature and program data.

Enclosure 2

Offshore Wind GHG Reduction in Practice

The computed cost of avoiding carbon emissions in Enclosure 1 from NJ wind projects is greater than the global social benefit achieved. But because NJ will draw on higher carbon emitting sources from the PJM electric grid when the wind is not blowing, it is questionable whether any greenhouse gas reductions will be achieved on a regional basis, which after all is what counts.

This depends upon the capacity factor for the project. A capacity factor is the ratio between actual energy produced and the hypothetical maximum energy possible. It's a key metric in assessing emission displacement potential. Research demonstrates that a minimum capacity factor of 33% is necessary for wind power to induce any net reduction in CO_2 emissions when displacing combined cycle natural gas, a large component of the PJM grid source. An Arizona State University study explained, "if wind power is displacing combined cycle natural gas the capacity factor has to be greater than 33% for a net reduction in CO2 emissions."[1] This is partially due to the inefficient ramping and cycling of gas plants required to compensate for wind variability. Combined cycle natural gas is currently the primary source of electricity generation in the United States, both in terms of total generation and dominance among fossil fuel sources.

Empirical data from numerous existing offshore wind projects generally suggests that capacity factors are insufficient to engender any significant greenhouse gas reduction. For example, the average capacity factor for 36 wind farms in/near United Kingdom was stated to be 37%,[2] but notably the study found that capacity factors for offshore wind decrease much more celeritously than onshore wind projects. "Hughes [6] found that the capacity factor of Danish offshore wind farms decreased from 39% to 15% during 10 years of operation, from 2002 to 2012. This indicates

[1] https://www.degruyterbrill.com/document/doi/10.7569/jsee.2017.629514/html

[2] https://docs.wind-watch.org/Wind%20Energy%20-%202024%20-%20Lorentzen%20-%20Immature%20Offshore%20Wind%20Technology%20UK%20Life%20Cycle%20Capacity%20Factor%20Analysis.pdf

that the deterioration in capacity factor tends to be more rapid in offshore wind farms."[3] Given a linear rate of decline, that implies that the Danish offshore wind farms' capacity factor was already below the aforesaid 33% between year 2 and year 3 of operation.

Moreover, Stateside, modelling simulations strongly corroborate the notion that observational capacity factors will be quite significantly lower than offshore wind manufacturers' aggressive projections. Based upon a best-case theoretical estimate, the AWS Truewind model estimates a 27% capacity factor for New England (onshore wind) and 35% for New England (offshore wind). "Based on the AWS Truewind model, the theoretical average capacity factor is 27% for onshore New England and 35% for offshore."[4] Given offshore New England contains some of the strongest average annual wind speeds on the East Coast of the USA,[5] the estimate of 35% for offshore New England would indubitably be even lower for locations south of New England in latitude.

As such, it is entirely unreasonable to dogmatically assert that offshore wind along the East Coast of the U.S. will induce meaningful reductions in greenhouse gas emissions; in fact, it is controvertible whether any such reductions will result. Both empirical and modelling data suggest the evidence is borderline that offshore wind will even exceed the break-even point of 33%. At capacity factors below 33%, negative net GHG emission reductions can result (i.e., more emissions than would have otherwise occurred without offshore wind), especially when accounting for the inefficiencies introduced by the intermittent nature of wind power and the resultant cycling of backup fossil fuel plants. Indeed, even Vineyard Wind concedes that there will be no climate mitigation impact, "Overall, it is anticipated that there would be no collective impact on global warming as a result of offshore wind projects, including the Proposed Action alone . . ."

Finally, there is no basis presented in the final Environmental Impact Statements or elsewhere for these projects to even assume that greenhouse gas emissions on a regional scale will be reduced at all. This is in fact, contradicted by the consultant, Levitan & Associates Inc., engaged by a number of states to do these types of analyses. In its report to the Maryland Public Service Commission of March 17, 2017 titled, "Evaluation and comparison of US wind and Skip Jack proposed offshore wind project applications," regarding the "regional" state –interconnected PJM transmission grid, and the US wind project, Levitan states on page 92 that: "The market response that will displace 372 megawatts of planned onshore wind resources in western and central PJM will cause carbon emissions to increase in western and central PJM due to increased coal generation. Since coal generation is more than twice as carbon intensive as gas fired generation, the

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[3] https://docs.wind-watch.org/Wind%20Energy%20-%202024%20-%20Lorentzen%20-%20Immature%20Offshore%20Wind%20Technology%20UK%20Life%20Cycle%20Capacity%20Factor%20Analysis.pdf

[4] https://www.iso-ne.com/committees/comm_wkgrps/othr/sas/mtrls/may212007/levitan_wind_study.pdf?utm_source=chatgpt.com

[5] https://www.energy.gov/eere/wind/articles/united-states-land-based-and-offshore-annual-average-wind-speed-100-meters

[6] Appendix A - Vineyard Wind 1 Offshore Wind Energy Project Final Environmental Impact Statement Volume II (Mar. 2021), https://tethys.pnnl.gov/sites/default/files/publications/Vineyard-Wind-1-FEIS-Volume-2.pdf, page 6

decrease in gas fired emissions in MMAC region is outweighed by the increase in coal emissions in western PJM, and overall emissions in PJM would increase due to the US Wind project."

Since the Atlantic Shores offshore wind project is also offsetting gas-fired generation in New Jersey and is part of the same PJM regional network, a similar situation exists for that and other projects. Therefore, it is anticipated that regional greenhouse gas emissions would increase and not decrease, contrary to the unsupported statements in the final EISs.

Enclosure 3

Framework for Identifying Measures for Widespread Global Deployment

Save Long Beach Island, Inc.
PO Box 2087
Long Beach Township, NJ 08008
www.savelbi.org

September 10, 2025

To: Potential Climate Change, New Plan, Sponsors

This letter is intended to provide constructive suggestions on how your organization could best address the climate change issue at this time.

My name is Bob Stern. I currently head the Save Long Beach Island, NJ organization, which from the name you can assume that we are not enamored with the offshore wind project proposed here. However, we do share your concern about the climate change problem and the need to address it promptly. In fact, one of the reasons for our opposition to the offshore wind project is that it is by far not the most cost- effective way, on a dollar per ton of greenhouse gas removed basis, to address the problem.

I have a Ph.D. degree in engineering and applied mathematics. In previous roles, I managed the environmental reviews for the U.S. Department of Energy, oversaw Air Quality Planning for the State of New Jersey (which included work on long range transport of ozone precursors and greenhouse gases), and worked with several local members of Congress on climate change when

serious legislation was under consideration. In doing that, I immersed myself in the climate change reports and, with my engineering, science, math and energy background, believe I have a decent understanding of the primary mechanisms at work.

The science of the climate change problem is well established. It is real. It is currently primarily caused by fossil fuel use. There is limited time to address it and doing so requires a real global commitment. The key issue then, given that the U.S. is just one player among many nations, is what we realistically can do about it.

The current global effort is floundering, a result in part of unrealistic goals and a leadership vacuum on the international scene. As shown below, recent projections by the U.S. Energy Information Agency show energy related carbon dioxide emissions rising steadily from 35.7 billion metric tons in 2022 to 41 billion metric tons in 2050 with no sign of the trend curving downward. Should that emission trend continue, the global average surface temperature in 2100 would rise to about midway between 2.7 degrees centigrade (the SSP2–4.5 scenario of the IPCC AR6 report) and 4.0 degrees (the SSP3–7 scenario), or approximately 3.3 degrees centigrade (6 degrees Fahrenheit) . Such a large temperature rise would portend major sea level rise, inundation of many coastal areas, and other major climate change impacts.

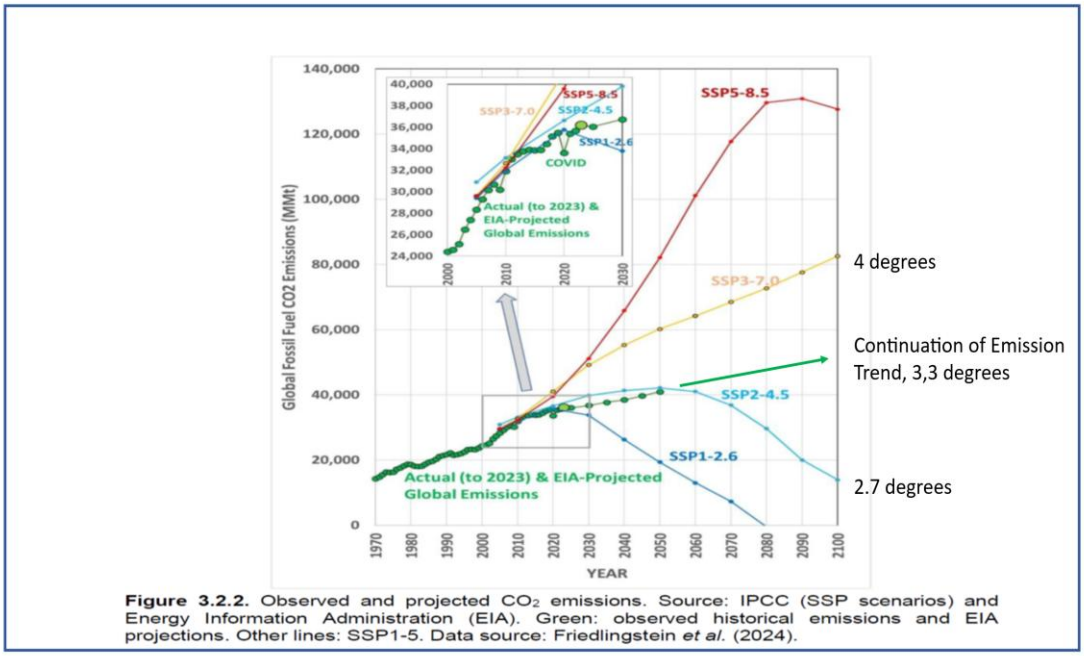


Figure 3.2.2. Observed and projected CO_2 emissions. Source: IPCC (SSP scenarios) and Energy Information Administration (EIA). Green: observed historical emissions and EIA projections. Other lines: SSP1-5. Data source: Friedlingstein *et al.* (2024).

