

**STATE OF VERMONT  
PUBLIC SERVICE BOARD**

Petition of Green Mountain Power Corporation )  
for a certificate of public good, pursuant to 30 ) Docket No. \_\_\_\_  
V.S.A. § 248(j), authorizing the installation )  
and operation of three temporary wind )  
meteorological stations on Lowell Mountain in )  
Lowell, Vermont )

**DIRECT TESTIMONY OF MARTHA STASKUS  
ON BEHALF OF GREEN MOUNTAIN POWER CORPORATION**

**August 7, 2009**

**Summary of Testimony**

Ms. Staskus describes GMP's request for a CPG for the installation and operation of three temporary wind meteorological stations (towers, associated meteorological instrumentation, and access roads) on Lowell Mountain, in Lowell, Vermont. She describes the sites, the components of the measurement stations, access arrangements and installation plans. She also explains why the wind measurements are needed and addresses certain criteria under Section 248.

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1 **1. Q. Please state your name and business address.**

2 A. My name is Martha Staskus and I am Vice President of Vermont Environmental  
3 Research Associates, Inc. (“VERA”), a wind resource energy company, located at 1209  
4 Harvey Farm Road, Waterbury Center, VT 05677. My business experience and  
5 educational background is set forth on Exhibit GMP-MS-1.

6

7 Green Mountain Power Corporation (“GMP”) has contracted with VERA to provide  
8 wind resource assessment and permitting services in connection with GMP’s evaluation  
9 of a potential site on Lowell Mountain in Lowell, Vermont for a wind powered electric  
10 generation project, known as the Kingdom Community Wind (“KCW”) project. GMP’s  
11 request in this proceeding involves the installation and operation of three temporary wind  
12 meteorological stations (towers, associated meteorological instrumentation), access roads,  
13 (the “Project”) on Lowell Mountain, on land that is primarily owned by Moose Mountain

1 Forestry, LLC (“MMF”), a timber/forestry management limited liability company, and  
2 also on an adjacent parcel owned by Wind Blown Energy LLC (“WBE”).  
3

4 **2. Q. Have you ever presented testimony to the Public Service Board (“Board”)**  
5 **before?**

6 **A.** Yes, I have presented testimony to the Board on behalf of Grandpa’s Knob  
7 Windpark, LLC for the installation and operation of its wind resource assessment  
8 program in Hubbardton and West Rutland, Vermont.  
9

10 **3. Q. What is your firm’s experience with projects similar to the KCW Project?**

11 **A.** As a significant part of its business, VERA has provided wind resource  
12 assessment services to clients interested in grid-connected wind power facilities for over  
13 25 years. Often these assessments involve installing wind measurement equipment at  
14 remote, windy locations on relatively high elevation ridgelines, similar to that proposed  
15 for this Project. For example, in Vermont we have been directly involved with the  
16 planning, permitting, installation, and/or operation of wind measurement stations  
17 installed in the towns of Stamford, Readsboro, Searsburg, Hubbardton, West Rutland,  
18 Milton, Isle LaMotte, Lowell and nine other Vermont towns prior to 1992. We have also  
19 been similarly involved with measurement station installations in New York, New  
20 Hampshire and Massachusetts.  
21

22 **4. Q. What is the purpose of your testimony?**

1       A. The purpose of my testimony is to describe GMP's request for a Certificate of  
2 Public Good ("CPG") for the 'Project'. I will describe the sites, the components of the  
3 measurement stations, access arrangements and installation plans. I will also explain why  
4 the wind measurements are needed and will address certain criteria under Section 248.  
5 Other Section 248 criteria are addressed by David Raphael (aesthetics, historic sites) and  
6 Dan Prasch (environmental and related criteria).

