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Honorary Mention

**Catamount Energy and the Glebe Mountain
Wind Farm – Clean Energy versus NIMBY**

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Catamount Energy and the Glebe Mountain Wind Farm: Clean Energy versus NIMBY

November, 2004

During the summer and fall of 2004, officials of Catamount Energy Corporation (CEC), headquartered in Rutland, Vermont, faced a challenging public relations situation. The company was seeking regulatory approval for the development of a twenty-seven turbine wind farm to produce wind-generated electricity (WGE) atop Glebe Mountain, in south-central Vermont. The project promised to add a considerable amount of “clean” energy to the state’s electricity grid, as well as bring considerable economic spin-offs to the area. However, a number of local residents were actively opposed to the project, fearing that it would harm the area’s scenic beauty as well as threaten the state’s lucrative tourist trade. Both opponents and supporters of WGE from across the state had weighed in on the proposed project, and as of the spring of 2004, the company faced a long and arduous process to gain approval of the project from Vermont’s Public Service Board. With opinion in the community and across the state divided as to the relative merits of WGE and of the Glebe Mountain project in particular, company officials had to map out their next steps in building increased support and gaining ultimate approval for the project.

History of Wind Power

The earliest instance of man harnessing wind power through windmills can be traced to 2000 BC in ancient Babylon, and involved grinding of grain and pumping water. Over the next thousand years, windmill usage to grind grain spread throughout the Islamic world, as well as to China and India. Windmill use for grain grinding only came to the western world in early medieval times. Windmills were being adapted for use in pumping irrigation canals. During the 19th century, steam based railway systems used windmills to pump water into train engines. In fact, windmills were Europe’s primary energy source until the introduction of the steam engine in the early 19th century. In the United States, between 1850 and 1970, over six million mechanical output small wind machines were installed, mainly in farms, to power water pumping and provide water for farm houses. By the early - mid 1950s, however, government efforts to extend the central power grid to nearly every American household basically ended the market for these machines.

The first usage of a large windmill to generate electricity was built in Cleveland, Ohio, in 1888 by Charles F. Brush. The Brush windmill was moderately successful, and operated for over twenty years, though its output was puny by modern standards. In 1891, a Dane, Pou La Court developed the first wind machine for producing electricity based on the aerodynamic principles of the large, European windmill towers. By the end of the First World War, windmills generating electricity had spread throughout Denmark, though they were subsequently driven out of business by fossil-fueled power plants.

The 1930’s saw a renaissance of WGE, with construction of experimental wind farms focused on electricity production in Denmark, Germany, France Britain and the U.S. The most significant of these experiments in the U.S. was actually in the state of Vermont, where Palmer Putnam installed a 1.25 megawatt turbine featuring a 175 foot diameter 16 ton stainless steel rotor. However, the size of the Putnam turbine exceeded the strength of existing materials, and one of the blades broke off in 1945 after only several hundred hours of irregular operation. The failure of the Putnam

turbine system marked the end of ongoing WGE developments in the United States until the mid 1970's (see below). However, in Europe temporary shortages of oil and gas following the end of WW II spurred ongoing developments in WGE technologies.

The sharp run-up in prices that accompanied the Organization of Petroleum Exporting Countries' (OPEC) 1973 oil embargo gave WGE a major boost in both the United States and Europe, on two levels: Electricity buyers began considering alternatives to generating electricity through fossil-fueled power plants. Meanwhile, governments in Europe and North America, panicked by the prospect of a cutoff in energy supplies, introduced a number of tax incentives to promote WGE.

However, this stimulus proved to be short-lived. The 1980's saw the phasing out of a number of these incentives. Meanwhile, economies in the industrialized world adjusted to higher oil prices by adopting various technologies to increase their energy efficiency. Interest in WGE declined through the decade, and only picked up in the 1990's as environmental concerns, mainly about climate change, began to mount around the world. In 1995, the United States re-introduced tax incentives for renewable energy, which further stimulated a WGE upsurge in the country.

Wind Power around the world

As of 2004, Germany, the United States, Spain and Denmark were the world leaders in installed WGE capacity (see table I). However, when expressed as a share of total system electricity capacity, WGE is far more important in Europe than the United States.¹ For example, in western Denmark, the utility ELTRA gets 100% of its electricity from WGE during low-demand periods of the year. In fact, WGE represents over half of ELTRA's required system capacity.²

Table I: Leading countries installed WGE capacity (December, 2003)

Country	WGE Capacity (n MW)
Germany	14,609
United States	6,374
Spain	6,202
Denmark	3,110
India	2,110
Netherlands	912
Italy	904
Japan	686
United Kingdom	649
China	568

Source: American Wind energy Association (http://www.awea.org/faq/tutorial/wwt_statistics.html)

¹ UK wind industry to take the plunge; the UK plans to become a world leader in wind technology through the development of offshore resources (2003). *Power Engineering International* 11, no 7 (August).

² Ibid

The European WGE industry has been driven by extensive government support. For example, the German WGE industry has been driven by generous tax incentives, estimated at between U.S. \$1.5 and \$1.8 billion, to promote construction of wind turbines.³ These construction incentives have been supplemented with a high minimum guaranteed selling price of 11.5 cents/KW hour (almost 2 ½ times the prevailing market price of 4.5 cents/KW hour as of 2004).⁴

In the United Kingdom, the government announced a goal of obtaining ten percent of the nation's electricity supplies from renewable sources by 2010, with this percentage increasing to 20% by 2020. These goals were set in the context of the British government's commitment to reduce the country's carbon dioxide (CO₂) emissions by 60% by the middle of the 21st century. In late 2001, the British government announced two major offshore WGE projects that would triple the country's WGE capacity from about 500 MW to almost 1.5 GW. In late 2003 the government announced plans for another expansion of offshore WGE turbines, adding another 6 GW of capacity at a cost of up to £ 6 billion (approximately U.S. \$9 billion).⁵

In the United States, WGE accounted for less than 1% of total energy production as of 2003, but output of WGE was rising rapidly since the late 1990's. Between 2003 and 2008 installed WGE capacity was expected to increase from 6,374 MW in 2003 to almost 9,500 MW.⁶ The U.S. Department of Energy announced a goal of having WGE produce 5 % of total American energy capacity by 2020, though industry groups were predicting that at that current growth rates, WGE would constitute 6% of total American energy output by that year.⁷

Two of the main drivers of WGE capacity installation and demand for WGE in the U.S. have been federal and state tax incentives, and state-level mandates on utilities to acquire a stipulated percentage of their energy from renewable energy sources. The federal tax incentives promoting renewable energy originated with the Energy Tax Act of 1978. This statute offered income tax credits to businesses and consumers who purchased renewable energy equipment. In the 1980's, the U.S. government broadened the terms of the credits and the types of equipment that qualified for credits. In 1992, the Energy Policy Act introduced a 1.5 cent/kW hour production tax credit (PTC) to WGE produced by privately-owned facilities. The PTC was subsequently changed to make it a 10 year 1.8 cents/KW hour credit (with an inflation allowance) for large-scale WGE projects that go online before December 31, 2003. As of that date, the PTC officially expired, though efforts were underway in the U.S. Congress to extend the PTC through to the end of 2008.

