

3233

Adams, Karen K NAE

From: foxdox@bellsouth.net
Sent: Tuesday, February 08, 2005 11:16 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Koning,

Before you approve or deny a permit to erect 130 turbines in Nantucket Sound, please require the developer to conduct the thorough studies recommended by the U.S. Fish and Wildlife Service and the Massachusetts Division of Fisheries and Wildlife.

Specifically, the environmental review of this project should include:

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- 12 months of radar observations of flying wildlife
- A thorough and timely review of the project's potential effect on wildlife, including marine mammals

These factors will help determine whether the Cape Wind project is in the best interests of both the public and wildlife.

As it is written, the U.S. Army Corps of Engineers' draft environmental impact statement is hopelessly flawed, because it ignores relevant information and draws conclusions based on inadequate research.

This project could be the first marine wind energy facility in the United States. As such, it will set a precedent for other offshore renewable energy projects.

Please require a rigorous, scientific review of its environmental effects. Clean air and healthy wildlife populations are not mutually exclusive. We need both.

Sincerely,

Gerry Fox
706 Yarbrough St
Bossier City, Louisiana 71111

3234

Adams, Karen K NAE

From: onvarov@aol.com
Sent: Tuesday, February 08, 2005 12:29 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Patricia Broda
646 Gallant Fox Dr
Dallas, Texas 75211-6924

3235

Adams, Karen K NAE

From: subject678@aol.com
Sent: Tuesday, February 08, 2005 1:40 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Koning,

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Sincerely,

Heather Athey Hennessey
33 Woodbrook Drive
Mantua, New Jersey 08051-2179

3236

Adams, Karen K NAE

From: jmoffatnu@students.mcg.edu
Sent: Tuesday, February 08, 2005 3:41 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Jessica Moffat
131 Berlin ct
Athens, Georgia 30601

3237

Adams, Karen K NAE

From: SLBmotorcity@aol.com
Sent: Tuesday, February 08, 2005 3:59 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

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U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Sandra L. Bickle
18181 Ramsgate Drive
Lathrup Village, Michigan 48076-4521

3230

Adams, Karen K NAE

From: marina@robertsteelegallery.com
Sent: Tuesday, February 08, 2005 7:11 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Marina Barry
250 Cabrini Blvd Apt 9f
New York, New York 10033-1163

Adams, Karen K NAE

3239

From: tom777@verizon.net
Sent: Tuesday, February 08, 2005 9:24 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Please require a rigorous, scientific review of its environmental effects. Clean air and healthy wildlife populations are not mutually exclusive. We need both. PLEASE, THANKYOU...

Sincerely,

Tom Sullivan
101 Putnam st.
Orange, Massachusetts 01364

3240

Adams, Karen K NAE

From: lks_best_mom_ever@yahoo.com
Sent: Tuesday, February 08, 2005 9:31 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Leah Staver
1822 Oak Knoll Dr.
Belmont, California 94002

3241

Adams, Karen K NAE

From: clapoo7321@yahoo.com
Sent: Tuesday, February 08, 2005 9:54 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Koning,

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Sincerely,

clapoo 7321
?????
?????
Moultonborough, New Hampshire 03254

3242

Adams, Karen K NAE

From: Peacockalante@juno.com
Sent: Tuesday, February 08, 2005 11:08 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Lauri Peacock
718 N. Burk
Hobbs, New Mexico 88240

3243

Adams, Karen K NAE

From: anamovilla7@yahoo.com
Sent: Tuesday, February 08, 2005 11:39 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Ana Maria Movilla
Calle Elvira Mendez 10
Panama, 871123
Panama

3244

Adams, Karen K NAE

From: jrob99@aol.com
Sent: Wednesday, February 09, 2005 12:45 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

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U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Jan Roberts
804 E Clubhouse
Queen Creek, Arizona 85242

3245

Adams, Karen K NAE

From: m-higgins@animail.net
Sent: Wednesday, February 09, 2005 6:17 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Madeleine Higgins
620 Tennessee St
San Francisco, California 94107

3246

Adams, Karen K NAE

From: melissa@telecomtrainingcorporation.com
Sent: Wednesday, February 09, 2005 9:14 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Melissa Harris
3437 Stokesmont Rd
Nashville, Tennessee 37215-1521

3247

Adams, Karen K NAE

From: deborah.eldridge@bellsouth.com
Sent: Wednesday, February 09, 2005 10:59 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

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U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Deborah Eldridge
810 Inverness Lane
Birmingham, Alabama 35242

3248

Adams, Karen K NAE

From: ashwilso@nmu.edu
Sent: Wednesday, February 09, 2005 11:25 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Ashley Wilson
2233 Center
Marquette, Michigan 49855

3249

Adams, Karen K NAE

From: Peter B. Eshbaugh [portfolio@capecod.net]
Sent: Tuesday, February 08, 2005 3:01 PM
To: Energy, Wind NAE
Subject: The "FARM"

Dear Ms Kart-Adams:

I'm an owner of beach on Nantucket Sound for some 60 years...So I'm an interested party. Importantly, once this deed is done, the Sound will be forever changed. Sure, wind power is important, but not at that location. Have we heard any results from the test tower? Where will the generated power go if the temperatures are 88 in Springfield? What insurance carrier will insure the plant? How soon after the operation generates power will management "flip" it for a solid additional profit? Does the operation show profit without government subsidies? I recommend a trip to Craigville Beach today...observing the beauty of the vistas and imagining the service platform looming on the Sound.

Off-Cape residents can't possibly impart knowledgeable comments here. The power to be generated for the Cape WILL not equal 75% of its needs, but rather equal 75% of our annual usage, a rather meaningless number. We can't get out of this once built. Not to start at that location is the best decision. Thank you

Peter B. Eshbaugh
66 Inwood Lane
West Hyannisport, Massachusetts 02601

3250

Adams, Karen K NAE

From: Randall Moore [randymoore1@earthlink.net]
Sent: Tuesday, February 08, 2005 4:49 PM
To: Energy, Wind NAE; pdascombe@capecodcommission.org
Cc: Jim Liedell; Peter Schlesinger
Subject: Comments regarding the Cape Wind Project

Comments on the Wind Farm

Almost everyone agrees that over the next few years we'll need more electricity than our current generating stations will be able to provide.

If we were to generate 170Mw of electricity in a conventional oil fired station, it would take:

More than 10,000 gallons of fuel oil per hour

Or 240,000 gallons per day! (Enough to heat more than 200 average homes for a year)

Burning this much fossil fuel would also generate:

Over 3000 TONS of CO₂ per day! (the average SUV produces 30 lb/day)

Almost 12 TONS of NOx emissions per day!

Almost 20 TONS of SO₂ emissions per day!

Using Natural Gas instead of fuel oil would reduce the SO₂ to almost zero and the CO₂ by 30%, while raising the NOx by 9% (and Natural gas is a **fossil fuel**, produced in large part from oil wells)

The emissions from a coal-fired plant (ala Brayton) are significantly worse (by 20-50%) than oil or gas.

..and remember the oil is transported in Nantucket Sound by barges and tankers that almost guarantee the occasional environmentally disastrous spill.

AND IF we used natural gas, then we'd really need more LNG tanker facilities in Massachusetts to provide the amounts of natural gas needed for homes and power generation.

Global warming is a reality. The photography from our NASA satellites and the data collected from an abundance of sources clearly shows shrinkage of the polar ice, the retreating of major glaciers and significant climate changes world wide. General wisdom finds that "greenhouse gases" produced by the burning of fossil fuels are contributing to this warming.

None of us want a belching fossil fueled power plant anywhere near the Cape and Islands. The construction costs are large, and the long-term prognosis for the costs of the power from them is for only increases. There's dissatisfaction with the prospects of a LNG facility and no one likes to clean up oil spills - our generating companies are considering a return to coal. So, let's carefully consider just how we want to get the energy we'll need.

The wind technology is mature, and ready to be used. The development phases are over and it offers renewable energy at affordable levels.

What can you really see from shore?

Consider the jets that fly overhead on their way to Logan or other airports.. they're about as long as a wind tower is high and about as far from you as the towers would be from the southern shore of Cape Cod . (Actually they're bigger in diameter) Can you really see much of them?? Do they spoil your view of the sky? For the more technically minded, consider the angle subtended on your retina by a 400 ft tall object 5 miles away – it's about the same as a S inch toothpick 5 to 7 feet away.

For me, those thoughts put a different face on an "ugly" wind farm, but having driven through the California farms, I have to admit I didn't find them very pretty.

The potential impact on fishermen and boaters MAY be an issue if a homeland security threat arises, and there are issues to be resolved with the use of public lands (ie: leasing etc.) but these are relatively easy. Consider for a minute that our politicians "lease" public lands all the time to mining, logging and exploration companies at ridiculous rates!! One mitigating thought

2/9/2005

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here is that Cape Wind would only have to increase their charges for electricity by the lease costs – so, we the public would still pay for it!

Building generating capacity is NOT easy. It takes time to design and construct plants and most currently viable alternatives to wind are just plain “dirty”!

Would the production of this electricity by wind then drastically improve our air over the Cape? Unfortunately, the answer is no, not as much as some might think, primarily due to emissions from our western neighbors. BUT, at least it would be a significant step and would alleviate the pollution plumes produced locally (by the Canal plant and Brayton Pt.) that have a direct effect on the Cape’s air quality.

Will there be an immediate reduction in our energy costs? Again the answer is no. Even though the costs associated with the actual generation of power would be near zero, the developer needs to recoup his construction costs in a reasonable time frame and provide for long-term maintenance and even “de-commissioning” costs and a return on investment. (Do you think NSTAR, Con Ed, or Mirant work without profit?) What we will get is more stable pricing of locally generated power. Are there other renewable energy alternatives? Yes, but all have some drawbacks.

The Gorlov Tide Turbine (invented right here in Massachusetts at Northeastern University) that was tested in the Cape Cod Canal can provide significant energy using the motion of the ocean. They would be more of an impediment to boat traffic and fishing, though they would not be visible (the turbines are sub-surface). There is also a drop in output at slack tide. There are currently plans for a 5 Megawatt station off the coast of Korea using this technology. Not a good technology to implement in an area of pleasure boating.

Fuel cells using hydrogen can produce power at reasonable costs and the hydrogen can be “harvested” from the sea using electricity generated by either wind or tides. This is not a mature technology and isn’t ready for “prime time”. When we’ve been able to solve the issues with hydrogen storage and transmission, then maybe it’ll be brought forward.

Solar cells can produce electricity and might work to an extent in a distributed network (“sprinkled” on roof tops all over the Cape and Islands). These are expensive, (Solar power generating equipment currently costs approximately \$6000 per rated Kilowatt) and in this climate and latitude cannot provide the continuous output required by the Cape and Islands grid. For an individual willing to spend the money, he might find that the energy produced would “pay back” in 7 to 10 years and would not fill his entire household needs.

Nuclear power generation was the “great white hope” a few years ago before Chernobyl or Three Mile Island and before we considered terrorism or the results of producing and disposing of large quantities of radioactive waste. Absolutely no one wants one of these near his neighborhood nor do we want the unknown effects of nuclear waste!.

Wind power generating equipment currently costs approximately \$500 per rated Kilowatt

Wind power densities along the southern NE coast are highest in Nantucket Sound (DOE Wind Power Class 6). In fact, it would take twice as many generators in Boston Harbor (DOE Wind Power Class 3) to generate the same power that a set of generators in Nantucket Sound would furnish. (DOE and the National Renewable Energy Laboratory have published wind power maps for the entire US)

These facts make the Sound THE best place to place a wind farm.

--- Randall Moore, PE
 --- 11 Notre Dame Lane
 --- Mashpee, MA 02649
 --- 508-539-8081
 --- <http://home.earthlink.net/~randymoore1/>

2/9/2005

3251

Adams, Karen K NAE

From: Ellie H. Grennan [blacksandsja@yahoo.com]
Sent: Wednesday, February 09, 2005 8:16 AM
To: Energy, Wind NAE
Subject: comments on windfarm proposal

To whom it may concern:

I write to add yet another voice to the ongoing debate about the windfarm. I am fully supportive of the project for a number of reasons.

- 1- The Cape will be more energy independent
- 2- The energy is clean and renewable
- 3- It sets a good example

I do not agree with the NIMBY arguments and believe that the mindset against due to visual impacts must be changed. Wind turbines are destined to become ubiquitous in our landscape. Impacts to wildlife can be minimized through science and experimentation (birds are smarter than most people think).

Thank you for your consideration.
Kind Regards

Ellie Hiteshew Grennan
Nantucket Ma. (since 1985) and Kingston Jamaica

blacksandsja@yahoo.com

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3252

Adams, Karen K NAE

From: Ekbender@aol.com
Sent: Wednesday, February 09, 2005 8:55 AM
To: pdascombe@capecodcommission.org
Cc: mepa@state.ma.us; Energy, Wind NAE
Subject: Comments re Cape Wind

Dear Mr. Dascombe,

Attached are the comments I made at the Cape Cod Commission hearing on February 8, 2005, regarding the proposed Cape Wind project. Thank you for considering them.

Sincerely,
Erich Bender

**Comments Regarding Proposed Cape Wind Project
Presented to Cape Cod Commission Public Hearing
February 8, 2005**

Presented by: Erich Bender
79 Woodland Way
North Chatham, MA 22650

Good evening and thank you for the opportunity to speak. My name is Erich Bender and I am a resident of Chatham. My professional expertise is in acoustics and noise control, and I would like to address the impact of noise from the proposed wind turbine power plant.

I have reviewed the noise sections of the U. S. Army Corps of Engineers DEIS and find that it is *categorically inadequate* with respect to noise. The DEIS relies on a study which was prepared by a consultant to Cape Winds Associates. That study concludes that there will be no noise impact from turbine operation. In my view, the study is *erroneous* and there will, in fact, be an impact. Boaters and people ashore will be able to hear turbine operation when there are southerly winds, especially at night.

The reason that the study sponsored by Cape Winds fails to predict noticeable sound is that it fails to account adequately for a well known phenomenon in acoustics called refraction. The effects of refraction are well known in the field of acoustics. In fact, one of the world's preeminent books in the field states [1]:

“As a result [of refraction over water], sound is channeled into a moderately thick layer of air above the water, and levels can be 10 – 20 dB [decibels] higher downwind than would otherwise be expected.”

Moreover, scientific papers prepared by NASA [2] demonstrate this effect for large wind turbines. Data measured for a single wind turbine out to 20km (that's 12 miles!) indicate that noise levels are also 10 – 20 decibels higher than those presented by Cape Winds' consultant.

10 – 20 decibels is a lot. It may well make the difference between sound that is barely audible and sound that is noticeably annoying.

Regrettably, I must conclude that if the wind turbine power plant is built, noise will likely be audibly annoying to boaters and to people along the southern shore of the Cape. In the interest of all of those individuals, I hope that the power plant will not be built in the Nantucket Sound and I urge the Cape Cod Commission to do its part in protecting all of us from this form of industrialization.

1. Beranek, L. L. and I. L. Ver, Noise and Vibration Control Engineering, Principles and Applications, John Wiley & Sons, Inc., New York, 1992, p138.
2. W. L. Wilshire and W. E. Zorumski, “Low-Frequency Acoustic Propagation in High Winds” Noise-Con 87, June, 1987

3253

Adams, Karen K NAE

From: emloomis@vassar.edu
Sent: Wednesday, February 09, 2005 10:55 AM
To: Energy, Wind NAE
Subject: Massachusetts needs wind energy

Wind power is a promising choice for Massachusetts' energy future. We need to ensure that the Cape Wind Project receives a prompt and thorough review that keeps the public interest at the forefront.

Emily Loomis
6 Summit Rd
Lexington, MA 024216004

3254

Katie Sperling

317 S. Jacob #7B , Grimes, Iowa 50111

February 03, 2005 03:18 PM

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Dear Colonel Koning:

Before you approve or deny a permit to erect 130 turbines in Nantucket Sound, please require the developer to conduct the thorough studies recommended by the U.S. Fish and Wildlife Service and the Massachusetts Division of Fisheries and Wildlife.

Specifically, the environmental review of this project should include:

- Three full years of visual observations of birds - 12 months of radar observations of flying wildlife - A thorough and timely review of the project's potential effect on wildlife, including marine mammals

These factors will help determine whether the Cape Wind project is in the best interests of both the public and wildlife.

As it is written, the U.S. Army Corps of Engineers' draft environmental impact statement is hopelessly flawed, because it ignores relevant information and draws conclusions based on inadequate research.

This project could be the first marine wind energy facility in the United States. As such, it will set a precedent for other offshore renewable energy projects.

Please require a rigorous, scientific review of its environmental effects. Clean air and healthy wildlife populations are not mutually exclusive. We need both.

Sincerely,

Katie Sperling



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FISHERY DIVISION



February 1, 2005

660 Barnstable Road
Barnstable Municipal Airport
North Ramp
Hyannis, Massachusetts 02601
508-790-3122
508-778-1870 FAX
Reservations (800) 352-0714
(800) 635-8787

Karen Kirk-Adams
Cape Wind Energy EIS Project
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742

2
3855

Dear Ms. Adams:

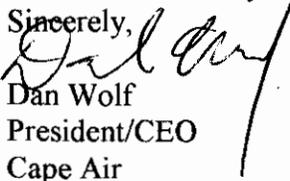
I am the founder and Chief Executive Officer of Cape Air, the largest airline in this region. In addition, I have been a pilot for the past twenty six years, an airline pilot for the past fifteen years, and have and have extensive experience navigating Nantucket Sound and the Cape and Islands. I concur with the Federal Aviation Administration findings that the Cape Wind project on Horseshoe Shoal will not have a negative impact on air navigation.

Unfortunately, opponents of this project have relied on fear and misinformation for the past three years in attempt to sway public opinion against this project. I have followed this project closely and am pleased that the Army Corps of Engineers and Federal and State Cooperating Agencies have issued a detailed and comprehensive document analyzing and illustrating the potential impacts of the Cape Wind proposal. My sincere hope is that as we move forward the public will increasingly base its opinion on science and engineering as opposed to hyperbole and speculation.

Speaking as a private citizen and business owner that consumes large quantities of petroleum products, I am mindful of the volatile and rising cost of energy and its impact on all sectors of our economy. I am also concerned about the impacts of fossil fuel consumption on our health, climate, environment and national security. With these concerns in mind, I decided to visit the Horns Rev offshore wind farm in Blavand, Denmark. I wanted to determine if the well-known benefits of wind power outweighed the impacts in a region that, like Cape Cod, treasures its coastal environment and depends heavily on tourism. I was impressed with the positive acceptance of Blavand's offshore wind farm and learned that their wind farm produced significant benefits at minimal impacts.

We need to rely on forms of energy generation that leave less of an imprint on our environment, health and economy and I appreciate the thorough and comprehensive nature of your analysis.

Sincerely,



Dan Wolf
President/CEO
Cape Air

660 Barnstable Road
Hyannis, MA 02601

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FEB 1 2005
U.S. ARMY CORPS OF ENGINEERS

2
3056

Christopher W. Stimpson
82 Sandwich Road, Apt. '33
Bourne, MA 02532

508 827 3031

cwstimpson@earthlink.net

February 5, 2005

U.S. Army Corps of Engineers
New England District
Cape Wind Energy EIS Project
attn: Karen Kirk Adams
696 Virginia Road
Concord, MA 01742

RECEIVED
FEB 10 2005
U.S. ARMY CORPS OF ENGINEERS

As a resident of Cape Cod for more than twenty years, I write to comment on the proposed Nantucket Sound Wind Farm.

The USACE is charged with determining whether the NSWF proposal is in the public interest. Since it was this organization's Draft EIS that showed conclusively that the proposal is overwhelmingly in the public interest, I will not repeat here the conclusions that your organization has already reached. I would like to address, however, the much-trumpeted complaint that Nantucket Sound is a 'national treasure', and as such should be off-limits to development.

The term 'national treasure' is an emotional one, with no legal, constitutional, or administrative meaning. Nantucket Sound is neither a National Park nor part of the National Seashore. It is simply a stretch of water.

In 2003 I spoke with the Deputy Director of the National Marine Sanctuaries Program in Silver Spring, MD. He informed me that this particular stretch of water had twice already been rejected for NMS status, due to its lack of unique ecological character. The NMSP does not regard the Sound as worthy of special treatment.

In truth, Nantucket Sound is no more special than New Bedford Harbor, Boston Harbor, or Long Island Sound. I doubt whether the organized opposition to the NSWF has ever asked the people who live on those coastlines if they think Nantucket Sound is more valuable than *their* stretch of water. And in the face of the impending energy crisis and the documented damage we have caused our environment with our profligate use of fossil fuels, we must very soon acknowledge that renewable energy facilities will have to be sited in every viable location in our country if we are to maintain even a semblance of the lifestyle we have come to assume is our right. When U.S. citizens find that they cannot

3²856

heat their homes in winter or drive their cars at will, 'aesthetic' concerns about wind farms will rightly be relegated to a very low level of importance.

In terms of the aesthetic impact on Nantucket Sound, however, let us suppose that it is deemed critical enough to justify relocating the proposed wind farm to a different stretch of water. In such a case, the overwhelming public benefit that the USACE has uncovered will accrue, not to the ordinary people of the Cape and Islands, but to the residents of some other area. Cape Codders will have to continue to suffer from the worst air in Massachusetts, and will have no buffer against the volatility of fossil fuel prices. And finally, the USACE, which is the legally designated permitting authority for this proposal, and which has established that the proposed wind farm is clearly in the interest of the public of the Cape and Islands, will have been prevented from bringing the permitting process to its logical and correct conclusion.

I hope that you will weigh these comments seriously in your deliberations, as you proceed to the stage of the Final EIS on the NSWf proposal,

Yours sincerely,

A handwritten signature in black ink, appearing to read 'CW Stimpson', with a long horizontal flourish extending to the right.

Christopher W. Stimpson

Note: an abridged version of these comments was verbally presented at the USACE hearing at MIT in December 2004.

3257

Nantucket Island Chamber of Commerce

www.nantucketchamber.org

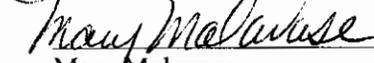
48 Main Street • Nantucket, Massachusetts 02554-3595 • 508-228-1700 • FAX: 508-325-4925

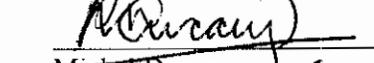
The proposed site is extremely close to regular commercial shipping and ferry transportation routes. Fishermen and recreational boaters also frequent this area. Commercial and general aviation routes are directly over the proposed site. High winds, fog and sudden drastic changes in the weather make the possibility of accidents quite real. The Army Corps should give greater value to the experience and opinions of the local Steamship Authority and Hyline boat captains and airport officials (who are opposed to this project location for navigational hazard reasons) than federal agency representatives who do not travel Nantucket Sound day in and day out.

This Board of Nantucket's Chamber of Commerce feels quite strongly that the proposed location of this project in Nantucket Sound is simply wrong. Each member is personally signing this statement so that there can be no confusion as to where we stand on this proposal.

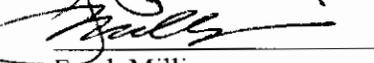
Sincerely,


Melissa Long

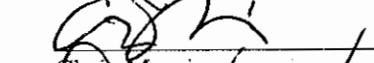

Mary Malavase


Michel Ducamp


Tom Mieczko


Frank Milligan

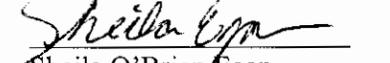

Charles Balas

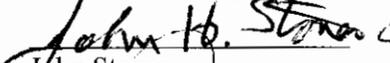

Chris Morris

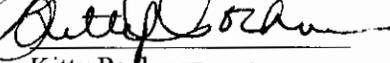

Deborah Dilworth

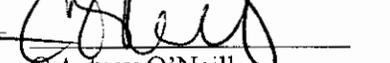

Richard Congdon

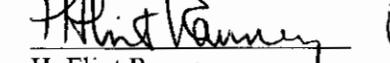

Patricia Rottmeier


Sheila O'Brien Egan


John Stover

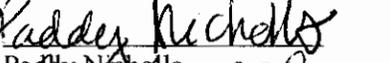

Kitty Pochman

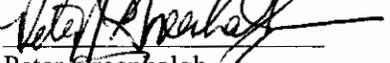

Colmney O'Neill


H. Flint Ranney

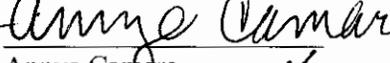

Michelle Langlois

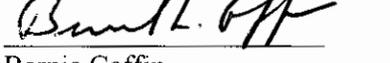

Stacey Stuart

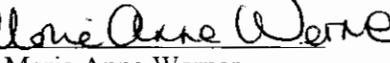

Paddy Nichols


Peter Greenhalgh


Paul Wolf


Annye Camara


Bernie Coffin


Marie Anne Werner

3257

Nantucket Island Chamber of Commerce

www.nantucketchamber.org

48 Main Street • Nantucket, Massachusetts 02554-3595 • 508-228-1700 • FAX: 508-325-4925

CC: Edward Kennedy, U.S. Senator
John Kerry, U.S. Senator
William Delahunt, U.S. Representative
Eric Turkington, State Representative
Robert O'Leary, State Senator
Nantucket Board of Selectmen
Nantucket Planning & Economic Development Commission
Nantucket Memorial Airport
Barnstable Municipal Airport
Woods Hole, Martha's Vineyard & Nantucket Steamship Authority
Hy-Line Cruises
Cape Cod Chamber of Commerce
Cape Cod Commission
FAA
Martha's Vineyard Commission
Nantucket Independent
Inquirer & Mirror
Cape Cod Times
Alliance to Protect Nantucket Sound
Cape Wind Associates

February 7, 2005
550 Turnpike Rd
New Ipswich, NH. 03071



Mr. Richard Wojtukiewicz
550 Turnpike Rd.
New Ipswich, NH 03071

Dear Ms. Adams:

3258

We write in opposition to the Cape Wind project. The idea of renewable wind power is needed and should be studied and researched. We are property owners on Chappaquiddick (25 Sea Avenue, Edgartown) with no water view. We often fish in the proposed wind project area and we firmly believe that this endeavor would adversely affect this sensitive area.

We know the initial cost would be greater but we believe the wind farm project should be located in a suitable area further away from the coastline.

Please reject this proposed development site. Thank you very much for the opportunity to comment on this controversial project. We believe your decision will have lasting impact on the region of Massachusetts.

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REGISTRY DIVISION

Sincerely,
Richard Wojtukiewicz
Richard S. Wojtukiewicz
Jessica Wojtukiewicz
Jessica Wojtukiewicz

3259

1204 Heatherwood
Yarmouth Port MA 02675
February 7, 2005

Karen Kirk Adams
Cape Wind Energy Project EIS Project Manager
Corps of Engineers, New England District
696 Virginia Road
Concord MA 01742-2751

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CORPS OF ENGINEERS

Ref. file no. NAE-2004-338-1

Dear Ms. Kirk Adams:

These comments are intended to replace the notes I submitted at MIT.

My concern is: will the questions of need, cost and grid operational adjustments be adequately factored into the Corps' decision? Thus:

Regarding Need:

There is little or no need for this project since there is no shortage of generating capacity.

When new generating capacity is needed, it can not be from wind because wind does not blow on demand.

For the same reason, an addition of wind power can never make possible the shutdown of any existing plant.

Regarding benefits from savings in fuel:

Any fuel saved is mostly gas which contains no metals. The volume of fuel saved is lessened by the inefficiency of back up generation.

Regarding Grid operation:

A deeper analysis is needed of the costs and operational problems associated with managing the grid with the admission of unpredictable amounts of wind generated power available only when the wind blows.

The claimed adverse environmental impacts are difficult to quantify, but none the less real. Thus: what is the acceptable number of birds killed by the blades (there will be some)? Or, will the concrete towers enhance or reduce fish populations? Will the view of the turbines from the shore result in an

3259

unacceptable loss in property values and summer tourism? If the applicant places every conceivable warning device on the towers, can he guarantee that in a fog a small plane will not collide with a turbine or that a small craft will not hit a concrete tower?

If the project answered an urgent need for increased generating capacity, it might be prudent to ignore the environmental concerns noted above. However, there is no need and if there were, a wind farm can not answer it as explained above. Therefore in the final EIS the potential adverse impacts should outweigh the negligible benefits. When, eventually new generating capacity is needed, the grid manager, ISO New England will have no interest in an unpredictable, intermittent power increment of 1%, such as the Cape Wind project. Wind power adds nothing to available, on demand capacity because for days at a time there will be no wind.

Does the DEIS contain any analysis of the manageability of the grid to accommodate the hundreds of separate startups and shutdowns of the wind farm which would occur over a year. I think the applicant owes you, if he has not already done so, a complete listing of the periods of operability and inoperability for one past year. This should show the length of each operable period and the range and average amount of power produced. I found 30 such periods in May and June using the applicant's web data.

The applicant may have submitted to the Corps calculations of the dollar value of the gas not used when power is coming from wind, but have you confirmed with ISO-New England the kind of 'spinning' reserve available for back up? How much gas saving is not realized because of inefficient back up operation? What is the ISO-NE estimate of the cost of back up operation?

I request that the Army Corps determine the true cost of the project including the cost of grid integration, costs for back up power and public costs to subsidize this unneeded project. Incidentally, The gas fired to produce the concrete for the towers is great, possibly equal to more than one year's alleged saving by the project.

The limited value of wind power is made clear in the attached report by Glenn R. Schleede. (see flagged paragraphs on pages 2 and 3.)

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The applicant would profit from the project as a result of the state and federal subsidies and maximum tax breaks from depreciation allowance. It is common knowledge that without any one of these benefits, the applicant would not proceed. Indeed, nation wide, activity on wind farm development nearly came to a halt in 2004 until congress restored the production tax credit at 1.5cents per kilowatt hour produced. I know of no wind farm benefiting the rate payers.

The utilities have no use for wind power. It is unreliable, intermittent, unpredictable and puny in capacity. The health gains from the unsubstantiated tiny reductions in emissions are considered unfounded, e.g. asthma not caused by air pollution.

There seems little justification for approving a project costing hundreds of millions in tax dollars and benefiting only the applicant, when there are real potential adverse impacts.

Respectfully,

E. Danforth Crosby
E. Danforth Crosby

Attachment to letter of Feb 7
from E.D. Crosby

3259



EVALUATING THE COSTS AND BENEFITS OF WIND ENERGY

Overstated Benefits and Understated Costs Create False Hopes for Wind Power

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* * *

Prepared by

Glenn R. Schleede*

May 5, 2003

Overstated Benefits and Understated Costs Create False Hopes for Wind Power

Many people accept the well-publicized claim that windmills will be able to supply a significant share of our country's growing requirements for electricity. They also believe that wind energy is environmentally benign and a way to avoid emissions from other sources of energy for electric generation. Political leaders in windy states have even been persuaded that "wind farms" will provide economic benefits, principally through rental payments to landowners.

