STATE OF MAINE
LAND USE REGULATION COMMISION

In the matter of
Rezoning Application ZP 702
Maine Mountain Power, LLC

PRE-FILED DIRECT TESTIMONY OF THOMAS A HEWSON JR
ON BEHALF OF THE FRIENDS OF THE WESTERN MOUNTAINS

Q: PLEASE STATE YOUR NAME, OCCUPATION AND BUSINESS ADDRESS.

A: My name is Thomas A Hewson Jr. I have been an energy and environmental consultant for 30 years. Since 1981, I have been a Principal at Energy Ventures Analysis that is located at 1901 N. Moore St. Suite 1200, Arlington, Virginia, 22209-1706. My resume and relevant experience to the issues in this proceeding are provided in Exhibit TAH-1.

Q: ON WHOSE BEHALF ARE YOU SUBMITTING TESTIMONY?

A: I am submitting testimony on behalf of the Friends of the Western Mountains.

Q: PLEASE DESCRIBE THE ASSIGNMENT YOU WERE GIVEN FOR THIS PROCEEDING

A: I was asked to review the information Maine Mountain Power LLC has provided on the 90 MW Redington Mountain Wind project in its rezoning application to the Maine Land Use Regulation Commission and provide an independent opinion on its claims of power output, project need, local economic benefits and pollution prevention claims.

Q: COULD YOU SUMMARIZE YOUR FINDINGS?

A: My testimony covers four areas. My major findings discussed in my testimony are:

- Project output estimates unsupported and likely overstated
- No demonstrated need for the Redington Mountain Wind project
- Project's local economic impacts unstudied with no examination of offsetting economic costs
- Project will provide no incremental air pollution control benefits

Q: HAVE YOU REVIEWED MAINE MOUNTAIN POWER LLC'S REZONING APPLICATION?

A: Yes, I have reviewed their rezoning application.

Q: DOES THIS APPLICATION CONTAIN ANY ESTIMATE OF THE PROPOSED WIND POWER PROJECT'S OUTPUT? IF IT DOES, WHAT WAS THE ESTIMATE?

A: Yes, in section 1 page 1 of the application, Maine Mountain Power LLC estimated that the proposed 90 MW wind project would provide 265,000 MWh of power each year. At this output, the Redington Mountain Wind project would have a calculated 33.6% capacity factor[1].

[1] Calculation: 265,000 MWh/(90MW*8760 hr/yr)= 33.6% capacity factor

Q: WHY ARE THESE POWER OUTPUT ESTIMATES IMPORTANT TO THE COMMISSION?

A: The energy output estimates are used to calculate many of the project benefit claims such as the avoided pollution benefits and its power contribution to Maine electricity generation. If the energy output is overstated, then many calculated project benefits that the Commission considers in its application determination would likewise be overstated.

Second, there is a maximum limit to the amount of wind capacity that can be added to the electric grid without causing significant problems. According to the 2006 National Renewable Energy Laboratory paper entitled "*Grid Impacts of Wind Power Availability: Recent Assessments from a Variety of Utilities in the United States*"[2], this limitation is reached when wind capacity reaches between 10-20 percent of the peak demand based upon capacity. According to the ISO-New England *Regional System Plan 2005 Report* (October 2005), the estimated summer peak demand for the Western Maine/Central Maine sub region is 1,045 MW in 2005 and is projected to grow to 1,225-1,280 MW by 2014. Given these loads, the maximum allowable regional wind capacity limitation would currently be between 104-208 MW and would grow to just 122-256 MW by 2014. By building a 90 MW Redington Mountain Wind project, few remaining wind projects could be built within the region without causing significant transmission problems. I leave it up to the Commission to determine if precluding other future wind projects should be a consideration in their Redington Mountain Wind project rezoning decision.

[2] Paper was presented at the 2006 European Wind Energy Conference (EWEC) and can be found at: http://www.uwig.org/ewec06gridpaper.pdf

Q: DID THE APPICANT PROVIDE ANY DATA TO DOCUMENT THE POWER OUTPUT ESTIMATE OF 265,000 MWH?

A: No. Supporting documentation or reports that are often required by a lender were not provided in the Commission application. The application simply attributes their power estimate to Ron Nierenberg, Consulting Meteorologist from Camas, Washington. His estimate was based upon a review of wind meteorological data from the site[3]. The wind data and assumptions he used to develop this estimate were not provided or described anywhere in the application.

Asking the Commission to make a rezoning change without any wind resource data upon which to judge the site's usefulness for a wind project is shortsighted and does not allow the public to fully comment on whether a rezoning variance should be granted. The Applicant's response to the Black Nubble Mountain wind project only option indicates that there are significant differences in wind resources between the Redington and Black Nubble Mountain sites.

All electric generation options have their environmental impacts. Wind creates a land use challenge since it effects a large area but yields little electricity.