In addition to the federal incentives, numerous states have introduced tax credit/rebate schemes at the state level to promote WGE investment. Finally, at least a dozen states had, by 2004, adopted some version of a mandated renewable energy portfolio for utilities in their jurisdictions. These mandates range from relatively low levels (e.g. Arizona's regulated utilities must purchase 1.1% of their power from renewables in the five years between 2007 and 2012) to the ambitious (e.g. 20% of California utilities electricity must be derived from renewable sources by 2017).⁸

³ Ferguson, N. (2004, July 24). War of the winds. *National Post*. P. A12.

⁴ Ibid

⁵ Ibid

⁶ American Wind energy Association (http://www.awea.org/faq/tutorial/wwt_statistics.html)

⁷ Fischbach, Amy F. (2002, February). Wind biz: High voltage electrical contractors are installing electrical infrastructure for large-scale wind farms. *Electrical Wholesaling* 83(2).

⁸ Renewable energy power purchase agreements: A reflection of the carrot-and-stick approach to renewable energy legislation (2003, March). *Journal of Structured and Project Finance* 9 (1).

A number of states were emerging as leaders in the American WGE scene. Their positions in the industry reflected a combination of unique topographical/geographical features and state tax incentives.

California

As of the end of 2003, California had the most installed wge capacity in the U.S., with some 2,043 MW. The state had been the leader among all American states in introducing WGE in the early 1980's. The first large scale wind farms in California reflected its unique topography, with large numbers of wind turbines packed into various mountain passes throughout the state. The early 1980-'s turbines were far smaller yet less efficient and cost effective than the newer versions that emerged in the marketplace in the late 1990's. So, beginning in 1998, a number of WGE operators in the state began "repowering" the older wind farms, tearing down the 1980's vintage turbines and replacing them with the newer technologies. For example, a farm with 100 40 KW turbines would be replaced with six 700 KW turbines, resulting in fewer turbines but higher output.⁹ However, wind farm repowering projects in the state have been stalled as a result of the electrical energy crisis of 1998-99, and the subsequent deregulation of California's electricity industry. A by-product of the crisis was the bankruptcy of the state's largest utility (PG&I) and the near bankruptcy of another (Southern California Edison). Both firms were forced to cancel large-scale wind farm repowering projects.

Despite these developments though, the WGE scene in California was not all gloomy as of 2004. The state began offering a 50% state tax credit to homeowners and businesses who installed WGE turbines. There was also the possibility that the state would offer an additional state tax credit of 30% on installation costs. Some industry observers predicted that the tax credit program would lead to an explosion in WGE usage and capacity in the state.¹⁰

Texas

WGE capacity in the state has risen dramatically since 1999. In that year, the state legislature adopted a requirement that 3% of the state's electricity be produced by renewable sources by 2009. This mandate and accompanying state tax credits added impetus to a federal energy tax credit (see above). Another key factor promoting WGE in the state has been its vast expanse of flat, wind swept, sparsely populated cattle grazing lands. A prolonged drought, which began in the late 1990's, has brought economic hardship to many of the state's cattle ranches, and their owners have discovered a much-needed source of revenues by selling rights to situate wind turbines on otherwise unused grazing lands. By 2003, a number of leading American energy firms had invested over \$1 billion in wind farms in the state, resulting in approximately 1,200 MW of installed capacity.¹¹ This represents over 20% of the U.S. total, and made Texas the second largest state in terms of WGE capacity.

⁹ Wind biz : High voltage elect contractors are installing electrical infrastructure for large-scale wind farms. Op cit.

¹⁰ Ibid

¹¹ Herrick, Thaddeus (2002, September 28). The new Texas wind rush. The Wall Street Journal, pp. B1, B5.



Exhibit I : Wind farm in southwestern Texas

Iowa

Iowa, the third largest WGE producer in the United States, was one of the early leaders in the American industry. In 1983, the state legislature had enacted a mandate that investor-owned utilities operating in Iowa had to source at least 2% of their energy from renewables. Two out-of-state utilities came in and each built large wind farms to serve Iowa's utilities. To stimulate demand for WGE, the state also introduced a unique zero interest loan program to encourage homeowners and businesses to install wind turbines. The state even began offering low interest loans to schools in the state to install WGE turbines. WGE in Iowa has also benefited from the state's topography which, like Texas, is characterized by vast expanses of open plains.



The World Supply of Oil

One of the justifications for WGE was that the world faced considerable uncertainty in terms of its future supplies of fossil fuels, notably oil, and that this uncertainty would directly impact utilities' ability to meet future demands for electricity. There have been dramatic changes in the world oil market over the past three decades. 1973 saw the world's first oil crisis, as the Arab nations who belonged to the Organization of Petroleum Exporting Countries (OPEC), initiated a boycott on exports to the United States and some of its allies. At that time, there were just over 3.5 billion people on earth, and total global consumption was approximately 35 million barrels per day (bbd). At the time of the Arab embargo, there were still substantial sources of untapped oil, both within

the United States and around the world. The rapid increase in petroleum prices which this first energy crisis created spurred dramatic increases in exploration and development of new oil fields. At the same time, the industrialized countries of the world found themselves having to confront the issue of energy efficiency for the first time. Businesses and governments in these countries responded with a number of new products, services and policies that greatly increased energy efficiency in many sectors of the economy and society.

By the year 2000, however, the long-term outlook for world oil supplies was again uncertain. It was estimated that at the start of the industrial age, the total amount of oil beneath the earth's crust which could be economically recovered was between 1,800 and 2,200 billion barrels. As of 2000, about 880 billion of these resources had been consumed.¹² Meanwhile, world population and global oil consumption both doubled from their 1973 levels, to 6 billion people, and 80 million bbd. By 2004, global daily oil consumption had increased to some 88 million barrels, reflecting increased economic activity in China and India, the two most populous countries on earth. However, discoveries of new sources of oil slowed significantly, with some 90% of global oil supplies in the year 2000 coming from fields found before 1980.¹³ Furthermore, most major discoveries made since 1990 were considered to be quite small by traditional standards.¹⁴ Compounding the uncertainty in the world's oil market was political instability and violence in several of the world's leading producing countries, including Nigeria, Iraq and Venezuela. As a result of these developments, crude oil future prices of a 50 gallon barrel of oil rose from just over \$30 in late 2003 to over \$52/barrel in October 2004, an increase of practically 66% in just over a year.

With increased consumption and a slowdown in discoveries of new oil fields, many industry experts have predicted that global oil production would peak some time between 2006 and 2015, then fall steadily to the point where the world ran out of oil some time between 2050 and 2090.¹⁵ However, this scenario is not universally accepted, and there are observers who feel that it is too pessimistic. These observers base their arguments on the fact that increasing prices generally stimulate even more exploration which will ultimately yield new supplies.¹⁶ At the same time, the oil supply optimists point to advances in drilling technology, which should permit the industry to increase the yield of existing oil fields above the present-day figure of about 20%.¹⁷ Finally, they point to energy efficiency gains which have been made in the industrialized world over the past thirty years, a trend these observers say will only be further stimulated by higher oil prices. As proof, they point to the dramatic improvements in automobile gas efficiency since 1973, and to the fact that developed economies such as the U.S. and the U.K. have increased the amount of GDP produced per unit of energy by almost 500% since the 19th century.¹⁸

Pros of Wind Power

WGE proponents present it as a clean, reliable and economically efficient source of power. The motivation for moving to WGE from other forms of electricity generation – notably burning fossil fuels – is based on three elements:

¹² The coming energy crisis. *The Vermont Sierran*, 24(2), June 2000, p.p. 6-7.