This suggests that your funding of certain mainstream environmental organizations and university departments to deal with the issue has been ineffective. For some, their stubborn adherence to unrealistic fossil fuel use reduction goals, particularly for developing countries, has been a barrier to securing real international commitments. Their litigation against particular domestic fossil fuel projects may be gratifying to some of their membership, but does virtually nothing to address the larger climate change problem,. Some university-based programs, such as the Climate and

Development Laboratory at Brown University, have adopted a strongly adversarial posture toward fossil fuels, lambasting those associated with them or allegedly associated with them (but not). Such approaches do not reflect the reality of global energy needs, and have just fostered divisiveness and a backlash against making real climate mitigation progress.

A new inclusive, more tolerant, collaborative and practical approach is needed. Our thoughts on resetting that global effort towards realistic goals and practical measures that can get the buy-in from the many countries that are essential to significantly mitigate the problem are provided in the enclosed Power Point briefing. The numbers in there are somewhat dated, but the points being made, I believe, are still valid.

There is no clear, publicly comprehensible roadmap to mitigate the worst impacts to come. Your organization's leadership here in a new direction could begin with the funding of a comprehensive, up-to-date, plain language study providing: (1) a realistic global greenhouse reduction goal, (2) a country-by-country menu of practical, achievable, socially acceptable greenhouse gas reduction and climate change preparedness measures that can be implemented to meet that goal and (3) a means for monitoring progress. That then could lead to securing the essential other country buy- in. Once that is secured, the U.S. could demonstrate and export the most promising measures, while doing its fair share of the effort required at home.

We estimate roughly that such an effort could cost about $6.5 million and is beyond the capabilities of our organization to do. We, therefore, are inquiring as to whether you have any interest in funding such an effort. If so we would suggest a meeting with your staff to discuss how such an effort would be framed, what persons or entities could be assembled to do it, what previous studies it might build from, and how it would be directed and promoted. Perhaps I and/or a few others I have worked with on this matter might play some modest role in the latter.

Please advise regarding your interest or not. If you have any questions or you would like to arrange a time to for us to present the Power Point briefing, please call me at 917-952-5016.

Thank you for considering.

Bob Stern

Bob Stern, Ph.D., President
Save Long Beach Island Inc.
info@savelbi.org

Enclosure 4

Benefits and Risks of an Offshore Wind Project

-the Atlantic Shores South Project off the New Jersey Coast-

Save Long Beach Island, Inc.

June 10, 2025

https://www.savelbi.org/benefits-risks

Save Long Beach Island, Inc. (Save LBI)
info@savelbi.org

Benefits and Risks of an Offshore Wind Project

Myth and Fact Regarding the Atlantic Shores South Project off Long Beach Island (LBI) and Brigantine, NJ.

Introduction

There has been and continue to be much misinformation about the benefits and damage from offshore wind projects. Based on Save LBI's professional level research over the past four years with respect to the Atlantic Shores project, we provide below what we believe represents both the unfounded and well-founded information regarding that project. Many of the issues for that project are found in others.

We hope that offshore wind project proponents will read this, and if their goal is reducing greenhouse gasses, consider the many other alternative ways of doing that that are far less costly and environmentally damaging.

Impacts Addressed

1. Climate Change
2. Greenhouse Gas (GHG) Reductions.
3. Sea Level Rise.
4. Electric Cost
5. Job Creation and Loss
6. Visible Impact
7. Onshore Airborne Noise
8. Onshore Air Quality
9. Harm to Marine Mammals-Vessel Surveys.
10. Harm to Marine Mammals- Pile Driving
11. Harm to Marine Mammals-Turbine Operation
12. Air Defense Radars
13. Vessel Navigation Safety
14. Marine Archeological Resources
15. Decommissioning and Turbine Removal

1. Climate Change

Myth: Offshore wind projects will reduce climate change.

Facts and Evidence: These projects have virtually no effect on climate change.

The environmental impact statement (EIS) for the Atlantic Shores project itself states that the project will have a "negligible" impact on climate change.

The Vineyard Wind EIS concedes that there will be no climate mitigation impact, stating that "Overall, it is anticipated that there would be no collective impact on global warming as a result of offshore wind projects, including the Proposed Action alone".

The Revolution Wind draft EIS also acknowledges that the full build out of all projects in total will have “no measurable influence on climate change”.

No reports have been put forward by proponents showing any specific mitigations of climate change from the projects, only vague unsupported statements of “addressing”, “tackling” or “dealing with” climate change.

2. Greenhouse Gases

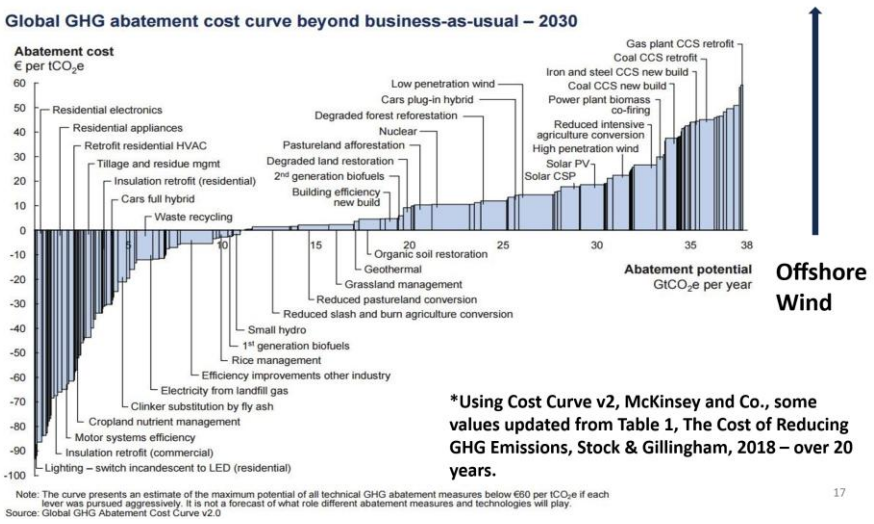
Regional Reductions; there is no basis presented in the final environmental Impact statements or elsewhere for these projects to assume that greenhouse gas emissions on a regional scale will be reduced at all. This is in fact, contradicted by the consultant, Levitan & Associates Inc., engaged by a number of states to do these types of analyses. In its report to the Maryland Public Service Commission of March 17, 2017 titled, “Evaluation and comparison of US wind and Skip Jack proposed offshore wind project applications”, it stated regarding the “regional” state –interconnected PJM transmission grid, and the US wind project, on page 92 that:

“The market response that will displace 372 megawatts of planned onshore wind resources in western and central PJM will cause carbon emissions to increase in western and central PJM due to increased coal generation. Since coal generation is more than twice as carbon intensive as gas fired generation, the decrease in gas fired emissions in MMAC region is outweighed by the increase in coal emissions in western PJM, and overall emissions in PJM would increase due to the US Wind project”.

Since the Atlantic Shores offshore wind project is also offsetting gas-fired generation in New Jersey and is part of the same PJM regional network, a similar situation exists for that and other projects. Therefore, it is anticipated that regional greenhouse gas emissions may increase and not decrease, contrary to the unsupported statements in the final EISs.

Alternative GHG Reductions; if one is looking for greenhouse gas reductions, there are many less expensive and more effective ways to go about it, as shown in the chart below. It shows the cost per ton of GHG removed, moving from the left with energy conservation measures that ultimately save money to the increasingly expensive options. Offshore wind is the most expensive of all. Adding commercial level energy storage to it, which some are proposing, would dramatically increase that cost even more.

Green House Gas Reduction– Better Options than Offshore Wind Turbines



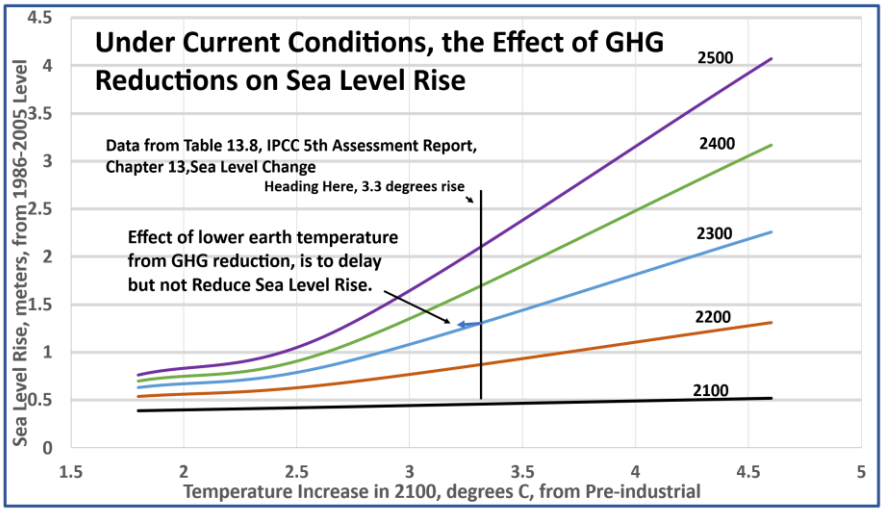
Note: the cost per ton removed for offshore wind is 97 euros per metric ton of CO2e (using Whitestrand 2024 cost and EIS carbon dioxide reduction numbers).

3. Sea Level Rise

Myth: Offshore wind projects will reduce or stop sea level rise.

Fact: An offshore wind project will not stop or reduce sea level rise, only delay whatever is coming by a matter of days.