Q. DOES ANY PUBLICALY AVAILABLE INFORMATION SUPPORT THE 265,000 MWH ESTIMATE?

[3] Application Section 1 page 1 footnote 1

No. Public sources indicate that Maine Mountain Power LLC may have overstated the project‘s performance and thereby overstated its benefits and revenues.

The best public source on wind project performance is monthly power output data provided by operating wind projects to the US Department of Energy on the EIA-Form 906. These data allow a comparison of each project’s annual and monthly capacity factors and differences between different areas. The copy of the 2005 wind project performance data is provided in Exhibit TAH-2.

As shown in the exhibit, the project’s claimed performance (33.6% capacity factor) would exceed all existing wind projects in eastern US. If the 2005 US national average wind project performance (29.0%) was applied, the 90 MW Redington Mountain Wind project would produce 14 percent less power or only 229,000 MWh. If the average performance of other New England projects was used, the output would be 36 percent less or 170,000 MWh/year.

I am very concerned that I have seen no evidence provided by the applicant that would support their estimated performance that would make the Redington Mountain Wind project the highest performing wind project in the eastern US.

Q: DO YOU HAVE OTHER CONCERNS ABOUT THE SITE THAT WOULD ADVERSELY AFFECT THE REDINGTON MOUNTAIN WIND PROJECT’S PERFORMANCE?

A: Yes, I have two major performance concerns for this project—icing/cold temperature problems because of the site’s high elevation and the high technology risk of

being the first US project to use the Vestas V90-3MW turbine design. Both issues were not discussed in the application and it is uncertain how they are incorporated into the project output estimate.

First, the proposed wind project site is located in very high elevations between 2,900-4,000 feet. At these higher site elevations, the turbines can be highly susceptible to prolonged low temperatures and freezing/icing events that can pose a safety problems and as well as reduce project performance. The Vermont Agency of Natural Resources Wind Power Working Group highlighted these concerns in their wind economic fact sheet[4]:

> "*The best resources for wind power development in Vermont are north-south running ridgelines that extend for one mile without extended or abrupt changes in grade, with elevations between 2500 and 3500 feet. Above 3500 feet, icing of blades is problematic; below 2500 feet, wind velocity and constancy drop off dramatically.*"

This concern was also illustrated in the wind monitoring data for the East Haven Wind project in northeastern Vermont. The monitoring sensor at an elevation of 3,375 feet did not report wind data for 21 percent of the time (76.6 days equivalent). The developer's wind monitoring report attributed the problem primarily to icing.

[4] This fact sheet from the Vermont Agency of Natural Resources can be found at http://www.vermontwindpolicy.org/factsheets/Wind%20Economics1.pdf

Turbine icing impacts at high elevations have also been well documented in technical literature. In a June 2000 paper entitled, *Wind Energy: Cold Weather Issues* by Lacroix and Manwell of the University of Massachusetts[5] states:

> "*In the Northwestern US, the most suitable sites for wind turbines are frequently mountains or ridgetops. These also are areas where wind turbines are susceptible to rime ice due to the relative proximity of low-level clouds. Bailey (1990) suggests that during cold weather at altitude about 2300 feet, rime ice can be expected approximately 10% of the time. This figure jumps to 20% for altitude above 3000 feet.*"[6]

Icing can also potentially create some safety problems from ice throws if turbines are nearby to public areas. Morgan et al in their April 1998 Boreas IV paper entitled "*Assessment of Safety Risks Arising from Wind Turbine Icing*" Icing in Standards"[7] quantified the safety risks from ice throws for a 50 meter wind turbine rotor (Note: Redington Mountain Wind uses a larger 90 meter rotor that may throw ice farther) for three types of icing conditions (Note: Redington Mountain is considered to be a "heavy icing" area under the article's definitions). These risks are shown in figure 3 of this article that is provided below:

[5] This paper is available at http://www.hydro.mb.ca/issues/transmission_projects/wuskwatim/exhibits_1031b.pdf

[6] This passage refers to a 1990 Windpower article by B. H. Bailey entitiled, "The Potential for Icing of Wind Turbines in the Northeastern US.