7

8       **5. Q. Why are the temporary wind measurement stations necessary and over what**  
9       **period of time will data be collected?**

10       A. Reliable estimates of the long-term wind resource at hub-height of wind turbines  
11 are necessary to estimate accurately the long-term energy production potential of wind  
12 power facilities. The proposed wind measurement program, which will last for a period  
13 of up to five years, builds upon the data collected in connection with a 164 foot (50-  
14 meter) tower previously located on the ridge. The Board approved the previous station in  
15 *Petition of enXco (East Coast), Inc. for a Certificate of Public Good, etc.*, Docket No.  
16 6784 (Vt. Pub. Serv. Bd. Jan. 29, 2003). One of the proposed stations (Site B) will be at  
17 the same location and height as the enXco station and the two others (Sites A and C) will  
18 be located adjacent to other areas where wind turbines are likely to be located and will be  
19 262 feet (80 meters) tall, which is closer to the likely rotor hub-height of wind turbines.  
20 The instrumentation at the tower heights and locations will provide newly-collected data  
21 to be correlated to the previous 5-year measurement data, effectively increasing the  
22 measurement period and thus the value of both data sets. Thus the program proposed will  
23 reduce the uncertainty inherent in estimating the long-term energy production of the

1 KCW Project in three important ways: 1) it will build on the previous measurement  
2 period data on Lowell Mountain, reducing errors associated with correlations to off-site  
3 reference stations; 2) it will collect data in close proximity to the prospective wind  
4 turbine locations, reducing errors associated with extrapolating estimates produced at  
5 measurement station locations to wind turbine locations further away along the ridge and;  
6 3) it will collect data at heights that are representative of where the wind turbine rotors  
7 will be, thus reducing the uncertainty associated with extrapolating sensor height values  
8 to higher levels.

9

10 **6. Q. Please describe the locations planned for the wind measurement stations.**

11 A. They will be located at three sites along the generally north-south oriented Lowell  
12 Mountain ridge line at elevations between 2350 feet to 2548 feet above mean sea level.  
13 The locations are on lands owned by MMF and WBE in the southeastern portion of the  
14 Town of Lowell and shown on the U.S. Geological Survey topographic map attached as  
15 Exh. GMP-MS-2. Each of the sites is described below.

16

17 Site A is located approximately 3100 feet from the MMF northern ridgeline boundary at  
18 2356 feet above sea level. The existing forest canopy is open with predominately young  
19 hardwood vegetation. Site B is the highest in elevation at approximately 2548 feet above  
20 sea level and is the only site above 2500 feet elevation. The location was cleared and  
21 access to it brushed out in connection with the prior wind meteorological station  
22 installation between 2003 and 2008. Revegetation (predominately softwood) has begun  
23 at this location.

1 Site C is located at 2464 feet above sea level. The site is located on the WBE property  
 2 approximately 1200 feet south of the southern ridgeline boundary of MMF lands. The  
 3 existing forest canopy is open with predominately young hardwood vegetation.

4

5 **7. Q. Please describe the major components and the installation procedure for the**  
 6 **Project.**

7 **A.** Site preparation, equipment to be used and the installation process at Site B, and  
 8 the new locations of Sites A and C, are described below.

9 Site B Measurement Station - Site Preparation: Site B will be reestablished with the  
 10 vegetation cut within a .75 acre area located at the existing clearing. *See* Exh. GMP-MS-  
 11 4d. No herbicides will be used in the site preparation at any of the sites.

12

13 Site B Measurement Station – Equipment Specifications and Installation: The Site B  
 14 station includes a tower of the same height as the previous, Board-approved installation  
 15 and similar instrumentation. This station consists of a guyed, galvanized steel, 50-meter  
 16 (164 feet) tall lattice tower with three 18 inch faces and a gray finish, manufactured by  
 17 World Tower, Inc. ([www.worldtower.com](http://www.worldtower.com)). *See* Exh. GMP-MS-4b. The twenty-foot  
 18 tower sections will be assembled vertically (stacking each section on a previously-  
 19 installed section). The meteorological instrumentation, including anemometers, direction  
 20 sensors and temperature sensor, is manufactured by NRG Systems, Inc. of Hinesburg, VT  
 21 ([www.nrgsystems.com](http://www.nrgsystems.com)) and will be mounted at the same levels on the tower as the  
 22 previous installation. The tower base will be installed on foundation, consisting of a 3'  
 23 diameter, 6'-6" tall concrete pier, resting on a 6' long x 6' wide x 1'-6" high buried