¹³ Phillips, W.G. Are we really running out of oil? *Popular Science*, May, 2000, p. 56.

¹⁴ Ibid.

¹⁵ Ibid.

¹⁶ Lomborg, B (2001). *The skeptical environmentalist: Measuring the real state of the world*. Cambridge, U.K. Cambridge University Press, p. 125

¹⁷ Ibid

¹⁸ Ibid.

Environmental

WGE backers stress that unlike fossil fuel burning energy plants, wind farms do not generate any air or water emissions. Unlike nuclear power plants, wind farms do not produce hazardous waste. Finally, in contrast to hydroelectric plants, wind farms do not require major impacts on rivers.

In terms of emissions of pollutants into the air, WGE backers note that fossil fueled power plants in the United States were responsible for almost 70% of sulfur dioxide (SO₂), 33% of nitrogen oxide (NO), 28% of particulate matter and 23% of toxic heavy metals released into the air as of 1997.¹⁹ SO₂ and NO and oxide are blamed for a phenomenon known as acid rain, where the acidic content of rain kills all living things in lakes, rivers and streams. Acid rain is particularly acute in the northeast United States, where many bodies of water have been impacted by SO₂ and NO emissions from coal fired power plants in the American Midwest states.

Concerns about global warming/climate change basically come down to concern about human activities that generate so-called greenhouse gases (GHG's), the most prominent of which is CO₂. According to scientists involved in the climate change debate, GHG's emitted into the air rise to the earth's stratosphere, where they form a layer which traps heat escaping from the earth. This so-called greenhouse effect is begin blamed by many scientists for what appears to be a slight warming of the earth's temperatures over the past twenty years. The policy debate on climate change focuses on the question of whether or not the warming is a natural evolution in the planet's climate, or if it is the result of this greenhouse effect. If it is indeed the latter and if human activities – notably the burning of fossil fuels – are the reason GHG's are released in the environment, then some reduction in GHG emissions is called for to prevent a potentially catastrophic rise in temperatures on earth.

A significant amount of GHG's, mainly CO₂, are emitted when fossil fuels – primarily coal, oil and natural gas- are burnt to power turbines which generate electricity. Proponents of WGE say it offers an alternative to fossil fuel burning, thus directly addressing climate change concerns. For example, a one-megawatt wind turbine generating about 3.1 million KW hours of electricity would eliminate 1, 500 tons of CO₂ emissions if the turbine replaced a natural gas fired turbine.²⁰ This figure goes up, to almost 2,100 tons of CO₂ emitted, if one were to assume that the electricity generated by the wind turbine had replaced a "typical" portfolio of 85% natural gas-fired and 15% oil-fired turbine generated electricity.²¹ Finally, if one assumes that some of the electricity generated by the WGE turbine had replaced power generated from a coal-fired plant, the figure of CO₂ emissions saved is higher still.

The concerns about GHG emissions are particularly important in the U.S., given that the country produces over 36% of all GHG emissions from industrialized countries. Moreover, according to 2002 data from the Environmental Protection Agency (EPA), emissions of CO₂ from electricity generation in the U.S. amounted to over 2.25 billion metric tons per year, more than double the amount released by motor vehicles in that year.²²

Economic

¹⁹ American Wind energy Association (http://www.awea.org/faq/tutorial/wwt_environmental.html)

²⁰ Boucher, T. and Stoddard, T. (2003, October 12). Do you prefer wind or coal? The Burlington Free Press, p. A 12.

²¹ Ibid.

²² As Kyoto protocol comes alive, so do pollution permit markets (2004 November 8). The Wall Street Journal, p. A2.

Another major argument employed by WGE proponents is the idea that since wind is free, the cost of WGE is stable and predictable, once installation costs have been accounted for. As Dr. Linn Draper, Chief Executive of the largest utility in the United States noted at the American Wind Energy Association's 2003 annual meeting:

Any renewables added to our generation mix reduces some of the volatility in the overall cost of fuel for our power plants... We've seen natural gas prices rise from about \$3/thousand cubic feet in late 2001 to as much as \$9/thousand cubic feet this year. We like the idea that the cost of fuel for a wind turbine is totally predictable.²³

WGE supporters also point to the economic benefits of siting wind turbines. They argue that wind farms represent critical additions to local and state tax bases, and through the lease payments wind farms pay for land use rights, represent a crucial revenue for property owners across the country. In Texas, for example, a landowner can earn about \$3,200 per turbine installed each year, with turbines placed every 25 acres.²⁴ A proposed 200 turbine farm in Grant County, Virginia is expected to pay over \$500,000 per year in local taxes, making it the fifth largest taxpayer in the county. The company developing the facility has also entered into a partnership with two local schools, who will earn royalties of \$75,000 per year from the farm. Landowners in the county, an area hard hit by coal mine closures over the years, will receive between \$2,000 and \$4,000 per acre to lease the almost 8,000 acres needed for the facility. Finally, installation of the turbines will create 200 construction jobs for up to one year, and 15 permanent servicing jobs in the county.²⁵

Finally, WGE supporters claim that with current improvements in turbine technology, electricity generated by wind turbines is economically competitive with power produced through burning of fossil fuels. Factoring in installation costs, operations and maintenance costs, and cost of fuel, one WGE firm estimates electricity costs of between \$0.05 and \$0.10 per KW hour for wind, versus \$0.06 - \$0.08 for natural gas fired engines.²⁶ These technological improvements have focused on making the turbines quieter, more reliable and more powerful, all at a lower cost. A spokesperson for a leading manufacturer of wind turbines noted that turbine efficiency has gone up by 5% per year every year since the late 1990's.²⁷

Criticisms of Wind Power

WGE has attracted opposition from a wide and sometimes surprising range of groups and interests. These opponents base their opposition on the following areas:

Variability/reliability

Critics of WGE point to its variability. Simply put, the wind on any given day cannot be too weak, since it will not turn the turbines. However, winds that are too strong can force a shutdown of the turbines to prevent possible toppling. Wind's efficiency is usually estimated at between 30 and 40%. Critics of WGE charge that this means every WGE facility needs an equivalent power backup source, usually from traditional fossil fuel fired plants, thus negating much of the

²³ Regulators vow that change is in the wind (2003 July). Power Engineering 107(7).

²⁴ Thaddeus, op cit.

²⁵ Seelye, Katharine Q. (2003, June 5). Windmills sow dissent for environmentalists: An energy source's impact is debated. The New York Times, p. 28.

²⁶ Northern Power Systems (2003). On site power systems deliver cost savings and emission reductions. Waitsfield, VT: Author.

²⁷ Kirsner, Scott. (2003, August 28). A high tech update makes windmills more efficient, changing the energy equation. But inconspicuous they're not. The New York Times, pp. G1, G4.

