Response to Comments on the Draft Air Pollution Control Permit to Construct for Beaver Wood Energy Fair Haven, LLC (BWE) issued September 15, 2011

On September 15, 2011 the Vermont Agency of Natural Resources, Department of Environmental Conservation, Air Pollution Control Division (Agency) issued a draft Air Pollution Control Permit to Construct to Beaver Wood Energy Fair Haven, LLC. On October 10, 2011 the Agency closed the public comment period on the Draft Air Pollution Control Permit to Construct Written comments were received from the following:

*Commenter #1*: United States Environmental Protection Agency - Region 1 Office.

*Commenter #2:* Southern Vermont Citizens for Environmental Conservation and Sustainable Energy. Also incorporated by reference all comments submitted by Commenters #3 and #4.

*Commenter #3:* The Partnership for Policy Integrity. Also incorporated by reference all comments submitted by Commenters #2 and #4.

The Partnership for Policy Integrity submission also included a *December 2010 affidavit* to the Vermont Public Service Board by Biomass Energy Resource Center founder Tim Maker, testifying as to the impacts of the proposed Beaver Wood Energy Pownal plant. The content of this affidavit does not provide comment on the Draft Air Pollution Control Permit to Construct and therefore the Agency is not providing a response to this affidavit.

*Commenter #4:* Center for Biological Diversity. Also incorporates by reference all comments submitted by Commenters #2 and #3.

*Commenter #5:* Jointly: The Wilderness Society, The National Wildlife Federation and The Vermont Natural Resources Council.

The Vermont Agency of Natural Resources, Department of Environmental Conservation, Air Pollution Control Division (Agency) has summarized herein all the written comments submitted and is providing the Agency's responses to those comments below. The full text of the comments provided, as well as a *summary of comments from the public meeting* held on October 13, 2011 are included as an appendix to this document.

## Comments related to Green House Gases:

Comment #1: BWE is subject to the Most Stringent Emission Rate (MSER) for greenhouse gases (GHGs). In determining the MSER for GHGs, the Agency should not rely on the US

Environmental Protection Agency's (US EPA) guidance document Guidance for Determining

Best Available Control Technology for Reducing Carbon Dioxide Emissions from Bioenergy

Production, dated March 2011. The use of biomass should not be considered MSER. In addition, EPA's guidance does not support the determination that no alternative fuels – biomass or otherwise – may be considered in determining MSER.

(Commenter 3 & 4)

*Response: The Agency reviewed the BWE project for MSER for GHGs in accordance with the Vermont Air Pollution Control Regulations. While the Agency referenced*

*EPA's Guidance for Determining Best Available Control Technology for Reducing*

*Carbon Dioxide Emissions from Bioenergy Production dated March 2011 in our review and agreed with the ultimate conclusions, the MSER review still considered all other options in the standard top-down approach and in accordance with state regulations.*

*However, in response to this and other public comments on the draft permit, the Agency has added additional documentation of our review process. The Agency has also taken*

*a closer look at whether alternative fuels as a control option would fundamentally redefine the proposed facility or whether alternative fuels should be included as a control option in determining BACT/MSER. In doing so, the Agency "must be mindful that BACT, in most cases, should not be applied to regulate the applicant's objective or purpose for the proposed facility, and therefore, the permit issuer must discern which design elements are inherent to that purpose, articulated for reasons independent of air quality permitting, and which design elements may be changed to achieve pollutant emission reductions without disrupting the applicant's basic business purpose for the proposed facility."* In re Prairie State Generating Co., 13 E.A.D. 1, 23 (EPA 2006). *The crucial question to consider in determining whether a control option, such as alternate or cleaner fuels, would redefine the project is "when does the imposition of a control technology require enough of a redesign of the proposed facility that it strays over the dividing line to become an impermissible redefinition of the source?" In re Desert Rock Energy Company, PSD Appeal No. 08-03 et al. at 63-64 (EAB Sept. 24, 2009).*

*BWE is proposing to construct a 34 MW (gross) biomass fuel electric generating facility co-located with a 115,000 ton per year wood pellet production facility. According to BWE, "The BWE Fair Haven project concept, design, and development are based on the availability of sufficient biomass fuel in the project area. . . . The project was designed and sited on the basis of the availability of biomass wood waste in the project*

