STATE OF VERMONT
PUBLIC SERVICE BOARD

Docket No. 7678

Petition of Beaver Wood Energy Pownal, LLC	)
for a Certificate of Public Good, pursuant to 30 V.S.A.	)
§ 248, to install and operate a Biomass Energy Facility	)
and an integrated wood pellet manufacturing facility	)
located north of the old Green Mountain Racetrack in	)
Pownal, Vermont, to be known as the "Pownal Biomass	)
Project"	)

AFFIDAVIT

I, Timothy Maker, being duly sworn, depose and say that:

1. My name is Timothy Maker. I reside in Calais, Vermont.

2. I have worked as a professional in the woody biomass energy industry since 1985, as a project manager, a study consultant, and as an employee of the Biomass Energy Resource Center (BERC). I was the founding executive director of BERC and served six years in that capacity, after which I continued there for two more years as senior program director. At BERC, I was active in the development of policy and programs to encourage the efficient and sustainable use of the forest resource for energy, both for thermal and CHP applications. I left BERC in 2009 to start my own biomass project development and implementation company, Community Biomass Systems, Inc. (www.commbio.com), originally named VisionPower USA until I assumed control of the company in 2010. I serve as president/CEO of the company. I have managed approximately 12 woodchip biomass system projects in my career – mostly thermal – and have studied and laid the groundwork for dozens more. I have carried out detailed financial and cost-effectiveness studies of more

than 50 biomass systems. Over the last 25 years I have developed expert knowledge of the full range of wood-to-energy conversion technologies on the market in the US and Europe. In 2009 I testified before the Vermont Public Service Board on feed-in tariff rates for the SPEED program (Docket 7533). I hold a BS in engineering physics from Cornell University.

3. I have reviewed the application by Beaver Wood to construct a 29.5 MW generation facility in Pownal, Vermont. I understand a substantially similar biomass plant is proposed by Beaver Wood in Fair Haven, Vermont. While the two plants and their applications are separate, they will have overlapping impacts on both the forest resource and the markets for low-grade wood.

4. For biomass plants, conversion efficiency is a very important consideration related to the impact on forest resources. The low-grade wood resource is a valuable natural resource for the Northeast region and the state of Vermont that must not be squandered. For wood energy systems, a net annual efficiency of greater than 50 percent (defined as the ratio of the productively used thermal and electrical energy output of the plant divided by the Btu input of wood to the plant over the course of an entire year) may be reasonably taken as the minimum definition of "efficient" – a definition adopted by the Vermont Legislature in the Vermont Energy Act of 2009 relating to qualification for standard offer tariffs for biomass CHP systems. Large projects and plants that operate below this annual standard will waste huge amounts of the commercially available low-grade wood resource. For example, a 15-20 MW biomass power plant, using conventional steam turbine technology with no productive use of the released thermal energy, may consume 150-200,000 green

tons of wood each year and will waste approximately 80% of the wood input to the plant. This scale of waste of the wood resource will result in less low-grade wood available for much more efficient applications, such as: heating schools, colleges and hospitals; community district heating systems; higher-efficiency small-scale combined heat and power (CHP) systems; and, in the form of cordwood, home heating. The efficient approach to the use of wood fuel is to 1) use it for thermal applications (space heat, domestic hot water, cooling or industrial process), or 2) use it in small, optimized CHP systems where the thermal (heat) energy is the primary use and the electrical output is a secondary use, with the combined use having an annual efficiency greater than 50 percent. While an optimized CHP system will be heat-led, the Applicant in this case has proposed a power plant with thermal energy as a byproduct, thus reversing the order and giving precedence to the inefficient electrical power side of the CHP equation. Since its proposed 29.5 MW power plant presents an inefficient use of the biomass resource on its own (it claims a 30 percent efficiency improvement over conventional wood-fired power plants of the same size, meaning perhaps a net annual efficiency of 32 percent), the Applicant has proposed that a separate wood pellet manufacturing plant will be constructed near the power generating plant and approved as part of an integrated electrical generation and industrial heat-using facility. This would allow Beaver Wood to use some fraction of the heat released in power production for the productive purpose of drying wood feedstock for pellet production. While this is a positive feature, since overall system efficiency is increased by using some part of the otherwise-wasted thermal energy, Beaver Wood does not provide in its application the energy balance

