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March 2, 2010

Brendan McCahill
U.S. Environmental Protection Agency
Region I – New England
Air Permits Program
1 Congress Street – Suite 1100
Boston, Massachusetts 02114-2023

Re: OCS Permit Application
Cape Wind Energy Project
ESS Project No. E159-504.1

Dear Mr. McCahill:

A Permit Application for the proposed Cape Wind Offshore Renewable Energy Project (the Project) was submitted by ESS Group (ESS) on December 17, 2008 to fulfill the regulatory requirements of the United States Environmental Protection Agency's (EPA) Outer Continental Shelf (OCS) Air Regulations, codified under Title 40 Code of Federal Regulations, Part 55 (40 CFR § 55). The Project, as proposed by Cape Wind Associates, LLC (Cape Wind), will be located at Horseshoe Shoal, Nantucket Sound, Massachusetts, and will utilize emission free offshore wind energy as its renewable fuel to generate electricity for sale.

The OCS Air Regulations require the Project to comply with the applicable regulatory requirements of the Corresponding Onshore Area (COA). Massachusetts is the COA for the Project. The Project is therefore subject to the applicable requirements of the Massachusetts Air Regulations (310 CMR 6.00 – 8.00) which have been incorporated into 40 CFR § 55 by reference. The specific Massachusetts air regulations which have been incorporated by reference into 40 CFR § 55 are listed in Appendix A of the OCS Air Regulations. The OCS Permit Application addressed the Massachusetts regulatory requirements which apply to the Project and its compliance with those requirements.

The Massachusetts Air Regulations (310 CMR 7.02(8)(a)) stipulate that Best Available Control Technology (BACT) is required for all plan approvals. BACT is defined as the emission limitation which results in the maximum degree of reduction of a regulated contaminant which is determined, taking into account energy, environmental, and economic impacts, to be achievable. BACT is determined using a top-down analysis. The most effective control technology is first considered, and unless it can be eliminated based on its technical feasibility or cost, it must be adopted as BACT. If the most effective control technology is eliminated from consideration, other control technologies are then considered in decreasing order of effectiveness, until a technology is identified that cannot be eliminated based on its technical feasibility or costs. This technology is considered the BACT determination.

A BACT analysis has been conducted for the stationary sources associated with the construction of the Cape Wind Project to comply with the Massachusetts Air Regulations. There are no stationary sources associated with the operation of the Project. The BACT analysis conducted for the Project was detailed in the OCS Permit Application.

The BACT analysis conducted for the Project concluded that the use of diesel particulate filters (DPF) for the control of PM emissions is not a technically feasible option for the stationary sources associated with the construction of the Project. The EPA has subsequently requested that Cape Wind provide some additional documentation to support its BACT analysis. Cape Wind provided additional BACT documentation in its EPA Comment Response dated March 12, 2009 and in an email to EPA dated February 5, 2010. The EPA has requested that Cape Wind provide further documentation of whether the use of DPF for the control of PM emissions from the Project sources represents BACT.

DPF are effective when used on engines that operate at a consistent high operating load, and above a specified exhaust temperature. This is because DPF removes PM by the oxidation of unburned carbon, a reaction which is not effective at lower temperatures. In contrast, the stationary sources to be used for the construction of the Project, including cranes, hydraulic rams, jacking systems, and pile drivers, will generally operate intermittently and at transient operating loads, due to the nature of the operations required. Because of their intermittent operation, DPF technology would not be effective for the sources and operations proposed for the Project, and is therefore not a technically feasible PM control option. This conclusion is supported by the fact that DPF have not been commonly adopted for similar diesel construction equipment on recent major construction projects for which information on controls has been published.

Furthermore, the use of DPF for the Project would not be cost-effective. The BACT guidelines allow you to eliminate a control technology with an associated cost effectiveness ($/ton reduced) which exceeds previously established thresholds. The cost effectiveness of a control option is determined as the ratio of the annualized cost of the control device over the assumed life of the equipment to the amount of emissions reduced per year. The attached worksheets summarize the cost effectiveness of installing either an active or passive DPF on each of the proposed Project stationary construction sources. Their cost effectiveness has been determined for each source in accordance with the EPA's Air Pollution Control Cost Manual.