The graph below, using data from International Panel on Climate Change (IPCC) Reports shows that a small decrease in the land temperature by 2100 from greenhouse gas reductions, coupled with a slightly increased time results in the same sea level rise. That is because sea level rise involves heat transfer from the land to the ocean and ice caps which fundamentally depends on the temperature difference between them and the elapsed time. So, this project does not reduce sea level rise at all, it only delays whatever sea level rise is coming by about 9 days based on the IPCC data and the GHG reductions for the project EIS.



This estimate is confirmed by another study titled: "Estimation of Climate Change Damage Functions for 140 Regions in the GTAP9 Database" by *Roberto Roson and Martina Sartori* Development Economics, Development Prospects Group of June 2016. Their formula for sea level rise (SLR) is: $SLR = [(\alpha+\beta\Delta t)\ (T - 2000)]$, where Δt is the change in average global temperature with respect to the baseline [1985-2005], and T is the year period. A panel estimation of equation gives a value for the α coefficient of 0.000954281, whereas the corresponding value for β is 0.003421296.

The formula shows the same effect as the IPCC data, that when the change in global temperature decreases but the time period increases proportionately, you get the same sea level rise. So, the only effect now of greenhouse gas reductions is to delay, but not to stop or reduce sea level rise. Their formula, using a value of 3.3 degrees centigrade for the expected change in global land temperature by 2100, shows a delay of 2 days in sea level rise from the project. Two to nine days of delay in future sea level rise is hardly worth a $19 billion investment.

4. Electric Rates

Myth: Offshore wind projects will lower energy costs.

Fact: Offshore wind is the most expensive of all commercial electric generation sources today, and can only increase electric costs.

Based on a comparative study by Whitestrand Consulting, it costs $250 for an offshore wind project to deliver one unit of electric energy- a megawatt hour. This is much higher than the $140 for a small nuclear reactor, $169 for a natural gas peaking unit, and $63 for a utility solar project, and does not include the use of battery storage, which would be prohibitively expensive to provide back-up for the substantial periods of time when the wind is not there. Based on another study by White Strand Consulting of the impact of the Atlantic Shores South project on electric rates, it is shown that electric rates will increase NJ-wide by 11% for residential use, 13% for commercial users and 15 % for industrial users from that project alone.

5. Job Creation & Loss

Myth: Offshore wind projects will create thousands of jobs.
Fact: A project will only create at most a few thousand temporary (2-3 year) construction jobs at the expense of lost permanent jobs in the tourism industry and in the commercial and industrial sectors from higher electric rates.

Temporary Construction Jobs; we would surely expect a project such as the Atlantic Shores South wind project with a $19 billion capital cost to create some jobs, but the New Jersey jobs created are relatively few and temporary with most going overseas for the manufacturing of the turbines. Based on a scaling back of all reported job-years (NJ and overseas) by the company to New Jersey jobs based on a study in the State's Offshore Wind Strategic Plan, the actual job gains in the State would be 183 during seven years of development, 1,154 jobs over a three-year construction period, followed by 219 jobs over the operational life of the project.

Job Losses Tourism; these modest, mainly temporary gains however are more than offset by about 5,000 job losses in the tourism industry over a long time period, based on a Bureau of Ocean Management (BOEM) sponsored tourism impact study and a NOAA shore employment data base.

Jobs and Revenue Loss Electric Rate Increases; a study, titled the Cost and Economic Impact of New Jersey's Offshore Wind Initiative, by Beacon Hill Institute at Suffolk University, June 2011, found that a 2 percent increase in electric rates in New Jersey results in an annual loss of 2,219 jobs, with an average decrease in wages of $111 per year. It also causes a Statewide loss of $330 million in annual disposable income. A 12 percent rate increase from the Atlantic Shores South projects projected by an economic consultant, White Strand Inc. would result in an annual loss of 13,314 jobs, an average decrease in wages of $ 666 per year, and a Statewide loss of $1.98 billion in annual disposable income. Over the life of the project, this results in a total present (2024) value loss of $40 billion. (Economic Analysis of the Atlantic Shores South Offshore Wind Projects, Edward, P. O'Donnell, White Strand Consulting LLC, August 2024).

6. Visible Impact

Myth: Offshore wind turbines will be barely or rarely visible.
Fact: The Atlantic Shores Turbines Will Cause Irreparable Harm to Citizens Access to Unobstructed Views of New Jersey's Oceans.

With 1000- plus foot -high turbines starting just 9 miles from the shore, this project would be the most visible modern wind project in the entire world. It would destroy the natural beauty of an unvarnished ocean vista from an 18 mile long, 5000-year-old barrier Island.

Despite the extensive use of a consultant study in the EIS Appendices using an unrelated meteorological study of visibility of an unknown object onshore and purporting to show that the turbines will be visible only rarely, the Bureau of Ocean Energy Management (BOEM) actually admits to such visible impacts in other studies for smaller turbines farther away.

The BOEM concluded in its NY Visual Assessment Study that the Jones Beach scenario of 577-foot-high turbines, 15 miles offshore, would have its worst "dominant" visual impact ranking of a 6.

A visibility level 6 means that "the turbines **dominate** the view because the study subject fills most of the visual field for views in its general direction. Strong contrasts in form, line, color, texture, luminance, or motion may contribute to view dominance. An object/phenomenon with strong visual contrasts that is so large that it occupies most of the visual field, and views of it cannot be avoided except by turning one's head more than 45 degrees from a direct view of the object. The object/phenomenon is the major focus of visual attention, and its large apparent size is a major factor in its view dominance. In addition to size, contrasts in form, line, color, and texture, bright light sources and moving objects associated with the study subject may contribute substantially to drawing viewer attention. The visual prominence of the study subject detracts noticeably from views of other landscape/seascape elements".

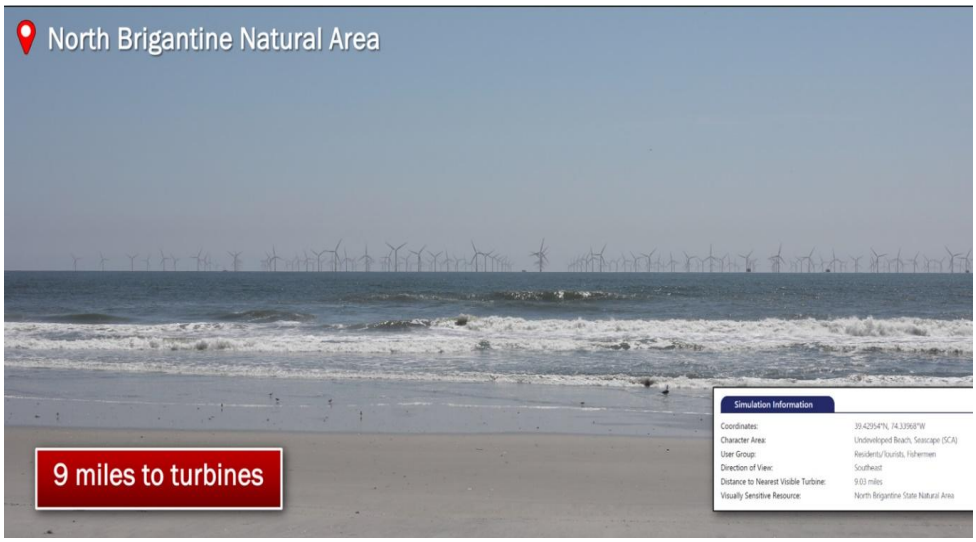
The Vesta-236 turbines approved by the NJ BPU for the project off LBI would have an even worse and disturbing visual impact.

Rotating Blade Effect. The EIS does not address this at all. The Construction and Operations Plan (COP) refers to a separate study done but does not present or cite it. Rotating turbine blades are visible at distances slightly less than that for the stationary turbine. Therefore, the turning blades will be clearly visible under the dominant, unavoidable view conditions discussed just above. The human impact of a view of that rotation is disturbing because of the disparity between what the brain expects to see at the seashore and the actual view, it could cause visible induced vertigo or other physiological effects. It may force the viewer to turn away from the shore and face down beach or the dunes, hardly the thing people come to the shore to do.

It is undisputable that geometrically the Atlantic Shores turbines will be visible for up to 40 miles, essentially fencing in the majority of Atlantic & Ocean County beaches. Brigantine NJ is among the closest points to the Atlantic Shores South Project. According to Atlantic Shores COP, the character of Brigantine will be changed forever. "With the proposed Project in place, the view is **dominated by a large and highly visible array** of WTGs that extend across a large portion of the ocean view to the southeast from this location…Panel members indicated that the WTG's become dominant elements in the view. They reduce the view's sense of openness and add a large number of built features to what was previously an open, undeveloped ocean view."

According to the COP, "the presence of the turbines tends to enclose the view and adds substantial **visual clutter**. This effect is enhanced by the transition of the WTGs from an apparent disorderly organization to a regimented alignment across the field of view. The movement of the rotor blades will also attract viewer attention and make the turbines the focus of this view." Attachment E, Visual Simulations, pp. 38

According to Atlantic Shores this is what the Atlantic Shores South project turbines will look like from Brigantine.



The above simulation is not even a fair representation of what it will actually look like from the Brigantine beach. Because of the scale used in presenting these visuals in the EIS, in an actual view the turbines would be a third larger and higher. In addition, this visual only contains 34 percent of all the visible turbines after all the planned projects are completed.

7. Airborne Noise Levels at the Shore

Myth: The turbines are far enough offshore so that they won't be heard onshore.

Fact: Pile driving noise will be heard at the shore from closer pile locations during more typical stable atmosphere conditions, and from farther locations during inversion conditions. Operational turbine noise will be heard during inversion conditions. In both cases, indoor noise levels over large areas at the shore during inversion conditions are expected to exceed the levels at which sleep disturbance, annoyance and health effects can occur.

Airborne noise assessments from offshore wind activities have been done for several projects, for example, the Revolution Wind, Kitty Hawk Wind, South Fork and Sunrise projects. However, no assessment was done for the Atlantic Shores South project, which is the closest to shore of all the projects on the East Coast. This required Save LBI to engage its own noise expert consultants to do its own assessment of noise propagation over the water.