[7] http://virtual.vtt.fi/virtual/arcticwind/boreasiv/assessment_of_safety.pdf

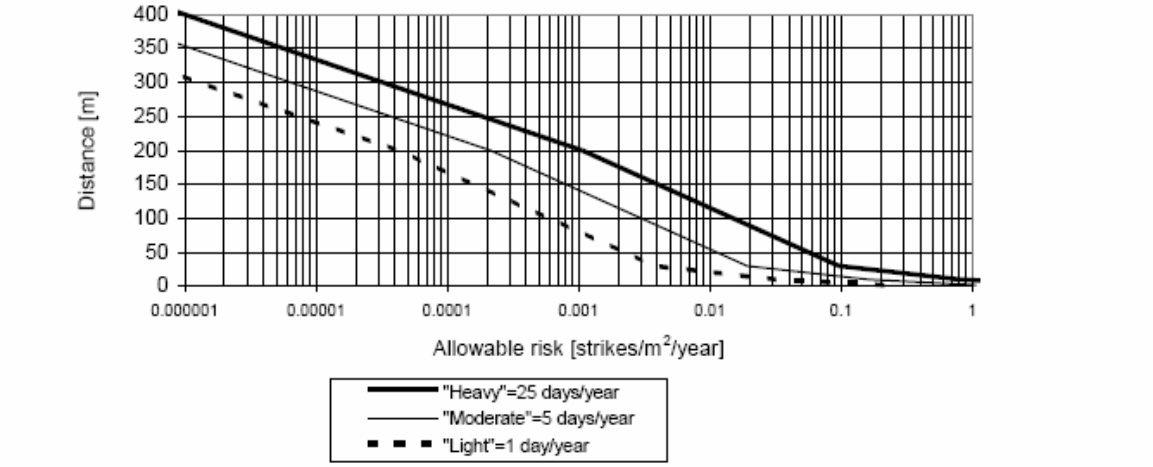

Figure 3 Safety distance for different icing levels (50m rotor)

All this evidence and literature indicate that icing problems can occur in higher elevations. As is shown in Exhibit TAH-3, **all 12 Redington Mountain sites and 75 percent (3 of 4 turbines) of the Upper Black Nubble sites have elevations in excess of 3,500 feet that Vermont considers as unsuitable for wind turbines because of prolonged icing problems**. Surprisingly, the application contains no discussion on either the site's cold temperatures or the estimated power losses and safety issues from icing conditions.

Secondly, Maine Mountain Power LLC plans to use the Vestas V90- 3 MW turbines. To my knowledge, these turbines have not yet been used in any existing wind projects in US. New turbine designs often have a much greater technology risk and may have a lower availability because of unforeseen problems than the more conventional turbine models in widespread use. Lower availabilities would also translate into lower project

performance and lower output. Again without any documentation provided on their power output estimate, it is impossible to determine how this issue was handled, if at all.

In summary, having a site with very high elevations that are prone to icing and much lower air temperatures and the use of a new turbine design should contribute to lower turbine availability and higher project power losses. Half of the Redington Mountain Wind project's turbines are at elevations would be considered as unsuitable for wind projects in Vermont.

Q: FROM YOUR REVIEW OF THE APPLICATION, DID YOU FIND THAT THEY DEMONSTRATED THE NEED FOR THE PROJECT?

A: No they did not. The applicant states that "the Redington Wind Farm will help Maine's economy become more economically and environmentally sustainable" by generating renewable energy, promoting economic development, reducing pollution and reducing dependence upon imported fossil fuels[8].

First, Maine does not need the Redington Mountain Wind project to meet its in-state power needs. The state is already a net power exporter since its in-state power generation (18,550,000 MWh) significantly exceeds Maine's retail sales (12,321,000 MWh) by more than 50 percent (Exhibit TAH-4).

Second, while this project will generate renewable energy, it is not needed to meet Maine's 30 percent renewable portfolio standard that have already been exceeded. As is shown in Exhibit TAH-4, Maine already has the highest percentage of energy produced

[8] Application Section 1 page 15

from non-hydro renewables in the nation—21.8 percent. In combination with its 19.2 percent generation from hydroelectric facilities, 41 percent of the in-state generation already qualifies towards and exceeds Maine's Renewable Portfolio Standard. In fact, according to the January 2006 *System Impact Study Redington Mountain Wind Farm* (Central Maine Power), the proposed wind project will likely displace some local hydro (Wyman and Harris hydro projects) and biomass (Stratton Energy) project output[9].

Finally and more importantly, Redington Mountain Wind may receive only a minimal generation capacity credit[10] towards the New England power pool reserve margin requirements that trigger new powerplant construction. With a summer capacity credit of about 9 MW, the Redington Mountain Wind project will likely not displace any new conventional powerplant construction (nuclear, fossil fuel, biomass, etc.) in either Maine or the New England power pool.

Q: DID YOU EXAMINE THE APPLICATION'S LOCAL ECONOMIC BENEFIT CLAIMS?

A: Yes I did. The application states that the $130 million project expects to pay more than $500,000 a year in property taxes as well as provide 100 construction jobs and 5-10 full time jobs[11]. The application simply provided a copy of a 2004 Oregon report entitled, *Windfall from the Wind Farm Sherman County, Oregon* to illustrate the benefits of a local wind project. However, no report was provided that discusses the Redington

[9] System Impact Study: Redington Mountain Wind Farm May 2006, Table 5-3, Table 5-4,and Table 5-7. This report was included in the application in Section 1 Part 5.4

[10] ISO-NE Manual 20 (Installed Capacity Manual- Rev 12 effective date 1/1/06) contains the methodology for assigning capacity credits for wind projects in Supplement D. Currently the 3 New England wind projects have credited capacity of only 10% of nameplate capacity. This translates to 9 MW for the proposed Redington Mountain Wind project.