The worksheets calculate the cost effectiveness for each source and control technology based on annualized costs and emission reductions over a 2-year, 5-year, or 10-year equipment life, and assuming a 5% annual interest rate, consistent with EPA guidance. The construction of the Project will take one to two years. Cape Wind will not have any operational control over the equipment which is retrofitted once the construction of the Project is completed. Any costs or emissions reductions associated with this equipment in the time period following the construction period are not relevant to the BACT analysis for the Project. However, at the request of EPA, the cost effectiveness of DPF as a retrofit option has also been determined over an assumed 5-year and 10-year equipment life, consistent with other BACT cost effectiveness determinations, for informational purposes only.

As the table shows, the cost effectiveness of active DPF (retrofit cost of $20,000 per engine and annual O&M cost of $250 per year) would be greater than $48,000 per ton in every case.

The cost effectiveness of passive DPF (retrofit cost of $10,000 per engine and annual O&M cost of $250 per year) would be greater than $26,000 per ton in every case. The lowest cost effectiveness of active and passive DPF over the 2-year Project construction period would be $189,000 and $97,000 per ton, respectively. The established cost effectiveness for PM controls used in previous BACT determinations is $5,000-$10,000 per ton of PM reduction.

The overall cost effectiveness of retrofitting all of the Project stationary construction equipment with DPF, when considered over the one to two year Project construction period, is approximately 40 to 80 times higher than the established threshold for PM BACT determinations.

This analysis clearly demonstrates that the use of DPF to control the emissions of PM from the Cape Wind stationary construction sources would not be cost effective, as compared to the thresholds used for previous BACT determinations, and therefore DPF can be eliminated as an available control technology for these sources in the BACT analysis for the Project. If you have any questions regarding this submittal, or if you require any additional documentation, do not hesitate to call me at (781) 489-1149.

Sincerely,

ESS GROUP, INC.

Michael E. Feinblatt
Project Manager

Attachments

C: Ida McDonnell, EPA
Karen Regas, MassDEP
Craig Olmsted, Cape Wind Associates
Rachel Pachter, Cape Wind Associates
Chris Rein, ESS
Terry Orr, ESS

Cape Wind Energy Project
Construction Emissions Inside of 25 Miles - Stationary Activities
BACT Cost Analysis - Passive Diesel Particulate Filters

Activity Type	Emission Source	Engine Output (kW)	Total Operation (hrs)	Annual Operation (hrs/yr)	Uncontrolled PM Emissions			PM Reductions	
					g/KW-hr	lb/hr	tons/yr	% reduction	tons/yr
Put piles in place	Primary 500 ton crane	597	520	260	0.20	0.26	0.034	85	0.029
Pile driving - Pile installation	Hydraulic ram	1,193	520	260	0.20	0.53	0.068	85	0.058
Set transition pieces	Primary 500 ton crane	597	520	260	0.20	0.26	0.034	85	0.029
Install rock armor	Crane	298	520	260	0.20	0.13	0.017	85	0.015
Install filler material	Crane	298	520	260	0.20	0.13	0.017	85	0.015
Sheet pile driving for cofferdam	Hydraulic ram	298	20	10	0.20	0.13	0.00066	85	0.00056
Cable laying	Compressor Drive	75	16	8	0.20	0.033	0.00013	85	0.00011
Sheet pile removal	Crane	298	20	10	0.20	0.13	0.00066	85	0.00056
Cofferdam backfill	Crane barge	298	20	10	0.20	0.13	0.00066	85	0.00056
WTG vessel stabilization	Jacking system	355	260	130	0.20	0.16	0.010	85	0.0086
Tower installation	Primary 500 ton crane	597	260	130	0.20	0.26	0.017	85	0.015
Nacelle installation	Primary 500 ton crane	597	260	130	0.20	0.26	0.017	85	0.015
Rotor installation	Primary 500 ton crane	597	260	130	0.20	0.26	0.017	85	0.015
Setting template for ESP	Crane	2,237	16	8	0.20	0.99	0.0039	85	0.0034
Pile setting	Crane	2,237	18	9	0.20	0.99	0.0044	85	0.0038
Pile driving - ESP installation	Hydraulic ram	2,386	12	6	0.20	1.05	0.0032	85	0.0027
Total							0.246		0.209