It was found that the assessments being done use standardized models that do not account for inversion conditions that enhance noise transmission over water. Those assessments use a standard International Organization for Standardization (ISO) 9613 model which states in its User Manual that: "inversion conditions over water surfaces are not covered and may result in higher sound pressure levels than predicted from this part of I. S. O. 9613-1".

Therefore, estimates of that increased noise due to those conditions was included from other studies. It was found that such conditions occur frequently at night and on about one-third of summer days, and can add up to 11 decibels (dB) to received onshore noise levels based on industry observations as reported in a review study done for Save LBI by Rand Acoustics, Inc.

The underwater noise exposure modeling reports for the project say that pile driving will begin in the day, but may continue into the night. Those reports say that it will require 8.5 hours to drive one 15-meter diameter foundation into the seabed, but that assumes continuous operation with pile strikes every two seconds. Considering downtimes, it is likely that pile driving will continue into the night. The pile driving is also concentrated in the summer to avoid the January through April migration period of the North Atlantic right whale. The pile driving and turbine operating noise is also concentrated at lower frequencies which more readily penetrates houses.

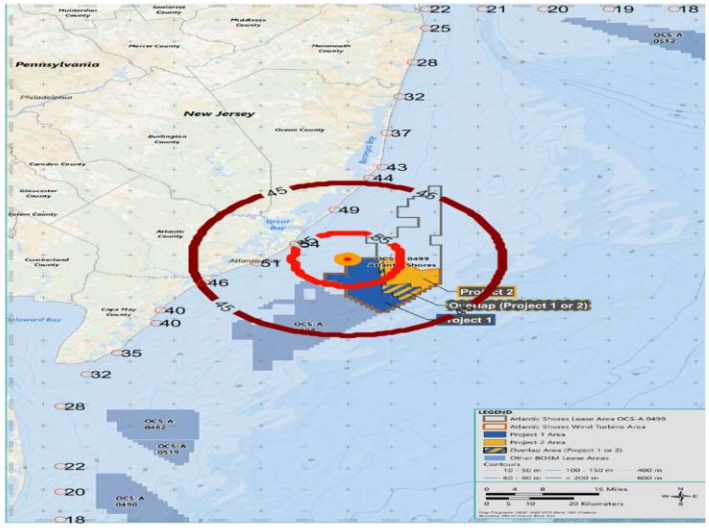
The noise impact modeling done by Save LBI's consultant considered both the increasing pile driving energy and noise source levels from the beginning of the pile driving operation to the end, as well as the decreasing height of the noise source during that same period.

The modeling results were compared to local noise residential standards, 50 dB for outdoor nighttime for LBI, 50 dB for Brigantine, NJ all the time, and to a 40 dB indoor level at which sleep disturbance and other annoyance is expected.

The results are rather startling as shown below. For pile driving, the standard model, without atmospheric inversions, shows exceedance of the 50 dB outdoor level during certain phases of the pile driving operation for closer pile locations. Under inversion conditions, outdoor levels above 50 dB can be expected for those and other pile locations over large onshore areas. Accounting for noise attenuation by houses, those outdoor levels are expected to cause indoor levels above the 40 dB level resulting in sleep disturbance and other annoyance.

Xi Engineering Consultants

Noise contour maps – 3000 KJ source term, 15km to shore, dB(A)



Onshore Noise form Turbine Operation; the standard noise modeling conducted by the acoustics company shows levels at the shore from the multiple turbine operation of the wind complex just below the 50 dB level. So here again, under inversion conditions large onshore areas can be expected to exceed the 50 dB outdoor level and the 40 dB indoor level. In addition, the noise here occurs all the time that the turbines are operating, day or night. It also has a pulsating character to it caused by the turbine blades passing the tower which makes it even more perceptible and annoying.

Onshore Noise, Health Effects: Save LBI also employed an expert in the health impacts of noise who concluded that; “Industrial wind turbines emit a unique form of environmental noise, which at sufficient levels causes high annoyance and adverse health effects in a substantial percentage of exposed populations. I have a high degree of confidence that the reported information and data in the Save LBI and XI-Engineering reports provide a solid basis on which to assume that the proposed wind turbine project off the shores of Long Beach Island will result in adverse health effects in a substantial proportion of onshore residents if either of the proposed (200- or 136-turbine) projects is approved”.

8. <u>Onshore Air Quality from Offshore Construction</u>

Myth: Pile driving operations are far enough offshore to pose no threat to onshore air quality.

Fact: Those Operations Involve intense vessel and Diesel Engine activity, and the emissions from them can contravene onshore air quality standards.

This is particularly the case for sensitive onshore areas such as the Brigantine National Wilderness area near the Atlantic Shores South wind project. The air quality modeling done for that showed daily fine particulate concentrations approaching the stringent prevention of significant deterioration (PSD) criteria for that area. But the modeling used an “average”

emission rate and did not disclose whether the air emissions modeled from the equipment and vessels being used accounted for the energy needed to pile drive the foundations, which can vary by a factor of ten from the beginning to the end of the pile driving cycle. In addition, the modeling report did not disclose the daily schedule for the pile driving, which if extends towards or into the evening, would couple the highest pile driving energy and emissions with nighttime inversion conditions that can significantly enhance the propagation of pollutants to the shore.

The daily standard for fine particulates is based on the second highest value for the year, so unless the modeling accounted for these factors, it likely underestimated the concentrations at the wilderness area, and proper modeling could readily result in exceedances of the PSD criteria.

Likewise, the operations and maintenance air quality modeling did not show and may not have accounted for the frequency of major turbine, repairs or component replacements, which again could involve substantial engine activity. The air quality impacts from ultimate turbine removal were also not considered, which could involve substantial abrasive cutting of steel and other materials and significant particulate and hazardous air pollutant emissions.

All of these defects were provided by Save LBI to the EPA Environmental Appeals Board and were a major factor in having the Clean Air Act permit remanded back to the EPA.

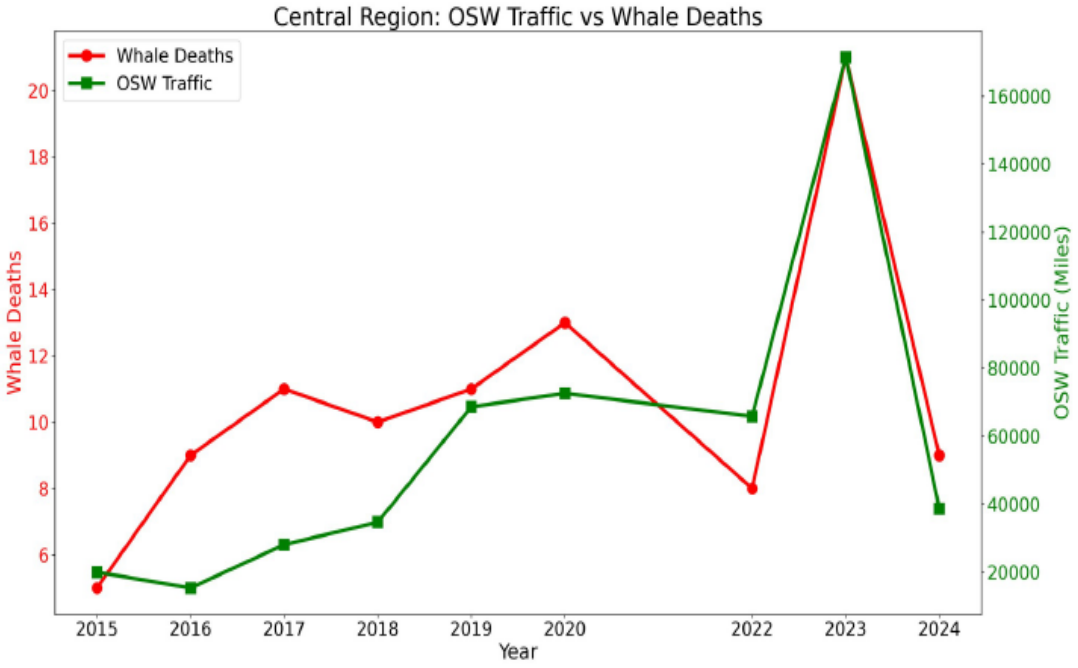
9. <u>Harm to Marine Mammals- Vessel Surveys</u>

Myth: there is "no evidence" that wind vessel surveys using high intensity noise devices to characterize the seabed were the cause of recent increases in whale stranding and death.

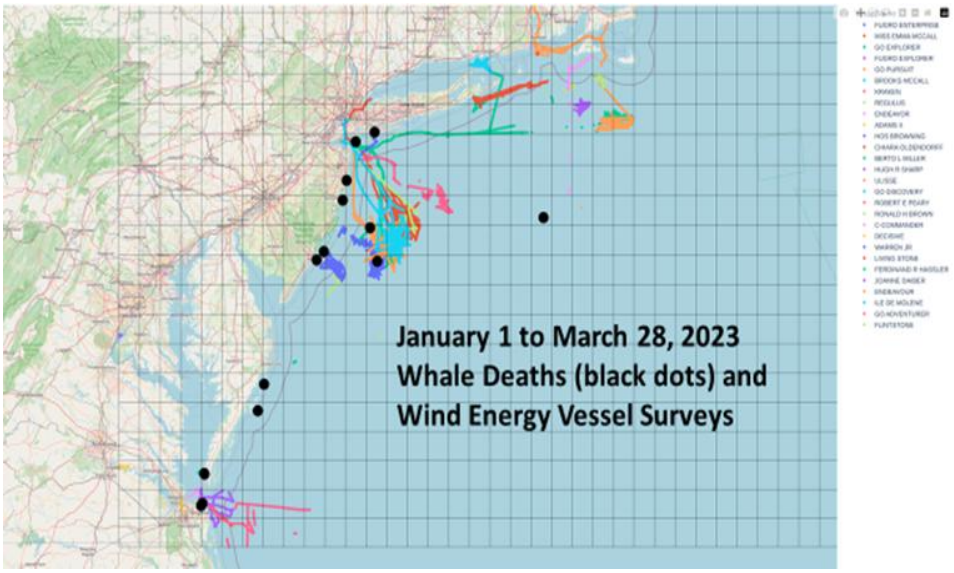
Fact: There is substantial evidence that recent increased whale deaths are strongly correlated with the increased presence of wind energy vessel surveys.