As proposals to build "wind farms" have proliferated, however, the adverse impacts of wind energy are becoming clear to a growing number of citizens, consumers and taxpayers. They are learning that "wind energy" has adverse environmental, ecological, scenic and property value impacts. They are learning that many of the claimed benefits of wind energy are misleading or false, and that the true costs of wind energy are higher than advertised -- with those higher costs falling on taxpayers and electric customers.

Producing Electricity from Wind

Windmills have been around for centuries and were quite useful in earlier times to provide power to pump water or grind grain. Today, small-scale windmills that produce electricity can be useful in areas without access to electric distribution lines. While expensive, they may be acceptable if their owners need electricity only when the wind blows, or if the windmills are coupled with a battery system that permits storing the electricity until it is needed.

Quite different are the large commercial-scale "windmills" that wind energy advocates favor as a way to produce electricity that would be fed into electricity grids that serve commerce, industry and the general public. These "windmills" consist of large turbine-generators mounted on tall towers (200 feet or higher), powered by long blades (with a diameter of 150 feet or more) and overall height that may be in the range of 300 to 465 feet.

Such windmills need to be located in areas with substantial wind. Depending on the model, these wind turbine-generators begin producing a small amount of electricity when wind speeds reach about 9 miles per hour, reach full generating capacity around 33 mph, and then cut out when wind speeds reach 56 mph. (Higher wind speeds can damage the machinery.) The wind turbines produce no electricity when wind speeds are outside the speed range.

The electricity is fed through wires that run down the towers and to a connection point with transmission lines that can carry the electricity to places where it is needed. A collection of these large windmills is often referred to as a "wind farm."

Costs and Benefits of Electricity from Wind

The wind industry -- which includes manufacturers of turbines, towers, blades and other equipment, "wind farm" developers and owners -- has touted the benefits of wind power. Advocates in the US Department of Energy (DOE) and National Renewable Energy Laboratory (NREL) often voice support for these claims. The industry has enjoyed favorable media coverage and obtained generous federal and state tax breaks and other subsidies.

However, as proposals for additional “wind farms” have proliferated, the claims of the wind industry and other advocates have faced closer scrutiny, as explained below. Proposed facilities are encountering strong opposition from a variety of sources. →

Big machines -- little electricity. DOE and the wind industry have suggested that wind could supply 5% of the nation’s electricity by 2020.¹ However, a more objective assessment by the U.S. Energy Information Administration indicates that wind will provide only 61/100 of 1% of our electricity by 2020.²

Despite their large size, commercial-scale windmills produce very little electricity and only when the wind is blowing within certain speed ranges. At the end of 2002, there were about 15,000 commercial-scale windmills in the US³ scattered across thousands of acres in 27 states. Ninety percent of the capacity is in 6 states: California, Texas, Iowa, Minnesota, Washington and Oregon. All these windmills combined produce less electricity than one nuclear power plant, one large coal-fired power plant or two modern base load gas-fired power plants. ←

Because wind turbines produce only when wind is within a certain speed range, their output is intermittent, highly variable, and largely unpredictable. Therefore, the electricity has less value than electricity from generating plants that can produce whenever they are needed.

True Cost of Electricity from Wind. Wind energy advocates claim that the cost of electricity from wind has been reduced sharply but still requires government subsidies. In fact, the true cost of electricity from wind is much higher than admitted by wind energy advocates because they leave out important elements of the true cost, including:

- The cost of providing backup generation to make up for the intermittent and variable output from wind turbines -- so that electricity systems are kept in balance.
- Extra costs of electric transmission and grid management due to intermittence, variability and limited predictability of wind turbine output and inefficient use of transmission capacity.
- Tax breaks and subsidies that shift tax burden and costs from “wind farm” owners to remaining taxpayers and to electric customers.

Environmental impacts. Advocates often claim that wind energy is environmentally benign and that electricity from wind offsets emissions from fossil-fired (coal, oil and natural gas) generating plants. However, the advocates’ claims generally are overstated because other generating plants must be kept running at less than full efficiency or in “spinning reserve” to assure that electricity is available when needed by electric customers.⁴

Wind advocates also tend to ignore the adverse environmental, ecological, scenic and property value impacts of large, commercial-scale windmills that are leading to the growing citizen opposition to proposed “wind farms.” Examples of adverse effects include:

- *Noise*, such as in Mackinaw City, MI, involving two wind turbines, or in Kewaunee, WI, where homes near a “wind farm” were purchased because of noise complaints.
- *Bird kills and interference with bird habitat and migration:* Potential adverse impacts on bird and other wildlife and their habit are important key concerns. The US Fish & Wildlife

Service, for example, is requiring detailed studies in connection with a proposed wind farm in West Virginia.

- *Destruction of rare ecosystems.* For example, citizens are opposing “wind farms” that are proposed for Kansas’ Flint Hills, location of the last remaining tall grass prairie in the US.
- *Impact on scenic vistas:* Areas where scenic impairment is a major issue for proposed “wind farms” include the Kittitas Valley in Washington, Allegheny Front in West Virginia, several mountain locations in Vermont, Maine, and Western Massachusetts, and offshore areas near Cape Cod and Nantucket, Massachusetts.
- *Property values:* Concerns about adverse impact on property values are particularly acute when “wind farms” are proposed near populated areas. Examples include but are not limited to existing or proposed “wind farms” in the towns of Lincoln and Addison in Wisconsin; DeKalb, Lee and Bureau Counties in Illinois; Erie, Chautauqua, Steuben and Yates Counties in New York; and counties along the eastern shore of Lake Michigan.

In addition to the above concerns, towns that are developing ordinances to deal with wind turbines are also finding it necessary to deal with issues such as “shadow flicker” from spinning blades, and to protect health and safety from broken windmill blades or ice throws from spinning blades.⁵

Tax breaks and subsidies. Wind industry lobbyists have been very successful in securing tax breaks and other subsidies from federal, state and local governments, all of which shift costs from “wind farm” owners to remaining taxpayers. Federal tax breaks include very rapid, accelerated depreciation (the entire capital cost can be deducted from income over a 5-year period), thus sharply reducing taxable income at both the federal and state level. Also, a “production tax credit” of \$0.018 cents is provided for each kilowatt-hour (kWh) of electricity produced during the first 10 years of operation. Some states have sharply reduced or eliminated sales and property taxes for owners of “wind farms,” and some provide additional subsidies.

Particularly in the early years of operation, the value of tax breaks and subsidies may far exceed the income that a “wind farm” owner receives from the sale of electricity. Tax breaks and subsidies are now so large that their value to “wind farm” owners – not the alleged environmental benefits – is the primary motivation for building a “wind farm.”

Economic impact on states hosting “wind farms.” Political leaders in some Midwestern states favor tax breaks and subsidies because of presumed economic benefits to a state. These presumed benefits consist largely of:

- Rental or easement payments to owners of land where windmills and transmission lines are located,
- Jobs during construction (which may last only 6 months or less, with the higher skilled jobs filled by out of state workers), and a few jobs after the project becomes operational,
- In-state purchases of materials and services, and
- Tax revenues or contributions in lieu of taxes.

In fact, however, the net economic impact on a state’s economy is often negative, particularly when the higher cost, wind-generated electricity is used by electric customers in the state. The

higher cost of the electricity (i.e., compared to the cost of electricity from traditional sources) paid by these electric customers will often exceed the income associated with the presumed economic benefits.

The big economic winners are the often out-of-state “wind farm” owners. Most of the capital investment in a “wind farm” flows to companies in other states and often in other countries. Most wind turbines, which make up the overwhelming share of the capital investment in a “wind farm,” come from foreign owned companies (e.g., Vestas and NEG Micron of Denmark).

The big losers are the electric customers and the local businesses where their money would have been spent if it were not being used to pay electric bills.

Wind resources. Wind advocates often claim that there are enough “wind resources” in sparsely populated states such as North Dakota to satisfy all US electricity requirements. This “Saudi Arabia of Wind” concept is unrealistic. It would be costly to add electric transmission capacity to move the electricity from relatively remote windy areas to places where the electricity is needed. In addition, wind’s use of transmission capacity is inherently inefficient (due to its intermittent use) and losses of electricity during transmission increase with distance.

Renewable Portfolio Standards. Because the true cost of electricity from wind is high and because opposition to “wind farms” is growing (except in remote areas), wind advocates are lobbying for mandatory state and/or federal “Renewable Portfolio Standards.” Such standards would set a minimum share of electricity that must be provided from wind and other “renewable” energy sources – without regard to the high costs that would be imposed on electric customers.

A few consumers are willing to pay higher prices for electricity that they believe is generated from “renewable” sources such as wind. The revenue from such “green energy” programs is not adequate, however, to cover the higher cost of the electricity and the cost of administering such programs. The remaining cost would be passed on to all electric customers and hidden in their monthly bills. The big winners would be the owners of “wind farms” and other renewable facilities, who would be guaranteed a large demand for their expensive product.

In effect, renewable portfolio standards are another form of subsidy for owners of electric generating facilities powered by wind and other qualifying renewable energy sources. The standards are an insidious subsidy because the higher costs resulting from them are likely to be passed on to many customers without their knowledge.

Protecting Local Interests

People living in areas where “wind farms” are proposed, local government officials, and landowners approached by “wind farm” developers have learned that the developers can be very aggressive.

Protecting citizens and communities. Local governments often do not have zoning ordinances that deal adequately with complex issues raised by large windmills or proposed “wind farms.” Local officials may not have the technical, legal, economic and environmental expertise needed to evaluate proposed “wind farms.” Therefore, they may not be able to protect adequately the interests of the citizens that they represent. Citizens in some communities facing “wind farm”

higher cost of the electricity (i.e., compared to the cost of electricity from traditional sources) paid by these electric customers will often exceed the income associated with the presumed economic benefits.

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proposals have learned that existing rules covering open meetings and records, conflicts of interest, and other fundamental “good government” practices are not adequate to protect the public interest.

Protecting landowners. In addition, landowners often do not have the expertise to defend their interests adequately when confronted by aggressive “wind farm” developers with proposed contracts containing provisions that prove to be onerous. For example, some landowners have been confronted with (and perhaps even signed) contracts that tie up land and prevent alternative use for long and even undefined periods of time, whether or not development occurs. A bill has been introduced in one state (North Dakota) that has the objective of protecting landowners from some of the more egregious practices.

Conclusions

In summary, wind energy provides far fewer benefits and results in much higher costs than its advocates typically claim and which the public, media and government officials have been led to believe. Generous federal, state and local tax benefits and other subsidies – rather than environmental benefits – appear to be the primary motivation for the proliferation of proposed “wind farms.” Owning “wind farms” offers the potential for substantial profits for organizations with significant amounts of income to shelter from federal and state income taxes.

Federal, state and local executives, legislators and regulators have an obligation to pay a lot more attention to the validity of claims made by the wind industry and other wind advocates. They need to understand the true cost of electricity from wind and the adverse impacts of “wind farms” on environmental, ecological, scenic and property values. They also need to take strong action to protect citizens and communities – as well as landowners – from overly aggressive activities of “wind farm” developers and owners.

* * *

Author: This analysis was self-financed and is provided as a public service by Glenn R. Schleede, Energy Market & Policy Analysis, Inc. PO Box 3875, Reston, VA 20195-1875; Phone: 703 709-2213; Email: EMPAInc@aol.com. Schleede is semi-retired after spending more than 30 years on energy and related environmental and economic matters in the federal government and private sector. He now devotes much of his time to analysis and writing about:

- a. Government policies, programs and regulations that are detrimental to the interests of citizens, consumers or taxpayers.
- b. Government or private programs and projects that are presented to the public, media, Congress and other government officials in a false or misleading way.

The views presented in this analysis are provided in Schleede’s role as a citizen, consumer and taxpayer and are not on behalf of any client or other interest.

Endnotes:

¹ <http://www.eere.energy.gov/wind/web.html>

² U.S. Energy Information Administration (EIA), *Annual Energy Outlook 2003*, Tables A8, A17 & regional table 73. EIA is a part of the U.S. DOE but was given statutory independence to help assure its objectivity.

³ California has about 13,000 windmills, many of which were built during the 1980s in response to generous tax credits. After tax credits were exhausted, many fell into disrepair and/or were abandoned.

⁴ In addition, wind advocates often use outdated data on emissions from existing generating units and do not take into account the fact that new fossil-fueled generating technologies have fewer emissions than older units.

⁵ For example, Eveline Township in MI.

February 2, 2005

~~3269~~ 3260

Dear Sir:

I am very much opposed to placing 130 wind turbine generators on Truesdell Shoal in Nantucket Sound. I have been informed that we already have enough energy for all our needs on Cape Cod and the islands. Therefore, there is no need for this extra energy.

A large part of our natural world which use Nantucket Sound as their habitat, mainly fish and birds, are in grave danger if this plan is to be implemented.

According to the News Hour, 2/1/05, the Earth's Coral Reefs are ^{also} in grave danger which is an indication of what is happening to our Oceans and its affect on the human way of life.

All of these factors should be thoroughly investigated before any decisions are made. Also, I believe that the very first wind farm in a large body of water should be built in an area where it is definitely needed. I am a property owner in the Village of Barnstable, in the Town of Barnstable, in the County of Barnstable, Massachusetts.

Sincerely,
Sarah Pallman
28 Powder Hill Rd
Barnstable, MA 02630

Adams, Karen K NAE

3261

From: aimee@beldock.org
Sent: Wednesday, February 09, 2005 7:32 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Koning,

Before you approve or deny a permit to erect 130 turbines in Nantucket Sound, please require the developer to conduct the thorough studies recommended by the U.S. Fish and Wildlife Service and the Massachusetts Division of Fisheries and Wildlife.

Specifically, the environmental review of this project should include:

- Three full years of visual observations of birds
- 12 months of radar observations of flying wildlife
- A thorough and timely review of the project's potential effect on wildlife, including marine mammals

These factors will help determine whether the Cape Wind project is in the best interests of both the public and wildlife.

As it is written, the U.S. Army Corps of Engineers' draft environmental impact statement is hopelessly flawed, because it ignores relevant information and draws conclusions based on inadequate research.

This project could be the first marine wind energy facility in the United States. As such, it will set a precedent for other offshore renewable energy projects.

Please require a rigorous, scientific review of its environmental effects. Clean air and healthy wildlife populations are not mutually exclusive. We need both.

Sincerely,

Aimee Beldock
169 North Second St.
Campbell, California 95008

3262

Adams, Karen K NAE

From: jane378@aol.com
Sent: Wednesday, February 09, 2005 7:14 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Nancy Ohm
8825 Turkey Ridge Rd.
Breinigsville, Pennsylvania 18031

3263

Adams, Karen K NAE

From: Ramsay Huntley [ramsayhuntley@hotmail.com]
Sent: Wednesday, February 09, 2005 8:30 PM
To: Energy, Wind NAE
Subject: Comment in SUPPORT of Cape Wind proposal

This email is in SUPPORT of the Cape Wind project.

This project will help Massachusetts lead the way in renewable energy with minimal negative impacts. The electricity produced will offset a significant portion of electricity that is now produced with fossil fuels (which have significant negative social and environmental impacts).

I look forward to the day when our electricity comes from sources that are renewable, clean, and local, and Cape Wind will be a big step towards that ideal.

Please register my support for the Cape Wind renewable energy project.

Thank you for your time.

sincerely,

Ramsay Huntley

45 Glen St.
Malden MA 02148
ramsay@alumni.tufts.edu

3264

Adams, Karen K NAE

From: NANCY VESTER [vesternn@msn.com]
Sent: Wednesday, February 09, 2005 11:57 PM
To: Energy, Wind NAE

Please, please, please do not allow the proposed wind farm to be built in beautiful Nantucket sound. We are opposed to it for all the obvious reasons but most of all because once done , the damage can never be undone.

Norm and Nancy Vester
St Albans Bay, VT 05481

3265

Adams, Karen K NAE

From: patriciaharmon2000@yahoo.com
Sent: Wednesday, February 09, 2005 7:36 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Koning,

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Please require a rigorous, scientific review of its environmental effects. Clean air and healthy wildlife populations are not mutually exclusive. We need both.

Sincerely,

Patricia Harmon
510 Viewmont Street
Benicia, California 94510-2325

3266

Adams, Karen K NAE

From: cdboydston@yahoo.com
Sent: Wednesday, February 09, 2005 7:37 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Charlene Boydston
2735 Poppyseed Way
Las Vegas, Nevada 89142

3267

Adams, Karen K NAE

From: spykat56@hotmail.com
Sent: Wednesday, February 09, 2005 7:40 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Katherine Tildes
94 Franklin Ave
Apt 2
Athens, Ohio 45701

326B

Adams, Karen K NAE

From: wolfee18@mchsi.com
Sent: Wednesday, February 09, 2005 7:42 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Sara Owens
619 1st Street
Silvis, Illinois 61282

3269

Adams, Karen K NAE

From: acroia2002@yahoo.com
Sent: Wednesday, February 09, 2005 7:52 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Kathy Bayles
11425 Upper Applegate Rd
Jacksonville, Oregon 97530-9372

3270

Adams, Karen K NAE

From: tkelleywal@stny.rr.com
Sent: Wednesday, February 09, 2005 7:52 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

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696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Terry Wallace
6 Pembroke Dr.
Binghamton, New York 13901

3271

Adams, Karen K NAE

From: jkawashima@corp.ultratech.com
Sent: Wednesday, February 09, 2005 7:53 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

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U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Joan Kawashima
1608 Ronald Ct
San Jose, California 95118

3272

Adams, Karen K NAE

From: lahanin@swbell.net
Sent: Wednesday, February 09, 2005 8:03 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Laurie Hanin
8232 Madison Avenue
St. Louis, Missouri 63114

3273

Adams, Karen K NAE

From: starlines@hotmail.com
Sent: Wednesday, February 09, 2005 8:10 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Josh Gaudfeldt
906 Second Street
Radford, Virginia 24141

3274

Adams, Karen K NAE

From: hab427@webnmore.net
Sent: Wednesday, February 09, 2005 8:15 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Heidi Betts
PO Box 99
Kylertown, Pennsylvania 16847

3275

Adams, Karen K NAE

From: rgb2cmyk@hotmail.com
Sent: Wednesday, February 09, 2005 8:18 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Pat Liss
2015 S. Finley Rd
Lombard, Illinois 60148

3276

Adams, Karen K NAE

From: miwa@miwa-kunz.de
Sent: Wednesday, February 09, 2005 8:25 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

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U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

miwa kunz-kuwahara
hofbachstr.60
"7-19-16,ebara,shinagawa-ku,tokio"
siegen, 57078
Germany

3277

Adams, Karen K NAE

From: a-kunz@gmx.de
Sent: Wednesday, February 09, 2005 8:25 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

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U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

andreas kunz
hofbachstr.60
siegen, 57078
Germany

327e

Adams, Karen K NAE

From: hanna@hanna-kunz.de
Sent: Wednesday, February 09, 2005 8:26 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Koning,

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This project could be the first marine wind energy facility in the United States. As such, it will set a precedent for other offshore renewable energy projects.

Please require a rigorous, scientific review of its environmental effects. Clean air and healthy wildlife populations are not mutually exclusive. We need both.

Sincerely,

hanna kunz
hofbachstr.60
siegen, 57078
Germany

3279

Adams, Karen K NAE

From: slamers@execulink.com
Sent: Wednesday, February 09, 2005 8:34 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Koning,

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Sincerely,

Sharon Lamers
5-111 Brunswick Ave
Kitchener, N2H 4E7
Canada

3280

Adams, Karen K NAE

From: sxeangel757@aol.com
Sent: Wednesday, February 09, 2005 8:45 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

April Hale
1801 Wandsworth Dr.
Virginia Beach, Virginia 23454

3281

Adams, Karen K NAE

From: manon@houstonjobs.com
Sent: Wednesday, February 09, 2005 8:47 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

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U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Manon Carr
P.O Box 1384
League City, Texas 77574

3282

Adams, Karen K NAE

From: Jas90m@aol.com
Sent: Wednesday, February 09, 2005 8:51 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Theresa Terhark
2328 Sumac Circle
Woodbury, Minnesota 55125

3283

Adams, Karen K NAE

From: cap9111@comcast.net
Sent: Wednesday, February 09, 2005 8:52 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Carole Pappas
8185 Whiteclift Lane
Grand Blanc, Michigan 48439-9561

3284

Adams, Karen K NAE

From: Donbeardsr@wmconnect.com
Sent: Wednesday, February 09, 2005 9:01 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Don Beard
4063 Mountain View Circle
Lenoir, North Carolina 28645

3285

Adams, Karen K NAE

From: valmki@aol.com
Sent: Wednesday, February 09, 2005 9:04 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

vera kierme
41-41 44 th
sunnyside, New York 11104

3286

Adams, Karen K NAE

From: biblioteky@aol.com
Sent: Wednesday, February 09, 2005 9:06 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

roger glatzofer
16511 s. 84th ave
crimestops.com
tinley park, Illinois 60477-1201

3287

Adams, Karen K NAE

From: djrossum@comcast.net
Sent: Wednesday, February 09, 2005 9:07 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Deborah Rossum
97 Kingsgate Road
Apt. C31
Lake Oswego, Oregon 97035

3288

Adams, Karen K NAE

From: erin12779@earthlink.net
Sent: Wednesday, February 09, 2005 9:18 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Koning,

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Sincerely,

Erin Springer
110 Governors House Drive
Morrisville, North Carolina 27560

3289

Adams, Karen K NAE

From: bunnybutt102000@yahoo.com
Sent: Wednesday, February 09, 2005 9:20 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

lisa lammon
188 piney road
188 piney road
kodak, Tennessee 37764

3290

Adams, Karen K NAE

From: friesianrider96@yahoo.com
Sent: Wednesday, February 09, 2005 9:24 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

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U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Melissa Landis
50 Henne Road
Bernville, Pennsylvania 19506

3291

Adams, Karen K NAE

From: sheeezball@hotmail.com
Sent: Wednesday, February 09, 2005 9:28 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Lara Olczak
1375 Grandview Dr.
Berkeley, California 94705

3292

Adams, Karen K NAE

From: skamperoni@juno.com
Sent: Wednesday, February 09, 2005 9:30 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Kim Lewis
22391 San Joaquin W
Canyon Lake, California 92587

Adams, Karen K NAE

3293

From: shelseald@cinci.rr.com
Sent: Wednesday, February 09, 2005 9:39 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

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U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Shelsea Davis
1896 Greenpine Dr.
Cincinnati, Ohio 45231

3294

Adams, Karen K NAE

From: courte3@aol.com
Sent: Wednesday, February 09, 2005 9:50 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Courtney Enz
14 Unity Avenue
Belmont, Massachusetts 02478

3295

Adams, Karen K NAE

From: beverlytazangel@yahoo.com
Sent: Wednesday, February 09, 2005 10:03 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Beverly Lussier
PO Box 13114
Colorado Springs, Colorado 80913

3296

Adams, Karen K NAE

From: cscurnow@hotmail.com
Sent: Wednesday, February 09, 2005 10:06 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

CONNIE Curnow
219 E. Summer Meadow Circle
Bountiful, Utah 84010

3297

Adams, Karen K NAE

From: MOOCH13@HOTMAIL.COM
Sent: Wednesday, February 09, 2005 10:10 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

SUZANNE MUCCIO
50 EAST HARTSDALE AVE
hartsdale, New York 10530

3298
~~3298~~

Adams, Karen K NAE

From: magicdove_99@yahoo.com
Sent: Wednesday, February 09, 2005 10:15 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Nancy Cunha
95 Newman Ave Apt N809
Rumford, Rhode Island 02916-1955

3299

Adams, Karen K NAE

From: GAVISLUV@AOL.COM
Sent: Wednesday, February 09, 2005 10:16 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

MICHELINE SODER
424 MELON AVE
EGG HARBOR, New Jersey 08215

3300

Adams, Karen K NAE

From: tavani55@yahoo.com
Sent: Wednesday, February 09, 2005 10:44 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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This project could be the first marine wind energy facility in the United States. As such, it will set a precedent for other offshore renewable energy projects.

Please require a rigorous, scientific review of its environmental effects. Clean air and healthy wildlife populations are not mutually exclusive. We need both.

Sincerely,

Savanna Frohling
6165 Riverside Drive
Atlanta, Georgia 30328

Adams, Karen K NAE

3301

From: tonijaros@cox.net
Sent: Wednesday, February 09, 2005 10:45 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Koning,

Before you approve or deny a permit to erect 130 turbines in Nantucket Sound, please require the developer to conduct the thorough studies recommended by the U.S. Fish and Wildlife Service and the Massachusetts Division of Fisheries and Wildlife.

Specifically, the environmental review of this project should include:

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Sincerely,

Toni Jaros
923 S Lazona Dr
Mesa, Arizona 85204

3302

Adams, Karen K NAE

From: fharmer@amgen.com
Sent: Wednesday, February 09, 2005 10:46 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Felicia Raab
11007 Braewick Dr.
Carmel, Indiana 46033

3303

Adams, Karen K NAE

From: ansel bubel [abubel@comcast.net]
Sent: Wednesday, February 09, 2005 10:52 PM
To: Energy, Wind NAE
Subject: Bring Cape Wind online!

February 09, 2005

Karen Kirk-Adams
U.S. Army Corps of Engineers, New England District
Cape Wind Energy EIS Project
696 Virginia Road, Concord, MA 01742

Cape Wind Energy EIS Project

I was very excited to hear about the Cape Cod Wind Energy project. The public benefits are indeed compelling. I want to see Massachusetts become a successful example of moving towards a clean energy future.

The project will have minimal impact on fishing, boating and tourism. The wind park will bring high-paying jobs to the area, and I urge the Army Corps of Engineers helps to bring Cape Wind into operation quickly and safely.

The visual impacts will be minimal, and with some wind projects, tourists actually travel to see the wind farms.

As an environmentalist, I support the project whole-heartedly. The turbines will have little impact on birds -- according to the American Wind Energy Association, windows pose a greater threat to avian life than wind turbines. Wind power can replace fossil-fired generation, improving the air quality in the Northeast.

Sincerely,

ansel bubel
bldg #1
4520 baxter hall
williamstown, MA 01267
USA
abubel@comcast.net

3304

Adams, Karen K NAE

From: mtvjock@hotmail.com
Sent: Wednesday, February 09, 2005 10:58 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Please require a rigorous, scientific review of its environmental effects. Clean air and healthy wildlife populations are not mutually exclusive. We need both.

Sincerely,

Michael Frazier
4421 Meade Av
Fort Myers, Florida 33901

3305

Adams, Karen K NAE

From: MILLARDR@MYACC.NET
Sent: Wednesday, February 09, 2005 11:07 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

ROSANA MILLARD
3662 TERRAPIN LANE
1413
CORAL SPRINGS, Florida 33067

3306

Adams, Karen K NAE

From: dogfishdonna@earthlink.net
Sent: Wednesday, February 09, 2005 11:30 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Donna Willinsky
3675 Valleybrink Road
Los Angeles, California 90039

3307

Adams, Karen K NAE

From: lynzee182001@yahoo.com
Sent: Wednesday, February 09, 2005 11:31 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

chris hirst
7717 georgia peach drive apt 18102
winter park, Florida 32792

3308

Adams, Karen K NAE

From: animalslove21@yahoo.com
Sent: Wednesday, February 09, 2005 11:40 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Lindsey Chambers
2541 S Semoran Blvd
Apt 1713
Orlando, Florida 32822-

3309

Adams, Karen K NAE

From: summergurl77@alloymail.com
Sent: Thursday, February 10, 2005 10:05 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Lauren Brown
1155 Burnett Rd.
Byron, Georgia 31008

3310

Adams, Karen K NAE

From: craigleeasbury1@yahoo.com
Sent: Thursday, February 10, 2005 12:02 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Koning,

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Sincerely,

Craig Lee Asbury
3530 S. Kings Ave.
3530 S. Kings Ave.
Springfield, Missouri 65807

3311

Adams, Karen K NAE

From: barbaras@yahoo.com
Sent: Thursday, February 10, 2005 12:05 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Barbara Schiano
305 W 52 Street
New York, New York 10019

3312

Adams, Karen K NAE

From: astamoat@yahoo.com
Sent: Thursday, February 10, 2005 12:17 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

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U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Leslie Durkee
65 Bridge St.
Northampton, Massachusetts 01060

3313

Adams, Karen K NAE

From: SP@sirdog.net
Sent: Thursday, February 10, 2005 12:25 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

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U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Sheila Peterson
8428 Weddell Court
Citrus Heights, California 95610

3314

Adams, Karen K NAE

From: dksandor@ix.netcom.com
Sent: Thursday, February 10, 2005 12:34 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Deana Haines
3151 Poplar Creek Dr SE Unit 303
Kentwood, Michigan 49512-5656

3315

Adams, Karen K NAE

From: urlovd2nd@aol.com
Sent: Thursday, February 10, 2005 12:39 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

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U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Please insist on at LEAST the minimal studies as outlined, not allowing anyone to cut the study short, or by using equipment that is not comparable to what will actually be used in the ultimate project.

Sincerely,

Lynda Gray
po box 229
Silver City, Iowa 51571

3316

Adams, Karen K NAE

From: holywoman8@earthlink.net
Sent: Thursday, February 10, 2005 12:56 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Julie Porter
13932 NE 14th ST #1-7
Bellevue, Washington 98005

3317

Adams, Karen K NAE

From: spaz241@aol.com
Sent: Thursday, February 10, 2005 1:16 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Koning,

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Sincerely,

Paula Berry
137 cook st
Johnstown, Pennsylvania 15906

Adams, Karen K NAE

3318

From: keolsen@earthlink.net
Sent: Thursday, February 10, 2005 1:18 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Krystyna Olsen
6516 Farralone Ave
Woodland Hills, California 91303

3319

Adams, Karen K NAE

From: dean_becca@hotmail.com
Sent: Thursday, February 10, 2005 6:15 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

rebecca dean
512 manor dr
dublin, Pennsylvania 18917

3320

Adams, Karen K NAE

From: singer1940@hotmail.com
Sent: Thursday, February 10, 2005 6:35 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Michelle O'Hanley
315 Belair Street
Brockton, Massachusetts 02301

3324

Adams, Karen K NAE

From: peacebrtha69@yahoo.com
Sent: Thursday, February 10, 2005 6:43 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Lawrence McMillan
214 Walnut St
Williamstown, Pennsylvania 17098

3322

Adams, Karen K NAE

From: debes@optonline.net
Sent: Thursday, February 10, 2005 7:14 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Debora Sisco
47 Laurel Dr.
Oak Ridge, New Jersey 07438

3323

Adams, Karen K NAE

From: rlapma@kingwoodcable.com
Sent: Thursday, February 10, 2005 7:25 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Koning,

Before you approve or deny a permit to erect 130 turbines in Nantucket Sound, please require the developer to conduct the thorough studies recommended by the U.S. Fish and Wildlife Service and the Massachusetts Division of Fisheries and Wildlife.