*area." As part of the development for this project, BWE hired Innovative Natural Resource Solutions, LLC to conduct a biomass fuel supply study for the Fair Haven area. This study concluded that there is enough wood available to sustainably supply the proposed BWE project. The Agency has not undertaken, as part of the air permitting process, an independent analysis of the conclusions reached in the wood supply study, and has looked at the study for the limited purpose of considering whether alternative fuels should be included as a control option in determining BACT/MSER. BWE also maintains that the use of fossil fuels, such as coal, natural gas, or oil, would fundamentally redefine the proposed facility. In addition, BWE states that the use of fossil fuels would also be infeasible due to availability and/or economic considerations. Further, BWE is "unaware of any sources of alternative biogenic fuel stocks available in the required amounts within a reasonable radius of the facility."*

*The Agency finds that BWE's objective is to build a biomass fuel electric generating facility co-located with a wood pellet production facility. Based on the application and statements made by BWE, the Agency also finds that BWE has "defined its 'goal, objectives, purpose, or basic design' for the proposed facility," In re Desert Rock Energy Company, PSD Appeal No. 08-03 et al. at 65 (EAB Sept. 24, 2009), based on BWE's conclusions regarding the availability of biomass wood fuel. The Agency further notes that the co-location of the electric plant and the wood pellet facility will allow bark and other residue generated by the adjacent wood pellet manufacturing plant to be used as a small portion of the overall fuel source at the wood-fired electric generating plant. In addition, the proposed facility is designed to allow waste heat from the Main Boiler at the electric generating plant to replace an equivalent amount of fuel input to the wood fired burner at the pellet plant. Thus, for the limited purpose of considering whether alternative fuels should be included as a control option in determining BACT/MSER, the Agency finds that these design elements are inherent to BWE's basic purpose.*

*The Agency concludes that BWE's choice of fuel is integral to the proposed facility's fundamental purpose and basic design. Thus, imposing alternate fuels such as coal, natural gas, or oil as a control option would fundamentally redefine the proposed facility. For these reasons, the Agency finds that such alternate fuels should not be included as a control option in determining MSER. With respect to alternative biogenic fuels, the Agency finds there is currently not sufficient availability of other biogenic fuels (such as grasses, agricultural byproducts, bio oils from seed crops or bio gases from digesters) to contribute significant fuel energy to a project such as BWE Fair Haven.*

Comment #2: BWE has included "good combustion practices" in the list of measures to be taken to reduce greenhouse gas emissions. It should be noted that typically, the objective of good operating and maintenance practices is to ensure complete combustion and reduce the amount of carbon *monoxide* emissions by ensuring complete oxidation of fuel carbon to carbon dioxide. Therefore, while we agree that a well-run facility is more likely to be an efficient facility, it should be acknowledged that there is really very little that can be done to reduce $CO_2$ emissions from burning fuels, and the goal of "good combustion practices" is to actually increase $CO_2$ emissions." (Commenter 3)

*Response: "Good combustion practices" includes the concept of optimizing the use of combustion air to provide 'good combustion' with a minimum amount of excess air usage. Good combustion practices lead to more complete combustion of the fuel which not only minimizes the emissions of CO and volatile organic compounds but improves boiler efficiency by producing more heat per unit of fuel input. Good combustion practices also minimizes excess air which improves the overall boiler efficiency. Increases in 'excess air' result in more exhaust gases which results in more heat loss up the stack.*

Comment #3: BWE will increase carbon emissions at the state level. (Commenter 3)

*Response: The nature of any new source requiring an air permit will increase emissions of air pollutants. Under the current statutory and regulatory structure that is in place, the Commenter's assessment of $CO_2$ emissions does not impact the development of an Air Pollution Control Permit to Construct.*

Comment #4: BWE's carbon emissions are real and lasting. BWE will not be able to meet its wood fuel demands with just forest residue and will need to harvest additional trees specifically for fuel. Studies such as the Manomet Study show that such harvesting is not carbon neutral and can result in greater CO2 emissions than fossil fuels due to biomass' higher CO2 emission per unit of energy input and the loss of forest sequestration. (Commenter 3)

*Response: The Agency agrees with the commenter and the basic conclusions of the Manomet Study that the combustion of biomass is not carbon neutral. However, the combustion of biomass does have potential carbon benefits over fossil fuels depending on the harvesting and future sequestration practices. But as noted above, the Agency has based the applicability and review for MSER for GHGs on the actual GHG emissions from the stack without credit for any carbon benefit arguments. While the Agency has not imposed any sustainable harvesting measures under MSER at this time, the Agency reserves its right to do so in any future MSER reviews. The Agency reserves its right to establish a position concerning the potential carbon benefits of wood as a fuel and the effect of harvesting practices on carbon emissions in other proceedings outside of its the review of MSER for this air permit application. Other such proceedings may include Act 250, Section 248, or other permitting regimes.*