data for the power plant and the pellet mill to demonstrate whether or not the system could be considered "optimized", with full or significant utilization of the heat released from the power generation side. Beaver Wood also does not offer a plan for how the thermal usage and overall efficiency would be maintained if the pellet facility were ever to close or reduce its production due to changes in the pellet market or for any other reason. Unlike capturing waste energy and using it for heating at a public institution or in a municipal district heating system, where the thermal load can be expected to be there for the life of the energy plant, an industrial heating load cannot be guaranteed for the long term. The Applicant does not make any assertion of how the pellet business could be guaranteed to stay in operation for the life of the power plant. In the case of the pellet plant ceasing operations at some point in the future, the Beaver Wood power plant would cease to have a use for thermal energy, the net useable energy output would drop, the plant's net efficiency would be reduced, and more wood would be wasted.

5. While Beaver Wood claims that it will be "much more efficient and has far fewer environmental impacts than prior biomass projects of its size" these claims are not supported in their filing. The type of technology is not sufficiently detailed. It should be kept in mind that the efficiency of steam-cycle power production is captive to the laws of thermodynamics, which do not change because a developer makes claims of "high efficiency" combustion. The Applicant claims, "The use of a higher temperature and pressure boiler steam cycle combined with the use of multiple heaters will make this Plant among the most efficient of its type." This statement begs the question of what "its type" is and also flies in the face of the

Second Law of Thermodynamics. There are similar concerns about emissions performance. While the new EPA MACT regulations will set the floor for allowable emissions, Beaver Wood offers no detail on its emissions controls to demonstrate whether or not they will exceed the new regulatory floor level.

6. When you introduce a new, large biomass user to a regional "wood procurement radius" you need to be extremely careful. A proposal of the size of Beaver Wood's has the potential to negatively impact the orderly development of the region in several respects. From the perspective of a new, very large single demand for low-grade wood, "orderly development" means paying strict attention to: the existing and future competing uses of the wood resource (the demand side), particularly by public institutions; the capacity of the harvesting industry to remove wood from the forest in a sustainable, ecologically appropriate manner (the supply side); and the impact on the forest itself (the resource protection side).

7. While the stated wood procurement radius of the Pownal project may be 50 miles as the Applicant claims, it and Beaver Wood's Fair Haven project will have direct and indirect impacts on the wood market for most of the state of Vermont and parts of Massachusetts, New York state and New Hampshire. The Applicant states that the Pownal project alone will require, for energy and pellet production, 570,000 tons of wood, approximately equal to the annual consumption of the McNeil Generating Station in Burlington. Upon construction and start of operation, the Pownal plant will have an immediate competitive impact on wood supply and availability for the following Vermont public schools that now burn woodchips, all within 100 miles of Pownal and therefore all drawing from the same overlapping wood baskets: Mt.

Anthony Union High School, Mt. Anthony Union Middle School; Brattleboro Union HS, Springfield HS/Tech Center, Weathersfield Elementary School, Whitingham Elementary, Dresden Hanover HS and Dresden Richmond MS (both part of a two-state district), Westminster Center School, Mt. Abraham Union HS, Leland & Gray Union School and Hartford HS/Tech Center. Based on data from the Vermont Department of Education, these 12 schools have invested over $11 million in public funds to build their woodchip heating systems over the last 20 years. In addition, other facilities with public investment in woodchip systems within the same radius include one New York public school (Hartford Central School), Green Mountain College in Poultney, the Addison County Courthouse and the Pittsford State Police Academy. Private institutional users with woodchip plants, all with much smaller demand for fuel than the Pownal plant, include Bennington College and Middlebury College. All these small, predominantly heat-only users are good examples of the beneficial, high-efficiency use of wood in the region that makes up the proposed Pownal wood basket. They are each relatively small and none place a significant pressure on the forest resource. Small, energy efficient users combine to make up an inherently orderly development of the new, evolving energy market connection between the forest resource and the economic use of low-grade wood for energy. The introduction of much larger, inefficient users (particularly if less than 50 percent efficient) can upset the balance of the wood supply market within the region, and make it more difficult for existing, smaller users with less market influence to procure fuel in the short term, with the possible outcome of forcing them back onto fossil fuels from time to time – increasing heating costs and