Specifically, the environmental review of this project should include:

- Three full years of visual observations of birds
- 12 months of radar observations of flying wildlife
- A thorough and timely review of the project's potential effect on wildlife, including marine mammals

These factors will help determine whether the Cape Wind project is in the best interests of both the public and wildlife.

As it is written, the U.S. Army Corps of Engineers' draft environmental impact statement is hopelessly flawed, because it ignores relevant information and draws conclusions based on inadequate research.

This project could be the first marine wind energy facility in the United States. As such, it will set a precedent for other offshore renewable energy projects.

Please require a rigorous, scientific review of its environmental effects. Clean air and healthy wildlife populations are not mutually exclusive. We need both.

Sincerely,

Paula Arsenault
3707 Sunny Oaks CT
Kingwood, Texas 77345

3324

Adams, Karen K NAE

From: dbowdoin@towson.edu
Sent: Thursday, February 10, 2005 7:30 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Deborah Bowdoin
7514 Steens Hill Drive
Glen Burnie, Maryland 21060

3325

Adams, Karen K NAE

From: lmccall13@yahoo.com
Sent: Thursday, February 10, 2005 8:00 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Lisa McCall
824 Shirley Drive
Henderson, North Carolina 27536

3326

Adams, Karen K NAE

From: dlhobo@yahoo.com
Sent: Thursday, February 10, 2005 8:23 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Donna Nelson
20336 Homeland St
Roseville, Michigan 48066-1763

3327

Adams, Karen K NAE

From: mintonj@wyeth.com
Sent: Thursday, February 10, 2005 8:26 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

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U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Joanne Minton
158 Parrott Rd
West Nyack, New York 10994

3320

Adams, Karen K NAE

From: ksteininger@mnat.com
Sent: Thursday, February 10, 2005 8:37 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

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U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Kim Steininger
334 Edinburgh rd
Chadds Ford, Pennsylvania 19317

3329

Adams, Karen K NAE

From: mkkingsley@earthlink.net
Sent: Thursday, February 10, 2005 8:43 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Mary Kay Kingsley
605 N Jackson St
Salem, Missouri 65560

Adams, Karen K NAE

3330

From: Silvia_L_paolini@newyorklife.com
Sent: Thursday, February 10, 2005 8:44 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

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U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Silvia Paolini
212-17A 73rd Avenue
Bayside, New York 11364

3331

Adams, Karen K NAE

From: nacfaa@rit.edu
Sent: Thursday, February 10, 2005 8:51 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Nancy Chwiecko
585 Honeoye Falls Five Points Road
Honeoye Falls, New York 14472

3332

Adams, Karen K NAE

From: x_fylz@yahoo.com
Sent: Thursday, February 10, 2005 8:57 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Jenny Franklin
2475 Orr Road
Arlington, Tennessee 38002

3333

Adams, Karen K NAE

From: egdame@aol.com
Sent: Thursday, February 10, 2005 9:13 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Evan Dame
100 Lincoln Street
Brighton, Massachusetts 02135

3334

Adams, Karen K NAE

From: rbonomet@su.edu
Sent: Thursday, February 10, 2005 9:19 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

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U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Robert Bonometti
260 Golds Hill Rd
Winchester, Virginia 22603

Adams, Karen K NAE

3335

From: jlunger@wyasd.k12.pa.us
Sent: Thursday, February 10, 2005 9:24 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

jennifer unger
1903 Brian Lane
York, Pennsylvania 17404

3336

Adams, Karen K NAE

From: ppray@verizon.net
Sent: Thursday, February 10, 2005 9:39 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

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U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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This is a real opportunity. If handled properly, It can really set the tone for many similar projects. If not, it could really set back the whole concept.

Please take the time to the studies and make it work,

Sincerely,

Peter Pray
223 Harvard Ave
Collingswood, New Jersey 08108

3337

Adams, Karen K NAE

From: tcs@techchemservices.com
Sent: Thursday, February 10, 2005 10:10 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Marcia Pageau
P.O. Box 2044
Corunna, n0n 1g0
Canada

3330

31 Dewey Road
Lexington, MA 02420-1017

February 7, 2005

Karen Kirk Adams
Cape Wind Energy Project EIS Project Manager
Corps of Engineers, New England District
696 Virginia Road
Concord, MA 01742-2751

Dear Karen Kirk Adams:

I am an engineer who has sailed and fished the area around Horseshoe Shoal and other portions of Nantucket Sound and adjoining waters for more than 35 years. I have a good knowledge of the bottom conditions and the fish species around Horseshoe Shoal.

Although I am in favor of clean, alternate energy sources, I am opposed to the location of the proposed Cape Wind energy project on Horseshoe Shoal or in any of the waters of Nantucket Sound for the following reasons:

- The main channel to Woods Hole, Buzzards Bay and Vineyard Sound passes very near Horseshoe Shoal. Inevitably there will be problems with commercial ships and recreational vessels wandering off-course in fog or drifting with the strong currents when crippled by engine malfunction. The "pea-soup" fog in Nantucket Sound and adjacent waters is unique because it is frequently accompanied by high winds that exacerbate drift rates. Collisions of marine vessels with the windmills or their support facility structures are inevitable. Helicopter rescue will be impossible amongst the windmills. The proposed windmills would present significant and unnecessary risk to life, property and navigation.
- Stabilization and "scour control" of the bottom in the areas immediately around the 130 windmill bases will likely be more of a problem than the Cape Wind engineers have anticipated. In order to survive the wind forces developed during hurricanes, the towers must be situated in a stable seabed. Horseshoe Shoal is not a stable seabed. Shoals by their very nature shift during storms. The shifting sands off Chatham are a good example of this phenomenon. Cape Wind would very likely have to stabilize the seabed by injection of stabilization agents such as Bentonite, a type of clay or other binders such as caustic soda, which have an irreversible and undesirable environmental effect. Bentonite is frequently used with highly toxic additives as binders in the earth and rock drilling process. Bentonite was used in a dewatering project on Nantucket's South East beach in the Sankaty Head area resulting in significant, disastrous fish kills. Bentonite, like most clays, remains suspended in water for long periods of time causing gill clogging and suffocation of marine species. Caustic infusions such as sodium hydroxide and other stabilizers bind the subsurface sands and fine gravels into a solid mass; however, these chemicals continuously leech into the surrounding water and are lethal to surrounding fauna and flora.

RECEIVED

FEB 10 2005

REGULATORY DIVISION

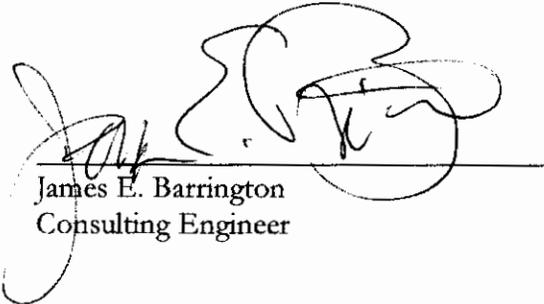
Because of the shallow depths and significant currents around Horseshoe Shoal, it is unlikely that the six "scour mattresses" around each tower proposed by Cape Wind will prevent scouring of the areas between and beyond the mats. These scour mats should be circumferential and should extend further from the tower bases than the proposed 5.0m X 2.5m mats. The diagram on Sheet 18 of 18, of the "Public Notice" dated November 9, 2004 shows mats on 4 sides of a tower base. There are gaps in the scour coverage between and beyond the mats. Surely, there will be scouring of the seabed in these areas.

- Horseshoe Shoal is a wonderful recreational fishing ground. Bluefish, striped bass and squid abound. It is a significant spawning ground for squid, an essential link in the food chain. At each turn of the tide the fish move to the down-current side of the shoal awaiting squid, sand eels and marine worms. Excavation for the 16 ft. diameter tower bases will attract fish looking for worms and sand eels brought up by disruption of the seabed. Unfortunately, silt caused by the excavation will likely result in mortality of the attracted fish by clogging their gills. This will certainly be the case if Bentonite, other clay binders or toxic chemicals are used to stabilize the seabed.
- Cape Cod is a national treasure and a popular tourist destination. Nantucket sound and the surrounding area is infamous for "pea-soup" fog. The 130 foghorns of the proposed Cape Wind facility will certainly create significant noise pollution - audible along the shore of the adjacent Cape. Cape Wind should not be allowed to create a nuisance that will impact the quality of residential life, the tourist industry and the local economy. The proposed project should not benefit Cape Wind at the expense of many other businesses.
- The proposed project is in conflict with the goals of the National Environmental Policy Act and should not be approved.

I have visited wind farms in Spain and California and I believe wind farms are better situated on land. Land based wind farms are less costly to build and because they are more readily accessible and don't have substantial corrosion issues, they are less costly to maintain. Understandably, for efficiency, Cape Wind favors the unobstructed winds over the water. However, when efficiency is balanced against lower construction and maintenance costs, land based wind farms, except for the purchase of land, should be less costly. Nantucket Sound, its' wind, water and beauty belongs to the people of the United States, not Cape Wind. That's why the Cape Cod National Seashore was established. By allocating public lands for the essentially exclusive use of Cape Wind you would be depriving the citizenry of an excellent economic and recreational resource to benefit one company that does nothing to benefit anyone except their stockholders.

I respectfully request you deny Cape Wind's application for a permit to construct the proposed 130 windmill, energy generation facility in Nantucket Sound.

Sincerely,



James E. Barrington
Consulting Engineer

3339

T. K. Christensen, I. Clausager, J. P. Hounisen and I. K. Petersen,

**Visual And Radar Observations
Of Birds In Relation To Collision Risk
At The Horns Rev Offshore Wind Farm**

Annual Status Report For 2003

National Environmental Research Institute, 2004

[Danmarks Miljøundersøgelser]

Ministry Of The Environment
DK-4000 Roskilde, Denmark

RECEIVED
2004-07-07
10:16:00

[This study shows that at the 80 turbine Horns Rev wind farm in western Denmark, for the 16 month period August 2002 - November 2003, a total of 16 dead birds were recorded. All of these dead birds were songbirds, primarily starlings. No deaths of shore birds or of ocean dwelling (pelagic) birds were recorded.]

Information Note

This information note summarises the framework for the three annual status reports for 2003, concerning bird studies in relation to the offshore wind farms at Nysted in the Baltic Sea and Horns Rev in the North Sea.

The three reports are:

Christensen, T. K., Hounisen, J. P., Clausager, I. & Petersen, I. K., 2004: Visual and radar observations of birds in relation to collision risk at the Horns Rev offshore wind farm. Annual status report 2003. - 48 pp.

Kahlert J., Petersen I. K., Fox A. D., Desholm M. & Clausager I. 2004: Investigations of birds during construction and operation of Nysted offshore wind farm at Rødsand. - Annual status report 2003. - 82 pp.

Petersen, I. K., Clausager, I. & Christensen, T. K., 2004. Bird numbers and distribution in the Horns Rev offshore wind farm. - Annual status report 2003. - 36 pp.

Bird studies are to be carried out at Nysted and Horns Rev during the period 1999-2006 under the permitting terms for wind farm construction at the two sites, granted by the Danish authorities. The bird studies are carried out before, during and after construction of both wind farms.

The installation of wind turbines was finished in autumn 2002 (Horns Rev) and summer 2003 (Nysted). Hence, the annual status reports for 2003 merely represent data from one year or less during the initial operational phase of the wind farms. Thus, natural variation between years, seasons, species and sites and the possible habituation effects during the operational phase could not be considered. Therefore, it must be emphasised that the tendencies, suggested by the results in all three annual status reports are to be considered as preliminary, and must await further compilation of data, before firm conclusions can be drawn with respect to impact on birds.

The final environmental impact assessment for the two wind farms is planned to be undertaken upon termination of the environmental monitoring programmes in 2006.

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National Environmental Research Institute

Synopsis

3339

The aim of the project is to assess the collision risk between birds and wind turbines at the Horns Rev wind farm. In 2003 the studies focused on describing bird movements in relation to the wind farm and to identify the species-specific behavioural responses towards the wind turbines shown by migrating and staging species. The Horns Rev area lies in a region known to be important for substantial waterbird migration as well as holding internationally important numbers of several wintering and staging waterbird species.

Theoretically, birds approaching the wind farm may:

- pass through the wind farm
- increase flying altitude and pass above the wind farm
- change direction and pass around the wind farm

Only birds passing through the wind farm risk collision with turbines, hence determining the proportions of all migrating birds adopting the above three alternatives is crucial to our assessment of collision risk. Having entered into the wind farm, the risk is assumed to be highest for birds flying in the altitude of the turbine rotors. Consequently, flight altitude is another critical factor for those species entering the wind farm in the assessment of collision risks.

The present study is restricted to the period after the construction of the wind farm. For practical reasons, data from the pre-construction period was not collected. Consequently, no base-line studies of bird movements in the area prior to establishment of the wind farm are available to which the present data can be compared.

All observations of birds were undertaken from the transformer station situated north of the northeasternmost turbine in the wind farm. Mapping of flight movements routes was undertaken using radar surveillance day and night. Visual observations were performed during the daytime along four transects, two located north and east of the wind farm, one along the eastern row of turbines and the fourth crossing diagonally through the wind farm in a southwesterly direc-

tion. Combined use of radar and visual observations during the daytime provided species-specific information on bird movements and orientations as well as data on flight altitude. Visual observations were performed in August 2002 and April-May and August-November 2003. Radar observations commenced in August 2003 and continued until November. Due to a temporary cessation of the study, it was not possible to collect data during February-March 2003, the period of peak occurrence of staging divers in the area.

Radar tracks of flying bird were entered into a GIS-database, from which subsets of data were selected to describe bird movements. In this report, radar observations were used to describe:

- The flight direction of migrating birds approaching the wind farm in order to assess the degree of avoidance towards the wind turbines
- The probability of birds flying into the wind farm from the outer edge to measure the overall response of passing birds to the presence of the wind farm
- In combination with visual observations, to describe the species-specific responses (flight direction and altitude) to the wind farm.

Bird movements generally followed a southwesterly orientation and the intensity was highest during night. Only a small percentage of bird tracks entered the wind farm (14-22%). The majority of tracks either changed their orientation and passed around the wind farm, most reacting 400 m from the wind farm (north side) or 1,000 m (east side), or disappeared from the radar screen. The disappearance of radar tracks is most likely the result of birds changing flight direction, resulting in a change in body orientation and hence reduced reflection area of the birds and thus lower detection probabilities by the radar. Loss of tracks may also reflect birds landing on the water. Whatever the precise nature of these disappearances, it is clear that loss of tracks on the radar screen reflects an avian behavioural response to the wind farm by approaching birds. Since most bird tracks disappeared c. 400 m from the outer turbines of the wind farm (north side) or 1,000 m (east side), these distances may represent the general extent to which flying birds avoid such structures.

In the area north of the wind farm, bird movements followed a general southwesterly orientation at distances greater than 400 m from the wind farm. The orientation did not differ between day and night, nor was it affected by different wind directions. Bird tracks within 400 m of the wind farm were predominantly of a southerly orientation and differed significantly from the general southwesterly orientation further away. This suggests that birds approaching the wind farm adjusted their flight direction and those that did pass through the wind farm did so along the open corridors between turbine rows, thereby further reducing the potential collision risk. Birds approaching the wind farm from the east in a south-

westerly orientation started to adjust their flight to a more westerly direction within 1,000 m from the eastern border of the wind farm. Probably due to the fact that gulls and terns, which seem to be attracted by the wind farm, were almost exclusively recorded by the radar in the area east of the wind farm, a clear pattern of deflection was not found in this area.

Analyses showed that adjustment of the flight direction (in respect of the turbine rows) was more accurate during the day than at night, which may relate to a more precise recognition of individual turbines by the birds during the hours of daylight.

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1 Introduction

1.1 Background

In February 1998, the Ministry of the Environment gave Elsam A/S and Eltra A.m.b.a. approval in principal to assess the feasibility of erecting a wind farm, capable of producing 160 MW of electric power, at Horns Rev, west of Blåvands Huk off the west coast of Jutland. The conditions imposed an environmental impact assessment (EIA) on the project which explicitly required that before-, during and after-construction comparisons of bird distributions be carried out to investigate and demonstrate any impacts resulting from the construction of the wind farm.

In order to assess the potential impacts from the offshore wind farm at Horns Rev on bird numbers and distribution, Elsam Engineering A/S (formerly Tech-wise A/S) contracted the National Environmental Research Institute (NERI), Department of Wildlife Ecology and Biodiversity (formerly Department of Coastal Zone Ecology), to take responsibility for these studies.

The southeastern part of the North Sea, including Horns Rev, constitutes major staging and wintering grounds for huge numbers of water- and seabirds (Tasker et al. 1987, Laursen & Frikke 1987, Laursen et al. 1997). In addition, Blåvands Huk, situated east of the wind farm area, acts as an important site for migrating waterbirds as well as for migratory terrestrial bird species, especially during autumn (Jacobsen in prep.).

According to the Ramsar Convention, an area is classified as being of international importance to a species if 1% of its flyway population is present regularly at some time in the annual cycle (Ramsar undated). Based on this 1%-criterion the area around Horns Rev has been identified as being of international importance to staging and wintering Red- and Black-throated Diver *Gavia stellata/arctica* and Red-necked Grebe *Podiceps grisegena* (Laursen et al. 1997). Of the species listed on the Danish Red-list, which includes breeding species that are uncommon or immediately threatened (Stoltze & Pihl 1998a), Little Gull *Larus minutus*, Guillemot *Uria aalge* and Razorbill *Alca torda* occur in considerable numbers at Horns Rev. Of breeding and non-breeding species that are

potentially threatened, according to the Danish Yellow-list (Stoltze & Pihl 1998b), Red-throated Diver, Eider *Somateria mollissima*, Common Scoter *Melanitta nigra*, Guillemot and Razorbill occur in large numbers at Horns Rev.

The potential effects of the wind farm on birds are considered to fall under three main headings:

1. Risk of collision (mortality).
2. Disturbance effects (displacement, habitat loss).
3. Physical changes as a result of the construction (changes to the bottom fauna and provision of new structures for loafing).

This report deals exclusively with bird studies in relation to collision risk with wind turbines.

Due to the remoteness of the wind farm area and the harsh environment it was agreed not to carry out a base-line study providing data before erection of the wind turbines on the numbers and phenology of migratory birds at the wind farm site.

If collisions happen they will increase the mortality of bird populations. At the level of a flyway population, the sensitivity to additional mortality caused by collisions with wind turbines will depend on the population dynamics of the species. Long-lived species with a low reproduction rate such as many waterbirds, are likely to be more sensitive to small changes in mortality compared to passerines that suffer a higher annual mortality (in some species more than 50%) and have a correspondingly higher reproductive output (Noer et al. 1996, Morrison et al. 1998).

Direct observations of collisions between birds and wind turbines will always present logistical challenges, as collisions in all probabilities will occur at a very low frequency and will be extremely difficult to observe. For this reason, the approach taken throughout this investigation has been to quantify the probabilities that particular species will come in close proximity to turbines under a range of environmental conditions. Consider, for example, a migrating bird heading straight for a newly constructed wind farm. On seeing the structures, a flying bird may alter its

flight trajectory to laterally avoid an unfamiliar visual stimulus and simply fly around the edge of the outermost turbines. It may, alternatively, gain height and fly over the top of the wing-sweep of the turbines and avoid their presence in that way. Finally, the bird may not respond at all and simply continue on a predetermined course through the wind farm. Even here, amongst those birds entering the wind farm, flight altitude and trajectory will greatly affect the collision risk. Birds flying below the turbine sweep height, or those flying between the turbine rows avoiding the vicinity of the turbines will be at no risk of collision.

Against this background, this investigation set out to measure species specific reactions to the newly constructed Horns Rev wind farm using a number of different methods. The objective was to establish probabilities for bird reactions to the wind farm, to determine the likelihoods for collision risk for each species under the range of conditions observed.

During the post-construction phase, this included observations of avoidance responses by flying birds to establish the proportions that deflect laterally when approaching the wind farm or climb to attain height to avoid it altitudinally. Such avoidance responses are likely to be highly species specific, for example mediated by the differential ability of species to manoeuvre, their sensitivity to the visual stimulus of large artificial constructions and interactions with weather factors. Furthermore, displacement from regular migration patterns will indirectly affect the collision risk, as the precise position of the local migration routes is a major determinant of the number of potential encounters. Initially, attempts to establish flight height for the most sensitive and critical species have also been started, to contribute to an accumulating database on species specific risks of collision given flight altitude probabilities under a range of weather conditions.

The report presents the results of observations of bird behaviour collected in 2003 in relation to the collision risk with wind turbines at the Horns Rev wind farm. Because data have only been compiled after the wind farm commenced operation, it has not been possible to make a comparison with bird behaviour or occurrence during pre-construction conditions in the area of the wind farm. Also, because this was the first year of such observations, they are provisional in nature, forming the basis

for recommendations for improving data collection in future and filling gaps in existing knowledge.

1.2 The Horns Rev offshore wind farm

The wind farm area is located in the southeastern part of the Horns Rev, c. 14 km west-southwest of Blåvands Huk in the Danish part of the North Sea (Fig. 1). Geomorphologically, the Horns Rev formation is a terminal moraine ridge, consisting of relatively well sorted sediments of gravel and sand (Danish Hydraulic Institute 1999). The water depth within the wind farm area varies from 6.5 m to 13.5 m.

Construction activities at Horns Rev started in September 2001 and were finished in summer 2002.

The wind farm has a capacity of 160 MW and comprises 80 turbines. The height of each turbine tower is 70 m and the rotor diameter is 80 m resulting in a maximum height to the upper wing tip of 110 m. The minimum free height from sea level to the lower wing tip is 30 m. The distance between adjacent turbines and the turbine rows is 560 m giving an open space of 500 m between the turbines. The turbines are equipped with a

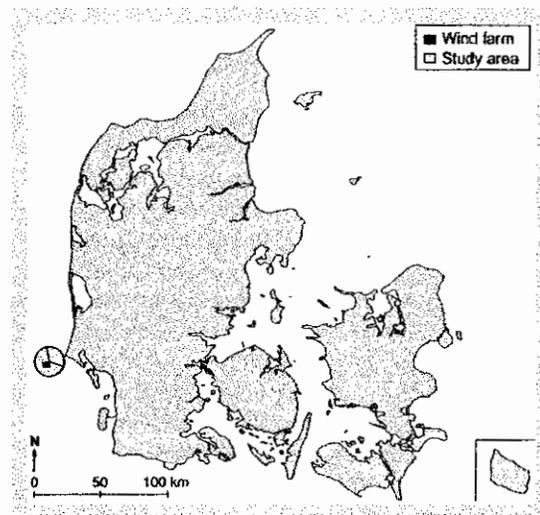


Figure 1. The study area, with indication of the Horns Rev wind farm position.

white navigation strobe light about 10 m above sea level for ship traffic and with a red strobe light at the top of the turbines for air traffic. The wind farm covers an area of c. 20 km².

A transformer station (dimensions 20 x 28 m) is situated on three support legs 10-23 m above sea level located 560 m north of the northeasternmost wind turbine.

Service and maintenance of the turbines are estimated to constitute 150 days of activity per year carried out partly by ship and partly by helicopter.

In 2003, the service and maintenance activities have been higher than expected. The activities have mainly concerned transportation of personnel between separate wind turbines by small ships.

1.3 Investigations of collision risk

Any predictive assessments of the collision risk to birds presented by the wind farm at Horns Rev are severely hampered because the general knowledge of bird species occurring at the Horns Rev wind farm area is very poor. Likewise, information about behavioural responses to offshore wind turbines of sea birds and terrestrial species is not available.

The wind turbines may impose a potential collision risk in relation to several types of bird movements:

- Annual migration of birds between breeding and wintering areas
- Daily flights of birds between roosting sites and foraging areas (including compensatory repositioning due to drift caused by current and wind. These movements usually occur at dawn)
- Birds flushed due to disturbance (e.g. as a result of turbine maintenance activities)
- Birds attracted to the wind farm area
- Active foraging flights.

When flying birds approach an offshore wind farm they may react in a number of ways, the fre-

quency of which will affect the probability of collision.

These include:

1. Changing flight direction to fly round the wind farm or return
2. Increasing their flight altitude to fly above the wind farm
3. Decreasing their flight altitude to fly through the wind farm
4. Continuing to fly through the wind farm without changing direction and/or altitude
5. Continuing to fly through the wind farm and adjust their direction and/or altitude so they pass the turbines at a safe distance
5. Interrupt their flight and land on the water before adopting one of the above.

Flying birds completely avoiding the wind farm suffer no collision risk from the wind farm. Hence, the proportion of birds doing so represents an important measure of overall collision risk. Nevertheless, even amongst that proportion entering the wind farm, the collision risk will vary considerably dependent upon bird species, flock size, flight speed, flight direction, flight altitude, weather conditions, etc.

From the outset, it is expected that collisions may be very rare and widely separated in time and space, making direct measurement of collision rates difficult. Therefore the studies have been designed to focus upon critical species such as those occurring in internationally important numbers. Emphasis has been put upon the assessment of likely collision rates of birds based on observations of bird activity and behaviour in the vicinity of, and in response to, the wind turbines. The studies include a combination of both radar and visual observations (see 2.1 for detailed description).

This report presents the results of the investigations obtained in 2003 as well as in August 2002. The report describes:

1. General flight trajectories of migratory waterbirds and passerines during the autumn period
2. Lateral changes observed in the migration orientation of birds approaching the wind farm
3. Seasonal and diurnal occurrence and migration intensity of specific bird species
4. Migration altitude of individual species

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5. Migration speed of individual species
5. Occurrence of birds that use the turbines as resting platforms.

The report also includes brief descriptions of the precise behaviour of individual bird species when approaching the wind farm and of variation of flock size of different species.

2 Methods

2.1 Methodological approach

The overall purpose of the bird studies in this project is to assess the collision risk of birds with wind turbines. Given the lack of knowledge on bird migration, local movements and behaviour of birds in the wind farm area the first part of the project focuses on providing basic information on:

1. Diurnal and nocturnal migration routes/corridors through the Horns Rev area
2. Intensity of bird migration
3. Local movements of birds within and around the planned wind farm in relation to various environmental conditions
4. The species involved.

2.1.1 Radar studies

To record bird/bird flock activity in the vicinity of the wind farm area and adjacent waters a ship-radar (Furuno FR 2125) was mounted on the transformer station (in October 2003 a Furuno FR 2110 was used). Each echo on the radar monitor (PPI) corresponded to a single bird or a flock in the study area, and in this way the spatial pattern of migration in this area of open sea could be described during both day and night. The distance from the transformer station to the periphery of the study area covered by the radar was at most six nautical miles (c. 11 km), but coverage was only possible over shorter ranges during some periods. The radar antenna was placed on the southwestern corner of the transformer station, and for health and safety reasons the radar beam was shut off between 350° and 110° to avoid uncontrolled reflection within the transformer station area where the observers were present (Fig. 2).

Bird echoes on the radar monitor appear as distinct dots moving at different velocities. Each migration trajectory was mapped by tracing the course of bird flocks from the radar monitor on to a transparency. At all times, as many tracks as possible were followed, normally comprising less than 10 tracks at the same time. Periods with no bird activity were noted. On all transparencies,

the location of the transformer station (i.e. the site of the radar), the meteorological mast and wind turbines were defined. Subsequently, transparencies were digitised and entered into a GIS-database. To determine species involved for each of the radar tracks, visual observations were coordinated with radar observations during daytime by direct communication between the radar operator and the visual observer.

2.1.2 Visual observations

Visual observations were also carried out from the transformer station by two observers and took place during daylight hours along three transects during August 2002, located west (285°), east (90°) and south (175°) of the transformer station. From April 2003, observations made along a fourth transect diagonally crossing the wind farm in a southwesterly direction (225°) were included (see Fig. 2). A telescope (30x) was used, and data were recorded in 15-minute periods. All birds passing the transects were recorded including identification of species with details of flock size, direction, flight altitude (if possible) and behaviour.

2.1.3 Flight altitude

Flight altitude is a key factor in the assessments of the collision risk between birds and wind turbines. The probability of collision is most likely

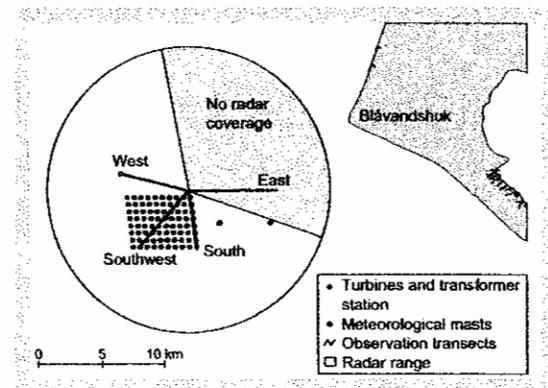


Figure 2. The study area with location of the four transects used in the visual observations and the areas covered/not covered by radar.

highest for birds flying in the area swept by the rotors (at Horns Rev 30-110 m above sea level). The present study is considered to be a pilot study, and the methods used will be evaluated and developed accordingly as a result of experience in 2003.

Flight altitudes of flocks identified to species from visual confirmation were calculated using simple trigonometry. The visual observer was able to measure the angle of the bird from the horizontal plane (using a levelling device attached to a telescope accurate to within 0.1°) at the transformer station. The height above sea level of the levelling device was precisely known and the distance to the birds could be calculated from the point at which the angle was measured, based on the radar track on the screen.

Within the ranges of distances over which angle measurements were performed (940-9,265 m; average distance = 3,219 m), the theoretical precision of the altitude measurements ranged between ± 1.74 m and ± 15.70 m increasing with distance (calculated as e.g., ± (tan 0.2° * distance - tan 0.1° * distance). For the average distance of 3,219 m the precision of measurements was ± 5.6 m.

2.1.4 Flight speed

Data on ground speed of migrating birds were obtained from radar tracks using a standard in-built software tool. Recording of ground speed of bird echoes was undertaken for two main reasons:

1. Flight speed of bird flocks that potentially cross the area swept by turbine rotors should be used in the assessment of the collision risk, as flight

speed is highly likely to affect the risk of being hit by the rotors

2. Flight speed of known species should be used in the discrimination of nocturnally migrating species or species groups based on species specific flight speeds during the day assuming similar flight speeds by day and night.

2.2 Study periods

Radar and visual observations were performed during eight periods (Table 1). These periods coincide with the main migration period of a substantial number of the species of waterbirds and passerines, and during late autumn with the peak occurrence of staging seabirds.

Due to a temporary suspension of the bird programme during September 2002 - April 2003, the first test of radar observations of bird movements was not conducted until May 2003, leading to full implementation in August 2003. Radar tracking was not possible in September 2003 due to severe weather conditions. Strong winds produced too much sea-clutter (reflected from wave crests) on the radar to enable identification of bird echoes.