Comment #5: BWE represents a threat to forests. Northeastern forests may not be able to meet emerging wood energy demand. The Agency should evaluate the net effect of BWE's facility on Vermont's forest carbon stocks. (Commenter 3)

*Response: The science and technical issues regarding the effect of a bioenergy facility on carbon stocks and overall carbon emissions is complex and evolving. On June 3, 2010, EPA finalized new thresholds for greenhouse gas emissions that define when Clean Air Act permits are required (also known as the "Tailoring Rule"). In January 2011, Vermont adopted the Tailoring Rule thresholds for greenhouse gas emissions in the Vermont Air Pollution Control Regulations. In July 2011, EPA deferred for a period of three years the application of permitting requirements to biogenic carbon dioxide*

*($CO_2$) emissions and committed to conducting a detailed examination of the science and technical issues associated with accounting for emission of biogenic $CO_2$ emissions.*

*Vermont has not amended its regulations to defer the applicability of permitting requirements for biogenic $CO_2$ emission sources such as BWE. However, because a carbon accounting method has not yet been developed to accurately adjust a bioenergy facility's actual stack emissions up or down based on the induced changes in carbon stocks on land (in soils, plants and forests), such sources are currently subject to air permitting requirements in Vermont based solely on direct $CO_2$ emissions from the stationary sources. In other words, at this time, air permitting for biogenic stationary sources is not taking into account possible supplemental emissions such as from depleted soils after harvesting or any future carbon sequestration that could result from the use of biogenic feedstocks. Likewise, the Agency is not establishing wood procurement requirements in its air permits for biogenic sources at this time. This may change in the future, for example when an accounting method for biogenic $CO_2$ emissions from the stationary sources is finalized and/or standards for sustainable harvesting and production are established.*

*The Agency reserves its right to raise any issues related to the management of forest resources, and the potential impact of this or any other facility, in the context of other proceedings such as Act 250, Section 248, or other permitting regimes.*

Comment #6: "While awaiting the results of an EPA study process to determine how to quantify net biogenic GHG emissions, Vermont should require proposed facilities to use feasible approaches which are already recognized as an effective means to reduce those emissions. For example, documenting the types and sources of wood fuel procured and encouraging strict oversight of forest management activities generating wood fuel are two approaches for limiting net GHG emissions." (Commenter 5)

*Response: Please see the response to the comment above. In addition, please note that the Agency agrees that requiring BWE to collect data on the source of the biomass used at the Facility would be useful in assessing the nature of the GHG emissions in the future. The Agency will add a "records of biomass fuel source" requirement in the final permit. For purposes of the air permit, BWEFH will be required to record wood fuel source(s) based on five (5) categories:*

*(a) Wood from urban tree waste;*

*(b) Wood waste from wood products industries;*

*(c) Wood from land-clearing harvesting resulting in change of land use;*

*(d) Forest residues including tops and limbs from pre-existing commercial round wood harvesting;*

*(e) New round wood harvesting of live trees that would otherwise continue growing.*

*The Agency reserves its right to request or require, as appropriate, implementation of additional wood procurement and forest management measures in the context of other proceedings such as Act 250, Section 248 and other permitting regimes.*

Comment #7: "It is unclear whether Vermont is at this time merely requiring reporting of these biogenic GHG emissions or whether quantitative limits will be enforced. Greenhouse gases (GHGs, measured as tons of $CO_2e$ per year), are listed in a table of Future Allowable Air Contaminant Emissions, but a footnote in the Technical Support Document p. 3 indicates that "this is not a facility limit". We recommend that Vermont clarify the extent to which the permit actually limits GHG emissions from this facility." (Commenter 5)

*Response: The facility limits for GHG emissions are based on a metric of mass of GHG/unit of production for the two sources at the facility that have numeric GHG limits: wood fired boiler and the pellet plant's burner/dryer system. The GHG limits for these two sources are enforceable limits. The annual GHG value in the Technical Support Document, page 3, is not an enforceable limit.*

Comment #8: Beaver Wood's proposed facility has two primary sources of greenhouse gas emissions (mostly carbon dioxide): a wood-fired boiler used to generate steam for electricity generation and a wood-fired rotary drier for chips used to manufacture wood pellets. Because these two processes are co-located, there is an opportunity, as noted in the permit application, to reduce the facility's GHG emissions through the use of combined heat & power (CHP): waste heat in the boiler exhaust can be used to offset fuel combustion requirements of the pellet plant's burner/rotary dryer process. The BACT determination for GHGs should require CHP to be part of BACT.