A statistical expert, working with Save LBI, has produced research findings which offer highly compelling statistical evidence demonstrating that offshore wind activity was the primary cause of the rapid increase in whale mortalities. As show in the chart below there was an 11.8-fold statistically significant increase in humpback whale mortality rates in the region off NJ and NY during 2023 which precisely harmonizes with a tripling of offshore wind survey vessel traffic from an annual average of 58,895 vessel miles (2015-2022) to 171,440 vessel miles in 2023. General shipping traffic exhibited only a marginal increase – from 1,800,359 to 1,973,891 vessel miles per year (less than 10 percent), clearly insufficient to produce the sharp increase in mortalities.

Image-6: Offshore Wind Traffic vs Whale Deaths in the Central Region from 2015-2024(excluding 2021 outlier year)

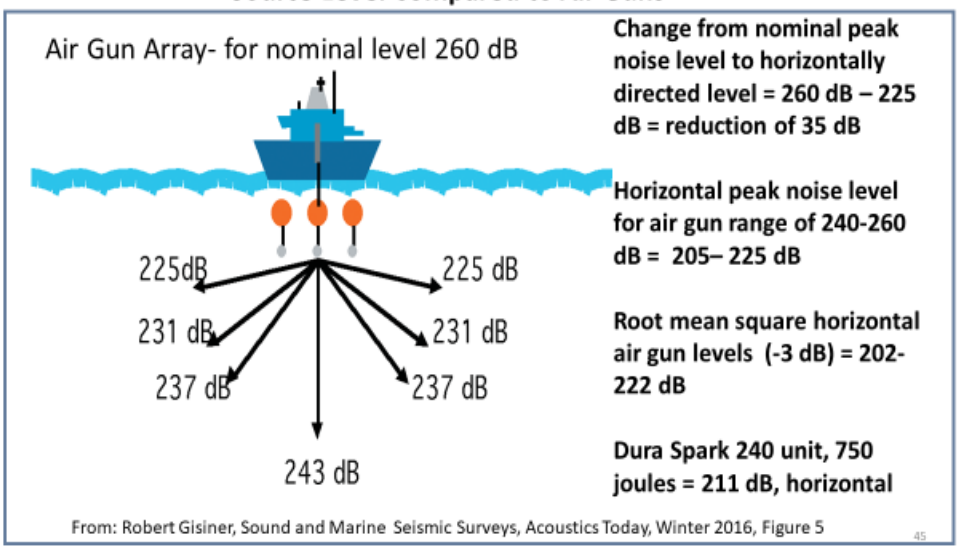


In addition, as shown in the map below, below both the time and place of the recent whale deaths correlate with vessel presence (See the Save LBI Report titled Impact of Vessel Survey Noise on Marine Mammals, July ,2024).



That report also describes numerous overseas incidents primarily involving oil and gas surveys primarily using air gun noise devices that were tied to marine mammal stranding. It shows based on published reports, that while the air guns used there do have a louder noise source level, much of their energy is propagated downward, whereas the sparker units used in the wind surveys propagate noise in all directions. As shown below, the noise levels in the horizontal direction away from the source where most of the animals are are similar. Consequently, the evidence of the correlation of the overseas survey noise with the strandings in those incidents cannot be ignored.

Source Level Compared to Air Guns



In further support of the impact of vessel surveys, it must be noted that the National marine Fisheries Services (NMFS) uses low noise source levels and high noise loss rates in predicting the extent of elevated noise from the vessel. For the Atlantic Shores South surveys it used smaller surrogate devices to define the source level as opposed to measurements from the larger sparker devices being used. It assumes a 20 decibel (dB) noise loss per 10-fold distance increase based on “spherical noise spreading” everywhere even though physically that spreading only occurs during the distance that it takes for the noise wave to hit the seabed. After that the noise waves must travel more horizontally confined between the seabed and the sea surface. The noise spreading there is characterized by “cylindrical spreading” with a transmission loss rate of 10 dB.

The combination of the two arbitrary assumptions significantly reduces the elevated noise range that was used to approve the vessel surveys. For example, using a measured noise source level for the Dura-Spark 240 unit that was used by Atlantic Shores and a 15 dB noise loss rate that the NMFS has properly used in the past to represent the transition from spherical to cylindrical spreading, the elevated noise range from the vessel increases from 0.1 miles to 1.6 miles. Considering the large area covered by the vessel, this would result in significant increases in the number of animal disturbances or Takes.

10. <u>Harm to Marine Mammals- Pile Driving</u>

Myth. There will be no harm or deaths to marine mammals from pile driving, only some disturbance which they can recover from.

Fact: There will be hearing loss, death and other serious injury to marine mammals from the loud noise and thousands of strikes necessary to drive the large foundations into the seabed.

Predicted marine mammal "Takes", i.e., incidences of death or serious harm (Level A Takes) and of disturbance of behavior (Level B Takes) via offshore wind pile driving are significantly underestimated in Agency documents. This is due to the use of understated noise source levels at the turbine site, understated animal densities, overstated noise transmission loss as the noise propagates, overstated disturbance noise level criteria, and inappropriate, scientifically unsound auditory weighting functions purporting to describe the whale's sensitivity to various frequencies,

In the decibel scale a change of plus or minus 10 decibels means that the actual noise energy or intensity experienced is ten times more or ten times less than what it was before. Therefore, unsupported optimistic decibel assumptions cause exponential increases in the elevated noise area and number of animals affected. When such assumptions occur at all the steps in the impact calculation and are combined, it results in a significant underestimate in the spatial extent of the elevated propagating noise and its impact on marine mammals. Those assumptions are summarized below.

They rely on a 10 dB noise source reduction from bubble curtains or similar systems that is not supportable for the low frequency noise from pile driving because that noise largely propagates down the foundation into the seabed and re-emerges downstream bypassing the bubble curtain system.

For the North Atlantic right whale (NARW) at the Atlantic Shores lease area, they rely on a new dramatically lower density presence of the whale in the area taken from a preliminary Duke University report that is not recommended for management use by the author. Such lower densities also do not account for the number of whales migrating and defy recent observation of greater NARW presence in the area, not just during migration but year-round. Such lower densities even contradicted those in the Atlantic Shores Incidental Take Authorization (ITA) application itself a year earlier, as shown below.

Right Whale Migration - from Atlantic Shores Incidental Take Application for Construction

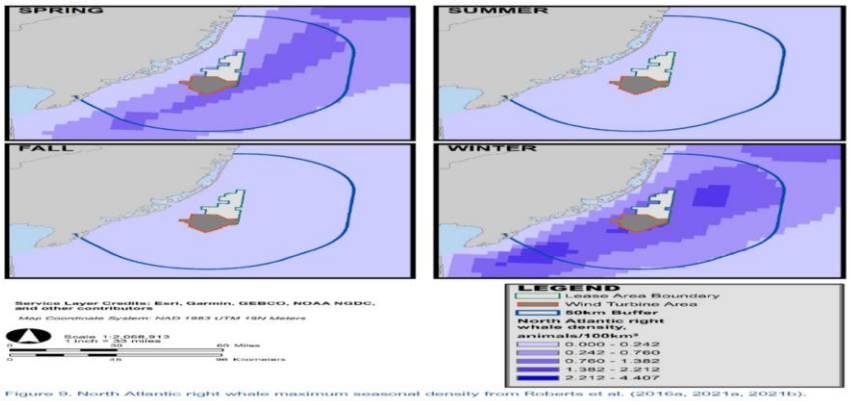


Figure 9. North Atlantic right whale maximum seasonal density from Roberts et al. (2016a, 2021a, 2021b).

They rely on a scientifically unsupported noise loss of 30 dB from 1 to 10 kilometers which cannot be explained by noise spreading or seabed attenuation. Actual measurements by Rand Acoustics and others show losses less than 20 dB.

They rely on a scientifically unsupported single criteria of 160 dB for whale disturbance and ignore a more reasoned probabilistic approach based on actual observations of behavior under noise which shows significant disturbance at lower levels.

They rely on auditory weighting functions which purport to describe the whale's reaction to different frequencies of the noise based on a National Marine Fisheries Service report that contradicts whale calling-our frequencies and which was repudiated a year later by its own authors alluding to political influence affecting that report.

When all this unwarranted optimism at each stage of the calculation is combined it results in Take estimates that are significantly underestimated and have no relation to what the whale will actually experience. In the decibel scale a change of plus or minus 10 decibels means that the actual noise energy or intensity experienced is ten times more or ten times less than what it was before. Therefore, unsupported optimistic decibel assumptions cause exponential changes in the elevated noise area and number of animals affected and results in impact numbers that are orders of magnitude less than what they should be-one example from data in an Agency document shown below.

Underestimate of NARW Deaths; even the agency documents themselves get caught up in these inconsistencies. For example, the Level A Take exposure range for the NARW and the number of Level A Takes in the Atlantic Shores Biological Opinion (BiOp) are inconsistent with the calculation method described and are significantly underestimated. The discussion in the BiOp of how the exposure range for a Level A permanent threshold hearing loss was calculated does not lead to the number of 0.72 kilometers in Table 7.1.8. The BiOp states on page 192 that the exposure range was calculated assuming an animal stayed there for the full pile driving duration to reach the accumulated energy criteria of 183 dB. It states on page 167 that the pile driving duration is 7 to 9 hours so the time spent contribution to the accumulated energy would be 10 times the log of 9×3600 or 45 dB.