[11] Application Section 1 page 23

Mountain Wind project's impact on Franklin County or that provides project cash flow analyses to quantify the impact.

Unfortunately, the application provides only a partial picture and does not describe the project's full economic project impact.

First, much of the capital investment will not be spent inside Maine to directly benefit Maine businesses. Two-thirds ($86.6 million) of the project capital investment[12] will be for the wind turbine purchases alone. These purchases would provide no direct benefit to the state economic activity since they are from outside the state (Vesta is a Danish wind turbine manufacturer). In addition, not all the remaining work may be spent on local contractors. The turbine installation may require specialized equipment and qualified contractors from outside the area. Other equipment (e.g. transformers, transmission towers, transmission lines, etc.) may be purchased from outside the state. Therefore, only a modest portion of the investment may be spent inside Maine and directly benefit Maine businesses.

Second, the project may not pay its full share of local property taxes. The application's $500,000 per year of local property tax estimate represents only 0.38 percent of the $130 million project costs. While not all the capital investment will be subject to local property taxes, the applicant must be assuming some property tax abatement to the 1.024 percent Franklin County property tax rate for 2005 that is neither identified nor discussed. The developers for the Mars Hill wind project apparently considered local property tax abatement as an essential element to proceed with construction.

[12] Application Section 3 page 1 Table

This tax abatement estimated to be roughly $4.3 million maybe only a small part of the $239 million in governmental subsidies the Redington Mountain Wind project may receive over 20 years from both the US Taxpayer and the New England ratepayer[13]. If the project is built, these governmental subsidies may exceed its estimated capital investment cost and could reach the equivalent of 57 percent of the power sales revenues.

While the Redington Mountain Wind project will create an estimated 100 temporary construction jobs and only 5-10 full-time jobs, how many of these jobs will be filled by local residents is not discussed nor are their effects on the local economy quantified. These data may be important for the Commission to weigh any local employment impacts against the project's negative costs to the local area and the state. These potential negative costs include ratepayer/taxpayer subsidies, higher electricity rates, potential loss of wind development opportunities in other parts of the state[14] and adverse environmental impacts (e.g. wildlife as addressed in other intervener testimony and noise).

Q: THE APPLICATION STATES THAT THE REDINGTON MOUNTAIN WIND PROJECT WILL PREVENT 157,156 TONS PER YEAR OF POLLUTION. DO YOU AGREE WITH THEIR ESTIMATE?

[13] The project may qualify for both the Federal Production tax credit (may reach $55 million at applicant's estimated output) if project placed online prior to 12/31/2007 and Renewable Energy Credit Sales (estimated to reach $180 million over 20 years at applicant's estimated output).

[14] A recent 2006 NREL paper presented at the 2006 European Wind Energy Conference (EWEC) entitled "*Grid Impacts of Wind Power Availability: Recent Assessments from a Variety of Utilities in the United States*" found that current utility systems can handle wind penetrations up to up to 10-20 percent based upon capacity. For the Western Maine/Central Maine sub region, this translates to a maximum wind capacity of between 104-208 MW. By building a 90 MW Redington Mountain, little remaining wind projects could be built without causing significant transmission problems. Paper is available at: http://www.uwig.org/ewec06gridpaper.pdf

A: No, I do not. While the proposed project does not create any air emissions, it still will not prevent **any** incremental air pollution emissions.

First, the vast majority of this amount (99.8 percent or 156,795 TPY) is associated with carbon dioxide emissions[15] that neither EPA nor the state of Maine currently regulates as a pollutant.

Second, no additional carbon dioxide emissions will actually be prevented if Redington Mountain Wind project is built. These claimed CO2 reductions are part of the overall Greenhouse Gas Emission reductions that have been projected to occur due the implementation of the New England Renewable Portfolio Standards *and will occur independent on whether Redington Mountain Wind project is built.* Simply put, the Redington Mountain Wind project is competing to displace other qualifying renewable energy projects for this special protected set-aside renewable market demand that provides renewable developers additional revenues from the sale of renewable energy credits to cover their higher costs. Without the revenues from the sale of renewable energy credits, this project would likely not be built.

The correct "avoided" or prevented emissions calculation would be to compare air emissions versus other qualifying renewable energy projects that would be displaced or not built at all if Redington Mountain Wind project is built because of the limited size of the set-aside renewable power market. Since these competing qualifying renewable projects also are assumed to have no added carbon emissions, the **net displaced carbon**

[15] Application Section 1 Part 10.7 Pollution Prevention Spreadsheet

dioxide emissions from Redington Mountain Wind Project are zero tons not the 156,795 TPY claimed by Maine Mountain Power LLC in its application.