“savings” which WGE supporters claim. The WGE industry’s response is that wind is only part of a constantly shifting electricity generating portfolio. As described by one WGE proponent:

*...electricity demand is a constantly moving target. The more accurate picture is one of a number of generating plants moving on and off line throughout the day to meet a steadily shifting load. At any one time, only some 15% of the total generating capacity is consciously “dispatched” to keep load and generation in balance. Obviously a variable generating source fits into this latter picture much more readily.*²⁸

WGE supporters stress that most fossil fuel electricity plants are able to be operated on a variable basis to accommodate changes in wind conditions. They also point out that that wind turbines typically generate most of their output at night, when electricity usage is low and fossil fuel plants are used less, if at all. Better forecasting of wind conditions, together with more available WGE, will allow operators to scale back use of fossil fueled plants even further.²⁹

Cost

Another serious charge levied against WGE is cost. Critics claim that while wind turbines cost between \$1,000 and \$1,500 per KW to install, natural gas powered plants of equivalent scale cost between \$400 and \$650 per KW.³⁰ Critics of WGE concede that wind is essentially a free input, while traditional plants must pay for fossil fuel. However, they contend that the combination of wind’s relatively low efficiency and the higher installation cost of turbines mean that WGE is invariably more costly. For example, the Royal Academy of Engineering in Britain has estimated that coal, gas, and nuclear plants in the UK produce power for about 6 cents/KW hour, versus over 13 cents for land based turbines.³¹ This gap is even higher in the case of offshore turbines, whose higher installation, service and transmission costs push the price of their electricity to over 18 cents/KW hour.³²

Critics of WGE’s economics note that wherever it is used, it is accompanied by massive state subsidies. Referring to Denmark’s WGE experience, one American-based critic claimed that the Danish Energy Commission subsidizes nearly 30% of the true cost of producing wind power in that country.³³ In the case of Germany, a British WGE opponent stated that the industry has received tax concessions worth about \$1.8 billion simply for installation costs.³⁴ On top of that, the German industry, according to this observer, has been guaranteed a price of 11.5 cents/KW hour, almost triple prevailing market prices of 4.5 cents/KW hour.³⁵

Here too, WGE proponents have a counterargument. They maintain that the energy market is filled with various subsidies to other fuel producers. For example, they point to the over \$30 billion which the U.S. government has paid out over several decades to cover medical expenses for coal miners who developed “black lung” disease as a result of working in the coal mines, the federal government’s role as an insurer of last resort in the case of a major accident at any American nuclear power facility, and the billions of dollars in military expenditures which the

²⁸ Rising wind – time to take a second look (2003, September). Power Engineering 107(9).

²⁹ Bouchard and Stoddard, op cit.

³⁰ Mazur, Frank. (2003 October 12). Wind power not practical. The Burlington Free Press, p. 8A.

³¹ Ferguson, op cit.

³² Ibid

³³ McGrath, Kevin. Facts and fictions on wind power. The Burlington Free Press, P. 7A.

³⁴ Ferguson, op cit.

³⁵ Ibid

U.S. government incurs to ensure shipping lanes from the oil fields of the Middle East are kept open.³⁶

Environmental

A somewhat unintended consequence of WGE has been its impact on migratory birds. In areas with high levels of bird migration, the rotary turbines have caused thousands of bird deaths. This is particularly true of the older, 1980's generation turbines. For example, the Altamont Pass wind farm in California, built in the early 1980's, is in an area with one of the world's largest populations of breeding pairs of golden eagles. The farm is the world's largest, in terms of the number of turbines. Each fall, the eagles as well as thousands of red tail hawks fly through the pass on their way to winter homes in central California. According to the California Energy Commission, some 22,000 birds have been killed by the Altamont windmills, including between 400 and 800 golden eagles.³⁷

As the wind farm applied to renew its permits in late 2003, a number of environmental groups actually opposed renewal. As a spokesman for one of the groups, Californians for Renewable Energy, stated that "...renewing these permits without addressing the impacts of wind energy on migratory birds, especially raptor species, will give a black eye to wind power."³⁸

The WGE industry has responded to the criticism by referring to the Altamont wind farm as an "anomaly." More importantly, they contend that lessons learned at Altamont have been applied to other wind farms in migratory bird routes, significantly reducing bird deaths.³⁹ An industry-funded study conducted in 2001 found that the number of birds killed annually in the U.S. by wind turbines (between 10,000 and 14,000) paled in comparison to the number killed in collisions with cars (60 million), building windows (98 million) and satellite/radio towers (4 million).⁴⁰

The main environmental objection to WGE concerns aesthetics. Besides the visual impacts which may be caused by road building and site clearance needed for wind farms, the turbines themselves represent what one critic called "visual pollution." As a resident of Thomas, West Virginia whose home is near a wind farm of over forty 228 foot tall wind turbines lamented

*I can't believe how large and hideous they are. When you hear the word "windmill" you think Holland and Don Quixote. That's wrong. They [the turbines] look like alien monsters coming out of the ground.*⁴¹

Robert F. Kennedy Jr., son of the late senator and one of the country's leading environmental activists, explained his opposition to a major WGE project off the coast of Cape Cod, on similar lines:

*There are appropriate places for everything. You would not want a wind farm in Yosemite [a famous national park in Montana] and you wouldn't want one in Central Park [New York City's central green space]."*⁴²

³⁶ American Wind energy Association (http://www.awea.org/faq/tutorial/wwt_costs.html)

³⁷ Tempest, Rone (2003, December 22). . Bird lovers blast wind farms. The Detroit News, p. 7A.

³⁸ Ibid

³⁹ Ibid

⁴⁰ Ibid

⁴¹ Seelye, Katherine Q., op cit.

⁴² Ibid

Another celebrity who has shared Kennedy's opposition to the Cape Cod project, which calls for 130 turbines to be built seven miles off the coast of Nantucket Island, is the legendary American journalist Walter Cronkite. Cited in opinion polls as the most trusted man in America, Cronkite was quoted in the *New York Times* as saying "...our national treasures should be off limits to industrialization."⁴³

Echoing this notion that wind farms represent industrialization of previously pristine vistas, Wayne Kurker, the founder of a group formed to oppose the Nantucket project, stated

*A good portion of us who migrated to Cape Cod came to enjoy Nantucket Sound...and if Nantucket Sound becomes an industrial electrical generation area, then it's no longer the national treasure that people currently feel it is. We look at this as our wilderness, our national park.*⁴⁴

Community members' objections to the aesthetic impact of wind farms have developed in several American states where WGE projects were being proposed. For example, in the late 1990's, a proposal for relatively small (three turbine) wind farm on Long Island, NY was dropped following community member objections that the area's view of a lighthouse would be marred.⁴⁵

The phenomenon of residents of an area where a WGE project was being proposed objecting to its proximity to their homes while simultaneously supporting the notion of renewable energy had even acquired a moniker in the press: NIMBY ("not in my backyard").

