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Commenting on

# Supplement to the Draft Environmental Impact Statement for Vineyard Wind LLC's Proposed Wind Energy Facility Offshore Massachusetts and Public Meetings

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## Contents

## Credentials of W. Kempton

The author of these comments is Professor in the College of Earth, Ocean, and Environment and the Department of Electrical and Computer Engineering. He has published 22 offshore wind-related articles in the peer-reviewed literature, and has advised state governments of Massachusetts, New York, New Jersey, Delaware, Maryland, as well as BOEM and the US Department of Energy.

## Health Impacts

The SEIS for Vineyard Wind's project (VW) has no tabulation nor recognition of health impacts of the project, which are substantial. Improved air quality is referred to in Table A-7, page A-50 under "power generation emissions reduction" but health is never mentioned and absolutely no use is made of the published, peer-reviewed analysis of these health impacts. Throughout the entire SEIS, the words "death" and "mortality" occur hundreds of times, every one in reference to sea creatures not to humans.

The requirement to include human health impacts is explicit in the enabling legislation. Specifically, 40 CFR § 1502.16 "Environmental consequences" requires addressing both Direct effects and indirect effects, per §1508.8. Indirect effects are defined in CFR 40 §1508.8 as follows (emphasis added): (b) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. … Effects include … health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects.

Similarly, the Trump Administration's new NEPA regulations make equally clear that "effects" of actions to be evaluated under NEPA must include beneficial effects.

Two peer-reviewed publications give quantitative measures of the health impacts of building offshore wind and the resulting reduction in fossil criteria pollutants due to the displaced power. This is a complex problem as a full treatment requires understanding the time of wind power production, the criteria for dispatching or turning down existing plants, the air dispersal from those plants, and the health impact of those changes in pollution. Of the two studies cited, Kempton et al 2005 estimates for two power plants in Southern Massachusetts, and Buonocore et al 2016 calculates more precisely for an offshore wind plant in Northern New Jersey. Since the 2016 study is more detailed, mortality is calculated here from that study. Both mortality and health impact in dollars are scaled by project size in MW to develop health cost and premature deaths averted. Health costs are calculated in $ based on standard epidemiology measures (Buonocore et al). (Although the Buonocore article shows that health benefits do not scale precisely by project size, and vary with power region, these epidemiological studies are scientifically valid and well documented, so such studies should be cited and used to judge impact for the SEIS.)

To calculate total lifetime impacts, of the VW project and also cumulative for industry, I use the stated project lifetime of 30 years. Peer-reviewed studies estimate the emission savings the first 0.5 - 4 years break even with manufacturing emissions (Nugent and Sovacool 2014), so I here count only 27 years of air pollution benefits. (The SEIS assumes 8 years to break-even,

with no justification of that number from studies, literature, or calculation, p A-50.) To extend from project to cumulative impact, I scale from 800 MW to 22 GW per the SEIS, sec 1.2.1.

Worker deaths from land-based wind are subtracted from pollution-reduction health benefits by Kempton 2006, but worker safety has improved, especially for offshore. For example, Richard 2018 reports zero deaths from offshore wind construction plus maintenance in all Europe. Thus I do not tabulate worker deaths as an impact in the table.

In table 1 below, costs in lives and $ are per MW of capacity per year or per project, as noted in column headings. The rightmost column will be explained in Environmental Justice section. (n.a. in Table 1 means data not available).

Table 1. Avoided health impacts calculated here, based on peer-reviewed studies.

| | Health benefit/year $M/ MW project capacity | Mortality averted per project | EJ impact averted (Black+hispanic)* |
|---|---|---|---|
| Kempton et al (NMA 420MW) p 143-144 | n.a. | 11/420 MW | n.a. |
| Bunocore et al (NJ, 1100 MW) Table 1 | $95M/year/1100MW | 13/1100 MW | n.a. |
| Proposed Project (Adjust for size of VW1 project (800MW), & over project life (27 years) | $1,865M/800MW | 255/800 MW | $4.6M health benefit, 64 deaths* |
| Cumulative impact for(22 GW of development, with life of 27 years | $51,300M/22GW | 7,020/22 GW | $12,819M health benefit, 1,800 deaths |

* avoided deaths or costs for population * 21% black+hispanic population * 1.19 increase due to EJ issues = 64

In sum, the Proposed Project over its 30 year lifetime, compared to No Action, will reduce health impacts of power plant pollution by $1.8 billion, and will prevent 255 premature deaths from pollution. These figures are consistent with other epidemiological studies which have documented the cost of power plant pollution, and the corresponding value of displacing that with low-emission electricity sources. This is not correctly summarized in the SEIS.

In table ES-1, row “Air quality: Direct and Indirect Impacts” Proposed action is given as “negligible to minor and minor beneficial”. I know of no logic nor moral system that would call saving 255 lives and reducing health impact by $1.8 billion to be “negligible” nor “minor beneficial”. Similarly, the row “Air quality: Cumulative impacts” gives the impact as “minor”, a perplexing way to describe a $51 Billion health benefit, reducing mortality by 7,000 lives. These descriptions should be replaced with “Major beneficial” in both cases.

## Environmental Justice

The most immediate environmental justice issues flow from the health benefits.