The remaining claimed avoided emissions of 263 tons of SO2 and 97 tons of NOx has similar problems in that it does not examine the true displaced generation by the project. In addition, since SO2 and NOx emissions are subject to a cap and trade program. If the project could have displaced any of these emissions, the generator could sell and/or transfer his unused emissions credits to another source. In summary SO2 and NOx emissions that are regulated under a cap and trade program may be displaced but never avoided.

Q: SOME CO2 EMISSION DISPLACEMENT DOES OCCUR DUE TO THE ADOPTION OF RENEWABLE PORTFOLIO STANDARDS. HOW EFFECTIVE IS THE REDINGTON MOUNTAIN WIND PROJECT LIKELY TO BE IN DISPLACING FOSSIL FUEL GENERATION VERSUS ANOTHER COMPETING RENEWABLE ENERGY PROJECT WITH THE SAME ELECTRICITY OUTPUT LOCATED ELSEWHERE IN NEW ENGLAND?

A: To answer this question correctly, one must do some complex grid system modeling that incorporates the hourly system loads, transmission grid constraints, unit economic dispatch[16] and hourly power outputs from the renewable project. The model's answer would be highly dependent upon the type and location of the competing renewable power project. Unfortunately, Maine Mountain Power LLC has elected not to conduct such modeling in developing its own pollution prevention calculations.

[16] Economic dispatch deals with the order that units are dispatched based upon their incremental generation costs. The grid operator dispatches the unit in order of increasing incremental costs.

However, given these reservations, I would consider it highly likely that a competing renewable energy project with the same electric output would displace more conventional fossil fuel generation than the Redington Mountain Wind project. My conclusion is based upon the location of the Redington Mountain Wind project within the New England power grid and the generation mix within the Central Maine Power's Western Transmission area. According to the January 2006 *System Impact Study Redington Mountain Wind Farm* (Central Maine Power), the Redington Mountain Wind project will likely displace some local hydro (Wyman and Harris hydro projects) in the Maine-New England Transmission Interface[17] when the wind project is in operation. Under light western Maine generation condition case, Stratton Energy's biomass output would also be reduced[18]. Therefore, in the ISO-New England local transmission modeling cases, Redington Mountain Wind project will displace renewable energy sources.

In addition, given Central/Western Maine's already high hydro and biomass capacity mix being the highest of any subarea within the ISO-New England power pool[19], a renewable project in any other New England subarea would likely displace more conventional fossil fuel generation.

Q: DOES THAT CONCLUDE YOUR TESTIMONY?

A: Yes it does.

[17] System Impact Study: Redington Mountain Wind Farm May 2006, Table 5-3 and Table 5-4 on page 18, Table 5-7. This report was included in the application in Section 1 Part 5.4
[18] Ibid, Table 5-7 pg 20
[19] Source: *Regional System Plan 2005 Report* (ISO-New England, October 2005) Table 5.2 page 67

Exhibit TAH-1

RESUME OF
THOMAS A. HEWSON JR.

PROFESSIONAL EXPERIENCE

1981-Present Energy Ventures Analysis, Inc.
Principal

Responsible for power industry market studies. Provides regular power industry forecasts of future electricity demand growth, generation mix, environmental compliance and production cost changes for Fuelcast subscribers and individual client studies. Completed numerous studies examining the effect of future environmental regulation and utility deregulation on fuel prices, supplier capacity decisions (new, repower, retire), generation/environmental technology choice, wholesale electric prices and emission allowance values. Provided market assessments for new fuel, generation and pollution control technologies. Directed industrial utility group examining repowering technology options, costs and risks. Completes studies on renewable power options, costs, incentives and price impacts. Performs assessments of electricity demand, energy conservation potential and alternative energy charge frameworks for power consumers.

Responsible for corporate emission allowance forecasts and assessments. Provides ongoing forecasts of emission trading market prices and fundamentals of existing Acid Rain SO2 market, seasonal NOx market, CAIR, RGGI and individual state new source offset markets. Assesses future market trading values for mercury and carbon dioxide. Evaluates wide range of state legislative multi-pollutant proposals and their effect on regional production costs, state GDP, and environmental benefits. Engaged in developing new rules and regulations to expand existing emission allowance trading markets to include non-traditional sources (e.g. mobile sources).

Directs technical feasibility and environmental permitting studies. Expert in electric utility repowering technologies, fuel upgrading and environmental control technologies. Work includes several plant specific analyses on the costs of reducing SO2 emissions through allowance purchases, switching to lower sulfur fuels, least emission dispatching, plant retirements, repowering and FGD scrubber retrofits for all major coal and oil fired utility stations. Examined feasibility/costs of hazardous waste treatment/disposal for all major industrial waste streams in Louisiana.