With CHP, where heat energy is a by-product of one process and an input to another, the emissions from the shared heat must be allocated between the two processes, in this case the electricity plant and the wood pellet facility. CHP can be seen to enhance the efficiency, and hence lower the GHG emissions per unit of useful energy, for either or both of these operations. Since Vermont DEC is issuing a single air pollution control permit for both facilities, the simplest solution would be to set a target for waste heat utilization, split the credit between the two facilities, and adjust the permitted emissions rates accordingly. (Commenter 5)

*Response: The $CO_2e$ limit for the pellet plant in the draft permit does indirectly require CHP energy recovery from the main boiler. Full operation of the rotary dryer in the pellet plant can only be achieved by recovering this waste heat. To reach the full production rate, the rotary dryer will require all of the heat input from the burner (30 MMBtu/hr) plus an estimated 12 MMBtu/hr of heat recovered from the main boiler's exhaust gas. The BACT GHG determination in the draft permit for the pellet plant of 427 lb $CO_2e$/ton pellets was based on the $CO_2e$ produced by the 30 MMBtu/hr burner and the pellets produced from the full dryer output. Since the full output from the dryer can only be achieved when the facility is utilizing the maximum anticipated waste heat energy in the main boiler exhaust gas, this limit of 427 lb $CO_2e$/ton pellets produced includes 'CHP'. The GHG emission limit for the main boiler will remain unchanged at 2993 lb $CO_2e$/MW as the emissions of CO2e per MW electrical output is unaffected by the waste heat recovered in the stack.*

*While the CHP requirements/benefits could be placed on either the main boiler or the pellet plant, the collocation of the pellet plant provides the opportunity for CHP. Moreover, keeping all the documentation in the pellet production operation is the most straight forward method to account for the recovered heat energy and the benefit of reduced GHGs.*

*Due to timing concerns with optimizing the heat recovery systems when both plants are newly constructed, the pellet plant's GHG limit will be phased in over three years so the facility has time to optimize the heat recovery system. In addition, the heat recovery requirement will only apply during periods when the main boiler is in operation.*

Comment #9: In Condition 24, Vermont requires the measurement of $CO_2$ in determining compliance with the GHG emissions limit (stated on a $CO_2e$ basis). However, the measurement of $CO_2$ does not account for the non-$CO_2$ GHG (e.g., methane and nitrous oxide) that are emitted by the facility. These non-$CO_2$ GHGs are typically emitted in small amounts compared to $CO_2$, but should nevertheless be included in showing compliance with the total GHG emissions limit. Thus, EPA recommends Vermont require the facility to determine the amount of non-$CO_2$ GHG pollutants emitted by the facility and add the amount (on a $CO_2e$ basis) to the amount of $CO_2$ measured by the CEMS, or provide an explanation in the record as to why such measurement is not necessary to ensure compliance with the GHG emissions limit. Instead of direct measurement, Vermont could allow the source to use established fuel factors (e.g., from EPA's Greenhouse Gas Mandatory Reporting Rule at 40 CFR 98) or develop site-specific fuel factors to calculate the amount of the non-$CO_2$, GHG pollutants. (Commenter 1)

*Response: The APCD estimates that 98% of the GHGs on a $CO_2e$ basis are from $CO_2$. It is our intent to have the remaining 2%, attributed to the emission of $CH_4$ and $N_2O$, to be calculated based on the wood fuel consumed and the default emission factors established in 40 CFR Part 98, Subpart C, Table C-2 and the global warming potentials established in 40 CFR, Subpart A, Table A-1. The APCD will add to the permit the calculation to be used to determine the $CO_2e$ emissions from $CH_4$ and $N_2O$ for both the main boiler and the pellet plant dryer. The calculated $CO_2e$ emissions from $CH_4$ and $N_2O$ will be added to the $CO_2$ emissions measured by the main boiler's $CO_2$ CEMS to represent the total GHG emissions from the Main Boiler.*

Comment #10: It is unclear how the facility will calculate the GHG emission rate from the pellet dryer in Condition 25 (427 lbs $CO_2e$/ton finished pellets emitted) from data on wood fuel usage and pellet production. The permit should contain the necessary steps and assumptions the facility will use in such a calculation. (Commenter 1)