2.3 Hypotheses and data analyses

2.3.1 Relative migration intensity

A total of 1,088 bird tracks was obtained from the

Table 1. The period of effective observations (visual and radar) conducted from the transformer station at Horns Rev during 2002 and 2003.

Period	Visual observations	Radar observations
28-30 August 2002	22h 0min	
28 April - 1 May 2003	26h 15min	
12-15 May 2003	29h 30min	
6-8 August 2003	9h 30min	7h 53min
25-29 August 2003	14h 0min	32h 20min
22-25 September 2003	27h 30min	
13-16 October 2003	5h 30min	39h 20min
11-13 November 2003	7h 45min	32h 45min
Total	142h 0min	112h 18min

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radar observations. Of these, 128 were of very short length (less than 1 km) and were not included in the subsequent analyses.

Bird migration intensity in the covered area was calculated as the total length (in metres) of all tracks occurring within squares of 500 x 500 m imposed on the total area. Within each grid, correction for differences was performed in covered periods, i.e., number of hours covered at different radar ranges and between the areas northwest and southeast to the radar. Differences in radar coverage were due to:

1. Experimentation with different radar settings over various distances
2. Reduced detectability of bird echoes in areas viewed into a headwind (as a result of reflection clutter signals generated from incoming waves).

The total periods covered by radar observations divided into different radar ranges and the areas southwest to north of the wind farm and east to south of the wind farm are listed in Appendix 1.

2.3.2 Lateral changes in migration routes

In previous studies, lateral avoidance has been considered the most frequent bird response to established wind farms (Winkelman 1992). An alternative hypothesis would be that birds are attracted for example by illumination of wind turbines (Lensink et al. 1999), a phenomenon that only relates to nocturnal migrants. It is also possible that gulls and Cormorants, for example, will use the static turbine superstructure for resting during both day and night, resulting in relatively high numbers of radar tracks moving into the wind farm.

Main hypothesis: migratory birds show a lateral avoidance response to the wind farm. Based on this, the following predictions are made:

- 1) A gradual and systematic deflection of the migration route will occur involving significant changes in flight direction close to the wind farm.
- 2) The change in flight direction will occur closer to the wind farm at night and during periods of poor visibility than during daytime with good visual conditions.

Alternative hypothesis: migratory birds show a lateral attraction response to the wind farm. Based on this the following prediction is made:

- 3) A gradual and systematic deflection towards the wind farm will occur with significant changes in flight direction close to the wind farm area.

Methods: In order to assess lateral changes in the generally southward-oriented migration during autumn, radar tracks of migrating birds were collected. The analyses were carried out for birds approaching the wind farm from the north and from the east.

The area north of the wind farm was divided into 15 transects parallel to the most northern row of turbines at positions of 50, 100, 200, 300, 400, 500, 1,000, 1,500, 2,000, 2,500, 3,000, 4,000, 5,000, 6,000 and 7,000 m from the turbines. The transects were established parallel to, and of the same length as the turbine rows (Fig. 3).

The area east of the wind farm was likewise divided into 15 transects parallel to the most eastern row of turbines at positions of 50, 100, 150, 200, 250, 300, 400, 500, 1,000, 1,500, 2,000, 2,500, 3,000, 3,500 and 4,000 m from the turbines. Due to the blind angle of the radar, the covered area did only reach out to four kilometres east of the wind farm. The transects had the same orientation and length as the turbine rows (see Fig. 3).

The unequal intervals between the transects were adopted as a provisional solution, aiming in the

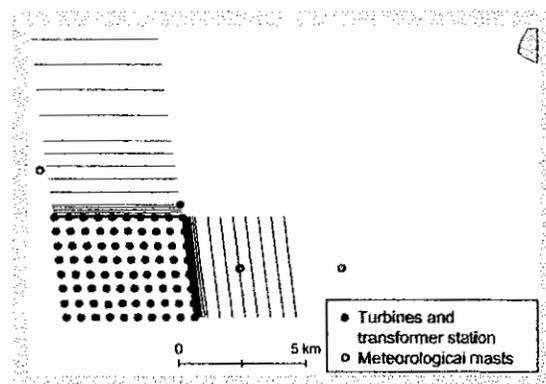


Figure 3. Location of transects north and east of the wind farm used in the analyses of lateral changes in migration orientation of birds during the autumn 2003. The locations of the three meteorological masts are also shown (yellow spots).

first instance at detecting all the possible changes in migration routes at increasing distance from the wind farm.

Tracks that did not pass at least two adjacent transects and tracks that moved northwards were excluded from the analyses. Hence, of the 960 tracks recorded during autumn 2003, 357 and 271, respectively, were selected for analyses of lateral changes in migration routes to the north and to the east of the wind farm.

For each interval between two adjacent transects the migration course were calculated for each track that intersected these two adjacent transects. For each transect interval the mean migration course was subsequently calculated from all considered tracks. Hence, long tracks crossing several transects contributed to the analyses with several track segments from which orientation was calculated, whereas short tracks crossing two or three transects contributed with only one or two track segments, respectively.

Mapping of migration routes gives the opportunity to test potential changes in the mean flight direction at different distances from the wind farm area, and to test whether a systematic change in migration route has occurred. If data from all sectors are normally distributed and show equal variance, the differences in the mean course at a specific distance can be tested using a t-test. However, if birds show lateral changes in the distributions of migration courses with respect to distance to the wind turbines, e.g. a deflection of individuals both to the west and east in birds that approach the wind farm from the north, this will result in a bimodal distribution close to the wind farm, but a unimodal distribution further away where the deflection has not yet begun. Such a tendency could be detected by testing for an increase in the variance of the angle measure with decreasing distance to the wind farm (Kahlert et al. in prep). Alternatively tracks will show a unimodal deflection to one side of the wind farm, but the angle of orientation will show a significant change.

Easterly and westerly winds can displace south-flying flocks to the west and east, respectively. Visibility and time of day (day and night) may also affect the orientation of migration routes. The effects of wind direction, time of day, distance to the wind farm on the orientation of migration were tested using ANOVA (SAS 1999) (except on

13 November 2003, see section 2.4). Analyses of the effect of visibility on orientation of migration at different distances from the wind farm area have not been carried out as no data on local visibility could be obtained for the Horns Rev area specifically.

Tracks of local movements by waterbirds could not always be distinguished from migrating birds and may cause some slight bias in defining overall migration patterns. However, most tracks of such local movements recognised on the radar were shorter than 1,000 m and these were omitted from the analyses.

Migration of terrestrial bird species could not be followed by radar with the same consistency as waterbirds due to the smaller size of passerines, which dominate the autumn migration from land areas (Christensen & Grell 1989). For this reason, it is considered that very few of the recorded bird tracks represent those of passerines and other terrestrial bird species.

During the day the degree of deflection of bird migration was also studied by direct visual observations. These observations included both visual transect counts and opportunistic observations. For all species, except gulls and terns, the behavioural responses to the wind farm were systematically noted, to provide a series of case stories relating to specific species.

No data could be obtained on bird flocks approaching the wind farm from the south as this was beyond the maximum range of both radar and telescope.

2.3.3 Probability of birds passing into the wind farm area

The main hypothesis is that migratory birds will show a lateral avoidance response to the wind farm. However, it is further hypothesised that the probability of passing into the wind farm area may depend on factors such as wind direction, time of day (day/night) and direction of approach.

For each area, the analyses included only tracks that specifically passed two transect-lines 2,000 m and 1,500 m away from the northernmost and

easternmost row of wind turbines (the transects used in analyses of lateral changes) which headed towards the wind farm and that were longer than 2,000 m. Of the 960 migration tracks recorded during autumn 2003 89 and 96 were extracted for analyses for the areas north and east of the wind farm respectively.

In each area, all tracks were followed to see whether they entered the wind farm area or not, and the proportion of flocks that actually did so was calculated. Likewise the proportions of tracks that turned west or south before entering the wind farm and the proportions of tracks that disappeared before entering the wind farm were calculated.

In order to analyse the migration pattern in detail, logistic regression models (SAS 1999) were used to describe the probability of passing into the wind farm area incorporating the following factors:

- 1) Flight direction between the 2,000 m and 1,500 m transects.
- 2) Time of day (day and night).
- 3) Wind (westerly and easterly).

2.3.4 Species composition, numbers and flock size

The results obtained from the daytime telescope observations enabled a species specific description of the abundance and phenology. The observations made an important contribution to the assessment of the potential impact and its consequence at a species level. The data presented include a description of the seasonal and diurnal occurrence, expressed as the number of birds observed per hour of observation and the mean number of birds per 15-minute period (migration intensity) during the spring and autumn periods on the four transects (see Fig. 2). Diurnal patterns were defined as 'morning', 'daytime' or 'evening', where 'morning' represents the first two hours after sunrise, 'evening' the last two hours before

sunset, and 'daytime' the rest of the day. As the species specific distributions of migration intensity and flock sizes differed markedly from normal distributions, log-transformation of data was undertaken when calculating the mean migration intensity, mean flock size and the respective 95% confidence limits.

2.4 Weather data

Weather conditions were incorporated into the analyses of effects of the wind farm on migration routes to increase confidence of the conclusions. Elsam collected data on wind force and direction (at 60 m a.s.l.) every 10 minutes at a weather station at the wind farm site. Weather data from 13 November were not available, thus, analyses including weather data did not include records of birds made on this date. No visibility data were compiled at the wind farm and are therefore not included in the present analyses. Since visibility is a very local phenomenon, data from the nearest meteorological station at Hvide Sande (> 55 km away) were not considered reliable in the analyses of potential effects on bird migration at Horns Rev.

A summary of daily means of wind direction and wind speed on dates with observations at Horns Rev is given in Appendix 2.

2.5 Quality control

The present report is subject to the following quality control:

- 1. Internal scientific review by a senior researcher
- 2. Internal editorial and linguistic revision
- 3. Internal proof-reading including spell check
- 4. Layout followed by proof-reading
- 5. Approval by project managers.

3 Results

3.1 Bird movements recorded by radar

Radar tracks of migrating waterbirds were superimposed on a grid-based system to present relative densities, expressed as the sum of metres of track lengths within each grid cell (Fig. 4) and as original tracks (Fig. 5). Although the detectability of bird tracks by radar declines with increasing distance, the highest concentration of migratory bird activity occurred north and northwest of the wind farm. The migration intensity east and southeast of the wind farm was highest close to the wind farm. In both areas the mean orientation of bird migration was southwest. With the present number of tracks, no specific migration corridors could be identified, although it seems that most migration takes place north of the wind farm. However, the general southwesterly orientation of the migration recorded and the known southward movements of migratory bird species along the coast north of Blåvandshuk suggest that the recorded bird movements at Horns Rev reflect a general continuation of the southwards migration along the coast.

During autumn 2003, a total of 793 tracks were recorded as southbound migration and 167 tracks as northbound migration (see Fig 5). A substantial number of northbound tracks were located east of the wind farm, whereas southbound tracks

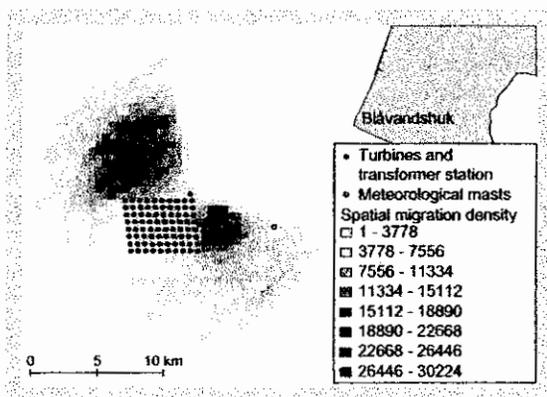


Figure 4. Spatial density of 960 birds/bird flocks migrating at Horns Rev during autumn 2003 recorded by radar, expressed at total metres of radar tracks per 500 x 500 m grid square.

were more evenly distributed north and east of the wind farm.

The intensity of migration showed a marked diurnal variation based on tracks recorded before sunrise and after sunset and between sunrise and sunset during all study periods in 2003 (Fig. 6). Migration intensity was markedly greater late at night than during the daytime and early night. Southward migration dominated during nighttime, whereas movements during the daytime were more evenly distributed between southward and northward directions.

Species identification was obtained for 154 tracks of 18 different species. Most records of gulls and terns (Fig. 7), with only small numbers of other species. Tracks of gulls and terns were almost exclusively recorded east of the wind farm making local movements to and from the wind farm

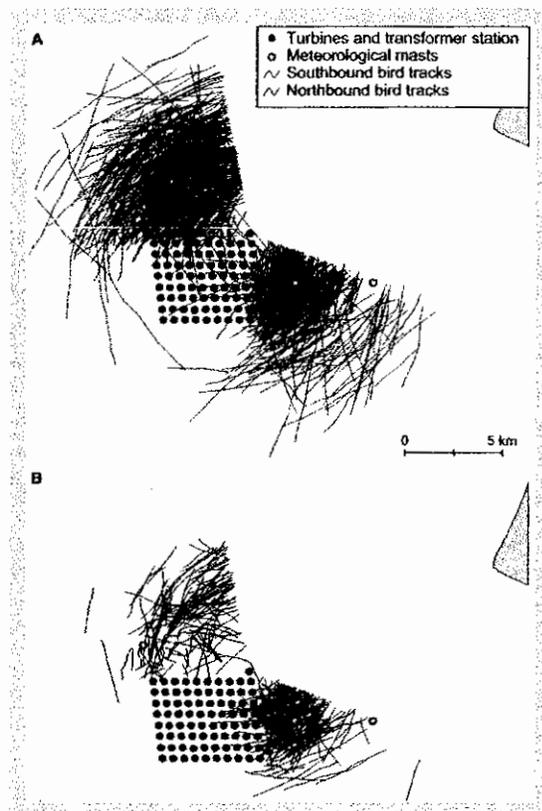


Figure 5. Radar registration of 793 tracks of birds/bird flocks migrating southwards (A) and northwards (B) at Horns Rev during autumn 2003.

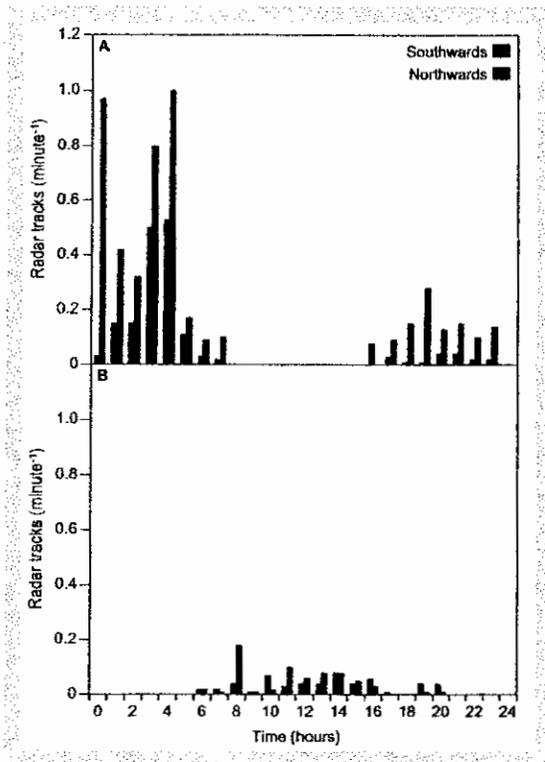


Figure 6. The number of tracks of birds flying north and south per minute recorded by radar during night-time (A) and daytime (B) during the autumn 2003 (all 1,088 tracks included). Note that the seasonal variation in the timing of sunrise and sunset results in overlaps in time between day and night.

area. Marked movements out of the eastern gate of the wind farm towards the northeast were obvious on some days just after sunset. A few of these were visually identified as terns and gulls and thus probably represented night-time roost movements to sheltered areas close to land. A more detailed description of identified species will be given below.

3.1.1 Lateral changes in migration routes

Radar observations of bird tracks

The selected tracks of migrating waterbirds moving in a southerly direction towards the northern border of the wind farm area showed a mean orientation of the migratory flocks which ranged between 185°-232° (Fig. 8). Migration orientation changed significantly with distance to the wind farm from a southwesterly direction to a southerly direction close to the wind farm (ANOVA: $F_{42,509} = 4.19$, $P < 0.0001$, $N = 552$ track segments).

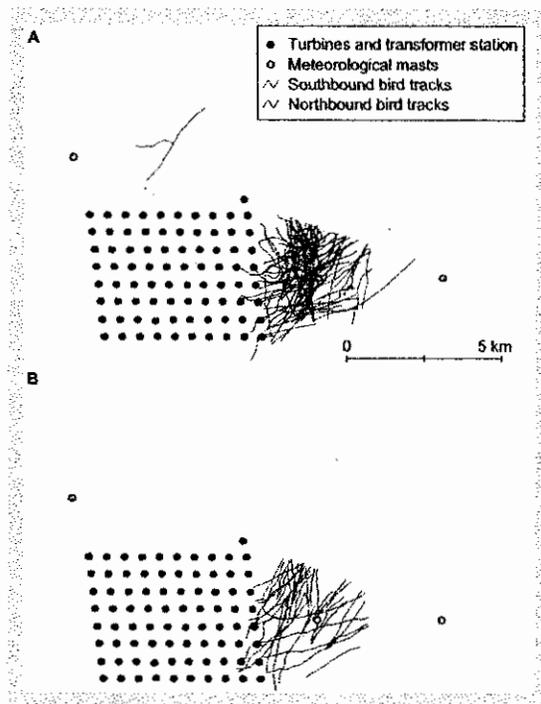


Figure 7. Radar registration of 72 gulls (A) and 38 terns (B) migrating southwards and northwards at Horns Rev during autumn 2003.

The most dramatic change was the statistically significant shift in orientation at 400 m from the wind farm (Fig. 8).

To exploit the effect of distance on the orientation of bird migration, separate analyses were performed on track segments recorded at distances of more than 400 m from the wind farm and on track segments recorded less than 400 m

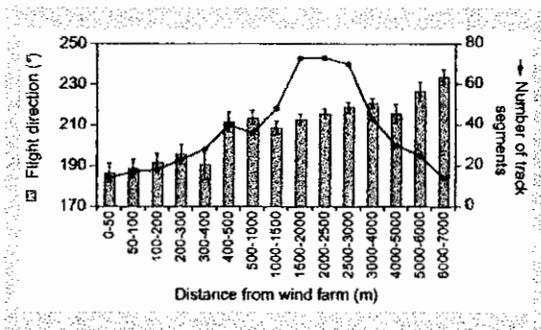


Figure 8. Mean orientation of tracks of migrating birds recorded north of the wind farm in relation to distance to the wind farm and the number of tracks recorded at different distance intervals. The north-south orientation of turbine rows is c. 175°.

from the wind farm. At distances of more than 400 m, the mean orientation of migration was $214^\circ \pm 1.1$ SE and did not differ between day and night nor between periods of easterly and westerly winds (ANOVA: $F_{23,389} = 1.07$, $P = 0.372$, $N = 413$ track segments). At distances less than 400 m from the wind farm the orientation of migration averaged $189^\circ \pm 2.6$ SE, but were significantly affected by both time of day and by wind direction (ANOVA: $F_{14,85} = 4.17$, $P < 0.0001$, $N = 100$ track segments). During the day, the mean orientation was significantly more southerly ($177^\circ \pm 4.9$ SE, $N = 38$) than at night ($195^\circ \pm 2.6$ SE, $N = 62$) (t-test: $t = 3.44$, $df = 58$, $P < 0.01$). During easterly winds, the mean orientation tended to be more westerly ($191^\circ \pm 2.3$ SE, $N = 93$) and more easterly ($168^\circ \pm 21.5$ SE, $N = 6$) during westerly winds, but the difference was not significant (t-test: $t = 1.03$, $df = 6$, $P = 0.341$).

There was a substantial decrease in the number of tracks with decreasing distance to the wind farm (Fig. 8). Thus few birds/bird flocks actually entered the wind farm area. The marked reduction in track numbers close to the wind farm partly reflects a lateral deflection in tracks moving directly west at some point before entering the wind farm, but also the fact that many echoes, for unknown reasons, disappeared on the screen (see below). Deflection of tracks to the east of the wind farm was not observed.

The selected tracks of migrating waterbirds moving in a southerly direction towards the eastern border of the wind farm area showed a mean orientation of the migratory flocks ranging between 233° - 256° (Fig. 9). A multi-factorial three-way analysis (3-way ANOVA) showed significant

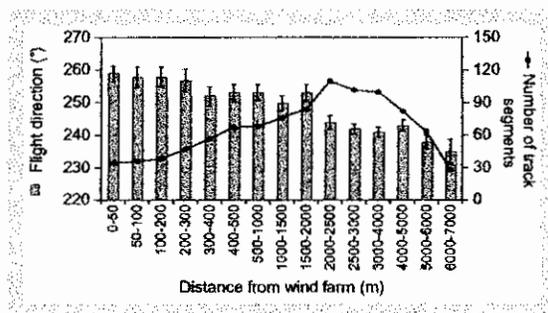


Figure 9. Mean orientation of tracks of migrating birds recorded east of the wind farm in relation to distance to the wind farm and the number of track segments recorded at different distance intervals. The east-west orientation of turbine rows is 270° .

change in migration orientation with distance to the wind farm, from a southwesterly direction to a more westerly direction closer to the wind farm (ANOVA: $F_{45,946} = 4.09$, $P < 0.0001$, $N = 992$ track segments). Migration orientation was also significantly affected by wind direction.

The effect of distance on the orientation of bird migration disappeared when analysing the data separately for distances of more and less than 1,000 m from the wind farm. In separate analyses, wind direction was the only single factor that affected the orientation of migration (more than 1,000 m from the wind farm: $F = 21.27$, $df = 1$, $P < 0.0001$, $N = 485$ track segments; closer than 1,000 m from the wind farm: $F = 14.63$, $df = 1$, $P < 0.0001$, $N = 507$ track segments), although there was a significant interaction between time of day (day/night) and wind direction on migration orientation in birds close to the wind farm ($F = 12.01$, $df = 1$, $P < 0.001$, $N = 485$ track segments).

As was the case north of the wind farm, the number of tracks declined with decreasing distance to the wind farm. Thus, at the eastern row of wind turbines, few birds/bird flocks actually entered the wind farm, and those birds/bird flocks that did so entered the wind farm heading west, almost parallel with the turbine rows. As for the area north of the wind farm, a reduction in track numbers with decreasing distance to the wind farm was found. No deflection of tracks to the north was observed.

3.1.2 Probability of birds passing into wind farm area

During autumn 2003, the overall proportion of birds entering the wind farm area was 13.9% for flocks of southbound waterbird migrating north of the wind farm and 21.9% for flocks of southbound waterbird migrating east of the wind farm. In order to describe the probability of bird flocks passing into the wind farm area in further detail, logistic regression models for different wind situations (easterly (0° - 179°) and westerly (180° - 360°)) and for day and night were computed incorporating direction of migration measured as the mean orientation between track-points located 1,500 m and 2,000 m from the wind farm.

The logistic regression models did not show any significant effects on the probability of entering the wind farm from the factors included. Thus,

there was no significant difference in the probability of entering the wind farm during day and night and under different wind conditions.

Of the 86 tracks recorded north of the wind farm and included in the analyses, a total of 12 tracks (13.9%) entered the wind farm, while 32 (37.2%) deflected westwards north of the wind farm. The remaining 42 tracks (48.8%) were unaccounted for. Of the 96 tracks recorded east of the wind farm and included in the analyses, a total of 21 (21.9%) tracks entered the wind farm, while 22 (22.9%) deflected southwards east of the wind farm, and 53 tracks (55.2%) were unaccounted for.

As mentioned above, tracks that disappeared before entering the wind farm could be birds that cease migration to sit on the water or represent birds changing flight course with the result of providing less cross-sectional area to reflect the radar signal. Until more data can be collected, it is not possible to provide a full explanation for these disappearances. However, whatever the precise course, these disappearances reflect a potential reaction towards the wind farm. The cumulative percentage of tracks that disappear (corrected for differences in distance intervals) with distance to the wind farm is shown in Fig. 10. In the area north of the wind farm, the greatest proportion of bird tracks disappeared between 200-300 m and 300-400 m, suggesting that most birds react to the wind farm at this distance. In the area east of the wind farm, bird tracks disappeared increasingly towards the edge of the wind farm, although the most marked disappearance (40%) occurred close to wind farm between 0-100 m and

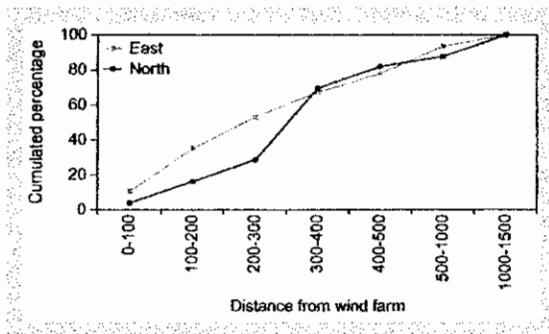


Figure 10. Cumulative percentage of the number of bird tracks that approached the wind farm from the north and east, respectively, but 'disappeared' from the radar for unknown reasons before entering or passing around the wind farm.

100-200 m. Although this result suggests that birds reacted differently to the wind farm depending on whether they are approaching the wind farm from north or east, it should be noted that the presence of gulls and terns, that showed no marked reactions to wind turbines, were almost exclusively recorded on the east side of the wind farm, close to wind turbines.

3.1.3 Avian behavioural reactions to the wind farm - case stories

It has previously been highlighted that the risk of collision between birds and wind turbines mainly concerns birds species that will occur at critical altitudes (i.e. at rotor heights) either when foraging or when migrating. Likewise, species occurring in substantial numbers through specific periods of the annual cycle may be at risk. At Horns Rev divers, Gannet, skuas, gulls and terns have been listed as species that may fly regularly at critical altitudes, and Common Scoter as a species that occurs in substantial numbers (Noer et al. 2000, Christensen et al. 2001, 2002, 2003). Consequently focus was placed on documenting avoidance reactions of these species.

A brief description of reactions of bird species approaching the wind farm made by visual observation is given below. The observations presented here were made opportunistically, together with some gathered during transect counts.

Divers Gavia spp.

Of the 70 divers recorded during transect observations 13 were recorded approaching the wind farm from the north crossing transect West. No divers were observed to enter the wind farm area, and all deflected westwards passing the edge of the wind farm before turning south again. One observation of two divers flying east between the wind farm and transformer station was made. Movements of divers were observed on all sides of the wind farm.

Grebes Podiceps spp.

On 14 October 2003, three Red-necked Grebes were observed entering the wind farm from the north. Between the first and second row, the birds showed signs of panic and spread out, before they

gathered again and continued at sea level southwards.

Gannet Sula bassanus

Of 243 Gannets recorded during transect observations, 28 were recorded approaching the wind farm from the north crossing transect West. None of these were observed to enter the wind farm area, and all deflected westwards passing the wind farm before turning south again. Movements of Gannets were observed on all sides of the wind farm.

Cormorant Phalacrocorax carbo

Six flocks of Cormorants were observed approaching the wind farm, four of which were recorded by radar (Fig. 11). One flock of six birds was observed flying above the turbines and one flock of 40 birds entered the wind farm at rotor height and continued through the wind farm. These flocks did not show any marked changes in behaviour when entering the wind farm. Two flocks (6 and 13 birds) showed a marked reaction at a distance of 200-300 m north of the wind farm: the birds reduced speed and stalled, turned in small circles, scattered from a line formation before lining up again, ultimately entering the wind farm in a loose line-formation. In these flocks, some birds were seen making 'panic' descents prior to entering the wind farm.

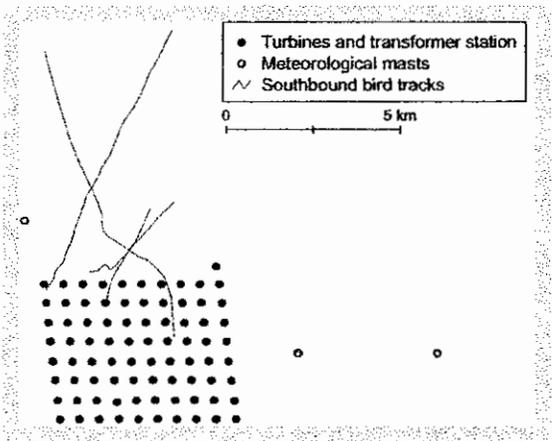


Figure 11. Radar tracks of four flocks of Cormorants migrating southwards at Horns Rev during autumn 2003.

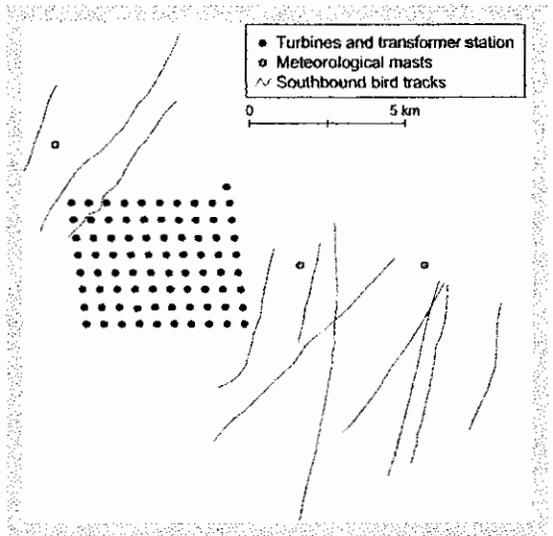


Figure 12. Radar tracks of 11 flocks of geese migrating southwards at Horns Rev during autumn 2003.

Geese Anser sp.

Of a total of 11 flocks of geese, one flock of 53 individuals was observed entering the wind farm area from the north (Fig. 12). This flock constantly increased flight altitude from before entering the wind farm and when flying within the wind farm, ultimately flying in rotor height. Within the wind farm, the birds showed less stability in flight resulting in a disrupted flock structure.

Common Scoter Melanitta nigra

Of 293 Common Scoters recorded during transect observations 28 were recorded approaching the wind farm from the north crossing transect West. None of these birds were observed to enter the wind farm area. Deflection was recorded both westwards skirting the wind farm and eastwards passing north of the transformer station. A total of 13 flocks of Common Scoter was recorded by radar, all outside the wind farm (Fig. 13).