1976- 1981 **Energy and Environmental Analysis, Inc.**
Project Manager

Responsible for environmental and regulatory analysis. Examined, for governmental and industrial clients, the requirements and associated impacts on current industrial practices of the Clean Water Act, Clean Air Act, Resource Conservation and Recovery Act, Toxic Substances Control Act, Safe Drinking Water Act, Fuel Use Act, Natural Gas Act, Natural Gas Policy Act, Surface Mining and Reclamation Act and Occupational Safety and Health Act. Results of these policy, economic and technical analyses have been used

for Congressional hearings, EPA rulemaking, court testimony, industrial policies, administrative hearings and permit negotiations. Developed Federal and state regulatory compliance strategies for the Department of Energy and several industrial clients. On behalf of several clients, he has applied for construction, NPDES, air, solid waste, hazardous waste, water use and land use permits.

Responsible for solid waste/hazardous waste management analyses. Evaluations have included analyses of solid waste and hazardous waste treatment/disposal options for the fertilizer, fermentation ethanol, petrochemical, inorganic chemical, electric utility, synthetic fuel, pulp and paper and mineral processing industries.

Publications

Mr. Hewson has presented and published several papers on the electric utility industry and emission allowance markets. Also co-author on two papers on innovative wastewater treatment technologies.

Educational Background

1976 B.S.E. (Civil Engineering), Princeton University.

Mr. Hewson was appointed for a 3-year term as a Member of the Alexandria Environmental Policy Commission in 2005.

Thomas Hewson Relevant Renewable Energy Experience

While renewable energy represents only a small share of current electric generation in the United States, it accounts for a growing share of my consulting work. My projects cover the full range of renewable power technology options—hydroelectric, biomass, geothermal, wind and solar. Some selected renewable projects on which I have worked include:

- Developed listings of existing and likely new wind projects for the Department of Energy's Energy Information Administration.
- Assessed economic and environmental issues of individual wind power projects proposed in the states of Illinois, Maine, Maryland, Massachusetts, Michigan, New York, Pennsylvania, Texas, Vermont, and Wisconsin for public interest groups. These evaluations looked into issues such as wind resource quality, power production costs, transmission, noise, aesthetics, and environmental impacts.
- Participated as a panelist for open public forums dealing with wind energy issues in Michigan, Vermont and Ontario.
- Provided input and peer review for Maine Public Utilities Commission Report on the *Viability of Wind Power Development in Maine* (January 2005)
- Provided comments on the estimated production and environmental issues of the proposed 468 MW Cape Wind Project
- Provided expert testimony on wind power potential and other project issues for hearings at the Vermont Public Service Board (Docket 6911), Maryland Public Service Commission (Case 9008) and California Public Utilities Commission (Docket U-338-E)
- Provided evaluations of proposed impacts of renewable energy portfolio standard legislation/regulation for several states including California, Colorado, Florida, Illinois, Maryland, Michigan, Minnesota, Montana, New York, Pennsylvania, Texas, and Washington.
- Evaluated costs and issues associated with several Congressional proposals to establish a National renewable portfolio standard for 2 major electric utilities.
- Examined the cost, performance, and permitting issues of renewable power options (including wind) for the National Rural Electric Cooperative Association.
- Projected future renewable energy capacity and energy generation as part of the semi-annual Fuelcast forecasts for subscribers that include major electric utilities, fuel suppliers, and fuel transporters.
- Provided periodic biomass price forecasts and analysis for the Vermont Department of Public Service and for utility studies.