WGE supporters vigorously dispute the notion that siting of a wind farm destroys views and harms the tourist appeal of an area. For example, a 2002 survey of tourists in the Argyll region of Scotland found that 91% said the presence of wind farms there would have no impact on their decision to revisit the area.⁴⁶ About one fifth of the respondents had actually seen one of the three wind farms in the region, and whereas 55% of these people felt that the wind farms contributed to a "generally or completely positive" perception of the region, only 8% said the turbines created a "negative" impression of the Argyll area.⁴⁷

In fact, wge backers claim that wind farms actually help tourism,. They cite data showing that in scenic areas in both the U.S. and Denmark where wind farms have been built, tourism has actually gone up, with local tourist promotion boards actively marketing the presence of the facilities to potential visitors. The Argyll, Scotland survey noted above found that twice as many people would return to an area because of the presence of a wind farm than would stay away.⁴⁸

Electricity supply and demand in Vermont

Vermont is one of the smallest states in the United States, ranking 43rd in area (24,903 square KM or 9,615 square miles) and 48th in population (approximately 620,000). Exhibit IV shows the location of the state as well as the site of the proposed Glebe Mountain project. The state consumes about 6 million MWh of electricity per year.⁴⁹ Average load is about 600 MW but can

⁴³ Burkett, Elinor (2003, June15). A mighty wind. *The New York Times Magazine*, pp. 48-51.

⁴⁴ Ziner, Karen Lee (2002, April 6). Offshore harvest of wind s proposed for Cape Cod. *The New York Times*, p. F3.

⁴⁵ Belluck, Pam (2003, March 2). Travel Advisory: Correspondent's report; a wind power plan stirs debate in Massachusetts. *The New York Times*.

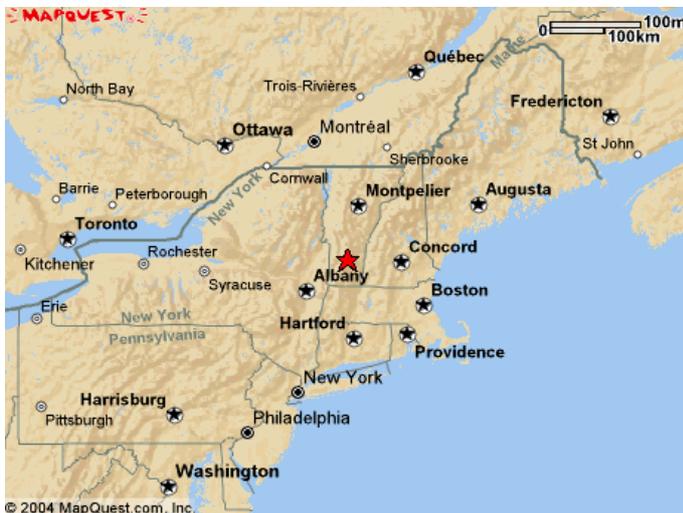
⁴⁶ American Wind energy Association (http://www.awea.org/faq/tutorial/wwt_environmental.html)

⁴⁷ British Wind Energy Association (<http://www.bwea.com/media/news/tourism.html>)

⁴⁸ Ibid

⁴⁹ Glebe Mountain Group (2004). Power Information, State of Vermont [on-line]. Available http://www.glebemountaingroup.org/q_&_a.htm

rise as high as 1,000 MW.⁵⁰ Though the state has a small population and a relatively small industrial base, the extremely cold winters constitute an important driver for electricity demand. The state’s utilities rely on long term contracts for almost 85% of Vermont’s needs. The most important of these are with Hydro-Quebec, the provincial government owned utility in nearby Quebec, which supplies hydroelectric power to the state, and with Vermont Yankee, an investor owned nuclear plant located in Southern Vermont. Vermont is actually the “cleanest” consumer of electricity in the United States, ranking first in the nation in terms of having the least amount of sulfur dioxide and carbon dioxide emissions arising from its electricity purchases, and second in the nation in terms of having the lowest level of nitrogen oxide emissions.⁵¹ Moreover, the state is ranked 9th in the country in terms of the percentage of renewable energy in its total energy mix.⁵² As of 2004, its mix of energy for electricity production was as shown in table *Exhibit III*: Map of Northeast United States and Canada, showing state of Vermont (black star indicates state capital of Montpelier; red star indicates site of proposed Glebe Mountain project).



CODY

Exhibit III: Map of Northeast United States and Canada, showing state of Vermont (black star indicates state capital of Montpelier; red star indicates site of proposed Glebe Mountain project).

Table II: Energy Sources for Vermont Electricity Production, 2004

Fuel	Percentage	Fuel	Percentage
Hydro	39.4	Nuclear	37.4
Wood	3.5	Market Purchases	19.2
Wind	0.5	Gas	1.3
		Oil	2.7

Source: Green Mountain Power (<http://www.gmpvt.com/whoware/green.shtml>)

⁵⁰ Ibid

⁵¹ Green Mountain Power (2004). Who we are. [on-line] <http://www.gmpvt.com/whoware/green.shtml>

⁵² Ibid

Vermont has typically had among the highest electricity rates in the country, averaging just under 12 cents- KW h as of 2004. Retail electric prices are regulated by a state government appointed authority, the Vermont Public Service Board.

Vermont is not considered an ideal state for WGE siting, ranking 32nd in the country in terms of wind resources.⁵³ Given the state's mountainous terrain, wind turbines have to be situated atop mountain ridgelines to capture prevailing westerly winds. However, only ridgelines between 2,000 feet and 3,400 feet vertical rise are suitable for wind turbines. Below 2,000 feet, prevailing winds are not sufficiently strong for turbines. Above 3,400 feet, fragile mountain ecosystems and abnormal cold which could ice the turbines inhibit WGE project siting. There are between 600 and 700 miles of ridgeline in the state which lie in this desired zone, but up to 85% of these lands are owned by the state or federal governments, and usually carry provisions barring development.⁵⁴ This means that only 100-150 miles of ridgeline in Vermont is amenable to turbine siting.⁵⁵

As of 2004, the only wind farm operating in the state was the 11 turbine Searsburg project, owned and operated by Green Mountain Power, the 2nd largest utility in Vermont. Opened in 1997, this wind farm was, as of 2004, the largest WGE facility in the eastern United States. It features relatively short towers (193 feet) and no 24 hour lighting for aircraft safety (though a proposal has been made to the U.S Forest Service to add 20 more turbines, each over 330 feet tall, requiring 24 hour lighting). The topography of the Searsburg project is such that there are a number of adjacent ridgelines and mountain peaks which reduce the overall impact of the wind farm on the scenic views in the area.⁵⁶

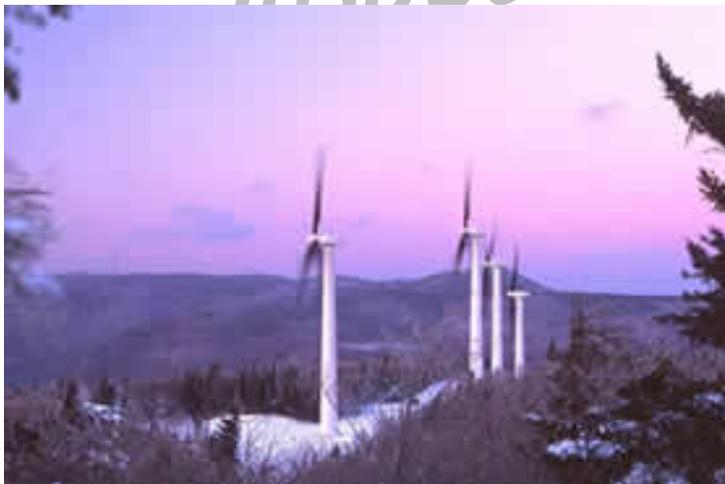


Exhibit IV: View of the Searsburg, VT wind farm from the summit

⁵³ American Wind energy Association (http://www.awea.org/faq/tutorial/wwt_potential.html)