Based on peer reviewed studies, black and hispanic populations in Massachusetts are exposed to significantly more air pollution from power plants (Levy et al). Also, nationally, blacks suffer significantly higher mortality from power plant emissions (Madinder et al 2019). Both studies show that race is a stronger predictor of exposure and health impact than is income, again confirming that this is an Environmental Justice issue.

Therefore, large reductions in power plant emissions, and large reductions in mortality and health impact, as documented in the prior section, have a corresponding Environmental Justice benefit.

I here construct an approximate measure of Environmental Justice benefits. From the US Census, the Massachusetts population is 9% black and 12% hispanic, so 21% of population is minority, suffering above-average impact from power plant air emissions (Census 2019. QuickFacts. Massachusetts). As a rough estimate, from Madinder's Figure 1, blacks have 19% higher mortality than the general population.

The SEIC, page ES-2, row "Environmental Justice: Direct and Indirect impacts" now gives impact as "Negligible to minor, depending on the specific community affected, and beneficial" Based on the employment activity alone, this may be a reasonable impact description. However, the existing SEIS does not consider health. Per 40 CFR §1508.8, health has to be included in impacts, as argued above. The Proposed Action would save 64 minority lives, and reduce health impact by $4.6M. The cumulative impact wold save 1,800 minority lives and reduce health impact on minority communities by $12 billion. It is difficult to see how this would not be described as a "Major Beneficial" impact on Environmental Justice, both for the project and the cumulative industry.

## Impact of proposed reduction in renewable energy area

The SEIA treats the developer's lease areas (including but not limited to VW's entire lease area) as "free" space or in other words, as unlimited. Thus the SEIA treats the impact of the first VW project taking more space as having effects on wire etc but not as using up the available space for subsequent wind projects. I believe that the amount of space is, in fact, limited. For example, assuming fixed bottom structures, we would run out of ocean space before meeting the applicable load on the Eastern Interconnect. Therefore, the correct analysis is to consider reductions in area to be reducing the amount of wind power eventually developed. Therefore area reductions will have the negative impact of reduced health benefit, proportionately to the amount of power production precluded.

The earlier change from the Proposed Action to alternative D-2 has been previously agreed to by the parties. I do not believe this change is consistent with an objective tabulation of the benefits and costs to all parties, including the developer, residents on land breathing air, fishermen, and other ocean users. I believe the Proposed Action would have represented a preferable alternative. However, since that has already been accepted by the parties, I here compare the benefits and costs of Alternative F with

Alternative D-2, which now seems to be the question at hand. I only consider Alternative F with 2 nm spacing, as the very wide 4 nm spacing seems unlikely to be seriously considered.

Per Alternative F, page 2-4 and Figure 2.2-2, "The Proposed Action Layout with the implementation of a 2-nautical mile transit lane would result in the following:
Out of a total of 2 ESPs and 106 WTG placement locations, up to 16 WTG placements would be relocated outside the proposed transit lane."

Because ocean space is not infinitely expandable, and because this is a cumulative environmental impact statement, removal of 16 turbines, for Alternative F at 2 nm, would reduce the benefit by 16/106 or 15%. Benefit reduction will occur either in this Proposed Project if the turbine count is reduced by 16, or more likely, a subsequent VW project will necessarily be smaller by 16 turbines. In either case, the reduction in benefit is the same, 15% reduction in benefit.

Table 2 compares the health benefits of Alternatives D-2 and of Alternative F with 2 nm transit lane. As a simplification, with the assumption of the same percentage reduction by placing large transit lanes through other projects in the 22 GW build used for cumulative impact, the cumulative health benefits of Alternative F are estimated in the last row.

Table 2. Avoided health impacts comparing Alternative D-1 and F.

| | Health benefit/year $M/MW averted per capacity | Mortality averted per project |
|---|---|---|
| Alternative D-2 | $1,865 M | 255 |
| Alternative F, 2 nm transit lane (15% reduction) | $1,585M | 217 |
| Impact of change — project | $280M added cost | 38 premature deaths |
| Impact of change — cumulative build | $7,700 M added cost | 1045 premature deaths |

The cumulative impact of requiring transit lanes also has a direct impact in reducing the size of the initial project, and/or reducing the cumulative size of all projects, due to limited ocean space. Therefore Alternative F diminishes the goals of EO 13783 of March 28, 2017, "to promote the clean and safe development of domestic energy resources, including renewable energy"

Another type of impact of Alternative F is that it imposes a unexpected cost of business, reduces revenue, and/or increases uncertainty of disruptive changes during the EIS process. For this reason, it risks further investment in the industry, with very large costs.

## Conclusion

The Proposed Project, compared with No Action, must be compared in health impact in addition to other criteria now in the SEIS. Health impact could affect the Decision, as it is a very large impact relative to many others in the EIS. Similarly the Environmental Justice health impact must be evaluated, both because minority populations comprise a portion of the populations.are disproportionally impacted by air pollution.

Similarly the proposed Alternative F, a two nautical mile-wide transit lane, is compared with the revised Proposed Action, D-2. Alternative F would impose significant costs in health and medical costs due to the loss of ocean area and thus the loss of total build, whether for this project, for later projects by the same developer, or in cumulative impact on all developers. The high costs in health impose a need to demonstrate a compelling advantage of switching from D-2 to Alternative F, to justify the costs in health.

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