*Response: The APCD intends to have the Permittee determine the $CO_2e$ emission rate from the pellet dryer by monitoring and recording the wood fuel usage in the Coen burner and by weighing and recording the finished pellet product. The wood usage will be used along with the factors established in 40 CFR Part 98 to calculate the $CO_2e$, including $CO_2$, $CH_4$ and $N_2O$, emitted on a monthly basis. This value will be divided by the monthly production of finished pellets. The APCD will add this calculation to the permit.*

## BACT/MSER Comments:

Comment 11: BACT is not final for a project until the second portion of the permit is issued (the Permit to Operate). Thus, between the initial draft permit (the one we are reviewing) and completion of the project the BACT is subject to additional review and possible modification clear up to the final issuance of the permit to operate. (Commenter 2)

*Response: BACT/MSER is established under the authority of an Air Pollution Control Permit to Construct not under the authority of an Air Pollution Control Permit to Operate. The emission limits in this construction permit provides some of the specifications for which the facility is designed to meet. Once the facility is constructed and operation has commenced, an Air Pollution Control Permit to Operate will be required for the continued operation of the facility. This operating permit will not change the BACT/MSER emission limits established in the construction permit.*

## PM BACT/MSER Comments:

Comment 12: The draft permit does not specify if an ESP or baghouse will be required for BWE, and cited the Domtar, Rothschild Plant's permit as an example of a BACT determination that provides adequate specificity to the PM control device: "baghouse technology with felted fabric filters for both the PM and PM2.5 particulate fractions." The proposed particulate emission rates for BWE are 0.012 lbs/MMBtu for filterable particulates and 0.019 lbs/MMBtu for total particulates. The BWE technical review prepared by VT DEC notes several permits with actual test data well below the proposed BWE limits demonstrating that lower particulate controls are achievable as MSER. Massachusetts issued an April 18, 2007 Biomass BACT guidance memo setting a PM BACT baseline starting point at 0.012 lbs/mmBtu (a level that Massachusetts DEP says is readily achievable in practice). While a reasonable compliance cushion is necessary and appropriate in setting limits, the actual results for several facilities referenced in the MSER analysis show that PM at a much lower level is readily achievable. (Commenter #2)

*Response: The commenter has incorrectly stated the BWE draft permit proposed filterable PM limit as 0.012 lb/MMBtu. The limit in the draft permit for BWE is 0.010 lb/MMBtu. Only one facility noted in the Agency's TSD has a lower permitted emission limit and that facility has not yet demonstrated compliance with that limit. Several facilities noted in the TSD have been tested and shown to achieve lower emission rates; however, in establishing MSER, the Agency must consider permitted emission rates and what is continuously achievable and not simply what was achieved during a single test.*

*While the draft permit left the option open for the Permittee to choose between an ESP and a fabric filter, the final permit will state that the PM control device on the main boiler is to be an ESP.*

Comment 13: In order to comply with MSER requirements, BWE must commit to lower PM emission rate for the power boiler. While the total PM emission rate for Seneca Sustainable Energy may seem out of reach, other biomass facilities have been transparent about their approach for reducing filterable PM. For instance, the We Energies plant in Wisconsin is guaranteeing a filterable PM rate of 0.008 lb/mmbtu, which is lower than the limit in the BWE permit. There are other instances of actual test data showing PM rates lower than that promised by the applicant. Even the Mount Tom coal plant in Massachusetts has test data showing lower PM emissions than are to be met by BWE. The technology is capable of meeting a more stringent standard, and BWE should comply with this under the requirements of MSER. (Commenter 3)

*Response: Wisconsin's review of the We Energies application included a BACT review only for total PM (referred to as $PM_{10}$ in the Wisconsin permit, issued March 28, 2011, – this is the sum of the filterable and condensable PM). The Wisconsin BACT for total PM was determined to be 0.024 lb/MMBtu: the Vermont BACT determination for total PM for BWE is a more stringent 0.019 lb/MMBtu. The basis for the We Energies filterable PM permit limit of 0.008 lb/MMBtu was the EPA's June 4, 2010 proposed Major Source boiler MACT rule (40 CFR Part 63, Subpart DDDDD). The final version of Subpart DDDDD was issued on March 21, 2011, and immediately the EPA published notice for reconsideration of this rule. On December 23, 2012, the EPA re-proposed the Major Source boiler MACT rule. In Table 1 (Emission limits for New or Reconstructed Boilers and Process Heaters) of this reproposal, the filterable PM emission limits for biomass boilers, depending upon the boiler design and moisture content of the fuel, ranges from 0.0098 to 0.32 lb/MMBtu of heat input. For 'stokers/sloped grate/others designed to burn wet biomass fuel' (the category BWE fits in, if it were a major source of HAPs), the proposed filterable PM limit is 0.029 lb/MMBtu of heat input. Note that the proposed filterable PM limit for the BWE main boiler is 0.010 lb/MMBtu of heat input, which is within 2% of the lowest proposed PM limit of 0.0098 lb/MMBtu of heat input for any wood fired boiler design, and is considerable lower than the 0.029 lb/MMBtu of heat input for stoker boilers like the one proposed for BWE. Since the original MACT standard has been re-proposed, the Agency does not think it is appropriate to use it as a basis for BACT.*

