**Statement at public hearing held on December 16, 2004 at MIT (Room 10-250) by the U.S. Army Corps of Engineers and the Massachusetts Environmental Policy Act Office on a proposal by Cape Wind Associates to build 130 wind turbines in Nantucket Sound.**

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## *Economic Costs Exceed Economic Benefits for the Cape Wind Project*

Thank you. I wish to focus my remarks on just one point that poses – or should pose – an insurmountable obstacle to the wind farm project. Presidential Executive Order 12866 of September 30, 1993 states that "each agency shall … propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs." The Draft EIS itself notes (p.2-2) that "the benefits which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments."

Although comments on costs and benefits are to be found scattered throughout the Draft EIS, the Army Corps does not, however, directly address the bottom-line question: "Are the social benefits of the project greater than the costs?" More importantly, it turns out that when one does, in fact, address this question, the answer turns out to be, "No": The benefits do not, in fact, measure up to the costs.

That they do not is made clear in a report submitted to the Army Corps on May 14 of this year by the Beacon Hill Institute at Suffolk University.1 As the principal author of this report, I can state that, on the basis of the available facts, the wind farm project fails a cost-benefit test of the kind envisioned by the Presidential Executive Order. My interest in cost-benefit analysis is long-standing: I have taught the subject at Harvard University, Suffolk University and elsewhere, since 1987.

In our analysis we estimate the economic costs of the project to be 9.06 cents per kWh of electricity produced, very close to the figure of 9.00 cents reported in the Draft EIS (p.3-307). This is expensive for factory-gate electricity – on my most recent bill from N-Star I paid 6.32 cents for the generation costs of the electricity I used.

[1] Jonathan Haughton, Douglas Guiffre, David G. Tuerck and John Barrett. *An Economic Analysis of a Wind Farm in Nantucket Sound*. Beacon Hill Institute at Suffolk University, Boston. April 2004.

But wind power has important virtues too. We estimate the economic benefits of electricity generated by Cape Wind to be 7.06 cents/kWh. This breaks down into

- savings in fuel of 4.95 cents/kWh. This figure takes into account the likelihood of periods of high energy prices in the future.
- savings in capital and operating costs of 0.98 cents/kWh. This figure is low because backup generating capacity must still be available to offset most of the wind farm's capacity, for times when the wind stops blowing (or blows too hard).
- health savings due to reduced emissions, worth 1.02 cents/kWh. The Draft EIS overstates these benefits tenfold because it assumes, incorrectly, that electricity from Cape Wind would offset only the dirtiest power stations in New England; and that those power stations would not become cleaner over time.
- greater energy independence, which we value at 0.10 cents/kWh. In this context, note that even when complete, the project would provide less than 1% of the electricity generated in New England.

The bottom line is that the economic costs exceed the economic benefits by 1.99 cents/kWh, or by $209 million in present value terms. This is a large margin. One is left with the clear and powerful conclusion that the benefits of the intended regulation – which would allow Cape Wind to build the wind farm – do not justify its costs. This balance could change in the future, but at this point in time, this particular project is not a good one.

The key result – that economic costs exceed the economic benefits – is robust. It stands even if one ignores any aesthetic effects or makes the most pessimistic assumptions concerning the future price of oil; and it does not even consider the effects of the project on tourism – which the Draft EIS believes, without evidence, would on balance be positive and which we, based on survey data, expect to be negative.

One puzzle remains: why would a private firm undertake an economically unattractive project? The answer is subsidies, in the form of

- accelerated depreciation allowances;
- a possible Federal production tax credit; and
- the sale of Massachusetts "green credits."

Together, we expect these to bring Cape Wind 4.04 cents/kWh, or almost half of the 9.06 cents/kWh cost of production. While some amount of subsidy to wind power is appropriate, we find that subsidies on such a scale are excessive and go beyond what serves the public good.

| Table 1: *Economic Costs and Benefits of the Nantucket Sound Wind Farm Project* | | | |
|---|---|---|---|
| | **Net Present Value (at 10%)** | | **Cents/kWh** |
| | **Mean** | **90% confidence interval** | |
| | | *($ millions)* | |
| **Benefits** | **744** | **638-859** | **7.06** |
| *Of which:* | | | |
| Fuel saved | 522 | 455 – 597 | 4.95 |
| Capital and operating costs saved | 104 | 85 – 122 | 0.98 |
| Emissions reduced | 108 | 55 – 176 | 1.02 |
| Greater energy independence | 11 | 3 – 21 | 0.10 |
| **Costs** | **952** | **888 – 1,035** | **9.06** |
| *Of which:* | | | |
| Project itself | 888 | 824 – 969 | 8.45 |
| Grid integration | 26 | 23 – 28 | 0.24 |
| Environmental effects (using royalty rates) | 39 | 35 – 44 | 0.37 |
| **Benefits - Costs** | **(209)** | **(333) – (83)** | **(1.99)** |
| Costs using expected property value | **(1,520)** | (1,647) – (1,392) | |
| Costs using willingness to pay measure | **(173)** | (300) – (46) | |
| *Note:* Totals may not add exactly, due to rounding errors. Based on 10,000 drawings from underlying distributions of the variables determining costs and benefits. | | | |

| Table 2: *Reconciling Private and Economic Returns* | | |
|---|---|---|
| | ***Cents/kWh*** | ***PV, $ millions*** |
| **Private return on equity (from Table 3)** | **0.29** | **30** |
| **Plus external benefits:** | | |
| + Capital and operating expenditures saved | 0.99 | 104 |
| + Value of emissions abated | 1.03 | 108 |
| + Value of greater energy independence | 0.10 | 11 |
| + Taxes paid to Federal, State and Local governments, and royalties | 0.39 | 41 |
| **Less external costs:** | | |
| – Cost of integrating wind power with New England grid | 0.24 | 26 |
| – Environmental/aesthetic costs | 0.37 | 39 |
| – Federal production tax credit | 0.94 | 98 |
| – Massachusetts green credits | 2.55 | 267 |
| – Accelerated depreciation for tax purposes | 0.55 | 58 |
| **And technical adjustments** | | |
| + For value of output (economic valuation > market valuation)* | 0.28 | 29 |
| – For loan effect (developer can use optimal loan financing)** | 0.41 | 43 |
| **= Net Economic Benefits (from Table 1; Benefits – Costs)** | **(1.99)** | **(209)** |
| **Memo items:** | | |
| Actual subsidy (net of taxes) | 3.65 | 382 |
| Optimal subsidy | 2.56 | 268 |
| **Therefore: excess subsidy** | **1.09** | **114** |
| *Notes:* * The market valuation measures what Cape Wind receives from selling the electricity from the project; the economic valuation measures this as the value of energy saved (which is slightly higher than the market valuation). ** The developer has recourse to loan financing, which raises the private return on equity since the interest rate on loans is lower than the discount rate of 10%. | | |