That would mean that the one second sound energy level at the 0.72 km point would have to be 183 minus 45 dB or 138 dB. Tables F.6 through F.12 in the August 10th Jasco Applied

Sciences modeling reports, even assuming the 10 dB source reduction and auditory weighting, show that it would require a distance of about 9 km to decrease to 138 dB, not 0.72 km. This 81-plus fold increase in the elevated noise area (assumed circular area, 9 times 9) would i**ncrease the Level A Take numbe**r in Table 7.1.13 for the NARW **from 0.14 to 11 deaths or serious injuries leading to that,** well above its biologic removal rate.

Even with all these underestimates and not considering operational noise impacts as discussed below, the project documentation acknowledges severe impacts to the whale. According to BOEM, the adverse impact of the proposed Atlantic Shores South plan on the endangered North American Right Whale (NARW) BOEM will be "**major**" and "could have **severe population-level effects**." FEIS 3.5.6-85. In its most recent submission concerning the Atlantic Shores North project, Atlantic Shores admits the turbines it plans to construct will be directly in the whale migration area. It states "[t]he Lease Area is located within the NARW migration biological important area (BIA) (Figure 4.7-1)." Atlantic Shores North Construction and Operations Plan, pp 4-212.

"Small numbers" Violations, the Marine Mammal Protection Act; the Marine Mammal Protection Act (MMPA) allows by rulemaking the incidental taking of "small numbers" of a species for a period of five years or less. NMFS defines a small number as 33% of the species stock. The Act also requires that the **total** of such taking during each five year or less period have a negligible impact on the species (bold emphasis added).

The MMPA approval for the Atlantic Shores project allowed 1,949 takes of the northern migratory coastal bottlenose dolphin in one year or 29.4% of its population. Over the five-year span of the project, it allowed for 3,087 takes or 47% of the population.

There appear to violations of the law here. First, 33% is not a small number, a previous court case said it should be less than 12%. In statistics and marketing a number less than 10% is usually considered to be small. The single year take violates the court's 12% criterion. The total take of 47% clearly violates the Agency's own 33% criterion, nevertheless the project was approved.

11. <u>Harm to Marine Mammals- Turbine Operation</u>

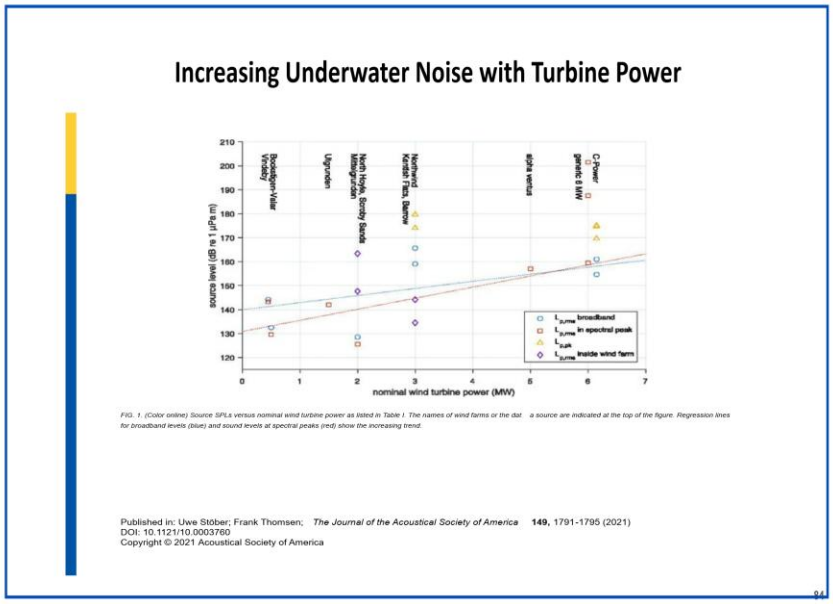
Myth: Noise from turbine operation is not a problem, it will dissipate down to safe levels within short distances.

Fact: The operational noise from a large turbine of today is exponentially greater than smaller turbines, is amplified by several hundred turbines operating together, will disturb whale behavior miles from the wind complex, and impair and potentially block migrations.

The Agency documents contain pages of discussion about the lower operational noise levels from smaller turbines which are not problematic, apparently trying to turn a new large turbine, which are, into a small one.

They ignore the best science available to predict the noise source level from the larger turbines. These are two studies from Stober (Uwe Stober and Frank Thomsen, How could operational underwater sound from future offshore wind turbines impact marine life? The Journal of the Acoustical Society of America 149, 1791 (2021), and Tougaard (Tougaard, Hermannsen, Madsen, How Loud is the Underwater Noise from operating offshore wind turbines, Journal of the Acoustical Society of America, 148,2888(2020)) of measurements of small and moderate size

turbines that show a clear linear increase in decibels source level with turbine power. Those clear linear trends are shown below.



Extrapolation of the straight-line lower broadband trend for monopile foundations to a projected 13.6-megawatt turbine operation of the planned Vesta-236 turbine shows a source level of 180 dB. A similar regression analysis by XI-Engineering engaged by Save LBI showed a level of 181 dB. Extrapolation of the lower frequency band more relevant to the whales hearing would result in a single turbine noise source level of of 192 dB.

The operation of two-hundred turbines adds about 23 dB to that source level from the full wind complex. So even with the lower single turbine level of 181 dB, you now have a source level of around 200 dB and a continuous noise disturbance criterion of 120 dB which is 40 dB less than the impulsive noise criteria for pile driving and vessel surveys. The noise level needs now to decrease 80 dB which is greater than what you had to do for pile driving or vessel surveys. This will require greater distances from the source and involve more animal Takes, but inexplicably there was no numerical analysis of operational noise Takes at all.

Since the agencies did not, Save LBI did its own calculations of the distances needed to bring the operational turbine noise from the wind complexes planned off the New Jersey and New York coasts down to 120 dB. The approach and results are summarized below.

- Prior measurement studies of the trends in turbine noise source level versus turbine power allow for a reliable prediction of a noise source level between 181 to 192 dB from the turbines and foundations expected.

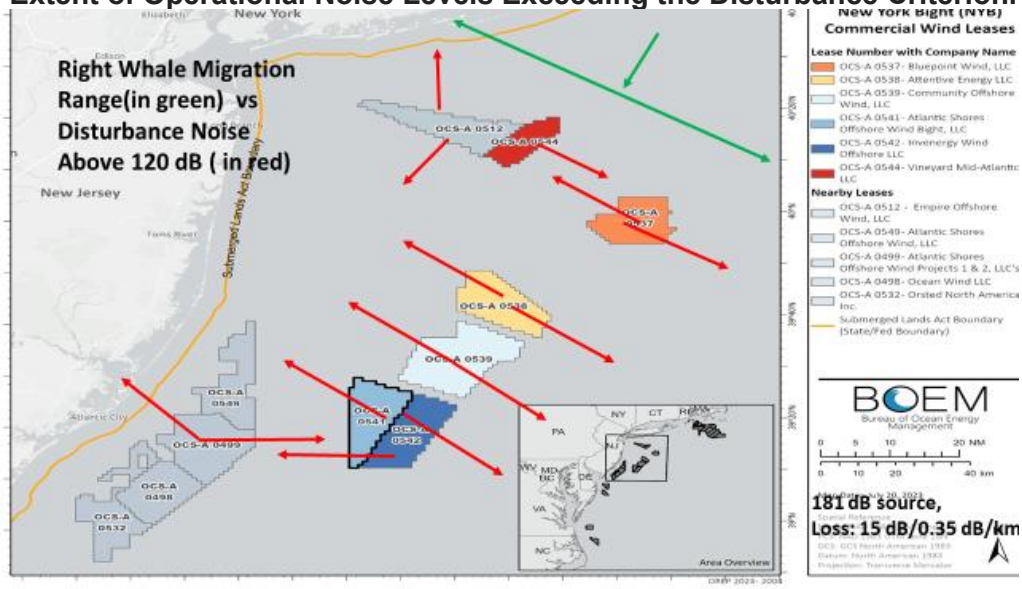
- Past agency practice and measurements of noise transmission loss, including one study on the NJ Continental Shelf, provide reliable noise transmission loss factors of 15 dB for noise spreading loss and a 0.35 dB loss per kilometer from seabed attenuation.

- With the lower source level of 181 dB for a single turbine and those noise loss parameters, it **requires 12 miles from the perimeter of the wind complex for the noise to dissipate to 120 dB.**

- The results are shown in the map below. The green line represents the North Atlantic right whale's (NARW) historic migration range, within about 55 miles from shore.

- The red lines represent the distance from the wind complexes where the noise level will exceed the 120 dB level that disturb the whale's behavior.

Extent of Operational Noise Levels Exceeding the Disturbance Criterion.



- There is general scientific consensus that the whale will try to avoid or stand-off from continuous noise above 120 dB.

- Given that, there is no route the whale could take within its historic migration range and avoid the 120 dB and greater decibel noise levels, thus jeopardizing its migration and continuing existence.

- There are no practical, observational mitigation measures that can be applied in an operational turbine setting.

- To leave the whale a migration corridor, wind energy projects in either the closer to shore New Jersey lease areas or the farther out New York Bight areas must cease.

- Save LBI has researched and identified the primary historic corridor of NARW migration and submitted a petition to NOAA and BOEM to designate that corridor as critical habitat and keep it turbine free to allow this whale to migrate and survive.

12. <u>Defense Radar Impairment</u>

Myth: the impact of offshore wind projects on onshore radar is manageable.

Fact, the presence of turbines can significantly impair onshore radar effectiveness, particularly those used for air defense.

A 2020 Radar Interference Report by the BOEM showed 17 installations in the Atlantic Region affected by offshore projects. Of particular concern are the ARSR-4 air defense system radars at Gibbsboro, New Jersey and Riverhead, New York which are part of our NORAD early warning system. The BOEM study did not include Gibbsboro, but did analyze the impact of turbines at the Empire Wind project on the Riverhead, New York, radars.