Activity Type	Emission Source	Passive DPF Costs		Annualized Cost ($/year)			Cost Effectiveness ($/ton)		
		Initial Capital ($)	Annual O&M ($/yr)	2-year	5-year	10-year	2-year	5-year	10-year
Put piles in place	Primary 500 ton crane	$10,000	$250	$5,628	$2,560	$1,545	$193,493	$88,004	$53,119
Pile driving - Pile installation	Hydraulic ram	$10,000	$250	$5,628	$2,560	$1,545	$96,827	$44,039	$26,582
Set transition pieces	Primary 500 ton crane	$10,000	$250	$5,628	$2,560	$1,545	$193,493	$88,004	$53,119
Install rock armor	Crane	$10,000	$250	$5,628	$2,560	$1,545	$387,634	$176,304	$106,416
Install filler material	Crane	$10,000	$250	$5,628	$2,560	$1,545	$387,634	$176,304	$106,416
Sheet pile driving for cofferdam	Hydraulic ram	$10,000	$250	$5,628	$2,560	$1,545	$10,078,496	$4,583,899	$2,766,809
Cable laying	Compressor Drive	$10,000	$250	$5,628	$2,560	$1,545	$50,056,528	$22,766,700	$13,741,819
Sheet pile removal	Crane	$10,000	$250	$5,628	$2,560	$1,545	$10,078,496	$4,583,899	$2,766,809
Cofferdam backfill	Crane barge	$10,000	$250	$5,628	$2,560	$1,545	$10,078,496	$4,583,899	$2,766,809
WTG vessel stabilization	Jacking system	$10,000	$250	$5,628	$2,560	$1,545	$650,789	$295,992	$178,659
Tower installation	Primary 500 ton crane	$10,000	$250	$5,628	$2,560	$1,545	$386,985	$176,009	$106,237
Nacelle installation	Primary 500 ton crane	$10,000	$250	$5,628	$2,560	$1,545	$386,985	$176,009	$106,237
Rotor installation	Primary 500 ton crane	$10,000	$250	$5,628	$2,560	$1,545	$386,985	$176,009	$106,237
Setting template for ESP	Crane	$10,000	$250	$5,628	$2,560	$1,545	$1,678,247	$763,300	$460,723
Pile setting	Crane	$10,000	$250	$5,628	$2,560	$1,545	$1,491,776	$678,489	$409,531
Pile driving - ESP installation	Hydraulic ram	$10,000	$250	$5,628	$2,560	$1,545	$2,097,927	$954,179	$575,935
Total		$160,000	$4,000	$90,049	$40,956	$24,721	$430,422	$195,765	$118,162

Assumed Annual Interest Rate (%): 5
Annualized Cost =(Initial Cost x (Interest Rate / (1 - (1 + Interest Rate) $^{-Years}$))) + Annual O&M
Cost Effectiveness = Annualized Cost ($/year) / PM Reductions (tons/yr)

Note: The Cape Wind Project construction will take one to two years. Cape Wind will not have any operational control of any of the retrofitted equipment following the construction period. Therefore, the determination of the retrofit cost effectiveness over a 5-year or 10-year equipment life is not relevant to the BACT analysis for the Project. This information has been provided, at the request of the EPA, for informational purposes only.

Cape Wind Energy Project
Construction Emissions Inside of 25 Miles - Stationary Activities
BACT Cost Analysis - Active Diesel Particulate Filters