1 concrete slab, with all but one foot of the pier below grade. The tower will be secured by  
2 guy wire from three directions, attached to the ground by rock anchors secured to 8' long  
3 x 2'-6" wide x 2'-6" high concrete anchor footings. *See* Exh. GMP-MS-4e,f each. The  
4 foundation and each guy anchor footing will require excavation of between  
5 approximately 150 square feet and 420 square feet. In the event that any foundation  
6 cannot be located at the planned depth due to ledge, it will sit directly on ledge, and the  
7 above-ground portion may be increased to up to two feet. In the event that any anchor  
8 footings cannot be located at the planned depth due to ledge, the affected guys will be  
9 anchored directly into ledge by means of a rock anchor approximately 2 inches in  
10 diameter. All attachments to ledge will be effected by drilling; there will be no blasting  
11 at any of the sites.

12 Sites A and C Measurement Stations - Site Preparation. Because these are new sites,  
13 trees will be cut in an approximately .75 acre area at each site. *See* Exh. GMP-MS-4c.  
14 Felled trees will be moved to the perimeter or removed by the landowner, if desired.  
15 Brush will be left on site. Ground disturbance will be limited to the setting of guy  
16 anchors and tower pier-foundation, with the amount of disturbance based upon rock/soil  
17 conditions. The remaining ground cover and root systems will be left in place,  
18 encouraging re-vegetation and discouraging the potential for soil erosion.

19 Sites A and C Measurement Stations - Equipment Specifications and Installation. The  
20 improvements on Site A and C will consist of guyed, 80-meter (262 feet) lattice towers  
21 with three 18 inch faces, also manufactured by World Tower, Inc. *See* Exh. GMP-MS-  
22 4a. The foundation, guying system and installation process will be identical to that  
23 described above for Site B. *See* Exh. GMP-MS-4e,f.

1 The meteorological instrumentation, including anemometers, direction sensors and  
2 temperature sensor, is also manufactured by NRG Systems, Inc. Sensors will be attached  
3 to the tower at multiple levels above ground with redundant sensors at the upper two  
4 levels. Temperature, other sensors and operational equipment, including electronic data  
5 recorder and photovoltaic panel will be installed approximately 3 meters from ground  
6 level. Data provided from the sensors will be collected and recorded on the electronic  
7 data recorders and transmitted via recorder cell phone, minimizing the need to access the  
8 site during the operational period. At the request of the Agency of Natural Resources,  
9 Anabat detector data collection equipment will also be installed at the top of the Site A  
10 and C stations.

11

12 Because Stations A and C will have towers higher than 200 feet above ground level, each  
13 tower will be lit by red LED lights (one (flashing) installed at the top and two (steady-  
14 burning) at mid-point (131 ft. (40 meters))), and each tower will be painted with seven  
15 alternating orange and white bands, in accordance with Federal Aviation Administration  
16 (“FAA”) specifications. An FAA Determination of No Hazard has been issued for the  
17 Site A and has been requested for the Site C station. The FAA determination for Site C is  
18 expected by early September 2009.

19

20 **8. Q. How will the wind measurement equipment be transported to the Sites?**

21 **A.** The equipment will be delivered to the “30-cord” log landing, and then  
22 transported over existing logging haul roads, existing woods roads, and new roads. The  
23 existing logging haul roads and woods roads are part of MMF ongoing logging

1 operations, and are managed in accordance to the Vermont Agency of Natural Resources,  
2 Department of Forests, Parks and Recreation's *Acceptable Management Practices for*  
3 *Maintaining Water Quality on Logging Jobs in Vermont* ("Acceptable Management  
4 Practices") and, in coordination with MMF's Forester and the Orleans County Forester,  
5 under an approved Forest Management Plan.