On several occasions, large flocks of Common Scoters resting at the reef north and northwest of the wind farm were flushed by boat traffic, and approached the wind farm in these situations. Many of these flocks moved towards the wind farm several times before either passing west or east around the wind farm, making turns at distances between 300 m and 1,000 m from the tur-

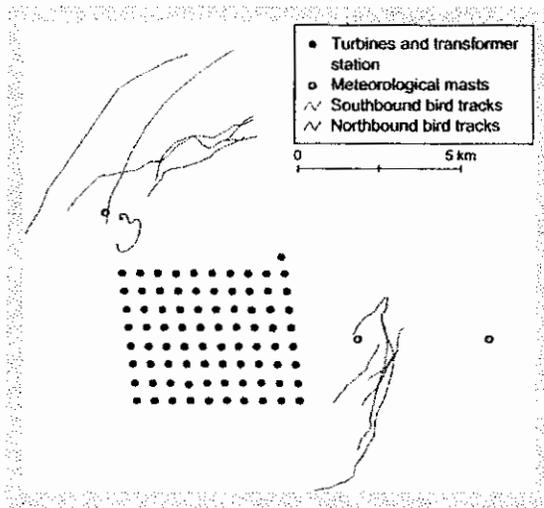


Figure 13. Radar tracks of 13 flocks of Common Scoters migrating southwards and northwards at Horns Rev during autumn 2003.

bines. Movements of Common Scoter were observed on all sides of the wind farm.

Gulls and Terns *Larus*, *Rissa*, *Sterna* spp.

Several gull and tern species were very frequently observed entering the wind farm. Most birds were flying below rotor altitude, but Herring Gulls and Great Black-backed Gulls were observed passing turbine rows at rotor height. Only on one occasion was a panic reaction observed; a Great Black-backed Gull made a rapid about-turn just before entering the wind farm. Sandwich Terns did not show any reaction towards wind turbines when entering the wind farm. Common/Arctic Terns were, however, often seen returning out of the wind farm after they had passed 100-200 m beyond the first row of turbines.

Arctic Skua *Stercorarius parasiticus*

Of the 27 Arctic skuas recorded entering the wind farm none showed reactions towards the wind turbines. Within the wind farm, skuas were observed chasing terns at various altitudes on several occasions.

Shorebirds

Individuals of four species, 11 Golden Plovers *Pluvialis apricaria*, 4 Curlews *Numenius arquata*, 1

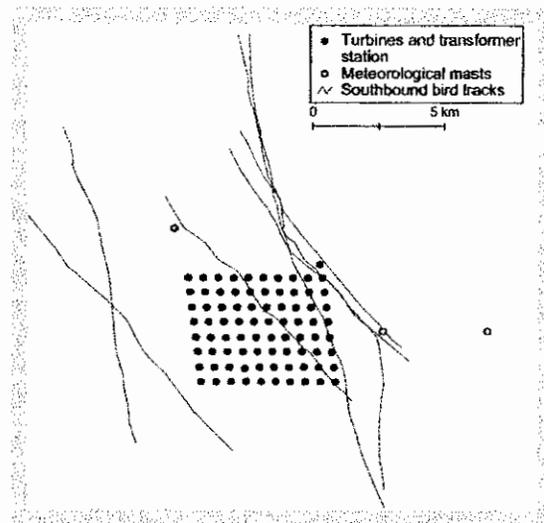


Figure 14. Radar tracks of seven flocks of Wood Pigeons migrating southwards at Horns Rev during autumn 2003.

Whimbrel *Numenius phaeopus* and 15 Oystercatchers *Haematopus ostralegus* were observed passing the wind farm area. Golden Plovers and Oystercatchers passed above the turbines, while one Whimbrel entered the wind farm at the height of the rotors. The one flock of Curlews stalled just before the wind farm and increased altitude before passing above the wind farm, markedly increasing wing beat frequency.

Terrestrial birds

Wood Pigeons and a flock of unidentified thrushes were observed passing the wind farm. All flocks of Wood Pigeons (Fig. 14) passed above turbine height. One flock of Wood Pigeons was observed to increase flight altitude when approaching the wind farm, and passed c. 300 m above the turbines. One large flock (300) of thrushes split into two groups close (<500 m) to the wind farm. The first half passed into the wind farm, whereas the other half made some turns and increased altitude before passing above the turbines.

3.2 Bird movements recorded by visual observations

During a total of 142 hours of observations on the four transects East, West, South and South-

west (see Fig. 2) a total of 47,534 individual birds was recorded. Complete lists of species and numbers recorded on separate dates on the four transects are given in Appendix 3-6).

In order to describe the occurrence of birds within and around the wind farm, the following section describes the seasonal and diurnal occurrence of the most abundant species and species groups, as well as species of special interest. The intensity of migration across the four transects is compared to assess species specific movements around the wind farm, into and out of the wind farm and within the wind farm.

Divers

A total of 70 divers was recorded during the tran-

sect counts. Most birds were recorded in May (22.8%) and during September-November (72.9%) with highest migration intensity during the morning hours in both spring and autumn (Fig. 15). Average flock size was 1.39 birds (95% c.l.: 1.01 - 1.9) in spring and 1.22 birds (95% c.l.: 1.1 - 1.35) in autumn, ranging from 1 to 3 individuals per flock.

No divers were recorded flying within the wind farm. Divers were only recorded on transect West and East with most divers (56) observed migrating east of the wind farm (Fig. 16). In spring 58.8% of the birds were migrating north while in autumn 82.0% were migrating south.

One diver was recorded foraging at the edge of the wind farm, and several were observed foraging at distances of 100-800 m from nearest wind turbine.

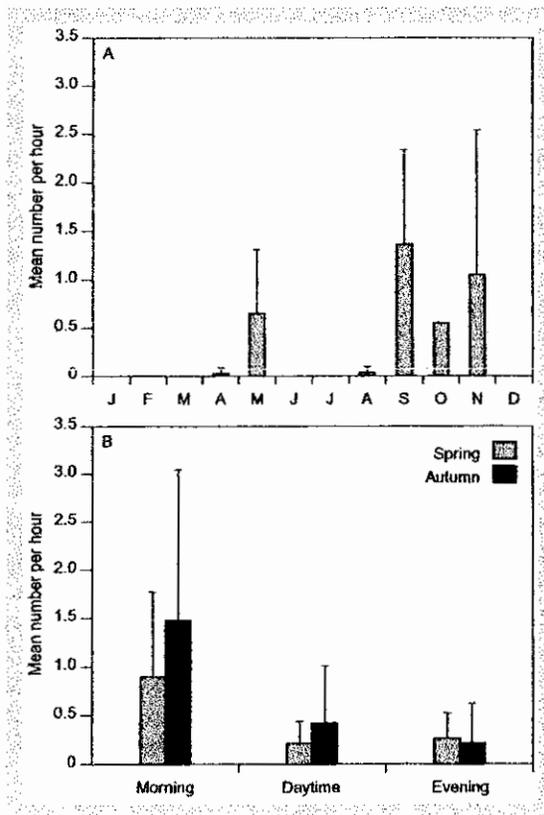


Figure 15. The number of divers recorded per hour of observation (\pm standard deviation) during A) April-May and August-November in 2002 and 2003, and B) morning, daytime and evening hours. 'Morning' includes observations made the first 2 hours from sunrise, 'Evening' includes observations the last 2 hours before sunset, and 'Daytime' includes the period in between.

Grebes

A total of six Red-necked Grebes was recorded in October. All birds were recorded migrating north crossing transect East. Two unidentified grebes recorded migrating northeast of the wind farm in October, were probably also Red-necked Grebes.

Fulmar Fulmarus glacialis

A total of three Fulmars was recorded during transect counts in August and September. All birds were migrating north crossing transect East.

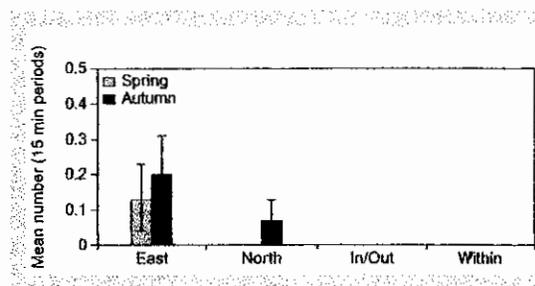


Figure 16. Migration intensity of divers (\pm 95% confidence limits) recorded by visual observation on the four transects placed east of the wind farm (transect East) north of the wind farm (transect West), along the eastern row of turbines (transect South) and within the wind farm (transect Southwest) at Horns Rev during spring and autumn 2002 and 2003.

One bird moving south towards the wind farm turned west around the wind farm.

Gannet

A total of 243 Gannets was recorded during the transect counts. Gannets were recorded during April and May (69.5%) and during August-September (30.5%). In both spring and autumn the migration intensity was highest during the morning hours (Fig. 17). Average flock size was 1.16 birds (95% c.l.: 1.09-1.22) in spring and 1.13 birds (95% c.l.: 1.08-1.18) in autumn, ranging from 1 to 7 individuals per flock.

Most Gannets (189) were recorded east of the wind farm (Fig. 18). Two individuals were observed within the wind farm. One of these was

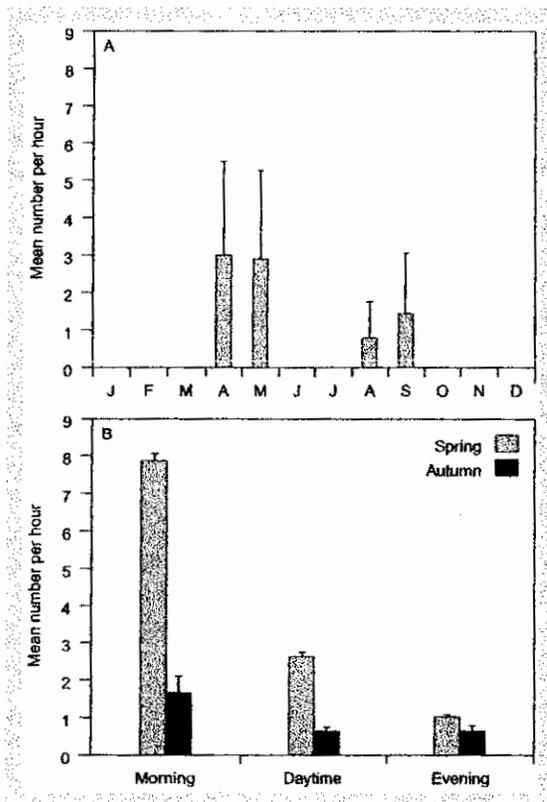


Figure 17. The number of Gannets recorded per hour of observation (\pm standard deviation) during A) April-May and August-November in 2002 and 2003, and B) morning, daytime and evening hours. 'Morning' includes observations made the first 2 hours from sunrise, 'Evening' includes observations the last 2 hours before sunset, and 'Daytime' includes the period in between.

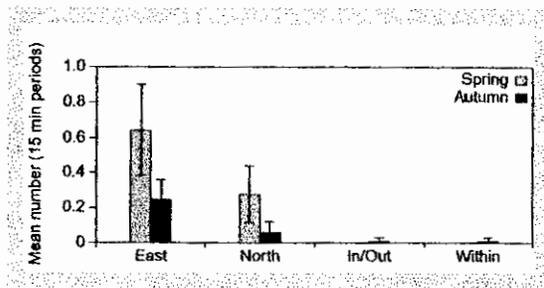


Figure 18. Migration intensity of Gannets (\pm 95% confidence limits) recorded by visual observation on the four transects placed east of the wind farm (transect East) north of the wind farm (transect West), along the eastern row of turbines (transect South) and within the wind farm (transect Southwest) at Horns Rev during spring and autumn 2002 and 2003.

observed crossing transect Southwest within the wind farm, subsequently to leave the wind farm crossing the transect South and the other was observed flying out of the wind farm.

Gannets were observed foraging along the reef contour, approximately 1,000 m north of the wind farm in both spring and autumn. Migrating Gannets were observed on all sides of the wind farm. In spring 63.4% of the birds were migrating north while in autumn 45.5% were migrating south.

Cormorant

A total of 147 Cormorants was recorded on the transect counts. Of these 133 were observed in November, with 130 individuals in one flock east of the wind farm. All other observations were of single birds.

Three birds were observed crossing the eastern row of turbines and four birds were observed within the wind farm.

Geese

A total of 142 Pink-footed Geese and 199 Greylag Geese were recorded on the transect counts. One flock of 7 Pink-footed Geese migrated north in May and two flocks of 5 and 130 birds, respectively, migrated south in October. All observations were on transect East.

Four flocks of 27, 11, 28 and 53 Greylag Goose migrated south in November. Except the last flock

that was observed on transect West, all flocks were observed on transect East.

Substantial southward migration of geese, probably Pink-footed Geese, were recorded far west of the wind farm on several days in September.

Common Scoter

A total of 35,780 Common Scoters was recorded during the transect counts. Most birds were recorded in April (15.9%) and May (81.4%). Migration intensity was highest during the morning hours in both spring and autumn (Fig. 19). Average flock size was 4.63 birds (95% c.l.: 4.38 – 4.88) in spring and 4.49 birds (95% c.l.: 4.27 – 4.72) in autumn. Flock size in spring ranged between 1 and 210, but was not recorded in the most active

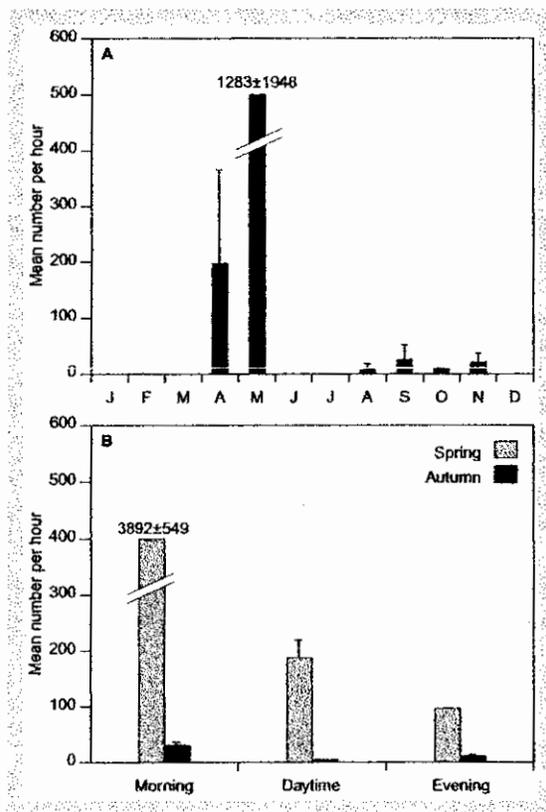


Figure 19. The number of Common Scoters recorded per hour of observation (\pm standard deviation) during A) April-May and August-November in 2002 and 2003, and B) morning, daytime and evening hours. 'Morning' includes observations made the first 2 hours from sunrise, 'Evening' includes observations the last 2 hours before sunset, and 'Daytime' includes the period in between.

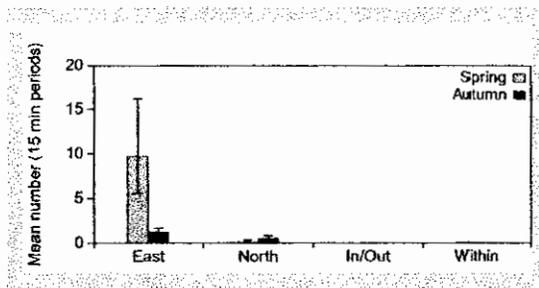


Figure 20. Migration intensity of Common Scoters (\pm 95% confidence limits) recorded by visual observation on the four transects placed east of the wind farm (transect East) north of the wind farm (transect West), along the eastern row of turbines (transect South) and within the wind farm (transect Southwest) at Horns Rev during spring and autumn 2002 and 2003.

periods. In autumn, flock size ranged between 1 and 23 individuals.

A total of 10 Common Scoters was recorded in the wind farm. Two flocks of two and four birds were observed flying into the wind farm in November, while three solitary individuals were observed flying out of the wind farm in May (1) and September (2).

In April-May many thousand Common Scoters were staging northwest and north of the wind farm on the reef proper. In October-November smaller numbers were observed staging in the same area. The high numbers recorded on transect East in spring (Fig. 20), reflected local movements from the area north of the wind farm to the area southeast of the wind farm. In spring 7.5% of the birds were observed flying north while in autumn 61.1% were flying south. During a 30-minute period in the morning of 13 May 2003, a total of 775 birds was recorded flying north in transect East, whereas 19,620 birds were recorded flying south. Although the highest numbers of Common Scoters were recorded during the mornings on all days, the occurrence on 13 May was for unknown reasons more concentrated than on other days.

Gulls and terns

Gulls and terns were the most consistently observed species on the transect counts. The most numerous species were Herring Gull (1,289), Great Black-backed Gull (1,355) and Kittiwake (804), with lower numbers of Common Gull (227),

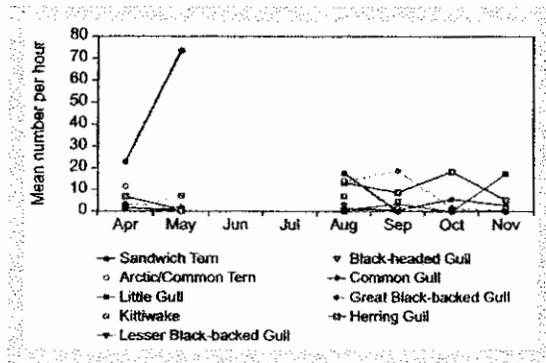


Figure 21. The number of gulls and terns recorded per hour of observation during the month April-May and August-November in 2002 and 2003 at Horns Rev.

Black-headed Gull (221), Lesser Black-backed Gull (156) and Little Gull (193). Sandwich Tern was one of the most numerous tern species with 3,539 individuals followed by Arctic/Common Terns (847).

The seasonal occurrence showed that most gulls decreased in numbers from April to May, except Kittiwake (Fig. 21). In autumn, Herring Gull and Great Black-backed Gull occurred in higher numbers than in spring, peaking in October and September respectively. Little Gull showed a marked increase in November. In spring, the Sandwich Tern increased markedly between April and May, while Arctic/Common Terns decreased. In autumn, most terns were recorded in August, and nearly all had left the area by the end of September. Flock size of gulls and terns during spring and autumn is shown in Table 2. Generally, most species occurred as solitary individuals, although Black-headed Gull, Little Gull and Arctic/Common Tern tended to occur in small groups.

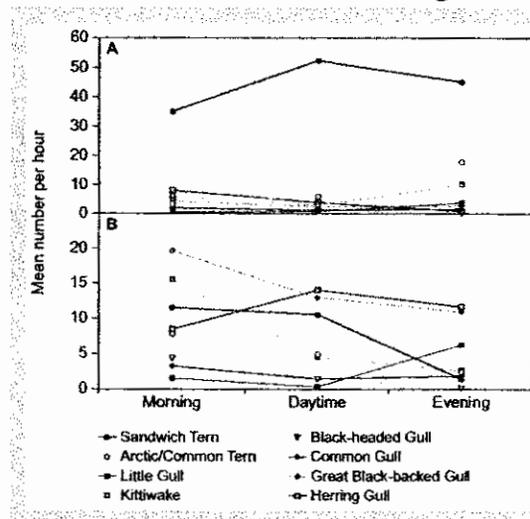


Figure 22. The number of gulls and terns recorded per hour of observation during morning, daytime and evening hours during spring (A) and autumn (B). 'Morning' includes observations made the first 2 hours from sunrise, 'Evening' includes observations the last 2 hours before sunset, and 'Daytime' includes the period in between.

Marked differences in diurnal occurrence were found both between species and between spring and autumn periods (Fig. 22).

Migration intensity or activity, expressed as the mean number of gulls and terns observed per 15 minutes of observation on the four transects is shown in Table 3. Generally, migration intensity in and out of the eastern border of the wind farm was highest and migration intensity lowest within the wind farm. Migration intensity east and north of the wind farm showed mainly intermediate values.

Table 2. Mean flock size (M) with 95% lower (L) and upper (U) confidence limits, and total number of flocks (N) observed during spring and autumn 2003. Data were log-transformed.

	Spring				Autumn			
	L	M	U	N	L	M	U	N
Herring Gull	1.08	1.13	1.18	183	1.06	1.07	1.09	1,014
Great Black-backed Gull	1.07	1.13	1.19	126	1.07	1.08	1.10	1,108
Black-headed Gull	1.39	2.51	4.52	15	1.80	2.45	3.34	33
Common Gull	1.08	1.19	1.32	55	1.11	1.18	1.25	117
Little Gull	1.44	1.84	2.35	27	1.53	1.75	2.01	60
Kittiwake	1.11	1.17	1.23	191	1.09	1.11	1.13	495
Arctic/Common Tern	1.79	2.04	2.32	139	1.61	1.73	1.86	224
Sandwich Tern	1.25	1.27	1.29	1,962	1.26	1.28	1.30	515

Table 3. Mean number (M) of birds per 15-minute visual observation periods with 95% lower (L) and upper (U) confidence limits and total number of individuals (N) for Herring Gull, Great Black-backed Gull, Arctic/Common Tern and Sandwich Tern and the group 'other gulls' (all other identified and unidentified gulls) recorded visually during autumn and spring on four transects located east and north of the wind farm, along the eastern row of turbine (In/out) and crossing the wind farm (Within).

		Spring				Autumn			
		L	M	U	N	L	M	U	N
Herring Gull	East	0.17	0.32	0.48	51	0.8	1.13	1.53	444
	North	0.22	0.43	0.47	76	0.51	0.71	0.93	260
	In/Out	0.23	0.53	0.89	85	1.27	1.71	2.24	301
	Within	-0.01	0.05	0.12	5	0.25	0.41	0.59	67
Great Black-backed Gull	East	0.24	0.41	0.6	67	0.8	1.09	1.44	411
	North	0.17	0.31	0.47	39	0.61	0.86	1.12	317
	In/Out	0.11	0.27	0.45	29	1.73	2.25	2.88	356
	Within	0.06	0.16	0.27	15	0.34	0.56	0.81	121
Other gulls	East	0.38	0.61	0.88	119	0.72	1	1.33	373
	North	0.17	0.35	0.56	56	0.48	0.74	1.04	330
	In/Out	0.29	0.56	0.89	72	1.1	1.58	2.18	360
	Within	0.1	0.31	0.55	56	0.55	0.87	1.26	226
Arctic/Common Tern	East	0.24	0.5	0.82	154	0.41	0.66	0.94	274
	North	0.11	0.32	0.58	75	0.09	0.19	0.29	47
	In/Out	0.26	0.64	1.12	176	0.27	0.45	0.67	97
	Within	-0.03	0.03	0.08	3	0.02	0.12	0.23	21
Sandwich Tern	East	1.18	1.66	2.24	490	0.36	0.58	0.83	204
	North	1.59	2.36	3.37	743	0.32	0.52	0.74	234
	In/Out	4.35	6.91	10.71	1,048	0.65	1.02	1.48	317
	Within	0.96	1.6	2.44	462	0.09	0.24	0.41	43

This pattern of high bird activity in and out of the wind farm and low activity within the wind farm suggests that both gulls and terns may use the wind farm as a 'land-mark' at sea, towards which the birds are oriented during local movements from the coast to offshore foraging areas. Even though most gulls and terns did not show reactions towards the wind turbines, the low activity within the wind farm indicates that this area is (for whatever reason) less attractive for foraging or resting birds. Thus, the greater activity at the eastern row of wind turbines may reflect local responses of birds that first move in and then out of the wind farm. Although this behaviour was only recognised specifically for Arctic/Common Tern, very similar proportions of birds were recorded between turbines moving westwards (in) and eastwards (out) (Table 4).

Skuas Stercorarius spp.

A total of 103 Arctic Skuas was recorded during

the transect counts. Most birds were recorded during May (87.5%). The majority was observed as solitary individuals or occasionally as two or three together when chasing terns or small gulls.

Most birds were observed east (N = 48) and north (N = 28) of the wind farm, but 19 were observed passing the eastern row of turbines and 8 observed within the wind farm. In spring, 44.9% of

Table 4. The percentages of gulls and terns flying in and out of the wind farm through the eastern row of wind turbines (transect South), excluding birds observed between the transformer station and the wind turbines.

	In	Out	N
Herring Gull	54.6	45.4	100
Great Black-backed Gull	53.6	46.4	138
Other gulls	61.6	38.4	292
Arctic/Common Tern	58.8	41.2	34
Sandwich Tern	63.6	36.4	1,020

the birds were migrating north while in autumn 75.0% were migrating south.

The peak occurrence of skuas in May probably reflects the numerous occurrence of terns, as skuas are known to follow terns during migration.

Shorebirds

Eight species of shorebirds were observed during transect counts: 15 Oystercatchers, 9 Golden Plovers, 2 Ruffs *Philomachus pugnax*, 1 Greenshank *Tringa nebularia*, 2 Redshanks *Tringa totanus*, 2 *Calidris* sp., 3 Bar-tailed Goodwits *Limosa lapponica* and 7 Curlews. All, except 1 Oystercatcher in April and 4 Curlews in September, were observed in August.

Terrestrial birds

Passerine species were recorded during the transect observations, including 118 Starlings *Sturnus vulgaris*, 2 Swallows *Hirundo rustica*, 2 Meadow Pipits *Anthus pratensis*, 1 White Wagtail *Motacilla alba* and 727 unidentified individuals. The majority of the species was observed in September coinciding with the peak migration period of most small passerines. Starling migration takes place later in the autumn, and most of these species were recorded in November. Of other terrestrial species, only 3 Sparrowhawks *Accipiter nisus* and 2 Grey Herons *Ardea cinerea* were recorded during transect observations.

However, as both the species identification and the numbers counted decreased markedly with

observation distance along the transects for small species, these were not subject to further analyses. Although the identified passerine species in all probability represent the species involved in the recorded passerine migration at the wind farm, a number of other species was observed at the transformer station during the present study, many using this platform for resting. A list of passerine birds observed is given in Appendix 7.

3.3 Flight altitudes

A total of 77 measurements of flight altitudes were obtained from 61 flocks of nine species (Table 5). There was at least 30 seconds between two measurements on the same bird flock. The flight altitudes of identified species were compared and showed significant differences between species and groups of species (One-way ANOVA: $F_{8,68} = 7.19$, $P < 0.0001$). Even though the numbers included are small for most species/species groups the percentage of records of birds/flocks that occurred in the altitude of the turbine rotors (30-110 m above sea surface) is shown for the most frequently recorded species.

No significant differences in flight altitude in relation to distance to wind turbines were found for gulls (ANOVA: $F_{6,35} = 0.55$, $P = 0.763$) or terns ($F_{5,5} = 3.24$, $P = 0.112$), when grouped in distance intervals of 500 m. Due to small sample size, altitude data from other species/species groups could not be analysed in relation to distance to the wind farm.

Table 5. Mean flight altitude, standard deviation (SD), recorded altitude range and percentage recorded in rotor altitude for 9 bird species recorded during the autumn 2003 at Horns Rev.

Species/-groups	Mean altitude (m)	SD	Range (m)	% in rotor range	N
Cormorant <i>Phalacrocorax carbo</i>	58.3	8.4	46.0 - 70.0	100%	6
Geese <i>Anserini</i>	64.2	35.5	34.0 - 105.0	100%	5
Pintail <i>Anas acuta</i>	238.0	-	-	-	1
Common Scoter <i>Melanitta nigra</i>	4.0	5.2	0.0 - 8.0	-	2
Bar-tailed Godwit <i>Limosa lapponicus</i>	119.0	14.1	109.0 - 129.0	-	2
Arctic Skua <i>Stercorarius parasiticus</i>	49.0	-	-	-	1
Gulls <i>Laridae</i>	71.2	67.9	2.0 - 395.0	61%	42
Terns <i>Sternidae</i>	21.2	5.3	16.0 - 33.0	9%	11
Wood Pigeon <i>Columba palumbus</i>	210.4	87.6	126.0 - 385.0	0%	7

3.4 Flight speed

A total of 821 ground speed measurements was obtained on 636 unidentified bird echoes and 67 measurements on 43 tracks of birds identified to species or species group. The minimum duration between two measurements on the same bird echoes was 30 seconds, and for this reason considered as independent measures.

Data on flight speed of identified species were compared and showed overall significant differences between species/groups (Table 6, One-way ANOVA: $F_{7,876} = 280.74$, $P < 0.0001$). Significant differences (T-tests, $P < 0.05$) existed between several of the identified species/groups. Thus gulls and terns showed significantly slower flight speeds than all other species/groups.

A multi-factorial analysis (2-way ANOVA) on all species and species groups was performed and showed that the only factor that did not affect flight speed was time of day (day, night). All other factors (species, wind speed, wind direction) and interactions turned out significant ($F_{11,872} = 22.37$, $P < 0.0001$). The effects of wind direction (north, west, east and south) (one-way ANOVA: $F_{3,880} = 3.880$, $P < 0.0001$), were related to higher flight speed during easterly winds (mainly tail-winds) and lower during westerly winds (mainly head-winds).

3.5 Birds resting on turbines

The presence of wind turbines at Horns Rev may potentially attract perching species such as gulls,

terns and Cormorants, which may use the turbines for loafing. Likewise, the turbines may offer a safe spot to other bird species (terrestrial species) that normally do not occur at sea. As attraction by wind turbines may potentially increase the collision risk, data on birds resting on turbines were collected.

Data on birds resting/sitting on the wind turbine foundations (exclusively on the safety railings eight metres above sea surface) were collected during all visits to the transformer station. However, the number of wind turbines that could be covered varied markedly in relation to visibility dependent on weather, and especially light conditions. Likewise, several of the most distant turbines were obscured to observers by nearer turbines. In addition, birds sitting on the turbines positioned themselves in relation to wind direction; some times sitting on the northern side of the turbines (mainly in northerly winds) and some times at the southern side of the turbine where they were impossible to observe from the transformer station (mainly in southerly winds). Consequently, the interpretation of data on birds resting/sitting on the turbines should be viewed with caution in the light of these restrictions.

During autumn 2003, more systematic counts of birds resting on turbine foundations were collected at the start of each count on transect South and Southwest, respectively (see Fig. 2). These counts included the species and number of birds resting and, in case birds were recorded, recording of whether the turbine rotors were turning or not.

During all counts, seven species were recorded resting on the turbine foundations: Herring Gull,

Table 6. Mean flight speed (km/h), standard deviation (SD), range (km/h) and sample size (N) of flying bird species and species groups recorded by radar during autumn 2003 at Horns Rev. Unidentified species/species groups were separated in two groups (A and B) based on differences in flight speed.

Species/-groups	Mean (km/h)	SD	Range (km/h)	N
Cormorant <i>Phalacrocorax carbo</i>	69.0	7.7	59.8 - 78.5	6
Geese <i>Anserini</i>	68.0	6.4	54.1 - 77.0	13
Common Scoter <i>Melanitta nigra</i>	75.3	10.7	46.9 - 86.1	11
Gulls <i>Laridae</i>	38.4	12.6	18.5 - 55.6	12
Terns <i>Sternidae</i>	32.8	7.8	25.5 - 41.1	3
Wood Pigeon <i>Columba palumbus</i>	60.3	5.8	50.2 - 69.4	18
Unidentified species (speed < 60 km/h)	A 43.6	10.4	17.2 - 59.8	481
Unidentified species (speed > 60 km/h)	B 75.5	10.8	60.0 - 107.8	340

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Great Black-backed Gull, Kittiwake, Arctic/Common Tern, Cormorant and Sparrow Hawk.