EXHIBIT TAH-2
REPORTED WIND PROJECT PERFORMANCE FROM EIA FORM 906 DATA

Operator/Utility	Pltname	State	Capacity (MW) 2005	Gen (MWh) 2005	Adj missing data Capacity Factor 2005
Cabazon Wind Partners LLC	Cabazon Wind Partners	CA	41	114,364	31.9%
Cameron Ridge LLC	Cameron Ridge	CA	57	107,945	37.0%
Difwind Farms Ltd VI	Difwind Farms Limited VI	CA	27	47,685	20.1%
Enron	Green Power I	CA	17	26,279	18.2%
ESI Mojave LLC	Mojave 16	CA	30	44,792	17.0%
ESI Mojave LLC	Mojave 17	CA	25	40,612	18.5%
ESI Mojave LLC	Mojave 18	CA	30	64,481	24.5%
EUI Management PH Inc	EUIPH Wind Farm	CA	26	28,311	16.9%
FPL Energy	High Winds LLC	CA	146	379,904	35.7%
FPL Energy	South Dakota Wind Energy Center	CA	41	152,327	42.9%
Howden Wind Parks Inc	Howden Windpark I	CA	25	23,617	11.9%
Kenetech Windpower Inc	Altamont Pass Windplant	CA	313	536,253	21.4%
Oak Creek Energy System Inc II	Oak Creek Energy Systems Incorporated	CA	28	96,104	39.3%
PGE Energy	Mountain View	CA	44	129,043	36.1%
Ridgetop Energy LLC	Cannon Energy Corp	CA	60	62,748	11.9%
San Gorgonio Farms, Inc.	Karen Avenue Windfarm	CA	8	31,271	47.6%
San Gorgonio Wind Farms Inc	San Gorgonio Farms Wind Energy Power Plant	CA	34	70,882	24.0%
Seawest Windpower Inc	Altech III	CA	32	27,873	13.1%
Seawest Windpower Inc	San Gorgonio Westwinds II LLC	CA	43	78,611	27.6%
TPC 4 Inc	Mojave 4	CA	29	65,796	28.2%
TPC Windfarms LLC	TPC Windfarms LLC	CA	29	61,047	24.3%
VMSO IV Corp	Cabazon Wind Farm	CA	40	75,708	21.7%
Whitewater Hill Wind Parnters	Whitewater Hill Wind Partners	CA	62	191,861	35.6%
Windpower Partners 1993 LP	San Gorgonio Windplant WPP93	CA	35	75,994	25.1%
Zond Systems Inc	Sky River Partnership	CA	77	213,102	31.6%
P P M Energy Inc.	Colorado Green Holdings LLC	CO	162	633,389	44.6%
Public Service Co of Colo	Ponnequin	CO	30	40,939	15.6%
Ridgecrest Wind Partners, LLC	Peetz Table Wind Farm	CO	30	58,408	30.0%
Hawaii Electric Light Co	Lalamilo	HI	2	1,697	8.8%
Cedar Falls Utilities	IDWGP	IA	2	5,398	27.4%
FPL Energy Hancock County Wind	Hancock County	IA	98	154,829	26.9%
Hawkeye Power Partners LLC	Hawkeye Power Partners LLC	IA	42	32,099	26.1%
MidAmerican Energy Company	Century	IA	150	37,804	33.9%
MidAmerican Energy Company	Intrepid	IA	159	449,206	32.3%
Northern Iowa Windpower, LLC	Top of Iowa	IA	80	87,359	12.5%
PPM Energy Inc	Flying Cloud Power Partners LL	IA	44	150,523	39.1%
Navitas Energy	Mendota Hills	IL	50	80,565	18.4%
FPL Energy	Gray County Wind Energy	KS	112	332,412	37.0%
Westar Energy Inc.	Westar Wind	KS	2	778	7.4%

Bay Wind Power	Bay Windpower I	MI	1	1,846	26.3%
Chanarambie Power Partners LLC	Chanarambie Power Partners	MN	85	256,064	34.4%
Dairyland Power Cooperative	G McNeilus Wind	MN	32	95,059	33.9%
Enron Wind Dev Corp LB I	Lake Benton 1 Wind Power Facility	MN	107	254,923	27.1%
Enron Wind Dev Corp LB II	Lake Benton II Wind PO Facility	MN	104	278,642	30.7%
Enron Wind Dev Corp SL I	Storm Lake 1 Wind Power	MN	113	272,806	27.7%
Enron Wind Dev Crop SL II	Storm Lake II Wind PO Facility	MN	60	193,189	36.8%
Garwin McNeilus	Adams Wind Farm	MN	10	56,952	65.7%
P P M Energy Inc.	Moraine Wind LLC	MN	51	146,295	32.7%
Windpower Partners 1993 LP	Buffalo Ridge Windplant WPP 1993	MN	22	46,299	29.0%
Basin Electric Power Coop	Minot Wind	ND	3	3,561	20.7%
FPL Energy	FPL Energy North Dakota Wind II	ND	62	213,604	39.6%
Nebraska Public Power	Ainsworth	NE	59	60,230	45.9%
FPL Energy	New Mexico Wind Energy LLC	NM	204	512,998	28.7%
Fenner Wind Project	Fenner Wind	NY	30	51,849	26.2%
NWP Indian Mesa Wind Farm LP	Madison Windpower	NY	11	19,381	19.8%
Blue Canyon Windpower LLC	Blue Canyon Windpower	OK	74	247,638	38.1%
FPL Energy	Oklahoma Wind LLC	OK	102	313,180	35.1%
ESI Vansycle Partners LP	ESI Vansycle Partners LP	OR	25	47,435	32.5%
Eurus Combine Hills I LLC	Combine Hills I	OR	41	70,539	26.2%
FPL Energy	Vancycle	OR	263	150,649	11.2%
SeaWest WindPower Ind	Condon	OR	50	60,304	18.5%
FPL E Waymart Wind LLC	Waymart Wind	PA	65	142,044	24.9%
FPL Energy Meyersdale WIndpower LLC	Meyersdale Windpower	PA	33	28,827	29.8%
Mill Run Windpower, LLC	Mill Run Windpower	PA	15	14,059	32.0%
Basin Electric Power Coop	Prairie Wind	SD	3	4,258	24.7%
Tennessee Valley Auth	Buffalo Mountain	TN	2	3,339	18.2%
AEP Texas Central Company	Desert Sky Wind Project	TX	160	468,192	33.4%
Crelo Wind Power LLC	King Mountain Wind Ranch 1	TX	278	648,548	26.6%
Delaware Mountain	Delaware Mountain Windfarm	TX	30	66,695	25.4%
El Paso Electric Co	Hueco Mount	TX	1	1,056	10.0%
FPL Energy	Pecos Wind I	TX	82	185,214	25.8%
FPL Energy	Pecos Wind II	TX	78	172,602	25.3%
FPL Energy Operating System	West Texas Windplant	TX	75	197,781	30.1%
FPLE Callahan Wind LLC	Callahan WInd	TX	114	179,254	35.6%
New World Power Corp	Big Spring Power Facility	TX	34	84,013	27.9%
NWP Indian Mesa Wind Farm LP	NWP Indian Mesa Wind Farm	TX	83	230,315	31.9%
Shell Wind Energy Inc	Brazos Wind Farm	TX	160	422,981	30.2%
Texas Wind Power Company	Llano Estacado Wind Ranch - Wh	TX	80	226,778	35.4%
Tri-Cities	Trent Mesa Wind	TX	150	492,653	37.5%
Windpower Partners 1993 LP	West Texas Windplant	TX	34	52,829	21.6%
Green Mountain Power Corp	Searsburg Wind Turb	VT	6	11,486	21.5%
Energy Northwest	Nine Canyon	WA	48	147,348	35.0%
FPL Energy	Stateline Wind	WA	166	223,056	26.3%
Badger Windpower LLC	Badger Windpower LLC	WI	30	51,247	19.5%