6

7 The Site A access begins at the "30 cord" log landing, which is approximately 6/10 of a  
8 mile from the end of Town Highway 28. The distance from the landing to Site A is 2.0  
9 miles, of which 1.5 miles consists of the existing MMF haul road network. The  
10 remaining .5 mile section consists of a new woods road. The Site B access also begins at  
11 the 30-cord log landing, is 1.5 miles in length, and follows existing haul and woods  
12 roads, some of which were created in connection with the previous measurement station  
13 installation. Access to Site C will consist of a new woods road beginning at Site B and  
14 extending south along the ridgeline approximately 1.2 miles, utilizing existing woods  
15 roads where possible. The location of the existing and new woods roads are identified on  
16 Exh. GMP-MS-3a,b.

17

18 It should be noted that MMF continues to implement improvements to its road network,  
19 in accordance with its Forestry Management Plan and Acceptable Management Practices.  
20 Currently ongoing activities of MMF in the measurement station access areas include  
21 adding culverts, ditches and water bars, widening the logging haul road, and overhead  
22 vegetation clearance and adding extensions to interconnect access roads.

23

1 The access roads to the temporary measurement stations will be ten feet in width and  
2 overhanging vegetation cleared. All roads and access activities will comply with the  
3 construction and erosion control measures provided in the Acceptable Management  
4 Practices. Specifically, all access roads will include the installation of water control  
5 measures (i.e., waterbars) and selective edge cutting for trail stabilization. These  
6 temporary accesses avoid rock outcrops, ledges, and swampy areas and ditches will be  
7 used to divert water away from the road width. Temporary water crossings will be  
8 achieved through a combination of pole culverts (sized in accordance with the Acceptable  
9 Management Practices), outsloping turn-ups and broad-based drainage dips and will be  
10 stabilized where necessary. Slash and other debris will be kept free from the water  
11 crossings.

12

13 Following installation of the wind measurement stations, the new portion of the access  
14 routes will be maintained in accordance with Acceptable Management Practices,  
15 including waterbars (minimum 8" deep, maximum 24-30" deep) typically at a 4 degree  
16 gradient and drained away from the trail on to undisturbed litter or vegetation. Any ruts  
17 created during station installation will be filled and all non-permanent water crossing  
18 structures removed and the channel restored. Subsequent site access will be infrequent,  
19 occurring only when needed for periodic seasonal maintenance.

20

21 **9. Q. How will the sites be restored at the end of the evaluation period?**

22 A. Upon termination of the wind evaluation period, the towers and associated  
23 equipment will be disassembled and removed, and the foundations will be removed to

1 below grade. This will leave the sites with no visible improvements. Vegetation will  
2 continue to grow, as is currently occurring at Site B, and over time the sites will be  
3 restored close to their original condition.

4

5 **10. Q. How much will the Project cost?**

6 A. The Project is estimated to cost approximately \$500,000. The estimated Project  
7 costs include permitting, equipment acquisition, installation and removal.

8

9 **11. Q. What is the proposed time frame for completing the Project?**

10 A. GMP proposes to install the stations as soon as possible following Board issuance  
11 of a Certificate of Public Good and any other applicable permit, and to collect data for a  
12 period of up to five years. GMP requests an expeditious review of this petition in order  
13 to install the equipment and gather data during the upcoming winter season, as well as the  
14 upcoming bat migration season. Installation is expected to take approximately four  
15 weeks.

16

17 **12. Q. Please describe changes to the Project from the description contained in the**  
18 **45-day notice.**

19 A. Notice of the Project was provided to the Lowell Selectboard, the Lowell  
20 Planning Commission and the Northeast Vermont Development Association by letter  
21 dated June 10, 2009. The following changes have occurred since the 45-day notice.