During the transect counts a total of 20 birds was recorded resting on the turbines in 57 counts. Excluding a few records where species identification was not possible, 13 birds from 34 counts were recorded resting on turbines in transect South, including observations of solitary indi-

viduals of Herring Gull (4), Great Black-backed Gull (7), and Sparrowhawk (2). Of these, 4 observations were made on turbines that were active (1 Herring Gull and 3 Great Black-backed Gulls), while 9 observations were made on turbines that were stopped. On transect Southwest 2 birds in 18 counts were recorded on turbines (one Great Black-backed Gull on a non-active turbine and one Cormorant on an active turbine).

4 Discussion and conclusions

4.1 Occurrence of birds at Horns Rev

The importance of the study area at Horns Rev for migrating and staging waterbird species was confirmed during spring and autumn 2003. The Common Scoter was the most numerously recorded species, but this was predominantly the result of substantial numbers in May. Otherwise, gulls and terns dominated the count results in the area during both spring and autumn.

Bird migration patterns at the nearby coast of Blåvands Huk are well described (Kjær 2002, Jacobsen in prep.), documenting the southward autumn migration along the coast of Jutland of many waterbirds and terrestrial species during autumn. In the present study, observations suggested that most autumn migration activity occurred north and east of the wind farm area. Given the general southwesterly orientation of the southbound migration, the nature of the main migration route in the area of the wind farm probably reflects the continuation of the general migration along the coastline north of Blåvands Huk. In the present study, it was not possible to undertake radar observations of bird migration northeast of the wind farm, but studies in this area may give a more detailed picture of the overall migration pattern of birds approaching from this direction.

Most radar observations of bird movements were made during the night and showed the most intensive bird movements north of the wind farm. In contrast, visual observations during daytime showed greater numbers passing east of the wind farm. Thus, it may be possible that bird migration during night-time occurs farther from the shoreline than during daytime, but this may also be the consequence of different species involved in daytime and night-time migration and for the confounding affects of local movements at different times of the day, and so requires further studies.

It must be stressed, that direct comparison between bird numbers and bird movement activity recorded by radar and those registered during visual observations can not be made. For example, in many instances, where only one or few

individuals of small-sized bird species are involved, the radar will fail to detect an echo, whereas visual observations would be able to register such birds.

Visual daytime observations showed that migration of passerines, pigeons and raptors occurs at very low intensity at Horns Rev. Most passerine species were observed resting at the transformer station, and although many different species were recorded, only a few species occurred regularly namely: Meadow Pipit, White Wagtail, Swallow and Starling, although only few individuals of these species were recorded during transect counts.

Of the focal waterbird species, divers, Gannet, Common Scoter, gulls and terns, only gulls and terns were observed regularly within the wind farm area. Although greater numbers of divers, Gannet and Common Scoter were recorded on all sides of the wind farm, only Gannet (two individuals) and 5 flocks of Common Scoters (9 individuals) were observed inside the wind farm. Compared to the total numbers recorded of divers (70), Gannet (243) and Common Scoter (35,780) during transect counts and observations of avoidance reactions, the few observations within the wind farm strongly suggest that these species actively avoided the wind farm. It should be noted, however, that the peak period of occurrence of divers at Horns Rev, February-March was not covered by this study (see Christensen et al. 2001, 2002, 2003).

The high flight intensities of gulls and terns occurring along the eastern row of turbines compared to the low flight intensity within the wind farm suggest that gulls and terns were making foraging flights from the coast to offshore areas, using the wind farm as a navigation 'land-mark' at sea, and only to a lesser extent as an area for foraging. Marked behavioural reactions towards the wind farm and single turbines were not observed in gull and tern species, although Arctic/Common Terns were observed entering between the turbines for a few hundred metres before turning to leave the wind farm again.

Very few radar tracks were recorded within the wind farm. This probably reflects the fact that

fewer birds actually occur within the wind farm than outside. However, studies showed that the turbines themselves caused radar shadow on the screen, which reduced the detectability of individual tracks beyond each turbine in line with the angle from the radar antenna. This shadow effect was evident in several bird echoes that moved behind turbines showing disrupted tracks, and resulted in a poor detectability when birds were moving farther than two or three turbine rows within the park (as seen from the transformer station). Consequently, the number of bird echoes recorded within the wind farm reflects a minimum measurement of activity, especially in the western and southwestern parts of the wind farm area.

4.1.1 Lateral change in migration routes

The radar study of autumn migration orientation was aimed at detecting lateral changes in migration routes caused by the wind farm, based on all recorded southbound flight tracks which originated north and east of the wind farm area.

In autumn 2003 waterbird movements showed a general southwesterly orientation of $227^\circ \pm 0.8$ SE at some distance from the wind farm. A significant change in flight direction was, however, found in bird tracks approaching the wind farm from both the north and from the east. In both orientations these modifications to flight direction resulted ultimately in an almost perpendicular entrance to the edge of the wind farm.

The orientation of bird movements at long distances from the wind farm was not affected by time of day (day/night) or by wind direction. However, at short range (< 400 m), the orientation of bird movements north of the wind farm was significantly affected by time of day and wind direction. This suggests that those birds that came in close to the wind farm adjust their orientation by visual recognition of the wind turbines, in a way associated with the prevailing wind direction.

In the area north of the wind farm with low numbers of gulls and terns, the mean track orientation of birds that entered the wind farm during night was $195^\circ \pm 2.6$ SE, whereas the mean heading during daytime was $177^\circ \pm 4.9$ SE. This result may suggest that while birds are able to see the rows of turbines by day more clearly and adjust

their orientation to pass through the wind farm in the free corridors between turbines, birds that migrate at night are more likely to cross between turbine rows when passing through the wind farm area.

In the area east of the wind farm, time of day (day/night) was not found to affect flight orientation. The large numbers of gulls and terns, making local movements to and from Horns Rev to coastal areas, may mask the potential existence of a pattern similar to that observed north of the wind farm.

In the present analyses, the change in flight orientation occurred at 400 m north of the wind farm at a similar distance to the major decrease in the number of bird tracks detected on the radar. This suggests that a large proportion of the birds or bird species that approached the wind farm from the north reacted by either changing flight direction or stopped (i.e. to settle on water) at this point (see below). On the eastern side of the wind farm, this point of deflection was found to occur c. 1,000 m from the wind turbines. In this area, however, substantial movements of gulls and terns close to the wind farm will, if they use the wind farm as a point of migration, be expected to contribute to such a pattern.

During the periods of data collection, visibility was not markedly reduced by the presence of heavy fog or misty conditions. Thus, the recorded flight direction of birds that approached the wind farm included bird movements during daytime or during clear night conditions. Under these circumstances, the birds were probably able to detect the wind farm visually, either directly during daytime or by the flashing red lights located on turbine nacelles during the night.

The ability of migrating birds to avoid collisions with offshore wind turbines is expected to decrease with decreasing visibility, and hence, it is predicted that the collision frequency will be higher in situations with poor visibility. As the visibility was better than 2 km for the vast majority of the main migration periods during the present study, and given the above described prediction, it can be concluded that collisions may occur as relatively rare, clumped and discrete events rather than as continuously occurring casualties. This necessitates a continuously operating remote collision monitoring system, which can collect data independent of human operators. The

Thermal Animal Detection System (TADS; see Desholm 2003), based on infra-red video cameras, meets these requirements, and the final offshore testing of the system has been conducted in the autumn 2003. The results of this test will be assessed in relation to the future collision monitoring programme at the Horns Rev wind farm.

4.1.2 Probability of birds passing into the wind farm area

Of the tracks selected for analyses, the percentage of the waterbirds that passed through the northern and eastern gates of the wind farm area during autumn 2003 was 13.9% and 21.9%, respectively.

The probability of entering the wind farm was not affected by time of day (day/night), wind direction (east/west) or by the orientation of the birds measured between 1,500 and 2,000 m from the wind farm.

A high proportion of bird tracks deflected laterally before entering the wind farm, but most disappeared on the radar at various distances to the wind farm.

In the area north of the wind farm the largest proportion of tracks disappeared between 300 and 400 m from the wind farm. Although disappearance of radar tracks outside the wind farm may have several explanations, e.g., birds settle on the water, echoes disappear due to a change in bird orientation (reduced target size), these all reflect responses of the birds to the wind farm.

4.1.3 Flight altitude and speed

Flight altitude is a key factor, as the risk of collision is considered much higher if the birds fly at turbine rotor height than if they fly below or above the rotors.

In the present study, it was only possible to measure flight altitude rarely amongst a restricted number of species. Only gulls and terns were recorded in numbers that allow some interpretation of mean flight altitude. Gulls showed a variable range of flight altitudes and 61% of the records occurred within turbine rotor heights. Terns showed a less variable range of flight altitudes, being more confined to altitudes below the

height of the turbine rotors, only 9% of the records occurred at rotor height. Gulls thus seem to have a higher probability of colliding with wind turbines than terns, although the risk of collision may also depend on several other factors, e.g., species, weather condition and behaviour (migrating, foraging etc.).

The levelling device could only be used to obtain data on flight altitude during daylight hours. Thus, measurements of flight altitude for birds migrating at night is an important factor to be included in following studies, especially as the risk of collision is expected to be highest during periods of poor visibility, when visual observations can not be made. Collection of data on flight altitude during night and also during foggy periods should have a high priority in the continuing programme of collision risk assessment. The use of vertically positioned radar, should be considered as an appropriate method to measure flight altitude.

Flight speed was recorded routinely during radar observations with the aim to subsequently assign unidentified radar tracks to species group or species from known flight speeds of identified birds. Measurements of flight speed were, however, also included as flight speed will affect the probability of being hit by a turbine rotor if birds are found to pass the wind farm in the height of the turbine rotors. Thus data on flight speed are expected to be included in final risk assessments of collisions between birds and wind turbines.

Although relatively few records of flight speed on identified species were obtained it seems that separation between gulls and terns from other species of waterbirds is possible based on flight speed differences. More data are, however, needed to improve the assignment of unidentified birds.

4.1.4 Birds resting on turbines

Very few birds were recorded using the turbines as loafing platforms. Except from two observations of Sparrowhawk and of one Cormorant, only gulls and terns were observed to rest on the turbine foundations.

Most birds were recorded on the turbine foundations on the turbines located at the edge of the wind farm (13), while only two birds were re-

corded on turbines on the transect crossing the wind farm. Likewise, there was a tendency for most birds to be recorded on turbines that had stopped. Although data are scarce, this may suggest that birds are more reluctant to use turbines for resting within the wind farm than at the edge of the wind farm and that most species, with the possible exception of Great Black-backed Gull, avoid resting on actively rotating turbines.

4.1.5 General phenology and migration intensity

It has often been pointed out that the intensity of migrating birds depends on several factors, especially the weather conditions, not just in the study area, but also along the entire migration route (Geil et al. 1974, Alerstam 1990). Thus, even when controlling for several influential factors, a substantial proportion of the variation in the occurrence and intensity of migration may remain unexplained. For this reason, migration intensity may be the least sensitive variable to detect potential effects of the operating wind farm. The apparent deviations from the normal distribution during some of the observation periods and wind directions must also be considered in future comparison of data between different seasons.

In general, the seasonal occurrence of recorded species made during the present study is in agreement with the results obtained during aerial bird surveys at Horns Rev 1999-2002 (Noer et al. 2000, Christensen et al. 2001, 2002, 2003). As a consequence, the seasonal timing of data collection is presently considered adequate to provide a description of the periods of peak occurrence for species that occur at Horns Rev, although emphasis on the period February – May is essential to track the migration periods of divers and Common Scoter, two critical species occurring in the area.

With the exception of gulls and terns, the intensity of bird flights was lowest within and at the edge of the wind farm. Most species, even those recorded in very high numbers outside the wind farm, were not, or only very occasionally, recorded within the wind farm. Of these species, Common Scoter represented the most extreme example, with a total of 35,779 recorded individuals of which only 9 birds were observed flying in between turbines.

Gulls and terns were the most numerous occurring species within the wind farm and showed generally no reactions to single wind turbines. For most species of gulls and terns flight intensity was markedly higher at the transect located at the eastern row of wind turbines than at transects north and east and within the wind farm. Lowest flight intensity was however, recorded within the wind farm, indicating that gulls and terns in general did not pass the wind farm from east to west, and that the high numbers recorded at the eastern row of turbines reflected birds that moved in and subsequently out again. In combination with a change in migratory direction towards the wind farm on distances out to 1,000 m east of the wind farm, this may reflect the fact that gulls and terns used the wind farm as a point of migration, and thus that the wind farm potentially attracts these species at least to the periphery.

4.2 Concluding remarks

The present study constitutes the first detailed investigation of bird occurrence and behaviour at the Horns Rev wind farm in relation to the risk of collision between birds and wind turbines. As expected, no observations were made of actual collisions during the eight periods of observation performed at the wind farm site.

Although a substantial proportion of bird radar tracks that approached the wind farm for unknown reasons disappeared before entering the wind farm, the majority of the longest bird tracks showed a lateral deflection in orientation, resulting in birds flying around the wind farm. Consequently only a few bird echoes (7.1% of all 1,088 tracks) were recorded entering the wind farm. This low number was in all probably somewhat affected by reduced detectability of radar tracks within the wind farm related to a shadow effect from every single turbine hampering recordings of bird echoes within the wind farm. However, consistent visual observations of lateral deflections around the wind farm in several species indicate that avoidance of the wind farm was a frequent behavioural response shown by most of the bird species occurring at Horns Rev.

With the radar located at the southwestern corner of the transformer station, a full 360 horizontal view could not be obtained, leading to the lack of coverage of the area north and east of the wind farm. The dominant southbound autumn move-

ments of birds recorded at Horns Rev during the present study originated from this direction, probably reflecting a continuation of the coastal migration of waterbirds along Jutland. Hence, if major deflections in the migration routes occur as a response to the wind farm, it was not possible to describe with the set-up used in this study. To be able to describe bird movements in this area, the radar should be relocated to the northern side of the transformer station. This will, however, result in no coverage in the direction of the wind farm. Alternatively, a combined use of two antennas would result in a full 360° coverage.

Given the present one year of study, the aim was to describe a series of variables that is considered the most important parameters to contribute to a final risk assessments for bird species occurring at Horns Rev. Based on the results obtained through the present study, no final conclusions about the risk of collision can be drawn. It seems, however, reasonable to cautiously conclude that since most species react to the presence of the turbines at relatively long distances and many avoid entering the wind farm altogether. Those that do so fly in the corridors between turbine rows; thus the risk of collision seems to be lower than if birds

did not modify their flight behaviour when approaching the wind farm. Likewise, the turbines were not found to act as resting platforms that potentially would attract large numbers of perching bird species such as gull, terns and Cormorants, that potentially would collide with the turbines.

Based on the recorded patterns of deflection in the orientation of migrating birds approaching the wind farm, it may be possible that birds that migrate at night may experience an increased risk of collision compared to those doing so by day. At night, adjustment in flight direction of birds occurring close to the wind farm corresponded less to a trajectory that was confined to the areas between turbine rows, than amongst birds migrating during daytime. This probably results in a higher frequency of birds passing across one or more rows of turbines, and hence increase the risk of collision. Taking into account that the majority of migration occurs at night, an important task of the future monitoring programme will be to generate an assessment of the flight altitude of nocturnally migrating birds, in order to document whether birds that enter or cross the wind farm at night fly in altitudes below, within or above the heights of the turbine rotors.

5 References

- Alerstam, T. (1990): Bird Migration. - Cambridge University Press, New York, 420 pp.
- Christensen, R. & Grell, M.B. (1989): Efterårstrækstedet Gedser. - Dansk Ornitologisk Forenings Tidsskrift 83: 15-16. (In Danish).
- *Christensen, T.K, Clausager, I. & Petersen, I.K. 2001. Base-line investigations of birds in relation to an offshore wind farm at Horns Rev: results and conclusions 2000/2001. - NERI report 2001. 21 pp.
- *Christensen, T.K, Clausager, I. & Petersen, I.K. 2002. Status report of seabird surveys at Horns Rev, 2000-2001. - NERI report 2002. 22 pp.
- *Christensen, T.K, Clausager, I. & Petersen, I.K. 2003. Bird surveys at the offshore wind farm at Horns Rev, results from the base-line and construction periods. - NERI report 2003. 43 pp.
- Danish Hydraulic Institute 1999. Horns Rev wind power plant: Environmental impact assessment of hydrography. - Report to Elsamprojekt A/S.
- Desholm, M. (2003): Thermal Animal Detection System (TADS) - Development of a method for estimating collision frequency of migrating birds at offshore wind turbines. - NERI Technical Report, No. 440, 25 pp.
- Geil, S., Noer, H. & Rabøl, J. (1974): Forecast models for bird migration in Denmark. - Report from the Bird Strike Committee, Denmark, 34 pp.
- Jacobsen, B. (in prep.): Fuglene ved Blåvand 1963-1992. - Report from Danish Ornithological Society.
- Kahlert, J., Petersen, I. K., Fox, T., Desholm, M. & Clausager, I. in prep: Investigation of birds during construction and operation of Nysted offshore wind farm at Rødsand: Results and conclusions 2003.
- Kjær, P.A. 2002. Blåvand Naturcenter, Blåvand Fuglestation - en oversigt over fugleobservationer 1993-1999. - Report from Ribe County.
- Laursen, K. & Frikke, J. 1987. Vinterforekomst af dykænder, lommer og alkefugle i den sydøstlige del af Vesterhavet. - Dansk Orn. Foren. Tidsskr. 81: 167-169.
- Laursen, K., Pihl, S., Durinck, J., Hansen, M., Skov, H., Frikke, J. & Danielsen, F. 1997. Numbers and Distribution of Waterfowl in Denmark 1987-1989. - Danish Review of Game Biology 15 (1): 1-184.
- Lensink, R., Camphuysen, C.J., Jonkers, D.A., Leopold, M.E., Schekkerman, H. & Dirksen, S. (1999): Falls of migrant birds, an analysis of current knowledge. - Report from Bureau Waardenburg bv, Culemborg, The Netherlands, 117 pp.
- Morrison, M.L., Pollock, K.H., Oberg, A.L. & Sinclair, K.C. (1998): Predicting the Response of Bird Populations to Wind Energy-Related Deaths. - Presented at 1998 ASME/AIAA Wind Energy Symposium Reno, NV, January 12-15, 1998, 10 pp.
- Noer, H., Fox, A.D., Clausen, P., Petersen, B.M., Kahlert, J. & Christensen, T.K. (1996): Effects of the construction of a fixed link across Øresund on waterfowl populations: Environmental Impact Assessment - NERI Report, 123 pp.
- Noer, H., Christensen, T.K., Clausager, I. & Petersen, I.K. 2000: Effects on birds of an offshore wind park at Horns Rev: Environmental impact assessment. - NERI report 2000. 65 pp.
- Ramsar Bureau, undated: The criteria for identifying Wetlands of International Importance. http://www.ramsar.org/key_criteria.htm.
- SAS 1999. SAS Institute Inc. 1999-2001. The SAS System for Windows. Release 8.02. SAS Institute Inc., Cary, NC, USA.
- Stoltze, M. & Pihl, S. (Eds.) 1998a. Rødliste 1997 over planter og dyr i Danmark. - Miljø- og Energi ministeriet, Danmarks Miljøundersøgelser og Skov- og Naturstyrelsen. 219 pp.
- Stoltze, M. & Pihl, S. (Eds.) 1998b. Gulliste 1997 over planter og dyr i Danmark. - Miljø- og Energi ministeriet, Danmarks Miljøundersøgelser og Skov- og Naturstyrelsen. 48 pp.
- Tasker, M.L, Webb, A., Hall, A.J., Pienkowski, M.W. & Langslow, D.R. 1987. Seabirds in the North Sea. - Report from Nature Conservancy Council. 336 pp.
- Winkelman, J.E. (1992): De invloed van de Sep.proefeindcentrale te Oosterbierum (Fr.) op vogels. - 1-4 (RIN-report 92/2-5) DLO-Instituut voor Bos. en Natuuronderzoek, Arnhem, 120 pp. (In Dutch).

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Appendix 1

Temporal extent of radar coverage of the study area, expressed as a number of minutes of radar coverage at increasing ranges from the transformer station conducted in the areas west and east of the wind farm at Horns Rev during autumn 2003.

		Radar range (nautical miles)					
		1 nm	2 nm	3 nm	4 nm	5 nm	6 nm
West	Covered time	5,000	4,855	4,855	3,600	2,825	1,285
East	Covered time	4,810	4,605	4,090	2,020	1,705	1,270

Appendix 2

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Daily mean wind direction (in degrees) and wind speeds recorded at Horns Rev on days when observations were carried out during 2002 and 2003.

Date	Wind direction (degrees)		Wind speed (m/sec)	
	Mean	Mean	Max	Min
28 August 2002	334	6.2	8.0	1.6
29 August 2002	237	6.7	11.7	2.1
30 August 2002	227	9.3	14.6	5.9
28 April 2003	200	10.8	15.2	7.1
29 April 2003	227	12.4	14.7	10.5
30 April 2003	215	9.5	13.4	1.1
1 May 2003	237	11.6	15.6	7.4
12 May 2003	197	7.3	11.9	1.78
13 May 2003	238	8.6	11.8	5.1
14 May 2003	247	11.4	14.8	5.7
15 May 2003	301	12.2	16.1	6.6
6 August 2003	74	4.4	7.2	1.1
7 August 2003	88	4.4	7.9	0.1
8 August 2003	206	3.8	6.5	0.9
25 August 2003	207	6.1	11.0	0.4
26 August 2003	318	12.4	19.5	8.2
27 August 2003	328	15.0	20.3	5.0
28 August 2003	293	3.9	7.4	1.0
29 August 2003	83	4.5	8.5	0.1
22 September 2003	211	13.1	22.0	9.3
23 September 2003	307	14.6	17.9	9.7
24 September 2003	290	9.7	16.7	4.3
25 September 2003	228	10.9	13.0	9.0
13 October 2003	113	5.6	10.8	2.6
14 October 2003	69	6.1	8.1	4.7
15 October 2003	62	4.9	6.1	3.1
16 October 2003	73	3.5	4.9	0.5
11 November 2003	135	9.2	14.0	5.7
12 November 2003	146	11.9	14.1	9.9
13 November 2003	-	-	-	-

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Appendix 3

Species and numbers recorded during counts on the transect 'Southwest' on specific days at Horns Rev during 2003.

Species	Date																Total		
	30 Apr. 2003	1 May 2003	12 May 2003	13 May 2003	14 May 2003	15 May 2003	6 Aug. 2003	7 Aug. 2003	8 Aug. 2003	29 Aug. 2003	27 Aug. 2003	22 Sept. 2003	23 Sept. 2003	24 Sept. 2003	25 Sept. 2003	15 Oct. 2003		11 Nov. 2003	12 Nov. 2003
Gannet							1												1
Cormorant								1						1	1				5
Common Scoter																		2	2
Arctic Skua						1													8
Common Gull									4					4	16		10		43
Herring Gull	7	2																	72
Lesser Black-backed Gull	1	1	1	1	11		2	3						1	4				24
Great Black-backed Gull	5	2			7	1	4	16	2	2	1	34	45	13	4				136
Black-headed Gull	17	15						1						2					35
Little Gull	1																16	4	21
Kittiwake	1	1	5	4	13						1	1	19	10	1		1		57
Gull sp.												1							1
FerringGull/ Great Black-backed Gull												82	2	58	14	2			158
Arctic/Common Tern		3						15	2	2		2	2	2					24
Tern sp.			1						2						1				4
Sandwich Tern	23	11	163	37	192	36	25	9	7	2									505
Razorbill/Guillemot																	1		1
Starling																1	2	10	13
Passerine sp.												5							6

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Appendix 4

Species and numbers recorded during counts on the transect 'South' on specific days at Horns Rev during 2002 and 2003.

Species	Date																Total									
	28 Aug. 2002	29 Aug. 2002	30 Aug. 2002	28 Apr. 2003	29 Apr. 2003	30 Apr. 2003	1 May 2003	12 May 2003	13 May 2003	14 May 2003	15 May 2003	6 Aug. 2003	7 Aug. 2003	8 Aug. 2003	29 Aug. 2003	27 Aug. 2003		22 Sept. 2003	23 Sept. 2003	24 Sept. 2003	25 Sept. 2003	15 Oct. 2003	11 Nov. 2003	12 Nov. 2003		
Gannet	1											1													2	
Cormorant												1					2									3
Heron												1														1
Eider																										1
Common Scoter									1											1	1					7
Velvet Scoter																										1
Sparrowhawk															1											2
Curlew																										3
Arctic Skua																										19
Common Gull												1														65
Herring Gull	90	79	35	4	66	8	1	2			4	9			3	7	1	21	6	22	4	16	4	2	384	
Lesser Black-backed Gull		2			6	4	1					2						1	5	2						23
Great Black-backed Gull	50	130	37	3	14	5	2	4			1	8	11	2	7	16	42	22	27	3	1					385
Herring/ Great Black-backed Gull											6	6		1	6	3	55	44	68	7	12					203
Black-headed Gull	39	57			2	7							3										1			109
Little Gull							2																			22
Kittiwake	42	51	35		4	1	2	8	9	7	6			1	1		1	6	3							177
Gull sp.																	1	1	2	1	2					10
Gull																										
Arctic/Common Tern	29	22	15	1	162	3	7	3				13	1	6	3	2	5	1	1							274
Tern sp.	6	7						2				4	3	1	6				2							91
Sandwich Tern	153	40	72	10	27	7	13	234	212	377	166	20			4	21	7									1,363
Razorbill/Guillemot																				1						1
Starling																										51
Passerine sp.																										19

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Appendix 5

Species and numbers recorded during counts on the transect 'West' on specific days at Horns Rev during 2002 and 2003.

Species	Date														Total										
	28 Aug. 2002	29 Aug. 2002	30 Aug. 2002	28 Apr. 2003	29 Apr. 2003	30 Apr. 2003	1 May 2003	12 May 2003	13 May 2003	14 May 2003	15 May 2003	6 Aug. 2003	7 Aug. 2003	8 Aug. 2003		29 Aug. 2003	27 Aug. 2003	22 Sept. 2003	23 Sept. 2003	24 Sept. 2003	25 Sept. 2003	15 Oct. 2003	11 Nov. 2003	12 Nov. 2003	
Red/Black-throated Diver																		3	3	3	1			7	14
Podiceps sp.																						2			2
Fulmar																		1							1
Gannet																		13	1	1					51
Cormorant	1																								4
Whooper Swan																									27
Greylag Goose																									53
Dabbling duck sp.																									8
Tufted Duck																									2
Common Scoter	22																								382
Velvet Scoter																									2
Oystercatcher																									6
Golden Plover																									2
Curlew																									4
Bar-tailed Goodwit																									3
Redshank																									1
Greenshank																									1
Ruff																									2
Arctic Skua	3																								28
Skua sp.	2																								2
Common Gull	1	26	1																						63
Herring Gull	24	131	25	2	53	5	10	3																	336
Lesser Black-backed Gull	1	5	1																						42

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Appendix 5 continued

Species	Date																				Total		
	28 Aug. 2002	29 Aug. 2002	30 Aug. 2002	28 Apr. 2003	29 Apr. 2003	30 Apr. 2003	1 May 2003	12 May 2003	13 May 2003	14 May 2003	15 May 2003	6 Aug. 2003	7 Aug. 2003	8 Aug. 2003	29 Aug. 2003	27 Aug. 2003	22 Sept. 2003	23 Sept. 2003	24 Sept. 2003	25 Sept. 2003		11 Nov. 2003	12 Nov. 2003
Great Black-backed Gull	10	68	38				4	1	2	6	5	3	1	17	16	12	51	78	23				356
HerringGull/ Great Black-backed Gull																80	2	51	20	13			166
Black-headed Gull	11			1	2	15				1								11					41
Little Gull				2	8					3												15	63
Kittiwake	9	58	80	4	5	18	5	37	26	18	1	1	1	5	2	62	15	2					353
Gull sp.														6	1							4	11
Arctic/Common Tern	2	3	6	1	56	5	5	7		1		1	6	6	10	7	1	4	1				122
Tern sp.														3	12								17
Sandwich Tern	15	51	33	12	74	75	27	105	59	246	145	113	6	13	2			1					977
Razorbill/Guillemot									1											4			7
Guillemot																			1				1
Passerine sp.																		49	300				349

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Appendix 6

Species and numbers recorded during counts on the transect 'East' on specific days at Horns Rev during 2002 and 2003.

Species	Date												Total									
	29 Aug. 2002	30 Aug. 2002	28 Apr. 2003	29 Apr. 2003	30 Apr. 2003	1 May 2003	12 May 2003	13 May 2003	14 May 2003	15 May 2003	6 Aug. 2003	7 Aug. 2003		8 Aug. 2003	29 Aug. 2003	27 Aug. 2003	22 Sept. 2003	23 Sept. 2003	24 Sept. 2003	25 Sept. 2003	15 Oct. 2003	11 Nov. 2003
Red/Black-throated Diver					1	1	8	5	2					1	1	15	13	4	2		3	56
Red-necked Grebe																			6			6
Fulmar	1													1		1						3
Sooty Shearwater	1													1								2
Storm Petrel																		1				1
Gannet	1	2		19	25	36	3	33	15	15	2	1	1	3	2	1	24	2	2			189
Cormorant					1												1				1	132
Heron	1																					1
Greylag Goose																						66
Pink-footed Goose							7											135				66
Dabbling duck sp.														1								142
Tufted Duck																			1			1
Eider																						5
Common Scoter	18	22	152	3370	333	1813	1068	6378	785	9	43	2	2	67	2	2	114	138	62	40	30	49
Velvet Scoter						8	26	45	67	14												160
Red-breasted Merganser						2																2
Sparrowhawk													1									1
Oystercatcher										1		13										14
Golden Plover														7								7
Redshank										1												1
Calidris sp.													2									2
Great Skua																	2					2
Arctic Skua		1					9	9	15	7						5						48
Skua sp.																		1				1
Common Gull	5	16		12	4	4					1	2			1			2		1	1	7
																						56

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Appendix 6 continued

Species	Date																	Total						
	29 Aug. 2002	30 Aug. 2002	28 Apr. 2003	29 Apr. 2003	30 Apr. 2003	1 May 2003	12 May 2003	13 May 2003	14 May 2003	15 May 2003	6 Aug. 2003	7 Aug. 2003	8 Aug. 2003	29 Aug. 2003	27 Aug. 2003	22 Sept. 2003	23 Sept. 2003		24 Sept. 2003	25 Sept. 2003	15 Oct. 2003	11 Nov. 2003	12 Nov. 2003	
Herring Gull	121	140	8	21	1	11	7	1		2	12	1	1	2	2	25	6	44	4	59	13	17	495	
Lesser Black-backed Gull	3	1		4	7	16	12	5	4	1	2				3	1	4	4					67	
Great Black-backed Gull	84	90	6	11	5	13	17	1	5	9	9	2		35	63	15	44	60	3	5		1	478	
Great/Lesser Black-backed Gull															2	3	2						7	
Herring Gull/ Great Black-backed Gull											1	2	7	13	17	6	76	104	2	29			257	
Black-headed Gull	1			4	1	1							7					17	5				36	
Little Gull			1	7	16	2																26	35	87
Kittiwake	6	82		3		6	9	11	36	3	1				7	7	34	6	1			5	217	
Sabines Gull.																	1						1	
Gull sp.								2	13	3	1						5			1	6	9	43	
Arctic/Common Tern	11	80	2	113	18	18			3		42	32	61	20	2	13	2	11					428	
Tern sp.											17	65	52	12	5	8	1	3					163	
Sandwich Tern	42	93	24	83	110	93	56	16	62	46	41	3		19	4		1	1					694	
Razorbill																		1					1	
Razorbill/Guillemot							1	1										4		20		4	30	
Guillemot										1								6	2				9	
Swallow				2																			2	
Meadow Pipit																		2					2	
White Wagtail	1																						1	
Starling																							54	
Passerine sp.																	80	269		2		1	352	

Appendix 7

Miscellaneous observations of bird species recorded at the transformer station at Horns Rev during August 2002 – November 2003. The list is considered to accurately reflect those species, which had occurred, but numbers recorded should be considered as minimum, as some observations may not have been noted. Numbers in brackets are those additionally found dead on the transformer station and are not included in total numbers.