It found that smaller aircraft, which might include drones, would not be detected at lower heights above the turbines. In addition, the return signals from smaller craft at higher elevations, or from larger aircraft, would be detected but obscured by the presence of numerous false targets created by the turbine operation. No mitigation measures were defined in the project Record of Decision to mitigate or reverse the radar degradation, only vague discussions of ongoing consultation with the Department of Defense (DOD), which should have been concluded prior to construction not afterwards.

No radar interference study for Gibbsboro, NJ was done but the Empire Wind study and a previous study of smaller turbines at the Ocean Wind project site father south points to the potential for significant obstruction of the Gibbsboro ARSR-4 radars from the newer larger turbine operation at the closer Atlantic Shores project location.

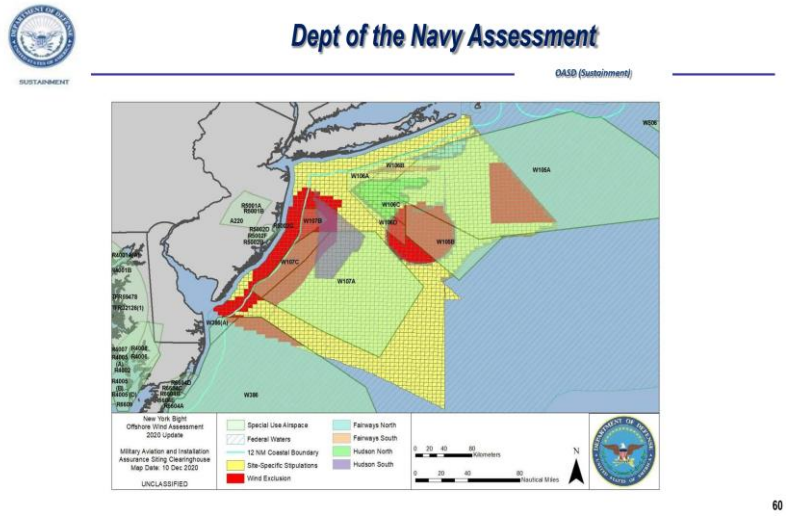
But there was was a review done by an expert defense consultant, West Slope Inc, titled Radar Screening Study Report of December 17, 2021 provided in Appendix II– T2 of the Atlantic Shores Construction and Operations Plan.

For the Gibbsboro ARSR-4 radars, that Report stated on page 47 that: “At a blade-tip height of 1,048 feet AGL, 101 of the 105 proposed WTGs in the Project 1 WTA, 59 of the 64 proposed WTGs in the Project 2 WTA, and all 31 proposed WTGs in the Overlap Area will be within line-of-sight of and will interfere with this radar site. See Figure 5. The radar effects will include clutter resulting in a partial loss of primary target detection and a number of false primary targets over and in the immediate vicinity of the proposed WTGs within line-of-sight”, and concluded on page 48 that;

“Because wind turbines will be within line-of-sight of the Atlantic City ASR-9, Gibbsboro ARSR-4, and the McGuire AFB DASR, West Slope expects that the **DOD and FAA will have concerns** with the proposed WTGs within line-of-sight at blade-tip heights of 880 feet AGL, 890 feet AGL, and 1,048 feet AGL based on electromagnetic interference to air navigation facilities”

(bold emphasis added).

In addition, BOEM was advised by DOD by letter of December 15, 2020, that the Atlantic Shores project “will adversely affect NORAD’s missions by hampering or degrading air surveillance radar performance”. That letter included the map below showing the inner half of the Atlantic Shores lease area as an exclusion zone for defense purposes, but that inner half of the lease area has been retained without any explanation from the BOEM or the DOD.



The degree of impairment of both ARSR-4 radar systems at Gibbsboro and River Head and what can be done to reverse that impairment remains as clouded as the return radar signals, even at this late stage of the process.

13. <u>Vessel Navigation Risk</u>

As shown above, the right whale will have to go in between the Atlantic Shores lease area in the Hudson south area in the NY Bight in an 11-mile-wide corridor. So will vessels to avoid the turbines and the Coast Guard has proposed that corridor as a safety vessel corridor, originally termed a shipping lane.

A shipping lane is "an official route that ships must follow when they sail from one place to another". Changing the name to "vessel corridor" does not give BOEM or the Coast Guard the authority to change the historic safety regulation and rules associated with shipping lanes. The United States standard requirements of fixed structures in and around shipping lanes in the Gulf of Mexico should be consistent with the Atlantic. "No structure may be placed within two nautical miles of any shipping lane". Applying that restriction here narrows the shipping corridor width to 6.6 miles.

The implications of that to navigation safety could be enormous, a significant amount of East Coast vessel traffic confined to a 6.6-mile-wide corridor with its on-board marine radars potentially degraded by turbines operating on both sides of it, according to a recent national Academy of Sciences Report. The final Atlantic Shores EIS acknowledged some of the risk:

According to BOEM, the “construction and installation, O&M, and decommissioning of the Proposed Action would have adverse impacts on navigation and vessel traffic. The impacts of the Proposed Action alone on navigation and vessel traffic would be **major**.” AS South FEIS, Affected Environment and Environmental Consequences 3.6.6-30. “Impacts on non-Project vessels would

include changes in navigation routes, delays in ports, degraded communication and radar signals, and increased difficulty of offshore SAR or surveillance missions within the WTA, all of which would increase navigational safety risks." Id. "In addition, the increase in potential for marine accidents, which may result in injury, loss of life, and property damage, could produce disruptions for ocean users in the geographic analysis area." Id.

According to Atlantic Shores, "The presence of offshore wind project vessels would add to the overall Atlantic Coast vessel traffic levels as each offshore WTAs are developed, leading to increased congestion and navigational complexity, which could result in crew fatigue, damage to vessels, injuries to crews, engagement of USCG SAR, and vessel fuel spills." (Atlantic Shores South_Vol1_FEIS.pdf, Page 3.6.6-16). The presence of WTGs would result in a widespread, permanent navigational risk to commercial and for-hire recreational fishing vessels transiting through and fishing near offshore wind farms. Maneuverability within wind farms depends on several factors including vessel size, fishing gear used, and weather conditions." (Atlantic Shores South Vol 1 FEIS, p. 3.6.1-58). "Structures installed under the Proposed Action would pose a long-term navigational hazard and risk of allisions to commercial and for-hire recreational fishing vessels transiting through and fishing near the Lease Area." (Atlantic Shores South Vol 1 FEIS, p. 3.6.1-73).

Vessel Traffic Effect on Whales & other Marine Mammals. The synergistic impact of the vessel traffic change and the operational noise impact from the larger turbines will likewise have a significant impact on the migration of the North Atlantic right whale and other marine mammals.

The noise levels in the shipping lane from turbine operation will be above the 120 dB disturbance level. Those levels will disorient any whale attempting to migrate through it. Worsening the situation further are experimental results showing that one reaction of the right whale to such noise is to surface to lessen the noise, which would make it more susceptible to strike from those deep draft and other vessels in the lane.

The synergistic effect of the concentrated vessel traffic and whale migration in the same narrow corridor, the disorienting effect on the whale from turbine operational noise, and the tendency of whales to surface to avoid that noise could have a devastating effect on marine mammals off the coast of New Jersey.

14. <u>Marine Archaeological Loss</u>

Myth: Now submerged ancient archeological sites in the project area and along export cable routes are not that important.

Fact: The project pile driving will destroy now submerged ancient archeological sites and artifacts of potential great value that could have shed light on the first humans to come to North America.

With respect to now submerged. archeological sites in the project area, specifically ancient submerged landforms (ASLFs), the final EIS states on page I-27 that: "ASLFs may be individually eligible for listing in the National Register of Historic Places (NRHP) or considered contributing elements to a TCP eligible for listing in the NRHP. ASLFs in the marine area of potential effect

(APE) are considered archaeologically sensitive. ASLFs are considered by Native American Tribes in the region to be culturally significant resources as the lands where their ancestors lived and as locations where events described in Tribal histories occurred prior to inundation. In addition, BOEM recognizes these landforms are similar to features previously determined to be TCPs (Traditional Cultural properties) and that are presumed to be eligible for listing in the NRHP under Criterion A". "Atlantic Shores' marine geophysical archaeological surveys in the marine APE identified a total of 59 geomorphic features representing potential ASLFs (Table I-5)".

The Marine Archaeological Resources Assessment (MARA) for the Atlantic Shores project also states that "the Holocene marine deposits, Holocene-Late Pleistocene transgressive channel sequence, and **upper Late Pleistocene sequence contain the highest potential for archaeological material**." "Pleistocene (U1) represents the late Pleistocene from about 40,000 to 28,000 cal BP".

The Pleistocene period coincides with the time that the first peoples are thought to inhabit North America. Therefore, these landforms and artifacts on or under them could be of immense archaeological significance. As stated by Daria E. Merwin *of the Department of Anthropology State University of New York at Stony Brook* in her paper titled, The Potential for Submerged Prehistoric Archaeological Sites off Sandy Hook*,* Published in 2003, *Bulletin of the Archaeological Society of New Jersey* 57:1-10, "Data from prehistoric sites dating to the Late Pleistocene and Early Holocene now submerged in the Mid-Atlantic Bight will fill substantial gaps in our knowledge, and allow researchers to explore issues such as the origins of coastal adaptations, settlement and mobility strategies at the coast versus interior, and variation in human subsistence patterns."

But then after that build-up it states without explanation that: **"Atlantic Shores is unable to implement the QMA-recommended avoidance buffers for ASLFs** (COP Volume II, Appendix II-Q, Atlantic Shores 2024) which would allow for the Project to have no effect on these historic sites. As such, the undertaking is anticipated to have adverse effects on 59 ASLFs identified in the marine APE".