Diablo Winds, LLC	Diablo Wind	WI	18	46,696	35.6%
Madison Gas & Elec	Wind Energy	WI	11	18,784	19.5%
Wisconsin Electric Pwr	Byron	WI	1	2,697	25.7%
Wisconsin Public Service Corp	Lincoln Turbines	WI	9	14,028	17.8%
GH Drilling Inc	Backbone Mountain Wind	WV	66	59,657	30.9%
FPL Energy	FPLE Wyoming Wind LLC	WY	144	297,224	23.6%
Platte River Power Author	Medicine Bow	WY	6	15,016	27.6%
SeaWest Windpower	Rock River I LLC	WY	50	115,039	35.1%
Seawest Windpower Inc	Foote Creek I	WY	41	123,952	37.6%
			5,840	12,913,127	29.0%

Reporting Wind Projects in Appalachian Mountains/Eastern States

EXHIBIT- TAH-3

REDINGTON MOUNTAIN WIND PROJECT TURBINE BASE ELEVATIONS

TAKEN FROM APPLICANT, MMP, APPLICATION PLANS BY BERTRAND LAMBERT, P.E.

Turbine#	Base Level (ft)	Mountain	Source
1	3900	Redington	Applicant's Sh W5
2	3990	"	" "
3	3900	"	" "
4	3890	"	" "
5	3645	"	" "
6	3550	"	W-6
7	3575	"	" "
8	3525	"	" "
9	3690	"	" "
10	3715	"	" "
11	3750	"	" "
12	3610	"	" "
13	3370	Upper Black Nubble	W-3
14	3550	"	" "
15	3700	"	" "
16	3585	"	" "
17	3465	Lower Black Nubble	W-2
18	3400	"	" "
19	3360	"	" "
20	3150	"	" "
21	3180	"	" "
22	3080	"	" "
23	3015	"	W-1
24	3060	"	" "
25	3190	"	" "
26	3130	"	" "
27	3085	"	" "
28	3030	"	" "
29	2965	"	" "
30	2875	"	" "

EXHIBIT TAH-4

2005 NET GENERATION AND RETAIL SALES BY TYPE

CERTIFICATION

I do hereby certify that the attached document entitled;

DIRECT TESTIMONY OF THOMAS HEWSON JR
ON BEHALF OF FRIENDS OF THE WESTERN MOUNTAINS
BEFORE THE MAINE LAND USE REGULATION COMMISSION
IN THE MATTER OF THE REZONING PETITION OF MAINE MOUNTAIN POWER LLC TO PLACE A 90 MW WIND PLANT IN REDINGTON TOWNSHIP AND WYMAN TOWNSHIP IN FRANKLIN COUNTY, MAINE

is my direct testimony that was written by me for the MAINE LAND USE REGULATION COMMISSION as part of their proceeding on Rezoning Petition ZP 702.

Signed:

Thomas A Hewson Jr.
Principal
Energy Ventures Analysis Inc
Arlington VA 22209

State of Virginia, Arlington County

The above named Thomas Hewson Jr. appeared before me and made oath as to the truth of the forgoing statements.

_____

Before me

Notary Public