⁵⁴ Glebe Mountain Group (2004). Why Glebe Mountain? [on-line]. Available <http://www.glebemountaingroup.org>

⁵⁵ Ibid

⁵⁶ Glebe Mountain Group (2004). Wind turbines are not magic. [on-line]. Available ⁵⁶ [on-line]. Available <http://www.glebemountaingroup.org>



Exhibit V: View of the Searsburg, VT wind farm along the access road

In the fall of 2003, East Haven Windfarm announced plans to build four 1.5 megawatt wind turbines atop East Mountain, the site of a former U.S. Air Force radar base in northeast Vermont. The project was presented to the local community as a demonstration project, aimed at showing the community what a wind farm would look like and how it could benefit the area. The local utility, Lyndonville Electric Department, had agreed to purchase the WGE output of the project at discounted rates. East Haven Windfarm announced that their ultimate goal was to build up to fifty turbines in the area. Each of the four initial turbines would be about 220 feet tall. The company held a series of informational hearings in the area in the fall of 2003. It also released a survey of area residents which showed that over 80 per cent were in favor of the project.⁵⁷ The town's Selectboard also gave its approval to the project, noting that the project would generate almost \$70,000 per year in additional property taxes.⁵⁸ The company originally planned to have the project running as of the fall of 2004, but as of November, 2004 the project was still under regulatory review.

Tourism in Vermont

With an overall impact of about U.S. \$4.2 billion per year, tourism is the second largest contributor to the economy of the state of Vermont. Tourism-related expenditure supported almost 64,000 jobs in the state, representing over 20% of total employment in 2001.⁵⁹ Tourism accounts for approximately one quarter of all business tax revenues for the state's government.⁶⁰

Winter is the most important season for the state's tourism industry, with its hundreds of alpine and Nordic ski centers generating almost U.S. \$1.6 billion per year. However, summer (\$1.23 billion) and fall (\$1.06 billion) fall closely behind in terms of economic importance.⁶¹ For these

⁵⁷ Survey: Residents back wind project (2003, October 9). *The Burlington Free Press*, p. 3B.

⁵⁸ Board backs wind farm (2003, October 17). *The Burlington Free Press*, p. 3B.

⁵⁹ Vermont Tourism Data Center (2002). *The Vermont visitor 2001* [on-line]. Available <http://www.uvm.edu/~snrvtde>

⁶⁰ Kelley, K. (2002, October). Conference facilities expand at tourist venues. *Vermont Business Magazine*, 33-34.

⁶¹ Vermont Tourism Data Center (2002). *Vermont tourism data 2001* [on-line]. Available <http://www.uvm.edu/~snrvtde>

latter two seasons, Vermont's attraction is based on the natural beauty of its forested mountains (the state name "Vermont" is translated from the French "Green Mountain"), and the tranquility of its mainly rural makeup. As an official in charge of marketing the northeast portion of Vermont to out of state tourists has noted:

*People just love the peacefulness of Vermont...Peaceful is the one word you hear over and over. People want to get back to earth, back to nature. Maybe their whole soul needs to be at peace...*⁶²

The positioning of the state as an oasis of rural tranquility is particularly important given its proximity to the crowded urban areas of the American northeast. The state is within driving distance of some fifty million residents of the Boston- New York- Washington urban corridor, and it aggressively promotes itself as a place of pastoral peace, clean air and unspoiled views.

The company

Catamount Energy Corporation (CEC) was formed in 1986 as a non regulated subsidiary of Central Vermont Public Service (CVPS), the largest utility in Vermont. The original mission of CEC was to invest in a wide range of renewable energy projects including wind, hydroelectric, natural gas and wood waste. However, in 2001 the company altered its mission from being a passive investor in renewable energy to becoming an active developer, operator and owner of WGE projects. As the company website explains, "Catamount believes that wind power will maintain the highest growth rate in the global energy market in the decades ahead."⁶³

Since undertaking its strategic redirection, CEC had by 2004 an operating portfolio of over 450 MW and a short term development pipeline of over 400 MW.⁶⁴ The company's main focus has been WGE projects in the U.S., U.K. and Germany.

In May 2004, CEC announced a new WGE partnership with Marubeni Corp., a giant Japanese industrial conglomerate. The agreement with Marubeni, owner of a global renewable energy portfolio of over 500 MW, represented a major boost in resources available to CEC as it attempted to build its WGE presence.⁶⁵

The Glebe Mountain Project

In 2003, CEC proposed a 27 turbine wind farm atop Glebe Mountain, in the southeastern corner of Vermont. The \$ 58 million project would have a generating capacity of 50 MW, or just under 10% of total demand in the state (in comparison, the state's only nuclear plant, Vermont Yankee, has a capacity of 550 MW). The project as proposed would spread of 3.5 miles of ridgeline, with each of the turbines spaced approximately 500 feet apart. The land for the proposed project is privately owned by two individuals, both of whom reside outside the state.⁶⁶ CEC was proposing to lease between 2,000 and 3,000 acres, though the turbines themselves would only occupy about

⁶² Marcel, Joyce (2002, October). After 9/11: Domestic tourism thrived, international waned. *Vermont Business Magazine*, 31-32.

⁶³ Catamount Energy Corporation (2004). What is our vision? [on-line]. Available http://www.catenergy.com/culture_values.html

⁶⁴ Ibid

⁶⁵ CVPS plans wind power expansion: Unveils link with Japanese power company. (2004, May 6). *The Burlington Free Press*, p. 8A.

⁶⁶ Glebe Mountain Group (2004). Wind turbines are not magic. [on-line]. Available <http://www.glebemountaingroup.org>

100 acres. In addition to land cleared for the turbines, the Glebe Mountain wind farm would require a four lane access roadway as well as connections to power substations in the nearby town of South Londonderry.

CEC selected Glebe Mountain since, at just over 2,923 feet elevation, it is in the ideal range for mountaintop turbine siting (see above). As well, the mountain has a favorable north/south alignment to take advantage of prevailing wind flows. Another factor favoring Glebe Mountain is the fact that one end of its ridgeline has already been developed as a ski area, known as Magic Mountain.