22 1. The 45-day notice was filed by Moose Mountain Wind LLC (“MMW”), an  
23 affiliate of MMF, which owned the wind development rights on the MMF

1 property. GMP recently acquired the wind development rights from MMW.

2 GMP also acquired the right to locate a temporary wind measurement station on  
3 the WBE property and is currently negotiating to acquire the wind development  
4 rights on the WBE property.

5 2. Site C has been relocated 1800 feet to the south, to a location on the WBE parcel  
6 that is 1200 feet from the southern boundary of the MMF parcel. The new,  
7 temporary measurement station location will facilitate the necessary wind  
8 resource data collection in the event wind turbines are proposed to be located on  
9 the WBE parcel.

10 3. The Site A and C clearing area has been reduced from 2 acres to .75 acre. The  
11 reduced area is the result of the vertical installation process rather than a  
12 horizontal installation.

13 4. The meteorological instrumentation at Sites A and C will be located at 80, 70, 50,  
14 40 and 30 meter levels. The meteorological instrumentation at Site B will be  
15 located at 50, 40 and 30 meter levels.

16 5. The towers on Sites A and C will be painted, as described above.

17 No comments were received in response to the 45-day notice.

18

19 **13. Q. Please explain how the Project complies with each of the § 248(b) criteria.**

20 **A.** Following is a listing of each of the § 248(b) criteria with a description in each  
21 numbered paragraph of how the Project complies with the criteria specified.

22

23

24

**Orderly Development of the Region**

[30 V.S.A. §248(b)(1)]

1 The Project will not unduly interfere with the orderly development of the region. The  
2 Project is located entirely on private property owned by MMF and WBE. The Project  
3 will not provide electricity and involves no transmission or distribution lines. Therefore,  
4 it has no impact on development in the region.

5

6 **Need for Present and Future Demand for Service**  
7 [30 V.S.A. §248(b)(2)]

8 The proposed wind measurement stations will provide an accurate estimate of wind  
9 resources on Lowell Mountain, which information is necessary to determine whether  
10 wind-powered electric generation is feasible at that location.

11

12 **System Stability and Reliability**  
13 [30 V.S.A. §248(b)(3)]

14 The Project will not be connected to the electric system in any way, and therefore will not  
15 adversely affect its stability and reliability.

16

17 **Economic Benefit to the State**  
18 [30 V.S.A. §248(b)(4)]

19 The Project is a necessary evaluation step toward development of a wind farm, which, if  
20 permitted and built, will provide additional state and local tax revenues and also provide  
21 renewably-produced electricity. If the data indicates that the wind resource needed for a  
22 wind-powered, electric generation facility are not present at the site, no further  
23 development activities will be undertaken, thereby avoiding the impacts of the possible  
24 installation of a non-viable wind farm development. If the data indicates that a sufficient

1 wind resource is present, that information will provide an economic benefit by assisting  
2 in the development of wind-powered electric generation at the site. The installation of  
3 the wind measurement stations will also have a small economic benefit to the state, due to  
4 temporary job creation resulting from the permitting, installation of the temporary wind  
5 measurement stations and the monitoring and evaluation of the data generated.

6

7

8

9

**Aesthetics, Historical Sites, Air and Water Purity,  
the Natural Environment, and Public Health and Safety**

[30 V.S.A. §248(b)(5)]

10 The Project will not have an undue adverse impact on aesthetics, historic sites, air and  
11 water purity, the natural environment and the public health and safety, with due  
12 consideration having been given to the criteria specified in 10 V.S.A. § 1424a(d) and §  
13 6086(a)(1) through (8) and (9)(K) discussed below. Please note that most of these  
14 criteria are addressed by Mr. Prasch and Mr. Raphael.