undercutting public investments. It should be further understood that other businesses and institutions that are now, or in the future may be, looking at new renewable energy solutions to get off oil and reduce their carbon footprints could be limited, prevented or discouraged from installing high-efficiency wood heating systems for the purpose of severing their reliance on fossil fuels – based on the market dominance of a single large, inefficient user in Pownal (or Fair Haven). The counter argument to this says that a large, new "anchor" user of biomass will, over time, bring new harvesters into the market and thereby increase the amount of biomass available to both small and large users. However, I believe that the market pressure that would be exerted by a wood user as large as Pownal will, on balance, make it harder for small users to compete in a constrained wood basket.

8. The reduction in wood use if the Beaver Wood plant in Pownal could increase its efficiency to the minimum standard of 50 percent would be dramatic. Beaver Wood plans to use 350,000 tons per year of woodchips to fuel the Pownal power plant (pre-filed testimony of Eric Kingsley on behalf of the Applicant). I calculate that the plant's current net efficiency would be approximately 32 percent for producing electricity and used thermal energy, based on information in the Application. If, however, the Pownal project could be improved to have a net annual efficiency of 50 percent, the wood fuel consumption for producing energy would decrease to approximately 225,000 green tons. The difference of 125,000 tons, representing wasted energy and wasted wood, is enough to heat 226 Vermont schools each year (based on the average of 552 tons per school documented by the Vermont School Energy Management Program for 2008/2009) – approximately equal to the number

of schools in Vermont that have not yet been converted to woodchip heating. This raises the question: which is the better use of 125,000 tons of wood, heating the rest of Vermont's fossil-fuel heated schools, or wasting it into the air at a low-efficiency plant in Pownal?

9. While it is laudable that the Applicant is applying for US Treasury funds to pay a significant portion of this Vermont project, there is an open question whether the proposed plant represents the most efficient and economic use of those public funds, given its negative economic impacts on the regions' investments in wood heating systems. While over 200 biomass power plants have been proposed in New England in the last decade (Manomet *Biomass Sustainability and Carbon Policy Study*), only one has been built (Kingsley testimony). With the large subsidies available in the form of Renewable Energy Credits and other incentives from state renewable energy funds in the last 20 years, this lack of success in bringing wood-fired power plants to construction points to the underlying lack of a sound economic basis for this technology. If they were economic they would be built. Availability of large subsidies, such as the US Treasury "recovery grant," may mask the inherently uneconomic aspect of this technology. Furthermore, the Applicant has not demonstrated that adding thermal utilization through using waste heat at a pellet plant located nearby, sufficiently improves the efficiency and economics of the wood power plant proposition. The Applicant has not demonstrated that this low-efficiency project would be a better, more efficient and more economic investment of US Treasury funds than a solar or wind project, as comparative examples, both of which draw from inexhaustible energy resources.

10. In summary, the Applicant has not provided sufficient detail to support its claims that the proposed Pownal combined heat and power plant will be either efficient or have benign environmental impacts on the forest resource. In addition, the Applicant has not demonstrated that the introduction of a 29.5 MW power plant will not adversely impact orderly development in its region nor that it will not have an adverse economic impact on existing public investments in wood energy in the region. The applicant has not demonstrated the role that the proposed pellet plant will play in balancing and optimizing energy outputs compared to wood energy inputs, nor what would happen to efficiency and waste of low-grade wood if the pellet plant did not continue at peak production or reduced its need for thermal energy for drying feedstock.

AND FURTHER DEPONENTS SAYETH NOT.

Dated at Montpelier, Vermont, this ___ day of December, 2010.

_____
Timothy Maker

STATE OF VERMONT
WASHINGTON COUNTY, SS

SUBSCRIBED and sworn to by Timothy Maker, before me this __ day of December, 2010.

_____
Notary Public