Exhibit VI: View of Glebe Mountain from nearby peak

The company predicted the \$58 million spent on the project would include almost \$15 million disbursed in Vermont, resulting in some \$10 million in direct and indirect wages for Vermonters. Though construction would only take about twelve months, CEC forecast that the total development period for the project would last between two and three years, and create some 260 jobs. Finally, the company forecast that over the estimated 20 year life of the Glebe Mountain project, some \$650,000 would be added to Vermont's economy each year.⁶⁷

The Glebe Mountain project differed considerably from the state's existing wind farm at Searsburg (see above). The 27 turbines proposed for Glebe Mountain would each be some 330 feet tall, almost 140 feet taller than the Searsburg turbines and some 25 feet taller than the Statue of Liberty in New York. In addition to having a significantly greater degree of visibility due to their height, the turbines would be subject to U.S. Federal Aviation Administration (FAA) regulations on lighting. These rules mandated that all structures over 200 feet tall had to be fitted with aircraft warning navigation lights. Though the FAA had not issued detailed instructions for

⁶⁷ Catamount Energy Corporation (2003). An open letter to the community. [on-line]. Available http://www.catenergy.com/glebe_mtn_documents.htm

the Glebe Mountain facility as of 2004, it was known that among the possible requirements for the turbines would be red lights, flashing strobe lights (up to 40 times/minute, 24 hours/day), or selective lighting of only some of the turbines. In contrast, the Searsburg turbines, being under the 200 foot threshold, did not have to be lit.

According to critics of the project, both the town of Londonderry's development plan and the Regional Plan make specific mention of the area's scenic beauty and the need to protect ridgelines in the area. The town plan includes a reference to the need for "protection of ridgelines from development which adversely affects scenic values."⁶⁸



Exhibit VII: View of Glebe Mountain in winter (note Magic Mountain Ski Center on left)

Shortly after CEC announced plans for the Glebe Mountain wind farm, a number of residents and property owners in the nearby town of Londonderry formed the Glebe Mountain Group to block the project. The group, led by former state legislator and former chairman of the Vermont House Natural Resources Committee Sam Lloyd, based its opposition on the aesthetic impact of the project. These concerns focused on the height of the proposed turbines, the probable FAA mandate for lighting the towers, and the potential impact of the development on wildlife habitats along the ridgeline. As Lloyd stated in an interview with *The Burlington Free Press*, "we'd be giving up something that is quite precious in Vermont – what you might call the purity of Vermont's ridgelines."⁶⁹ Though not opposed to renewable energy, Lloyd went on to say in the same interview that it appeared WGE was better suited to areas in the western U.S. where population density was lower than in the northeast. As stated on its web site, the Glebe Mountain group asked if the limited putative benefits of WGE warranted the aesthetic impacts of projects like Glebe Mountain:

⁶⁸ Glebe Mountain Group (2004). Wind turbines are not magic. [on-line]. Available <http://www.glebemountaingroup.org>

⁶⁹ Allen, Anne W. (2004, February 1). Wind turbine project stirs Londonerry: Glebe Mountain debate focuses on environment. *The Burlington Free Press*, p. 6C.

The commercial development of Vermont's mountain ridgelines for wind power is contrary to decades of Vermont public policy designed to protect fragile high elevation areas, preserve important scenic resources, promote tourism and maintain Vermont's special reputation as a place of unparalleled beauty. Glebe Mountain Group believes that wind power must be placed in perspective and analyzed in the Vermont context...wind power developers should have the burden to demonstrate that there is a compelling reason to sacrifice mountain ridgelines for an energy source of limited potential...⁷⁰

However, not everyone in Londonderry was opposed to the project. In late 2003, a small group of environmentalists led by local cross-country ski center manager Rob Roy Macgregor and architect Keith Dewey formed Fairwinds Vermont. The group's aim, according to Macgregor, was to offer facts "...in the face of misinformation coming from the wind opponents."⁷¹ The group was motivated by concerns about the impact of continued fossil fuel burning to generate electricity. As Dewey noted, "what trumps all of the aesthetic conversations is the fact that we're doing some very nasty things to the planet."⁷² As for the notion that Glebe Mountain offered too little energy to really address serious environmental issues such as climate change, Macgregor was emphatic that the project was "...like baby steps. If Vermont doesn't have the social and political vision to take their first steps, what is the incentive for another state to do it."⁷³ Speaking about the benefits of WGE, Macgregor was equally emphatic: "*The wind, it blows and it's free. That's got to be better than sending people to Iraq to preserve our access to the oil.*"⁷⁴

The regulatory and consultative process

Vermont is the only state in the United States to have a state-government level approval process for development projects. The statute under which the state regulates development projects, Act 250, was enacted in the early 1970's to protect Vermont's rural character and tourist appeal. Electric generating projects are exempt from Act 250. Instead, such projects must seek approval from the state's Public Service Board (PSB), under Act 248. However, the PSB is required to evaluate projects using a number of criteria which closely mirror Act 250 priorities, such as giving "due consideration" to development plans of towns and regions. That said, the PSB is authorized to approve electricity generation projects even if they are contrary to local objections and plans if the project in question is deemed "for the public good."

CEC began its efforts at building support for the Glebe Mountain project with a presentation to the Select Board [an elected council which functions as a local governing body] and the Planning Board of the town of Londonderry in November, 2002 [Author's note: Go to: http://www.catenergy.com/glebe_mtn_documents.htm for presentation]. In March of 2003, the company issued an open letter to the community of Londonderry to solicit support for the Glebe Mountain project . [Author's note: Go to http://www.catenergy.com/glebe_mtn_documents.htm for letter]. During the spring of 2003, CEC hired an outside consultant, David van Wie, to organize and lead a series of meetings in and around Londonderry to bring property owners, local officials, environmentalists, residents and company representatives together. The aim of the

⁷⁰ Glebe Mountain Group (2004). Welcome to the Glebe Mountain Group web site [on-line]. Available <http://www.glebemountaingroup.org>

⁷¹ Allen, Anne W. Op Cit.

⁷² Ibid

⁷³ Ibid

⁷⁴ Ibid

meetings was to try to respond to as many of the concerns being raised as possible, before CEC began the formal process to obtain Act 248 approval from the PSB. However, from the outset it was clear that both opponents and supporters of the Glebe Mountain project were so polarized that there was little, if any, middle ground between them. Speaking for the Glebe Mountain Group, Sam Lloyd stated that "...there's little to negotiate in the matter...there's either a wind farm or there isn't."⁷⁵ As for Fairwinds Vermont, leader Rob Roy Macgregor stated flatly "...there's no way any information is going to come out of this process that is going to convince Glebe Mountain Group to do anything but try to stop it tooth and nail."⁷⁶

Opposition builds and the Process Breaks Down

In late 2003, the first rumblings of wider opposition to WGE began to emerge in Vermont. A spokesman for one of the state's leading hunting and fishing groups, HAT (Hunters Anglers Trappers of Vermont) spoke out at a WGE forum in favor of a moratorium on all wind project construction until the state could determine a new policy on the issue. In early February, the moratorium call was echoed by several other outdoorsman's groups led by the Vermont Federation of Sportsman's Clubs. A spokesman for the Federation expressed concerns about how large-scale WGE projects could restrict access for hunters and hikers on certain mountaintops, as well as negatively impact high altitude species, notably bear and moose.⁷⁷

In February, 2004, The Burlington Free Press, the largest daily newspaper in the state, issued a scathing editorial against WGE. Calling the siting of wind turbines "...a serious threat to Vermont's natural beauty...", the editorial went on to warn that such projects represented a form of "visual pollution" that "...would be devastating" to a state so dependent on the tourism industry.⁷⁸