*The PM MSER review is for wood-fired boilers and the Agency is not considering expanding the category to include other solid fueled boilers such as coal.*

Comment #14: Particulates: While Vermont is in attainment for ambient particulate standards there is increasing attention, being focused on the health effects of particulate matter, especially that of fine particles or "nano-particulates" and their appropriate emissions standards. We encourage Vermont DEC to ensure that this permit achieves MSER for particulates, especially for fine particles and to evaluate whether the allowable emissions rates are really the best this facility can do. In particular, it is unclear whether an ESP or fabric filter is being specified and it appears from the Technical Support document (p. 21-23) that other wood fired facilities are contemplated to achieve lower PM emissions in practice. (Commenter 5)

*Response: The science of how nano-particles are formed and controlled is a developing field, and to date there are no regulations in place to address nano-particles alone. As a result, nano-particles are regulated as a component of $PM_{2.5}$. The Agency is confident that this permit does establish MSER for fine PM ($PM_{2.5}$). The final permit will state that the PM control device will be an ESP. The only wood fired facility noted in the TSD with a lower permitted PM emission limit than that proposed for BWE is Seneca Sustainable Energy, LLC. While SSE is operating, to date, they have failed to demonstrate that they can achieve a total PM emission rate of 0.008 lb/MMBtu.*

## NOx BACT/MSER Comments:

Comment #15: The NOx in the exhaust gas stream will be treated with a multi-pollutant selective catalytic reduction (MSCR) unit. This is a Babcock proprietary technology that has been permitted primarily in applications for biomass facilities. MSCR is intended to reduce the nitrogen oxides (NOx) and is reported as having similar benefits for carbon monoxide and volatile organic compounds. Although there are several of these MSCR units permitted, ARG has not seen sufficient test results to properly analyze their performance. Thus, it is difficult to assess their ability to achieve the proposed standards for these pollutants. VT DEC should be able to produce or obtain actual compliance test data or other verification information from Beaver Wood and from other facilities to support its conclusion that MSCR will meet the permit limits. The draft permit proposes limits of 0.06 lbs of NOx/mmBtu of heat input. Most of the other permitted plants presented in the VT DEC technical review have higher limits and the only operating information reported is for PSNH Schiller Station with a 1st quarter of 2011 reported rate of 0.064 lbs/mmBtu. However, the Palmer Renewable Energy conditional draft permit in Massachusetts proposes a one---hour limit of 0.055 lbs of NOx/mmBtu. The VT DEC does not explain why the Palmer limit cannot be achieved by BWE, so it should be BACT. (Commenter 2)

*Response: The Agency established MSER limits for NOx of 0.060 lbs/MMBtu of heat input on an hourly basis and 0.030 lbs/MMBtu on an annual basis. These limits are similar to those proposed by BWE through utilization of an MSCR. The MSCR will need to be designed to achieve this limit. If BWE is not able to demonstrate compliance with an MSCR then they will need to consider alternative control technologies to achieve this limit. The Palmer Renewable Energy emission limit is a very stringent emission limit that has not yet been demonstrated. Due to potential fouling of the catalyst surface by inorganic constituents in the exhaust gases from wood combustion, the Agency is concerned about the long term efficacy of the NOx catalyst being able to sustain the high NOx reduction efficiencies that will be required of the Palmer Renewable Energy permit without significant added cost and maintenance that the Agency does not feel represents MSER in the BWE case.*