15

16

**Public Health and Safety**

17 Reflective signage warning of the proximity of wind measuring equipment will be placed  
18 on private property along an existing trail nearby the measurement station at Site A as a  
19 precaution.

20

21

22

**Transportation Systems**

[10 V.S.A. §6086(a)(5)]

23 The Project will not cause unreasonable congestion or unsafe conditions with respect to  
24 use of highways, waterways, railways, airports and airways, and other means of

1 transportation existing or proposed. Delivery to the MMF property of measurement  
2 station components will be accomplished via standard shipping transport.

3

4 The Site B tower is less than 200 feet tall and therefore does not require FAA-approved  
5 lighting. The Sites A and C measurement towers will be subject to FAA-prescribed  
6 lighting and markings, as described above. All necessary Determination of No Hazard  
7 findings will be acquired prior to installation.

8

9

**Educational Services**

10 [10 V.S.A. §6086(a)(6)]

11 The Project will not cause any burden on the town of Lowell educational services. KCW  
12 staff and subcontractors (including VERA) will maintain and monitor the wind  
13 measurement stations. There will be no new full- or part-time employees added to the  
14 region as a result of the Project, and therefore no increase in the number of students  
15 attending school.

16

17

**Municipal Services**

18 [10 V.S.A. §6086(a)(7)]

19 The Project will not require Lowell to provide or expand services related to fire and  
20 police protection, solid waste disposal, sewage treatment, water supply, rescue services,  
21 or road maintenance. Nor will installation or maintenance of the temporary wind  
22 measurement stations threaten public safety. Access to the sites is controlled by MMF.

23

24

**Scenic and Natural Beauty, Aesthetics, Historical Sites,**

1

**and Rare and Irreplaceable Natural Areas**

2

[10 V.S.A. §6086(a)(8)]

3

Based on discussions with the University of Vermont Consulting Archeology Program

4

and a review of the Division for Historic Preservation Archeological Information System

5

map, there are no known archeological features in the Area of Potential Effect (“APE”)

6

(consisting of the access roads and station sites), and the Project will have no effect on

7

significant archeological resources.

8

9

**Development Affecting Public Investments**

10

[10 V.S.A. §6068(a)(9)(K)]

11

Based on the characteristics of the Project discussed above and Mr. Raphael’s testimony,

12

the Project will not unnecessarily or unreasonably endanger the public or quasi-public

13

investment in the facilities listed in 10 V.S.A. § 6086(a)(9)(K) or materially jeopardize or

14

interfere with the public’s use or enjoyment of or access to such facilities.

15

16

**Least-Cost Integrated Resource Plan**

17

[30 V.S.A. §248(b)(6)]

18

19

The Project facilitates the potential acquisition of new renewable resources. GMP’s 2007

20

IRP encourages the acquisition of in-state new renewables. 2007 IRP at 104-105. The

21

Project will also help GMP meet renewables requirements, including the RPS.

22

23

**Compliance with Electric Energy Plan**

24

[30 V.S.A. §248(b)(7)]

25

26

I believe the Project complies with the 2005 Electric Plan (the “Plan”). Electric policy

27

described in the Plan includes providing service “in a manner that is consistent with

1 efforts to protect the quality of the environment over time. ...Meeting Vermont's energy  
2 needs in a sustainable way... means making a long-term commitment to maintain the  
3 appropriate contributions from renewable resources and minimizing our dependence on  
4 imported fossil fuels." Plan at 1-5. The Plan describes wind power as technologically  
5 viable and ecologically acceptable. *Id.* The Department of Public Service has also been  
6 asked to issue a Section 202(f) determination that the Project complies with the Plan.

7

8 **Existing or Planned Transmission Facilities**

9 [30 V.S.A. §248(b)(10)]

10

11 This criterion is inapplicable because the Project will not be served by any transmission  
12 facilities, existing or planned.

13

14 **14. Q. Does this conclude your testimony?**

15 **A.** Yes it does.