In early May 2004, the Glebe Mountain Group gathered over 900 signatures from residents of the towns surrounding Glebe Mountain for a petition sent to Vermont's governor, James Douglas. The petition called for a moratorium on all WGE projects in the state, pending a comprehensive review of all potential economic, environmental and "quality of life" impacts (see Appendices II and III). Finally, in late May 2004, the Group notified David van Wie via a letter and email that it was formally withdrawing from the collaborative planning process which CEC had begun the previous year. In the letter, James Wilbur, the group's co-chairman and longtime Londonderry resident, stated

Catamount has consistently stated its intent to proceed with a massively scaled project even though necessary studies have not yet been carried out, and seemingly without any regard for the views of other participants.⁷⁹

Sam Lloyd, for his part, stated simply that the Glebe Mountain Group had felt for some time that the collaborative process would yield nothing from their point of view. "There's really not that much to negotiate," he told The Rutland Herald, "...they [CEC] have done their arithmetic to reveal that for it to be profitable, they've got to have that number of towers in that location."⁸⁰

⁷⁵ Ibid

⁷⁶ Ibid

⁷⁷ Crawford, Matt (2004, February 1). Outdoors folks wary of wind development. The Burlington Free Press, p. 7C.

⁷⁸ The high cost of wind (2004, February, 18). The Burlington Free Press, p. 6A.

⁷⁹ Smallheer, Susan (2004, May 19). Group pulls out of wind planning. Rutland Herald, p. 1.

⁸⁰ Ibid

Lloyd went on to suggest that the Glebe Mountain Group could be drawn back into the process by some kind of concession from CEC, such as offering to reduce the height of the Glebe Mountain turbines below 200 feet, thus eliminating the need for lighting. However, Lloyd then said "...I didn't feel they [CEC] would make any retreat."⁸¹ For now, Lloyd said that opponents of the Glebe Mountain project would focus their efforts at blocking the project in the Act 248 approval process.

Inspection copy

⁸¹ Ibid

Appendix 1: Glossary

i) Measuring electricity

Watts: A measure of electricity

- Kilowatts: 1,000 watts
- Megawatts: 1 million watts
- Gigawatt: 1 billion watts

Kilowatt hours (kWh): 1,000 watts of electricity produced or consumed for one hour. The most commonly used measure of electricity production and consumption.

An average household in the United States uses about 10,000 kWh of electricity per year. One megawatt of wind energy can produce between 2.4 million and 3 million kWh of electricity per year. So, one megawatt of wind energy can supply the needs of between 240 and 300 households. The proposed Glebe Mountain project, producing up to 131,400 MWh, could supply up to 18,700 households.

ii) Wind Turbine: A propeller-like blade connected to a generator to produce electricity. Wind turbines can have two or three blades, mounted on a tower to capture stronger winds at heights of 100 feet (30 meters) or more above ground. Under force of the wind, wind turbines begin to spin. The turbines are connected to a turning shaft which spins a generator to produce electricity. Wind turbines currently produced have power ratings from 250 watts to 2.0 Megawatts. A 2.0 MW wind turbine can produce over 5 million KW hour per year. Wind turbines range in size (in terms of diameter) from 8 meters (24 feet) or less for small residential systems, to between 50 and 90 meters (150-270 feet) in diameter for utility-scale turbines.

Wind turbines can be used as stand-alone generating systems, usually used for pumping water or to generate electricity for local structures. Alternatively, they can be connected to a utility power grid. When grouped together to produce electricity for a grid, turbines are referred to as wind farm.

Appendix 2: Letter

May 6, 2004

Governor James Douglas
109 State Street, Pavilion Office Building
Montpelier, VT 05609-0101

Dear Governor Douglas,

Enclosed are more than 900 signatures of residents and landowners of the Mountain-Valley/Glebe Mountain Region, including the towns of Londonderry, So. Londonderry, Windham/West Townshend, Peru, Stratton, Weston, Langrove, Andover, Chester, Jamaica, and Bondville, supporting a closer study of wind generation.

These signatures have been collected one-by-one, over the past 6 weeks, at town meetings, through phone calls, letters, neighbor visits, and emails.

Each person has expressed strong support for a careful review of the impact of large-scale wind turbines on the ridgelines of Vermont, especially at or above 2500', regardless of whether the land ownership is Federal, State, Land Trust, or private.

We believe that the Administration, the Legislature, and the people of Vermont should have the opportunity to review the potential environmental, economic, safety, and quality of life impact on the State of Vermont, and to weigh the costs and benefits of the installation of the modern large-scale 330" wind turbines on Vermont's pristine ridgelines. A comprehensive study would give us all the opportunity to better understand this complicated subject, and to participate in this important issue that will so profoundly affect Vermont's future.

As more wind factories are developed throughout the world, the unintended negative impacts of wind energy production have become more evident. While wind power appears to be an attractive source of renewable energy, it may come at considerable risk to many of the things that make Vermont a special place to live and to visit.

Governor Douglas, we greatly appreciate your support for a commission to study wind turbines and their appropriateness for the State of Vermont. The construction of massive wind power plants along Vermont's mountaintops has the potential to severely impact the beauty of the State in exchange for a small amount of energy. Let us not rush into industrial wind power before a thorough study of its effects on Vermont's environment, economy, and quality of life.

Sincerely,

Residents and landowners of the Mountain-Valley/Glebe Mountain Region

Contact:

Judith Mir

P.O. Box 1058
Chester, VT. 05143

Appendix 3: Petition

SUPPORT A MORATORIUM ON WIND POWER PROJECT CONSTRUCTION

We, the residents and landowners of the Mountain-Valley / Glebe Mountain region, including the towns of Londonderry, Windham, Peru, Weston, Landgrove, Andover, Chester, and Jamaica, hereby urge our Governor and State Legislature to immediately pass legislation that will impose a three-year moratorium on the construction of large scale wind turbine projects on protected (*at or above 2500'*) ridgelines of Vermont, regardless of whether the land ownership is Federal, State, land trust, or private.

We need time to:

- Study the many environmental, economic, health, safety, wildlife, and other impacts that would profoundly affect the area.
- Develop a statewide industrial wind policy.
- Resolve inconsistencies between land use issues and protections (Act 250) and electric power issues and regulations ("Act" 248.)
- Weigh the costs and benefits of putting large-scale wind projects on Vermont's ridgelines.

We now have an excess of power. A three-year moratorium would give us time to better understand this complicated subject and participate in this important issue affecting Vermont's future.

If you would like to add your name to a request for time to consider Vermont's future, please sign and return to the address below. You can also send an email, telephone message or fax indicating your support (see below.) *Please encourage others who would like to sign this petition to sign below or get in touch with us.*

Name(s): _____ Phone _____
 Address: _____ Email: _____
 _____ Other: _____

Name: _____ Phone _____
 Address: _____ Email: _____
 _____ Other: _____

Please sign & return to: The Glebe Mountain Group, PO Box 2087, S. Londonderry, VT 05155 or indicate your support by Tel/Fax: 802-824-4493 or e-mail postmaster@glebemountaingroup.org

(Please use the back of this sheet for additional names)