Comment #16: BWE's application notes that the vendor provided information that supports the emission estimates. The application and technical review also note that the vendor has provided guarantees for the proposed emissions levels. Usually, these guarantees have numerous caveats and limitations that define the conditions under which the guarantees will be supported by the vendor. Also, such guarantees are notorious for containing lots of comfort

room between actual performance and the guarantee level so as to protect the vendor from performance claims after startup. Since these vendor-provided emissions assumptions are critical to the ability of the Permittee to meet the permit limit after startup, it is not unreasonable for the VT DEC to obtain and make public the specifics of the vendor guarantees including any limitations to those guarantees and the degree to which the guarantees are conservative from actual performance. Further, if Babcock concurs that its technology can meet the permit limits set for Palmer following the Massachusetts BACT determination, then BWE should also be capable of meeting those levels. (Commenter 2)

*Response: The Agency is satisfied that it has accurately determined what constitutes the MSER limit for NOx emissions from the proposed BWE project. It is not necessary for the Agency to secure the vendor guarantees for their control equipment. It is necessary for the Permittee to operate the proposed plant in compliance with the terms of their permits to construct and to operate. Since the BWE project is required to install and operate a NOx CEMS, the Agency will be able to monitor the ongoing compliance with the permitted NOx limits.*

Comment #17: Power boiler emission rate for NOx does not represent MSER: VT DEC should commit BWE to lower emission rates for NOx and require BWE to have a separate and enforceable rate for startup and shutdown for NOx and other pollutants. In our opinion, VT DEC should not accept the applicant's claim that the emission rates set for the Palmer Renewable Energy facility in Springfield, MA are unachievable. Other facilities around the country have also set low emission rates for NOx; for instance, the Green Hunter Mesquite Lake plant in CA has an annual NOx rate of 0.015 lb/mmbtu. (Commenter 3)

*Response: The Agency is satisfied that it has accurately determined what constitutes the MSER limit for NOx emissions from the proposed BWE project. The Green Hunter Mesquite Lake plant in California is similar to the Palmer Renewable Energy facility proposed for Springfield, MA in respect to the fact that neither plant has been built (reconstructed in the case of Green Hunter), operated, or tested to demonstrate their ability to meet their permitted NOx emission limit. As noted above, due to potential fouling of the catalyst surface by inorganic constituents in the exhaust gases from wood combustion, the Agency is concerned about the long term efficacy of the NOx catalyst being able to sustain the high NOx reduction efficiencies that will be required of these other permits.*

*This catalyst fouling issue was also identified in the Palmer Renewable Energy project. The following is from Palmer Renewable Energy's permit application: "Although cold-side placement of the SCR does provide some protection, catalyst poisoning due to gaseous elements in the flue gas, as well as residual PM, limits the NOx removal that can be achieved to somewhat lower efficiencies than have been achieved on hot-side coal fired applications of SCR."*

*With respect to the need for separate and enforceable emission limits during startup and shutdown of the main boiler, the Agency notes that all of the emission limits with the exception of the NOx 1-hour limit, apply at all times including startup and shutdown.*

*The NOx 1-hour emission limit is reflective of proper operation of the SCR catalyst system. During periods of startup this limit does not apply until the SCR has reached full operating temperature. During these periods of boiler startup, a separate and enforceable NOx 8-hour emission limit applies. Since the annual NOx emission limit continues to apply even to emissions during startup and shutdown, BWE will need to properly manage and minimize these periods in order to ensure compliance on an annual basis.*

## CO BACT/MSER Comments:

Comment #18: Power boiler CO rate does not represent MSER: As is the case with NOx, BWE and by extension VT DEC have too quickly dismissed the CO rate that constitutes BACT at the Palmer facility in Massachusetts. The 3-hour emissions limit at Palmer is 0.07 lb/mmbtu, and the annual rate is 0.0365 lb/mmbtu. Reductions in CO are important not only because CO is a criteria pollutant, but also because the same factors that lead to emissions of CO also lead to emissions of organic hazardous air pollutants. (Commenter 3)

*Response: As noted above, the Palmer Renewable Energy facility proposed for Springfield, MA has not been built, operated, or tested to demonstrate their ability to meet their permitted CO emission limit. Due to potential fouling of the catalyst surface by inorganic constituents in the exhaust gases from wood combustion, the Agency is concerned about the long term efficacy of the catalyst being able to sustain the high CO reduction efficiencies that will be required of the Palmer Renewable Energy permit without significant added cost and maintenance that the Agency does not feel represents MSER in the BWE case.*

## PMCEMS Comment:

Comment #19: The Palmer Renewable draft permit also calls for the installation and operation of a continuous emissions monitoring system for filterable particulates. Continuous particulate monitoring provides an additional level of assurance that the combustion process and control equipment is performing to manufacturer's specification and within the compliance parameters. VT DEC should address the appropriateness and the benefits of a continuous emissions monitoring system for PM. (Commenter 2)