Activity Type	Emission Source	Engine Output (kW)	Total Operation (hrs)	Annual Operation (hrs/yr)	Uncontrolled PM Emissions			PM Reductions	
					g/KW-hr	lb/hr	tons/yr	% reduction	tons/yr
Put piles in place	Primary 500 ton crane	597	520	260	0.20	0.26	0.034	85	0.029
Pile driving - Pile installation	Hydraulic ram	1,193	520	260	0.20	0.53	0.068	85	0.058
Set transition pieces	Primary 500 ton crane	597	520	260	0.20	0.26	0.034	85	0.029
Install rock armor	Crane	298	520	260	0.20	0.13	0.017	85	0.015
Install filler material	Crane	298	520	260	0.20	0.13	0.017	85	0.015
Sheet pile driving for cofferdam	Hydraulic ram	298	20	10	0.20	0.13	0.00066	85	0.00056
Cable laying	Compressor Drive	75	16	8	0.20	0.033	0.00013	85	0.00011
Sheet pile removal	Crane	298	20	10	0.20	0.13	0.00066	85	0.00056
Cofferdam backfill	Crane barge	298	20	10	0.20	0.13	0.00066	85	0.00056
WTG vessel stabilization	Jacking system	355	260	130	0.20	0.16	0.010	85	0.0086
Tower installation	Primary 500 ton crane	597	260	130	0.20	0.26	0.017	85	0.015
Nacelle installation	Primary 500 ton crane	597	260	130	0.20	0.26	0.017	85	0.015
Rotor installation	Primary 500 ton crane	597	260	130	0.20	0.26	0.017	85	0.015
Setting template for ESP	Crane	2,237	16	8	0.20	0.99	0.0039	85	0.0034
Pile setting	Crane	2,237	18	9	0.20	0.99	0.0044	85	0.0038
Pile driving - ESP installation	Hydraulic ram	2,386	12	6	0.20	1.05	0.0032	85	0.0027
Total							0.246		0.209

Activity Type	Emission Source	Active DPF Costs		Annualized Cost ($/year)			Cost Effectiveness ($/ton)		
		Initial Capital ($)	Annual O&M ($/yr)	2-year	5-year	10-year	2-year	5-year	10-year
Put piles in place	Primary 500 ton crane	$20,000	$250	$11,006	$4,869	$2,840	$378,390	$167,413	$97,642
Pile driving - Pile installation	Hydraulic ram	$20,000	$250	$11,006	$4,869	$2,840	$189,354	$83,777	$48,862
Set transition pieces	Primary 500 ton crane	$20,000	$250	$11,006	$4,869	$2,840	$378,390	$167,413	$97,642
Install rock armor	Crane	$20,000	$250	$11,006	$4,869	$2,840	$758,050	$335,389	$195,613
Install filler material	Crane	$20,000	$250	$11,006	$4,869	$2,840	$758,050	$335,389	$195,613
Sheet pile driving for cofferdam	Hydraulic ram	$20,000	$250	$11,006	$4,869	$2,840	$19,709,301	$8,720,108	$5,085,928
Cable laying	Compressor Drive	$20,000	$250	$11,006	$4,869	$2,840	$97,889,527	$43,309,870	$25,260,108
Sheet pile removal	Crane	$20,000	$250	$11,006	$4,869	$2,840	$19,709,301	$8,720,108	$5,085,928
Cofferdam backfill	Crane barge	$20,000	$250	$11,006	$4,869	$2,840	$19,709,301	$8,720,108	$5,085,928
WTG vessel stabilization	Jacking system	$20,000	$250	$11,006	$4,869	$2,840	$1,272,670	$563,075	$328,409
Tower installation	Primary 500 ton crane	$20,000	$250	$11,006	$4,869	$2,840	$756,780	$334,827	$195,285
Nacelle installation	Primary 500 ton crane	$20,000	$250	$11,006	$4,869	$2,840	$756,780	$334,827	$195,285
Rotor installation	Primary 500 ton crane	$20,000	$250	$11,006	$4,869	$2,840	$756,780	$334,827	$195,285
Setting template for ESP	Crane	$20,000	$250	$11,006	$4,869	$2,840	$3,281,947	$1,452,052	$846,897
Pile setting	Crane	$20,000	$250	$11,006	$4,869	$2,840	$2,917,286	$1,290,713	$752,797
Pile driving - ESP installation	Hydraulic ram	$20,000	$250	$11,006	$4,869	$2,840	$4,102,662	$1,815,166	$1,058,680
Total		$320,000	$4,000	$176,098	$77,912	$45,441	$841,725	$372,410	$217,205

Assumed Annual Interest Rate (%): 5

Annualized Cost =(Initial Cost x (Interest Rate / (1 - (1 + Interest Rate) $^{-Years}$))) + Annual O&M

Cost Effectiveness = Annualized Cost ($/year) / PM Reductions (tons/yr)

Note: The Cape Wind Project construction will take one to two years. Cape Wind will not have any operational control of any of the retrofitted equipment following the construction period. Therefore, the determination of the retrofit cost effectiveness over a 5-year or 10-year equipment life is not relevant to the BACT analysis for the Project. This information has been provided, at the request of the EPA, for informational purposes only.