Species	Scientific name	N
Sparrowhawk	<i>Accipiter nisus</i>	6
Peregrine Falcon	<i>Falco peregrinus</i>	1
Merlin	<i>Falco columbarius</i>	1
Turtle Dove	<i>Streptopelia turtur</i>	1
Collared Turtle Dove	<i>Streptopelia decaocto</i>	3 (2)
Wood Lark	<i>Lullula arborea</i>	1
Swallow	<i>Hirundo rustica</i>	14
Hooded Crow	<i>Corvus cornix</i>	1 (1)
Jackdaw	<i>Corvus monedula</i>	2
Wren	<i>Troglodytes troglodytes</i>	5
Redstart	<i>Phoenicurus phoenicurus</i>	(1)
Whinchat	<i>Saxicola rubetra</i>	1
Wheatear	<i>Oenanthe oenanthe</i>	1
Ring Ouzel	<i>Turdus torquatus</i>	(1)
Blackbird	<i>Turdus merula</i>	1
Fieldfare	<i>Turdus pilaris</i>	1
Redwing	<i>Turdus iliacus</i>	10
Song Thrush	<i>Turdus philomelos</i>	2
Reed Warbler	<i>Acrocephalus scirpaceus</i>	1
Blackcap	<i>Sylvia atricapilla</i>	2 (1)
Garden Warbler	<i>Sylvia borin</i>	1
Whitethroat	<i>Sylvia communis</i>	1
Lesser Whitethroat	<i>Sylvia curruca</i>	1
Willow Warbler	<i>Phylloscopus trochilus</i>	3
Goldcrest	<i>Regulus regulus</i>	2
Meadow Pipit	<i>Anthus pratensis</i>	56
Yellow Wagtail	<i>Montacilla flava</i>	12 (1)
White Wagtail	<i>Montacilla alba</i>	2
Starling	<i>Sturnus vulgaris</i>	29 (8)
Greenfinch	<i>Carduelis chloris</i>	3
Linnet	<i>Carduelis cannabina</i>	4 (1)
Twite	<i>Carduelis flavirostris</i>	1
Crossbill	<i>Loxia curvirostra</i>	1
Chaffinch	<i>Fringilla coelebs</i>	1

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National Environmental Research Institute

The National Environmental Research Institute, NERI, is a research institute of the Ministry of the Environment. In Danish, NERI is called *Danmarks Miljøundersøgelser (DMU)*. NERI's tasks are primarily to conduct research, collect data, and give advice on problems related to the environment and nature.

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Department of Wildlife Biology and Biodiversity

Publications:

NERI publishes professional reports, technical instructions, and an annual report (in Danish). Databases containing reference to all publications and current projects are available on the World Wide Web.

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Monomoy Trap Company
STAGE HARBOR
P.O. Box 1407
West Chatham, MA 02669

February 2, 2005

Col Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742

RE: CAPE WIND PROJECT DEIS REPORT

Dear Colonel Koning

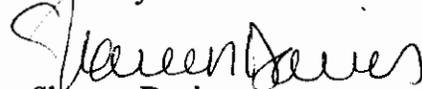
We are seriously concerned with the Cape Wind Association project and upon review of the DEIS even more so due to the deficiencies and inconsistencies in such an extensive report. When assessing impacts in sections 3.4.3.2.5 Fisheries, 3.4.3.4.5 Fisheries, 5.4 Finfish Resources and Commercial/ Recreational Fisheries, 5.4.3.2 Finfish Resources, 4.4.3.3. Commercial Fisheries, 5.4.3.4 Recreational Fisheries, 5.4.4 Essential Fish Habitat Assessment, 5.4.1.Introduction, 5.4.5.1.1 Direct Impacts we find the report :

1. Incomplete with flawed and incorrect assumptions
2. Lacking independent fisheries assessment
3. Conclusions are generalized and not specific to the project
4. Lacking quantitative fisheries information
5. Cites incorrect fisheries data
 1. The commercial landings data in the report are grossly underestimated

Most importantly: the fishing industry is held up to incredible scrutiny when it comes to the exploitation of the fish. The DEIS assesses finfish collectively for potential impacts even though fish species are managed individually with established framework, guidelines, regulations and reporting that are all in compliance with the Magnuson-Stevens Act.

The U.S. fisheries are reported to be in serious decline and to assess the fisheries in the manner that this report does is a serious deficiency. Do not permit this project until proper guidelines are in place.

Sincerely


Shareen Davis

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CHATHAM FISHERIES, INC
STAGE HARBOR
P.O. Box 1407
West Chatham, MA 02669

February 2, 2005

Col Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742

RE: CAPE WIND PROJECT DEIS REPORT

Dear Col. Koning

I own a fish company that operates weirs in Nantucket Sound. Our business is a seasonal fishery that has historic significance to the Sound dating back to the 1880s. There has been little change to the method and style of fishing since then. We are an artisanal fisheries dependant upon the traditional migratory habits of squid, scup, mackerel butterfish, bluefish, bonito, false albacore, Spanish mackerel as well as any number fish species that swims in Nantucket Sound.

Our fishing season begins in March and ends in late September. We employ 3-15 people per season, operate 3 boats out of Stage Harbor and are permitted for 10 grants to fish in the Sound. We report our catch to Massachusetts Division of Marine Fisheries and National Marine Fisheries Service and are allowed to fish under national, regional and state regulations and guidelines.

Upon review of the DEIS I have grave concerns and a number of issues not only as a weir fisherman/ business owner but as a fishermen who has fished Nantucket Sound for over 40 years. When assessing impacts in sections 3.4.3.2.5 Fisheries, 3.4.3.4.5 Fisheries, 5.4 Finfish Resources and Commercial/ Recreational Fisheries, 5.4.3.2 Finfish Resources, 4.4.3.3. Commercial Fisheries, 5.4.3.4 Recreational Fisheries, 5.4.4 Essential Fish Habitat Assessment, 5.4.1.Introdutction, 5.4.5.1.1 Direct Impacts I find the report :

1. Incomplete with flawed and incorrect assumptions
2. Lacks independent assessment
3. Conclusions are generalized and not specific to the project
4. Lacks of quantitative information
5. Uses incorrect reporting data

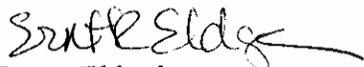
Specific but not exclusive concerns:

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1. The constant vibration from the turbines which will be transmitted through poles to the base and subsequently through the water and seabed will be deterrents to the migrating and spawning fish species.
2. The electromagnetic leakage and heat output from connecting cables and transmission cable will also deter many species from the area and disrupt traditional migratory paths.
3. The weirs harvest loligo (long-fin) squid annually in the weirs because of traditional migratory movement. Squid are a very marketable product and we are dependant upon them because of their value. They are known to have a short life span, about 1 year, it is imperative their traditional migrating and spawning activity not be altered or interfere with. The construction and placement of the permanent monopiles of the wind turbine will alter tidal currents and seabed conditions disrupting existing habitat and would be devastating to squid and the consequential marine life that are dependent upon them for food.
4. The commercial landings data in the report is grossly underestimated. Reports can be obtained from NMFS and MA DMF
5. Finfish are assessed together in the report but should be assessed as they are managed separately with species specific guidelines and framework in compliance with the Magnusen-Stevens Act.
6. The report confuses fish landing with fish stocks or populations.
7. The report does not recognize the uniqueness of Nantucket Sound as a migratory spawning area for finfish.

In conclusion, the DEIS has serious shortcomings that do not adequately address the potential impacts to fish, commercial and recreational fishing and the ecosystem that supports it.

Sincerely



Ernest Eldredge, owner

CC: MEPA

CapeCod Commission
Nat'l Marine Fisheries Service
MA DIVISION MARINE FISHERIES

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CHATHAM WEIRS, INC

P.O. Box 272 North Chatham, MA 02650

February 4, 2005

Col Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742

RE: CAPE WIND PROJECT DEIS REPORT

Dear Colonel Koning

Chatham Weirs is a business that represents three-quarters of the weir fisheries in Nantucket Sound. We market, sell and distribute seafood caught in the weirs to many parts of the country and through out the world.

The weir fishery in Nantucket Sound is the key part of our business. We harvest squid, scup, mackerel, butterfish, bluefish, bonito, false albacore, Spanish mackerel and other seafood from traditional fishing areas and we are dependant upon the migratory habits and patterns of the fish as they swim in and around Nantucket Sound.

Upon review of the DEIS, we have serious concerns about the report: **Sections 3.4.3.2.5 Fisheries, 3.4.3.4.5 Fisheries, 5.4 Finfish Resources and Commercial/ Recreational Fisheries, 5.4.3.2 Finfish Resources, 4.4.3.3. Commercial Fisheries, 5.4.3.4 Recreational Fisheries, 5.4.4 Essential Fish Habitat Assessment, 5.4.1.Introdutction, 5.4.5.1.1 Direct Impacts.** Our concerns include the following issues:

1. Incomplete with flawed and incorrect assumptions
2. Lacks independent assessment
3. Incorrect data used
4. Conclusions are generalized and inconsistent
5. Lacks of quantitative information

As an example, but not exclusively:

- ◆ The report confuses landings with fish stocks
 - ◆ Becuase of regulations weirs are limited in the amount of poundage allocated to harvest scup- approximately 100,000 pounds per year. A fish weir company may catch well over 500,000 pounds, releasing 400,000 alive and in good condition back into Nantucket Sound. The weir operator reports landing 100,000 pounds.
- ◆ The report does not adequately assess the impact of electromagnetic fields, vibration and temperature changes on loligo (long fin) squid. Large magnetic fields generated by power plants can cause pollution to underwater spawning

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grounds. The effects of this electromagnetic pollution and sea bottom/ current modification on spawning are yet to be known .Horseshoe Shoals and the Sound are prime spawning areas for squid during the spring. Squid eggs and developing juveniles become prey for other species and are an important component to the food web base. Squid posses a sensitive electrophysiological nervous system. The potential for serious disruptions in the squid spawning behavior could cause population decline and in effect begin the collapse of other species within the ecosystem.

- ◆ The commercial landings data in the report is grossly underestimated. Reports can be obtained from both NMFS and MA DMF
 - ◆ The report does not assess properly alewives and striped bass
 - ◆ Report incorrectly indentifies the number of weir grants- it only reports the weir grants that report fish catch
- ◆ Finfish are grouped together in the report and are assessed collectively.
 - a. Finfish are managed separate under federal, regional and state regulations and laws. The assessment of the potential impact should be addresses similarly by separate species and habitat.

In conclusion, we as members of the our country's fishing industry who are highly managed and regulated and are held to rigorous standards and scrutiny, find the lack of framework to assess the Cape Wind project flawed. And question the appropriateness and legality of the Army Corps reviewing this project .The DEIS has serious shortcomings that do not adequately address the potential impacts to fish, commercial and recreational fishing and the ecosystem that supports it. This permit should not be granted.

Sincerely

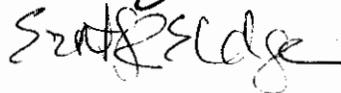
Theodore Lucas, President



David Carnes, Director



Ernest Eldredge, Director



CC: MEPA

Cape Cod Commission
MA Division of Marine Fisheries
NATIONAL MARINE FISHERIES SERVICE

3343

Col. Thomas L. Koning
District Engineer
United States Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742
Attn: Karen K. Adams

Secretary Ellen Roy Herzfelder
Massachusetts Executive Office of Environmental Affairs
100 Cambridge Street 9th Floor
Boston, MA 02114
Attn: Anne Canaday, EOE #12643

February 4, 2005

Dear Col. Koning and Secretary Herzfelder:

I am writing on behalf of the Massachusetts Energy Consumers Alliance (Mass Energy). We are a nonprofit organization dedicated to making energy more affordable and environmentally sustainable. Working in partnership with People's Power and Light of Rhode Island, we operate buying groups for discount heating oil, biofuel, and green electricity in the states of Massachusetts and Rhode Island. Currently, we have over almost 9000 members. We are advocates for energy policies that are pro-consumer and pro-environment.

Given our mission, we have been watching the Cape Wind project for some time. We decided that we would not take a position for or against the project until we were able to carefully review the Environmental Impact Statement. Now that we have reviewed the Draft Environmental Impact Statement, I am prepared to make these remarks:

We are ready to offer strong, but qualified and contingent support for Cape Wind. To remove any contingency from our support, we ask that the Army Corps adopt the recommendations of the Mass. Audubon Society for further data collection regarding potential impacts upon terns, winterfowl, passerines, and sea ducks. We have not seen evidence that Cape Wind would propose an undue threat to bird and other wildlife in Nantucket Sound, but we have a deep respect

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for Mass. Audubon and the their call for more data. We hope that such data collection would not delay the final EIS.

We also suggest that the final EIS address more specifically the question of which existing power plants in New England are most likely to be taken out of service, either partially or completely, as a result of Cape Wind coming on-line. In order to draw conclusions about how local air quality might be affected by Cape Wind, the analysis should focus on the Canal Power Plant, putting more detail into the discussion of DEIS Section 5.0.

Moving onto other issues, the DEIS does a good job of describing how Cape Wind would benefit the region economically. It also does a good job of explaining how the project would enhance the general reliability and fuel diversity of the New England power grid and how it would benefit New England ratepayers.

To go a step further, however, we note that by 2010, Greater Boston will be dependent upon natural gas for 80 percent of its power supply. This lack of supply diversity is practically unprecedented in the United States. While natural gas is environmentally preferable to oil, coal, or nuclear power, it is not preferable to wind power and is clearly going to fetch prices over time that will enhance its reputation as a premium fuel. Therefore, from the perspective of a ratepayer in New England, the Cape Wind project promises to offer significant relief, even if indirectly to ratepayers whose suppliers do not contract for Cape Wind power.

We further note that any measure to reduce natural gas consumption in New England will suppress market clearing prices for not just electricity, but also for natural gas for home heating use. This will help to reduce the potential for heating oil price spikes as natural gas and heating oil markets are inextricably linked due to the fact that some large customers can easily switch from one fuel to the other. In other words, additional energy sources in the region (in this case Cape Wind) will help to restrain the cost of fossil fuel-based end uses.

The DEIS focuses mostly on the assumption that the project will sell its output on the spot market. As the EIS process moves to the final document, we would like to see an analysis of how the Cape Wind project could specifically benefit ratepayers in Massachusetts, if not Cape Cod itself. This could be done through a bilateral contract with entities such as the Cape Light Compact, default service providers, and the Commonwealth or its subdivisions – for either electricity and/or Renewable Energy Certificates (RECs). Such a study should examine the potential benefits (to both the buyer and seller) of entering into a long-term contract for a fixed price commodity. It should also identify any barriers to that proposition. There are significant public benefits to renewable energy and those

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benefits can best be captured through public procurement. Much of the tension around the Cape Wind project concerns private development in public waters. Therefore, we challenge Cape Wind, public officials in Massachusetts and the Army Corps to work in good faith to relieve that tension by addressing this issue together.

We want to emphasize that the Cape Wind project is about more than just providing a certain number of megawatt hours of electricity. It is about meeting our power needs in a way that does not contribute to oil spills, smog, acid rain, neurological poisoning, nuclear waste, asthma rates or climate change. The DEIS only briefly mentions climate change. But again, overall, from our reading of the DEIS, the Cape Wind project would clearly qualify as being part of what we hope can be a sustainable energy future.

Aside from how Mass Energy values environmental sustainability, the Commonwealth of Massachusetts has a Renewable Portfolio Standard. Similar laws have been passed in neighboring Connecticut and Rhode Island. For the final EIS, we encourage the Army Corps to gather data from the appropriate agencies in each state about how progress is or is not being made towards fulfillment of the RPS. We know that progress is not being made fast enough and we are not getting the environmental benefits the RPS set out to achieve. Furthermore, the shortage of renewable energy certificates (RECs) is causing ratepayers to incur higher prices for RPS compliance, or in this case, "Alternative Compliance" than necessary.

If the supply of renewable energy in New England begins to catch up with demand, the price of RECs will fall to the level needed to finance most projects. Most projects should be able to do well if they can sign long-term REC purchase agreement of \$25-30 per REC, or 2.5-3 cents per kWh. Unfortunately, due to the large gap between the RPS demand and the supply from qualifying projects, the price of RPS-eligible RECs on the spot market has risen to upwards of fifty dollars. Furthermore, we believe that millions of dollars will be paid annually by electricity suppliers, using money collected from ratepayers, in the form of Alternative Compliance Payments (ACP) until supply catches up with demand. If supply lags behind demand through 2009, for example, ratepayers will be paying about \$60 for phantom RECs – double the cost of real RECs. The Cape Wind project will provide real energy and real RECs, while putting downward pressure on REC prices and reduce ratepayer exposure to Alternative Compliance Payments.

We think there is burden of proof on our public officials in this state to demonstrate how we will meet our RPS goals and how we will achieve the goals of our new Climate Change Action Plan if the Cape Wind project is not built.

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Whether our interests are birds and wildlife or jobs and electricity rates, we have a right to an energy plan that is more than just words on a page.

Finally, as mentioned above, Mass Energy pools the purchasing power of consumers who wish to voluntarily support green electricity. Working with another nonprofit organization, People's Power and Light, we are selling green power in Massachusetts and Rhode Island. Many consumers are willing to pay a small premium for their electricity if it is generated from renewable energy sources. To meet this demand we compete for RECs in the same marketplace as companies required to meet the RPS. Thus, with REC prices being as high as they are, voluntary demand for renewable energy is being restricted – and this means that we are not capturing all of the public benefits possible from green power. From this point of view, as is the case with the RPS market, Cape Wind would have a beneficial impact by putting downward pressure on REC prices throughout New England. The final EIS should analyze how voluntarily demand for renewable energy would be stimulated by lower REC clearing prices. Please note that Mass Energy does not have a business relationship of any kind with the project developers.

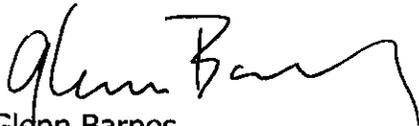
Sincerely,



Larry Chretien
Executive Director



Chad Laurent
Program Coordinator



Glenn Barnes
Membership Coordinator

3344

Adams, Karen K NAE

From: Jim Liedell [jliedell@comcast.net]
Sent: Wednesday, February 09, 2005 1:19 AM
To: Adams, Karen K NAE
Subject: Copy of my comments last night at the Cape Cod Commission's Hearing in Yarmouth

Dear Ms. Adams,

Regarding Cape Wind Associates' Permit Application, attached is a copy of my comments at the Cape Cod Commission's Hearing on their Staff Committee's Report, released about a week ago. Please review and file these as your office deems appropriate.

I have not attached the Diekan 400 Transformer Oil MDS (Material Data Sheet) because I do not have an electronic copy. I am quite sure you are familiar with that, and probably already have it on file, but if for any reason it is needed please advise and I will promptly send a hardcopy.

Thank you very much.

James E. Liedell, 148 Kate's Kate, Yarmouth Port MA 02675

3344

Feb, 8, 2005
148 Kate's Path
Yarmouth Port MA 02675

To: Mr. Phil Dascombe, Planner
Cape Cod Commission
P.O. Box 225
Barnstable MA 02630

cc: Committee Members
cc: Ms. Karen Adams, US Army Corps of Engineers

From James Liedell, Professional Engineer

Re: Commission Staff Report on the Cape Wind Energy Project

These comments are necessarily limited due to speaking times allowed at tonight's Mattacheese School Hearing.

Most importantly, I believe the CCC Staff document's proposal to create a Supplemental DEIS/DEIR is unneeded, thus frivolous and counter-productive to the long-awaited benefits from starting offshore wind generator projects in our nation as soon as reasonably practicable. This will save American lives here and abroad, and is the only way now to meet the Massachusetts RPS law in a way that will benefit the pocketbooks of Cape and Islands residents. Most of the CCC Staff questions and comments can be answered with common sense, basic project evaluation techniques, and/or use of references - of which 207 are listed in just the 3.0 Alternatives Analysis Section of the DEIS (on pages 3-254 through 3-265).

Although I have studied the whole document, my comments below are just on the following major summary points and their explanatory sections:

Comment G1 -- regarding Point b concerning the Beacon Hill Institute report
Comment G2 -- regarding the Global Insight and La Capra Reports
Comment G7 -- regarding Spill Prevention Control and Countermeasure Plan (SPCC)

Comment G1 b

The omission of the Beacon Hill Institute's October 2003 report is logical, because this was not a fact-based study, regarding tourism nor its other primary conclusions. BHI's methodology was to ask tourists on the street a series of questions (offering a \$10 inducement to answer their questions, which might itself skew results), after showing them visual simulations of the NSWf prepared by the Alliance to Protect Nantucket Sound -- some of which have been inaccurate.

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BHI's conclusion was based on a very small percentage of tourists who said they would be less likely to come to the Cape if the NSWf were built. However, BHI failed to obtain a valid number of new tourists who would be attracted to the Cape by the NSWf: their method did not use valid data, but was based on an inappropriate extrapolation of unrelated survey data. Against this, there is no report worldwide to-date that an offshore wind farm reduces tourism: many reports however document increased tourism. More recently, many newspapers such as the Cape Cod Times, and technical articles, have clearly stated the assertion that tourism will decrease is a "red herring" and not factual, based on experience at all other offshore locations.

The BHI study had other grossly flawed logic. For example, if Cape Wind's private investment in the project is removed from valid "public costs" (because it is not funded by the public) then BHI's own analysis of public benefits exceed the public costs by 3 to 1, and their overall major conclusion in that area is wrong.

Also, the BHI report did not classify new jobs or electricity savings to consumers as benefits. Instead it stated the very odd contention that jobs are not a public benefit because the workers are "inconvenienced" by having to go to work. Nor did BHI consider consumer electric price savings to be a public benefit, for the nonsensical 'reason' that wages/salaries are "just a transfer of money from companies to employees". There are other illogical parts of the BHI report. In summary, the BHI Report's credibility is destroyed as a source document for serious factual analysis and evaluations.

I thus strongly recommend that you delete the subject comment from your final report.

Comment G2

The Corps of Engineers, including the expertise of their contributing review groups, has accepted the Global Insight and La Capra Reports as factual, based on the groups' knowledge gained in almost 3 years of studying the details of this project. This by itself sufficiently constitutes an appropriate independent assessment of assumptions, logic of analysis, and conclusions reached.

I testify as a Professional Engineer, having a Bachelor – Engineering degree from Cornell University and Master – Management Engineering (MBA equivalent) from RPI in Troy NY, having spent much of my working career in the Power Generation industry, retired to Cape Cod with my wife in 1994, devoted considerable time in the last 2 ½ years to understanding and interfacing with many others concerning the NSWf project, made Coast Guard Auxiliary safety patrols in Nantucket Sound, and had other relevant experience such as working with an MIT graduate course on methods to more effectively introduce change and build consensus on critical technical projects such as US wind power development.

I have personally studied both the Global Insight and La Capra Reports in detail in the last year, and found them to actually significantly understate the project's benefits,

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because actual fuel prices of the primary alternatives (oil and natural gas) are now much higher than assumed in the reports, which were based on forecasts intentionally made conservative (lower savings estimated) when prepared. The reasons for this were clearly stated in the report.

I strongly believe that the Reports' assumptions, analysis and conclusions are based on facts, logical and entirely credible. Your Staff document provides no listing of inappropriate data, nor any reason to question the credentials or professionalism of Global Insight or La Capra. Also, as noted above, the Report's electricity price savings were conservative compared to current and presently forecasted future prices of the primary alternative fossil fuels.

Thus I believe your concern is unwarranted, and should be deleted from the CCC report when issued.

Comment G7 – regarding Transformer Oil Spills

As you may be aware, this and related spill plans are required to be proposed and approved before installation begins. This is logical because they have to be detailed to be most useful, and thus are based upon configuration details, not schematic layouts. This detail is not exactly known at this time because the whole plan or location could change from that originally proposed, as well as the fact that structural design work necessarily has not been completed yet. Let us consider the validity of the massive advertising by the opposition Alliance to Protect Nantucket Sound, which has caused some fears and illogical feelings of urgency. Enclosed are two factual documents on this subject which will aid in understanding this issue.

- Clean Power Now's recent Fact Sheet on Transformer Mineral Oil, and
- A prominent manufacturer's Material Data Sheet on Transformer Oil.

The oil used in the NSWF transformers is the same mineral oil used on human babies' skin to "help moisturize and prevent chafing". I purchased a bottle of Johnson's baby oil at CVS yesterday: the only ingredient other than mineral oil is fragrance. Also, off-the-shelf CVS "Lubricant Laxative's" sole active ingredient is mineral oil (the only inactive ingredient is added as a stabilizer). This liquid is sold for human consumption "for the relief of occasional constipation". It is odorless, tasteless, colorless - and harmless in reasonable doses.

So what validity is there to the 'Alliance' portraying Transformer Oil as a dangerous material in their advertisements – needing spill plans right now? Unfortunately, it appears that the CCC Staff has accepted this Alliance disinformation, joining others misled by the Alliance's massive advertising expenditures.

Also worthy of note is the fact that transformer oil is within many transformers we pass daily on-land, which have no protection against spills other than the steel containment

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tank of the transformer itself. There are not even curbs around large transformers in our local areas. However, Cape Wind's Electrical Service Platform will have two additional backup structural means of containment beyond the transformers' tanks.

It seems clear that the CCC should be content with the timing specified in present Spill prevention and control regulations as they apply to the Electrical Service Platform and individual turbine T-G units (which also have redundant spill containment).

Thank you for this opportunity to present my comments on some of your Staff document's contentions, and I hope you will earnestly consider changing the report in these areas.

Sincerely,

James E. Liedell
Vice- President, Clean Power Now



Clean Power Now

Fact Sheet - On Transformer Mineral Oil

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Background

The electrical industry has used transformers for over 100 years to step-up the voltage at generating stations before inserting power into transmission lines. Higher voltage means lower currents which reduces electrical line loss. Even so, about 4% of all power generated is lost as heat due to the resistance of the copper conductors. Likewise, transformers themselves lose about 3% of all power transformed because of core and copper winding losses. This loss also manifests itself as heat.

To dissipate heat in transformers and to prevent high voltage arcing, a heat transfer fluid is used to immerse the windings. Up until 1977 chemicals called polychlorinated biphenyls (PCBs) were used in transformers because they are good heat conductors and insulators. Unfortunately, PCBs were found to be very hazardous to your health and the environment if leaked or spilled. Now the heat transfer medium of choice is 100% mineral oil which is a much more benign fluid with good electrical characteristics.

The Issue

At issue is an exaggerated concern over an accidental spill of mineral oil contained in the transformers on the wind farm's service platform. This platform, located in the center of the turbine array, functions as a hub combining energy from 130 wind generators and transforming it into higher voltage for undersea transmission to shore, then underground to the Hyannis substation near the airport. Ten thousand gallons of mineral oil in each of four transformers will be triply contained to assure that it is trapped to prevent accidental leakage onto the ocean. The platform safety equipment will be built to the standards of the National Fire Protection Association and a spill response plan will be in place before operation begins. And the platform itself will be built to the American Petroleum Institute (API) standards for offshore platforms that can withstand hurricane winds and waves.

The Facts

FINA, one of several manufacturers of transformer mineral oil¹, provides the following information on their federally required Material Safety Data Sheet (MSDS) for their product called DIEKAN 400. The product is described as highly refined paraffinic petroleum oil with no hazardous ingredients such as PCBs. To quote: "There are no significant hazards for emergency response known."

The MSDS health rating by the Hazardous Materials Information System rates this product as "slight," a rating of "1" on a scale of 0 to 5 with no reproductive effects and no mutagenic effects. First aid measures for exposure include flushing eyes with water and washing skin with soap. Toxicological information on ingestion indicates that if swallowed no significant adverse health effects are anticipated other than mild irritation to the digestive tract and a laxative effect. This product is not known to contain any components for which the State of California has found to cause cancer, birth defects, or other reproductive harm. Furthermore, this product does not contain any components that are considered carcinogenic by OSHA, the International Agency for Cancer, and the National Toxicology Program².

With a specific gravity of 0.9 compared to water at 1.0 this mineral oil will float on top of water. It has negligible volatility and carries a National Fire Protection Association rating of "slight" and a "1" on a scale of 0 to 5. Accidental release measures indicate recovery and cleanup with absorbent materials and pads. Discharges are expected to cause only localized and non-persistent environmental damage³. Although birds may experience harmful effects if coated with mineral oil, an accidental spill plan will be in place to quickly recover as much oil as possible to minimize habitat damage.

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A Perspective

Compared to the hazards of the heavy No. 6 residual fuel oil burned at the Canal Plant and other coastal generation stations mineral oil is far less a threat to the environment. In one example, the 2003 spill of approximately 100,000 gallons of residual oil by the single hulled Bouchard barge headed for the Canal Plant took its devastating toll on hundreds of birds while at the same time sinking to close 100,000 acres of shellfish beds and fouling 93 miles of shoreline⁴. The Canal Plant alone consumes some 330 million gallons a year of this residual oil, all transported by barge or tanker, mostly single hulled vessels. In fact, 44% of the generation capacity in southeastern Massachusetts is fueled by oil⁵. But that's not all. Over 1.5 billion gallons of oil move through the Cape Cod Canal every year⁶. In the last 30 years over 7 million gallons of residual fuel oil have been spilled in the waters around the Islands and Buzzards Bay, most of it destined for power plants⁷.