The recommended buffers referred to were stated in the MARA for the Atlantic Shores project:" SEARCH recommends avoidance of each potential submerged cultural resource by a minimum distance of a 1-meter (3.2-foot) vertical buffer, a horizontal buffer of 100 meters (328 feet) from all paleo-landscape targets, and a buffer of 50 meters (164 feet) from the extent of the outer edge of the magnetic anomalies or acoustic contacts".

It is unclear, for turbines being placed at least 1000 meters apart, why the locations of particular turbines cannot be moved 50 to 100 meters in one direction or another to protect the sensitive sites.

The final EIS obscures the significance of the archeological loss here by merely saying on page 3.6.2-16 that "the proposed action may have negligible impacts on 22 marine archeological resources", and "negligible to major physical impacts on 59 ASLF's". The cultural loss here is much more than that. In fact, archeological information on the origin of human habitation of North America will be destroyed by the foundation pile driving.

No mitigation is provided for those ancient Pleistocene sites. Appendix G of the Final EIS on Monitoring and Mitigation for the Atlantic Shores South project includes the following related to submerged archaeological sites: "Establish approximately 164 feet (50 meter) protective buffers recommended by the QMA around each identified **post-Contact** marine archaeological resource or potential marine archaeological resource."

First, it should be noted that no justification was provided for the original recommendations of a 100 or 50-meter buffer zone. This mitigation measure limited the buffer zone to 50 meters for all sites without any justification. It also limited it to “post-contact” resources.

In the context of Appendix G, **"post-Contact"** refers to the period **after sustained European contact with Indigenous peoples in North America**, generally beginning in the **late 15th or early 16th century**, depending on the region. Specifically:" Contact" is the point at which Indigenous cultures first encountered Europeans—through exploration, colonization, trade, or other interactions. "Post-Contact" archaeological resources are therefore:

- Associated with European colonization, settlement, and activity
- Include artifacts, shipwrecks, or structures from the colonial period onward
- Differ from "Pre-Contact" resources, which are strictly Indigenous and pre-European contact.

Therefore, no mitigation at all is provided for the ancient Pleistocene sites which are likely to have the greatest archeological value. This deserved a thorough examination, and any pile driving for this project should be enjoined pending that examination.

15. <u>Decommissioning and Turbine Removal</u>

Myth: Turbine Removal is the Reverse of Turbine Installation, and can be Readily Done.

Fact: Once embedded in the seabed, the large, heavy turbines and 50-foot diameter 6-inch-thick steel monopile foundations of today will more likely never be removed and disassembled onshore.

There is no legal or regulatory requirement to remove the towers, blades and a turbine foundation section at the end of its useful life, as opposed to just decommissioning (taking out of service) it and leaving it in place. Current decommissioning rules allow the federal agency, the Bureau of Ocean Energy management (BOEM), to require to remove them <u>or</u> leave them in place <u>or</u> have them toppled them in place.

The technical feasibility of removal of these large, heavy 1,000-foot high, turbines with 50–foot diameter monopile foundations has not been presented despite requests made in comments on the draft EIS to do so. No such turbines have ever been removed. No method for sub-seabed cutting of the 50-foot diameter 6-inch-thick steel circumference of the monopile foundation has been presented. No study has been put forward showing how the exterior boulders and cement used for scour protection would be removed and the foundation section extracted.

The logistics of removal of a cut foundation section, the tower, and the blades are staggering. The availability of the limited number of wind turbine installation vessels needed to remain on site for years while foundations are cut and towers and blades are removed is highly questionable.

Even if the tower and foundation section could be brought ashore, there is no onshore industrial infrastructure to store, and cut them into manageable sections for rail or truck transport to smelting or disposal sites. The mass of steel to be cut in ten large turbine towers is

comparable to that of a navy warship, which can take a year to disassemble at one of the few facilities in the country capable of such a dismantling operation. It is unlikely that companies will invest in such industrial infrastructure in the future since there is no regulatory requirement for removal and assurance of a return on their investment. Cutting facilities, methods and disposal sites for the blades, which will involve toxic air pollutant release, have not been identified.

Dedicated funding for such an effort is not being provided. Collection of financial assurance during turbine operation can be deferred based on the company's "financial strength". Unlike an operational setting, where a cease operations order would cause a financial penalty, no such incentive exists here for the company to do the work once the turbines have already been shut down.

There is therefore the high likelihood that the turbines will not be removed and for very long-term vessel navigation safety risk, the loss of hundreds of thousands of acres of productive marine territory with a corresponding long-term loss of marine life, and for visual blight from shore for generations.

<u>Conclusions:</u> The minuscule benefit from this project cannot justify the environmental, economic, cultural and social harm from it. Proponents should seek alternate, less costly and less damaging means to reduce greenhouse gas emissions, if that is their concern.

<u>Enclosure 5</u>

Impacts to Marine Mammals

Save Long Beach Island, Inc. (Save LBI)
P.O. Box 2087
Long Beach Township, NJ, 08008
www.SaveLBI.org

Offshore Wind Development Kills, Seriously Harms, and Disturbs Marine Mammals

Project proponents often robotically state -without providing "evidence" that there is no "evidence " that offshore wind activities **directly** harm marine mammals. The "directly" caveat obfuscates the issue because the marine mammals do not die "directly" from the hearing loss or behavioral disturbances they incur from the underwater noise emanating from wind energy development activities, but rather from the impact of that noise-related impairment on their migration, foraging, predator -detection and other essential life functions. Since level 3 necropsies to determining hearing damage are never or very rarely done, it is also unclear what evidence proponents seek to convince themselves of the harm.

Save Long Beach Island, Inc., a non-profit environmental organization based in New Jersey, USA, has serious issues with the accuracy of these statements. Our professional analysis of noise impacts to whales over the past five years, supported by numerous calculations and reports, concludes the exact opposite: There is substantial **evidence** to show that serious harm will occur at every phase of wind project development — including vessel surveys, pile driving, and turbine operation — and that such impacts have been systematically and significantly underestimated in noise modeling reports prepared by offshore wind developers.

The decibel (dB) scale for measuring noise is logarithmic, meaning an underestimate of 10 dB — say from 180 to 170 dB — doesn't mean that the whale is receiving 6 percent more noise than predicted, but rather *10 times the noise* predicted. So, for the whale's sake, we humans need to get these decibel numbers right.

Wind Vessel Surveys

- Save LBI has analyzed and correlated the presence of numerous survey vessels with the unusual spate of whale deaths that occurred off the New Jersey shore in early 2023;

- Noise levels emanating from the sparker devices used in wind vessel surveys (in the horizontal direction where most of the animals are) are similar to those produced by the air guns used for oil and gas surveys, which have been associated with numerous whale strandings incidents around the world;

- Predicted impacts of vessel surveying have been underestimated by…

- The use of a high 20-dB noise transmission loss factor for all distances, which simply cannot physically occur at distances greater than the water depth, versus the 15-dB loss factor previously used by government agencies, which has been verified by near-field measurements, and
- The use of lower noise-source levels from surrogate devices instead of interpolations of measured values from *the actual devices used*.

Pile Driving

With respect to pile driving turbine foundations deep into the seabed, Save LBI has learned the following:

- Since noise avoidance was not considered in the noise modeling used by offshore wind developers, the expected case of a migrating whale traveling in a straight line past a pile-driving operation should have been considered in the animal movement patterns modeled but apparently was not;

- The noise energy a whale accumulates during the time it takes to swim past an active pile driver (even using the company's unduly optimistic noise level vs. distance numbers) will *exceed the 183 dB cumulative energy threshold for permanent hearing loss within 5 miles of the pile driver*, and exceed the 168 dB threshold for temporary hearing loss within 9.6 miles;

- Those effects, combined with behavior disturbance that occur at similar distances, will significantly impair the whale's migration.

Save LBI has further found that the predicted impacts of pile driving have been underestimated by:

- Reliance on a 10-dB noise-source reduction from bubble curtains or similar systems that is not supported scientifically for large turbine foundations and the low-frequency noise emissions, or verified by measurement over sustained periods;

- The use of unusually high, unexplained dB noise-transmission-loss rates above 30 dB per 10-fold increase in distance that are unsupported by mathematical derivation or by far-field measurements showing a rate of less than 20 dB;

- The use of a single numerical criteria of 160 dB to estimate disturbing incidents that does not reflect observed probabilities of such disturbance at lower noise levels (applicable to vessel surveying and pile driving);

- The use of limited, recent low-density numbers to detect animal presence (e.g., the critically endangered North Atlantic right whale (NARW) off New Jersey)

that do not accurately reflect the number of NARWs migrating and are not recommended for use by the Duke University Laboratory that created them (applicable to all activities);

- The use of auditory down-weighting functions adopted by government agencies in 2018 (and reissued in October, 2024) for low-frequency cetaceans that 1) do not reflect whale calling behavior and 2) were recommended for revision in a 2019 Journal article by the very people who had prepared them; revisions were recommended amid allusions of political influence at the time of the original derivation.

Operational Turbine Noise

With respect to operational noise from a large complex of wind turbines, Save LBI found that:

- Offshore wind developers and government agencies failed to do a numeric analysis of the noise impacts, even for wind complexes that sit directly in, or close to, historic migration corridors for endangered whales;

- Calculations (done by Save LBI) show that for a North Atlantic right whale attempting to pass by an operating wind complex, operational noise will cause permanent hearing loss within the complex and 2.25 miles of its perimeter;

- Temporary hearing loss and behavioral disturbance will occur within 12 miles from the perimeter of the Atlantic Shores South project off LBI, creating added major impediments to the NARW's migration- as this distance extends across its entire historic migration corridor in the seaward direction.

Conclusions

There is substantial mathematical, scientific, and measurements-based evidence that wind energy activities do harm marine mammals. One just has to look for it and at it.

The new Administration in Washington is revisiting the basis for prior offshore wind project approvals regarding marine mammals and may conclude, as Save LBI has, that prior analyses were underestimated and obfuscated.

Bob Stern

Bob Stern, Ph.D., President
Save Long Beach Island, Inc.
info@savelbi.org
917-952-5016