In addition, marinas located on Nantucket Sound store significant quantities of fuel oil. For example the Hyannis Marina stores almost 40,000 gallons of fuel in underground tanks⁸. Refueling boats in the harbor has lead to accidental spills, most recently 2,000 gallons⁹. And most unfortunately, commercial fishing boats that go down at sea take with them the diesel fuel in their tanks which will eventually leak out.

In Conclusion

The robust wind farm service platform, stationed on six sturdy legs in the middle of the wind turbine array in shallow water, is indisputably less likely to spill oil from its triply contained transformers than the moving single hulled barges and tankers that ply our waters delivering residual fuel oil to our fossil generation power plants. Even in the unlikely event of a leak, the transformer mineral oil is more easily cleaned up and far less environmentally damaging than hazardous residual fuel oil.

It is noteworthy that the electrical production of the wind farm will definitely offset the need for some of the fuel oil required for electrical generation in our regional power plants. For example, the electrical energy generated from the wind farm every year is equivalent to about 90 million gallons of fuel oil¹⁰ if used to generate the same amount of electrical power.

Regarding the concern over the view of the 100 foot platform that will be 10 miles off the coast, it will appear to be less than an eighth of an inch high on the horizon when measured at arm's length. And then visible only on the very clearest of days.

A Final Note

Petroleum mineral oils are used in many familiar household products and cosmetics. For example, Johnson's baby oil is 99% petroleum mineral oil¹¹. A more purified form of mineral oil, as listed in the United States Pharmacopoeia (USP), available in any drugstore, is used for medicinal purposes... it's good for what ails you. Enough said.

¹ FINA Product Data Sheet for DIEKAN 400 Transformer Oil.

² FINA Material Safety Data Sheet for DIEKAN 400 Transformer Oil, p.1, September 25, 2002.

³ Ibid, p. 2.

⁴ "Barge rules backed on hill," by David Kibbe, Cape Cod Times, April 28, 2004.

⁵ Commissioner O'Connor's Presentation to the MTC Stakeholder Meeting in Hyannis on October 31, 2002.

⁶ "Oil spill fouls Buzzards Bay," by Amanda Lehmert and Paula Peters, Cape Cod Times, April 29, 2003.

⁷ Argo Merchant 25 miles off Nantucket with 7.7 million gallons, 1979; Bermuda Star, 7,500 gallons, 1990; Bouchard Barge #120, 98,000 gallons, 2003.

⁸ Department of Fire Services, Massachusetts, Facility: Hyannis Marina ID #19438

⁹ "Hyannis Harbor Fouled by Spill," by K. C. Meyers, Cape Cod Times, December 12, 2004.

¹⁰ Heat rate conversion for oil fired generating plants.

¹¹ National Institutes of Health, National Library of Medicine, <http://householdproducts.nlm.nih.gov>

3346

Adams, Karen K NAE

From: eleanor giusti [elligiusti@yahoo.com]
Sent: Thursday, February 10, 2005 10:27 AM
To: Energy, Wind NAE
Subject: Cape Wind project

To Karen Adams,

We oppose The Cape Wind Project in Nantucket Sound. We have read the project's lists of pros and cons and it is quite clear that the cons far out weigh the pros even in light of the possible environmental advantages. We are sure that you have done your homework and know these same pros and cons. Why, then, does the Cape Wind Project continue to push ahead its agenda in light of these facts. The only conclusion we can draw is the almighty dollar. There are some things money cannot buy and Nantucket Sound's natural and perfect beauty is one of them. It has given for centuries generations of Americans both native and non a sense of history, of wonder and of pride. Please, don't destroy our Sound.

Most sincerely,
Elli Giusti and Michael Barse

Elli

Do you Yahoo!?
Yahoo! Search presents - Jib Jab's 'Second Term'

3347

Adams, Karen K NAE

From: Ray Sebold [Ray.Sebold@CrotchedMountain.org]
Sent: Thursday, February 10, 2005 10:55 AM
To: Energy, Wind NAE
Subject: Cape Wind

This is a letter in support of the Cape Wind project.

I work at a facility which sited the first wind farm in the United States over 25 years ago. US Windpower (later Kenetech) constructed our wind farm and continued their work at Altamont, CA. They were bold enough to make the many, sometimes miserable, mistakes that have allowed us to learn to improve the performance of wind turbines while considering proper site conditions.

The technology has matured from this time and is now a very reliable, safe, non polluting source of electricity production. Site evaluations are thorough. Though wind power is not perfect I feel it is far better to include wind farms in a varied, distributed power base. Centralized power plants only make our country and its citizens more vulnerable to attack or victims of massive blackouts. Nuclear, coal and other fossil fuels, the fuels of choice for these centralized plants, have serious issues of toxicity and pollution. Wind works!

Sincerely,

(Home address: 130 Meadow Road; Montague, MA 01351)

Ray Sebold

Project Manager/Building Services
Crotched Mountain Rehabilitation Center
1 Verney Drive
Greenfield, NH 03047
603/547-3311 ext. 457
603/547-3413 fax
Ray.Sebold@CrotchedMountain.org

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334e

Adams, Karen K NAE

From: Phyllis.Mollen@Pfizer.com
Sent: Thursday, February 10, 2005 10:26 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Koning,

Before you approve or deny a permit to erect 130 turbines in Nantucket Sound, please require the developer to conduct the thorough studies recommended by the U.S. Fish and Wildlife Service and the Massachusetts Division of Fisheries and Wildlife.

Specifically, the environmental review of this project should include:

- Three full years of visual observations of birds
- 12 months of radar observations of flying wildlife
- A thorough and timely review of the project's potential effect on wildlife, including marine mammals

These factors will help determine whether the Cape Wind project is in the best interests of both the public and wildlife.

As it is written, the U.S. Army Corps of Engineers' draft environmental impact statement is hopelessly flawed, because it ignores relevant information and draws conclusions based on inadequate research.

This project could be the first marine wind energy facility in the United States. As such, it will set a precedent for other offshore renewable energy projects.

Please require a rigorous, scientific review of its environmental effects. Clean air and healthy wildlife populations are not mutually exclusive. We need both.

Sincerely,

Phyllis Mollen
205 W. 91st Street
New York, New York 10024

3349

Adams, Karen K NAE

From: Sultana113@aol.com
Sent: Thursday, February 10, 2005 10:31 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Anna Hill
3819 Sunbreeze Circle Apt. 313
Roanoke, Virginia 24018

Adams, Karen K NAE

3350

From: larysa@apiusa.com
Sent: Thursday, February 10, 2005 10:39 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Larysa Olenska
8 Blackstone Avenue
Branford, Connecticut 06405

3351

Adams, Karen K NAE

From: evelyn.adams@usa.net
Sent: Thursday, February 10, 2005 10:47 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Koning,

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Sincerely,

Evelyn Adams
4920 Pecan Place Dr
Mc Kinney, Texas 75071-7030

3352

Adams, Karen K NAE

From: kat7@case.edu
Sent: Thursday, February 10, 2005 10:50 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Koning,

Before you approve or deny a permit to erect 130 turbines in Nantucket Sound, please require the developer to conduct the thorough studies recommended by the U.S. Fish and Wildlife Service and the Massachusetts Division of Fisheries and Wildlife.

Specifically, the environmental review of this project should include:

- Three full years of visual observations of birds
- 12 months of radar observations of flying wildlife
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These factors will help determine whether the Cape Wind project is in the best interests of both the public and wildlife.

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This project could be the first marine wind energy facility in the United States. As such, it will set a precedent for other offshore renewable energy projects.

Please require a rigorous, scientific review of its environmental effects. Clean air and healthy wildlife populations are not mutually exclusive. We need both.

Sincerely,

Kory Thornburg
2857 West Bailey Road
Cuyahoga Falls, Ohio 44221

Adams, Karen K NAE

From: marilyn.williams@bestbuy.com
Sent: Thursday, February 10, 2005 11:34 AM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Koning,

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Sincerely,

Marilyn Williams
10903 Rhode Island Avenue South
Bloomington, Minnesota 55438

3354

Adams, Karen K NAE

From: annie.sunderland@co.dakota.mn.us
Sent: Thursday, February 10, 2005 12:28 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Koning,

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Sincerely,

Ann Marie Sunderland
15555 Flight Way
Apple Valley, Minnesota 55124

3355

Adams, Karen K NAE

From: ejhubbard81@netzero.com
Sent: Thursday, February 10, 2005 12:59 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Elizabeth Hubbard
51 North Street
Madrid, New York 13660

3356

Adams, Karen K NAE

From: kitt11205@yahoo.com
Sent: Thursday, February 10, 2005 1:28 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Kimberly Thomas
18 Irving Ave Apt 2c
Brooklyn, New York 11237-2024

3357

2/5/05

To: Karen K. Adams, Cape Wind Energy Project Manager
From: Chris Fried, M.E.
Subject: Cape Wind Energy Project DEIS

Dear Ms. Adams,

As an engineer with many years of experience in energy and environmental issues, I conclude that the Nantucket Sound Wind Farm is a sensible project – one that the U.S. Army Corps of Engineers should approve. Here is a brief list of reasons why:

1. As reported in your DEIS, the negative impacts of the wind farm will be small, while the positive gains will be substantial.
2. The wind farm technology is well refined and proven, thus will perform as planned.
3. New England has many existing “dirty” and unsafe power plants that need to be retired (including the Pilgrim nuclear plant) and the wind farm will help make their retirement more likely.
4. The wind farm can be operational in a relatively short time, thus allowing its benefits to be realized at an early date.
5. The wind farm will serve as a much-needed example of the successful harnessing of renewable energy, and will help promote sensible energy policy (something that is missing from our current Administration).
6. Cape Wind is an experienced and reputable company, well qualified for managing the wind farm project.

I encourage you to move this project forward rapidly, for as Lester Brown and other experts say, we haven't much time to act before global warming and other imbalances become unstoppable and catastrophic.

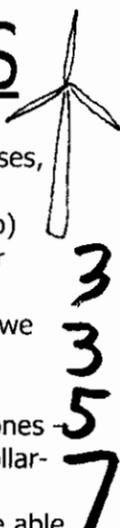
Sincerely,



Chris Fried
206 Norton Ave. Vineyard Haven, MA 02568

RECEIVED
FEB 10 2005
POLICY DECISION

A REVIEW OF ELECTRIC-GENERATING SYSTEMS

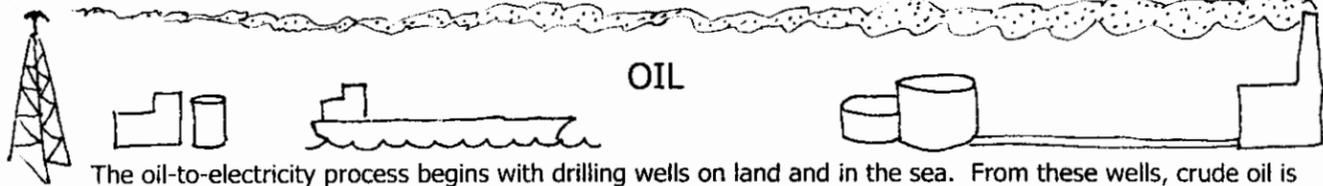


Electricity plays an important role in our lives. We use it to heat and light our homes and businesses, and power our tools, machines, and electronic equipment. Because we've become so dependant upon electricity, it's important for us to (a) have reliable fuel supplies of oil, coal, etc. for our power plants, (b) correctly maintain the drilling, mining, refining, and distribution systems, and (c) service and modify our power plants so that they are as efficient, reliable, and non-polluting as possible.

But we must do more. We must construct new power plants to replace old and "dirty" ones, and we must generate more electricity to meet the needs of our growing population.

This brochure attempts to provide accurate and valuable information. It begins by reviewing the conventional generating systems that presently supply our electricity. Then it reviews unconventional ones those powered by the wind and sun. The flip-side chart summarizes the environmental damage and dollar-costs of each system.

With the information offered in this brochure, it is hoped that we Cape and Island residents will be able to make sensible decisions -- those that satisfy our electricity-needs, yet cause little environmental damage.

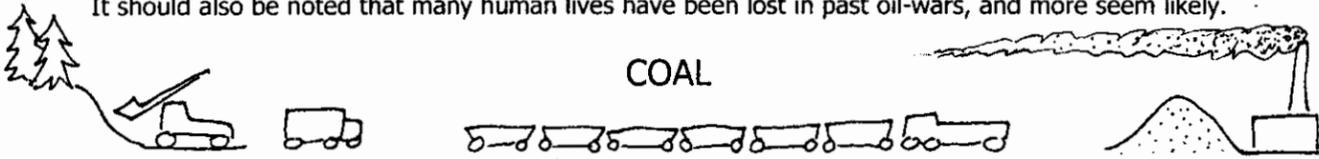


OIL

The oil-to-electricity process begins with drilling wells on land and in the sea. From these wells, crude oil is transported by pipelines and tankers to processing and storage facilities. Oil is then transported to power plants where it is burned to produce steam, which spins turbine-generators, and sends electricity into the distribution grid.

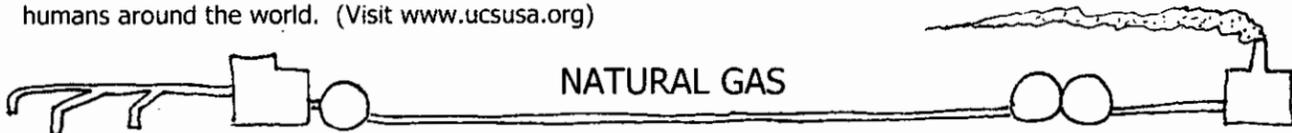
At all stages, from wells to power plants, dangerous pollutants are released into the environment. These include oil sludge, carbon dioxide (CO₂), carbon monoxide (CO), sulfur dioxide (SO₂), nitrogen oxide (NO_x), mercury, and other heavy metals. These cause global warming, acid rain, and world-wide health problems. Fish and birds are killed, forests and crops are damaged, and humans develop respiratory ailments, brain damage, birth defects, and cancers.

It should also be noted that many human lives have been lost in past oil-wars, and more seem likely.



COAL

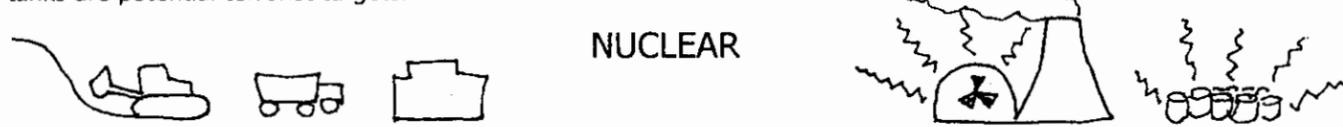
Coal is extracted at underground and surface (strip) mines, processed, transported by train to power plants, and then burned for turbine-generators. Wastes (including dust, CO₂, CO, SO₂, NO_x, arsenic, and mercury) are discharged into the air, water, and soil throughout the mine-to-generator process. The effects are like those of oil-burning power plants, except worse. Global warming may be the most serious problem, for it affects plants, wildlife, and billions of humans around the world. (Visit www.ucsusa.org)



NATURAL GAS

Natural gas is extracted from underground pockets, refined, and transported by pipeline and tankers to power plants. Wastes, like those of oil and coal, are discharged into the air, water, and soil throughout the process.

While less polluting than oil and coal, gas-fired power plants do release significant quantities of CO₂, and thus contribute to the serious problem of global warming. It should also be noted that gas is highly explosive, and large tanks are potential terrorist targets.



NUCLEAR

Uranium is strip-mined, refined, processed into fuel rods, and transported to nuclear power plants by trains and trucks. The fuel rods produce steam, which power the turbine-generators. "Spent" fuel rods are stored at the plant, and later transported to long-term, storage sites (that haven't yet been safely constructed).

At all stages, from mines to storage sites, radiation is released into the environment, causing birth defects, cancers, and deaths. Nuclear power plants are also recognized to be very attractive (and very dangerous) terrorist targets.



WIND

Unlike the previously described systems (above), wind-powered generators have no costly and damaging fuel cycle. There is no messy drilling, mining, processing, storage, transportation, or waste-disposal. All that's required are windy sites, the approval of government agencies and local people, and the construction of well-designed turbines (which, like all construction projects, do cause some environmental damage).

Wind turbines are rapidly gaining popularity around the world because their "fuel" is free, never-ending, and uncontrolled by foreign nations. In addition, wind turbines don't cause global warming, and don't explode or release radioactive materials if bombed. What's more, turbines can produce hydrogen from water, and when fed to fuel-cell cars, cause no pollution! (Visit www.awea.org)



SOLAR

Like wind, solar-electric systems have no polluting fuel cycle. "Solar cells" are manufactured in factories (causing little pollution), then mounted on south-facing surfaces (typically roofs). The cells produce electricity when the sun shines, and wires carry it to the building's electric panel. This electricity is used by the building during the day, excess electricity is sold to the local utility, and at night, the homeowner buys it back.

Solar-electric panels (and wind turbines) help improve U.S. energy independence, and are not dangerous if attacked by terrorists. (Visit www.solaraccess.com)



CONSERVATION



A huge quantity of electricity is wasted in the U.S. every day. Conservation can "harvest" this wasted electricity, cost us nothing, and cause no environmental damage. Examples: Turn off lights, TVs, etc. when not used; lower the thermostat setting when a building is empty; use electric fans in hot weather instead of air conditioners; lower the water heater thermostat to 120 F. (Call 1-800-797-6699 for more information, and a free home energy audit. And visit www.eren.doe.gov/consumerinfo/energy_savers)

Conclusion: Energy conservation is by far our most sensible "source" of electricity. But conservation cannot endlessly meet the demands of our growing population. Therefore, we must find ways to generate more electricity in the cleanest, safest, and least expensive ways.

Wind and solar appear to be excellent choices. Wind turbines and solar cells do not cause illnesses or global warming. They reduce our dependence on foreign oil. If attacked by terrorists, they don't explode or release radioactive materials. And their "fuel" is delivered free to us, every day, forever. 6/03

SUMMARY OF DISRUPTION, DAMAGE, & COSTS

Read down each column to learn about the disruption, damage, and costs of each generating system. Note that wind and solar cause little, and that conservation causes none!

3
3
5
7

Oil	Coal	Gas	Nuclear	Wind	Solar	Conservation
VISUAL DISRUPTION occurs at ...						
well refinery storage site transportation generator disposal site	mine refinery storage site transportation generator disposal site	well refinery storage site transportation generator	mine refinery storage site generator disposal site	generator	generator	none

Summary: All systems, except conservaton, cause visual disruption.

AIR-QUALITY & HEALTH DAMAGE occurs at ...						
well refinery storage site transportation generator disposal site	mine refinery storage site transportation generator disposal site	well refinery storage site transportation generator	mine refinery storage site generator disposal site	none	none	none

Summary: Oil, coal, gas, & nuclear cause respiratory ailments, brain damage, cancers, and/or premature deaths.

WATER-QUALITY DAMAGE occurs at ...						
well refinery storage site transportation generator disposal site	mine refinery storage site transportation generator disposal site	well refinery storage site transportation generator	mine refinery storage site generator disposal site	none	none	none

Summary: Oil, coal, gas, & nuclear cause acid rain, and pollution in streams, lakes, oceans, and/or aquifers.

SOIL & VEGETATION DAMAGE occurs at ...						
well refinery storage site transportation generator disposal site	mine refinery storage site transportation generator disposal site	well refinery storage site transportation, generator	mine refinery disposal site	none	none	none

Summary: Oil, coal, gas, and nuclear contaminate soil, cause soil erosion, and/or damage vegetation.

WILDLIFE DAMAGE occurs at ...						
well refinery storage site transportation generator disposal site	mine refinery storage site transportation generator disposal site	well refinery storage site transportation generator	mine refinery generator disposal site	generator	none	none

Summary: Oil, coal, gas, nuclear, and wind injure and kill wildlife.

GLOBAL WARMING IS TRIGGERED AT ...						
well refinery transportation generator	mine refinery transportation generator	well refinery transportation generator	mine refinery transportation	none	none	none

Summary: Oil, coal, gas, and nuclear cause global warming (partly from secondary, diesel machinery).

DOLLAR COSTS occur at ...						
well refinery storage site transportation generator	mine refinery storage site transportation generator disposal site	well refinery storage site transportation generator	mine refinery storage site transportation generator disposal site	generator	generator	none

Estimated Generating, External, and Total Costs (low - high, cents/KWH)

Gen.	4 - 5	4 - 5	3 - 5	10 - 14	4 - 6	25 - 50	0
Ext.	3 - 11	2 - 15	1 - 4	0 - 1	0 - 1	0 - 1	0
Total	7 - 16	6 - 20	4 - 9	10 - 15	4 - 7	25 - 51	0

Here on the Cape and Islands, we pay a total cost of about 14 cents per KWH. This is largely due to "generating costs", which include costs of fuel extraction, refining, storage, transportation, plant construction, and plant operation. But we also pay for "external costs", which are those relating to damage of air, water, soil, vegetation, wildlife, and human health. **Not included** in these estimates are the very unpredictable costs associated with global warming (flooded property, destroyed homes, etc.), and the military costs of gaining and protecting oil fields.

This brochure is offered by Clean Power Now (Cape), Vineyarders for Clean Power (Martha's Vineyard), and Islanders for Wind Power (Nantucket). For more information, and to join these citizen's groups, visit www.cleanpowernow.org.

335B

Comment Sheet
On Draft Environmental Impact Statement (EIS)
For the proposal for an Offshore Wind Project
In Nantucket Sound

RECEIVED
NOV 10 1995
NANTUCKET
DEPT OF ENVIRONMENTAL
PROTECTION

Name: Robert J. Walker

Address: PO Box 253
143 INWOOD LANE
West Hyannisport MA 02672

Phone Number (Please include area code): 508 - 771 - 3818

Email Address: _____

Please state your questions/comments in the space below:

The Wtando Club house on Seaview
avenue is not the only historic
site that will be negatively
impacted if the "Conedy Gardens"
and Army Corps hone their way

ONCE you DESTROY THE WATERS
around Cape Cod. you destroy
itself Cape Cod and the coast and islands
around it

Please use your good offices
to "SAVE OUR SOUND" and
a NATIONAL TREASURE AND
way of life for thousands of
tourists, swimmers, artists, sailors
fishermen AND TAXPAYERS

Please fold this questionnaire in half, affix two stickers or pieces of tape,
and mail it to the address listed on the other side.

3360

HHS

February 7, 2005

Karen Kirk-Adams
Cape Wind Energy EIS Project
U.S. Army Corps of Engineers, New England District
696 Virginia Road, Concord, MA 01742-2751

Dear Ms. Kirk-Adams:

Because of my concern that our nation must develop alternate sources of energy, and as a former resident of Orleans, for 20 years plus 15 years as a summer resident, I write this letter to you. I now live in Maine, and here, I contribute voluntarily to the renewable resource fund of my electric supplier, Central Maine Power Company.

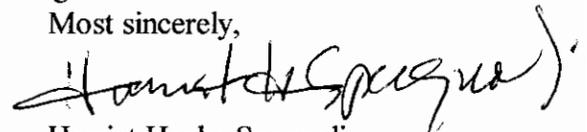
Through friends, reading the paper, and attendance at a couple of meetings during the past two years, to hear the president of Cape Wind, J. Gordon, speak I've kept abreast of the Nantucket Wind Project. His presentations were clear, indicated a serious concern for energy needs of the area, our nation, and the world. Friends of mine who've visited in the Netherlands during the past two years have reported very favorably on the off-shore wind generators they saw, which were clearly in view from the shore, proudly pointed out by their hosts, and, in fact, had become somewhat of a tourist attraction!

I note that the impact report of the Corps of Engineers indicated no serious problems observed: minimal or no adverse effects on fishing in the shoals and no excessive killing of birds by the wind turbines. As a biologist who spent a few years studying at Woods Hole (in the "fifties"!) I was especially pleased by those findings. I was also very pleased to note the positive effects cited on the economy and labor of the Cape and other factors.

Senator Kennedy has suggested that Congress develop regulations on the use of our off-shore waters before acceptance is granted. In view of the results reported in the impact study, I feel strongly that this would cause a serious delay in production of energy we need now. Of course, the study of use of all natural resources and initiation of legislated regulations bears merit, but given the current conditions on the Cape, the value of a successful wind energy operation as a model for other communities or regions in our country, and the positive impact report, I urge that Cape Wind be permitted to start construction.

Thank you for the opportunity to present these thoughts.

Most sincerely,



Harriet Hanke Spagnoli
25 Thornton Way #216
Brunswick, ME 04011

RECEIVED

FEB 10 2005

WATER DIVISION

3361

Adams, Karen K NAE

From: Don & Betty Ten Eyck [d.teneyck@comcast.net]
Sent: Thursday, February 10, 2005 1:42 PM
To: Energy, Wind NAE
Subject: Cape Wind Energy Project

Cape Wind Energy Project
EIS Manager Karen K. Adams
U.S. Army Corps of Engineers
New England District
Regulatory Division
696 Virginia Road
Concord, MA 01742-2751

Reference file NAE-2004-338-1

Dear Karen K. Adams;

I looked up California Wind Energy in my computer and discovered that in the year 2000 there were 13,000 wind turbines located in three location in California that produced 95% of the wind energy in California. The locations are Altamont Pass east of San Francisco, Tehachapi east of Bakersfield and San Gorgonio Pass east of Los Angeles and near Palm Springs.

In 2000 all of the wind turbines in the State of California produced only 1.27% of California's electric power needs and all of these thousands of wind turbines were located inland away from the coast and in remote areas away from any population areas. California has the largest coastline of any state in the union and the largest number of wind turbines of any state in the union and maybe the world and not one wind turbine is located off the coast of California.

The question for the people who live on Cape Cod is do we want to be the first state in the United States to allow wind turbines just 3 miles off our coast and in close proximity to the people who live here on the Cape and the Islands. If 51% or more of the people who live here on Cape Cod, Nantucket and Martha's Vineyard were to be in favor of locating a large number of wind turbines off our coast, I would go along with the people who live here, but right now I contend Nantucket Sound is not the proper location for a wind farm. I also feel that the proposed 130 turbines would be just the start and before long we would see several hundred more wind turbines off our coast.

My vote and that of my wife is NO to a wind farm on Nantucket Sound.

Donald T. & Betty M. TenEyck
44 Captain Crocker Road
South Yarmouth, MA 02664
508-394-8376

2/10/2005

3362

Adams, Karen K NAE

From: js_mason@msn.com
Sent: Thursday, February 10, 2005 2:46 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Koning,

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This project could be the first marine wind energy facility in the United States. As such, it will set a precedent for other offshore renewable energy projects.

Please require a rigorous, scientific review of its environmental effects. Clean air and healthy wildlife populations are not mutually exclusive. We need both.

Sincerely,

Jennifer Mason
1020 Crestway
Athens, Texas 75751

3363

Adams, Karen K NAE

From: debra.waldron@mci.com
Sent: Thursday, February 10, 2005 3:20 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Debra Waldron
72 Kevin Dr
Eules, Texas 76040-5508

3364

Adams, Karen K NAE

From: mikendeb@att.net
Sent: Thursday, February 10, 2005 3:32 PM
To: Energy, Wind NAE
Subject: Ensure 'Cape Wind' Project Is Safe for Wildlife

Colonel Thomas Koning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

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Sincerely,

Michael Waldron
72 Kevin Drive
Eules, Texas 76040

3365

Adams, Karen K NAE

From: Bob Bloch [rnbloch@earthlink.net]
Sent: Thursday, February 10, 2005 3:39 PM
To: Energy, Wind NAE
Subject: Proposed Cape Wind wind farm THE CART BEFORE THE HORSE!!!

Dear Ms. Kirk-Adams:

THE CART BEFORE THE HORSE !!!!!

Before we debate the construction of any wind farms any place on land or water in the United States, we should have a comprehensive master plan with rules and regulations governing the use of private projects on government land as we do regarding oil, gas and coal. After the rules are in place, and if a site meets the criteria, then this area should be leased or sold, **not given away** to the private sector.

The criteria for projects of this nature require unique expertise, and though the Army Corps of Engineering is very good at what they do, the unique problems and socioeconomic issues of "wind farms" extends beyond this expertise. The whole issue must be studied by many departments, The Corp being one of them at both the State and Federal level. Because of the Corp's lack of expertise on the issue, the Corp is relying on information supplied by Cape Wind. **A very dangerous precedent.** The information is usually bias and sides with the one paying the bill. We always see this happen with expert witnesses in court cases. Why didn't the Corp obtain it's own outside research??? When the Corp gave approval to construct a test tower, why wasn't it a replica of one of the proposed towers so all could see and hear what is being proposed, and the reliability could be quantified. I think there are too many questions unanswered and we are rushing into this project blind and much too quickly. I would think the Corp would want predefined guidelines for as it stands now without them; if this project is built and it fails, the fault would fall 100% on the Corp, and I wouldn't want to be the one who put my name to it!

The following are the reasons I am against the Cape Wind project specifically. I live in South Yarmouth and my home is located on the water five miles from the proposed site, and this project will directly impact me visually, noise wise, and monetarily for I will no longer have an unobstructed view of Nantucket Sound, and my property value will surely decline.

1. **Visual pollution** These towers are "not pretty" and can be seen for 27 miles. This location is 5 miles away. Other countries who have wind farms build a minimum of 12 miles and in water 130' deep. We should adopt the same standards. This is a problem for **we have no defined standards.**

2. **Noise Pollution** With the prevailing wind from the SW during the summer I know the noise of the blades will be heard. I can hear a bell bouy about the same distance and the wind farm blades make more noise. Have you ever personally been up close to the wind turbines out west? They are very loud.

3. **Oil Spill Risk** I work for an oil company for 29 years and was a member of the US Coast Guard. I know the damage 40,000 gallons of transformer oil can cause in the ocean.

4. **Free Land** We give free land to Cape Wind others will want the same treatment to build other commercial projects. Maybe a fish processing plant or a floating Hotel and Marina. **We must define how are waters are to be developed, and where.**

5. **Government Subsidies** Why should the tax payers subsidize Cape Wind some \$241 million ? Once the subsidies start they are hard to stop for fear the project will go bankrupt. If it does we are left with a rusty non functioning wind farm to look at. Why is this so hard to

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understand?

6. **Poor Track Record** The few offshore wind farms in the world have a very poor track record. Why should this one be different. If it fails who will pay to remove it? Again, so many unanswered questions.

I want to make it know that I and most individuals against the Cape Wind project **are not** against alternative energy sources such as wind energy. At the meetings I attended those that spoke **for** the project were pro wind energy not particularly pro Cape Wind. The debate here is, should Cape Wind be allowed to construct a wind farm in Nantucket sound, yet the meetings took a tone of those for or against wind energy.

In summary I am requesting that the Army Corp put this project on hold until a comprehensive plan is developed dealing with off shore wind farms. Under separate correspondence I have sent a copy of this letter to Senators, State officials, and the President of the United States.

Yours truly,

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