*Response: During the development of the draft permit, the Agency considered the possibility of requiring a PM CEMS for the BWE main boiler. A PM CEMS only measures the emission of filterable PM, which, for the BWE main boiler, is estimated to be less than 20 tons/year. Considering the PM emission levels expected from the BWE main boiler and the cost to purchase, maintain and calibrate such a unit, a PM CEMS is considered to be excessive (estimates of initial cost range from $50,000 to $200,000 and annual expenses for certification testing ranges from $40,000 to$ 60,000).*

*Additionally the filterable PM is controlled by the ESP, and the ongoing operation and performance of the ESP will be subject to a Continuous Assurance Monitoring (CAM) plan. The Agency believes that a CAM plan is a very effective means to ensure that the ESP is performing properly.*

## Comments on Fugitive Emissions and Mobile Source Emissions:

Comment #20: Vehicle impacts for the project are not adequately addressed. The operating hours can be as much as 11 per week day and six (6) on Saturday. Heavy truck traffic can enter and exit the site all during this time. Offsite vehicle emissions should be included in the net air quality impact analysis in order to show the net overall impacts of the project. Permanent on---site mobile equipment, such as front end loaders and short haul trucks, should be included in the potential to emit for the facility (Commenter 2)

*Response: According to EPA's New Source Review Workshop Manual - Prevention of Significant Deterioration and Nonattainment Area Permitting, October 1990,emissions from motor vehicles regulated under Title II of the Clean Air Act are not considered to be secondary emissions subject to review under PSD. Moreover, there is nothing in Vermont's Air Pollution Control Regulations to require otherwise. As such, the motor vehicles entering and exiting the site, offsite vehicles, and on-site vehicles were not included in the review for this permit. However, emissions from mobile source are addressed as a component of the background ambient levels provided to BWE by the Agency.*

Comment #21: BWE incorrectly notes that fugitive emissions are not part of the PSD analysis for this facility. EPA requires fugitives to be included for any of the 28 PSD named source categories. On March 30, 2011, EPA issued a rule regarding the use of fugitives in New Source Review [both NNSR (Non---Attainment New Source Review) and PSD]. EPA's rule reaffirms that fugitive emissions are to be included for any of the 28 named source categories (BWE falls in two categories: as a fossil fuel fired steam electric generating unit greater than 250 MMBtus/hour and as an industrial boiler greater than 250 MMBTUs/hour). (Commenter 2)

*Response: The BWE project's main boiler utilizes two fuel oil burners, each rated at 60 MMBtu/hr, that have a total heat input of 120 MMBtu/hr. This means that the boiler does not have more than 250 MMBtu/hr of fossil fuel firing capability, and is not categorized as one of the 28 named sources in the PSD regulations. The BWEFH project is not required to include fugitive emissions in the PSD analysis.*

## Comments on PM Emissions:

Comment #22: Conditions 18 (as required by 40 CFR part 63) and 24 (as determined to meet MSER) of the permit both contain an emission limit for particulate matter (PM). EPA recommends that Vermont include an addendum to Condition 18 stating the PM emission limit in Condition 24 is most stringent and must also be followed. (Commenter #1)

*Response: In Section H of the permit (Equivalency Determinations), the Agency established that the MSER PM limit of 0.010 lb/MMBtu is more stringent than the 0.03 lb/MMBtu PM limit required by 40 CFR Part 63 Section 63.11201. The Agency will note in Condition 18 that Condition 24 supersedes Subpart JJJJJJ.*

Comment #23: On May 10, 2011, EPA issued a new rule detailing the implementation of NSR for particulate matter less than 2.5 micrometers ($PM_{2.5}$). EPA officially ends the use of the 1997 $PM_{10}$ Surrogate Policy as of May 16, 2011. ARG did not see an analysis of the differences between $PM_{10}$ and $PM_{2.5}$ in either the applicant's documents or in the VT

DEC technical document and draft permit for this facility. As of January 2011 the states are required to account for the condensable portion of the particulates in the $PM_{2.5}$ analysis. In this regard BWE relies only on the historic approach of the $PM_{10}$ as the surrogate for $PM_{2.5}$. They have not estimated the contribution of in-stream condensables, such as the ammonia slip from the MSCR as to its contribution to $PM_{2.5}$. Palmer Renewable does include a brief discussion in the PM BACT section of the condensation contribution of $SO_2$, but does not discuss ammonia ($NH_3$ or other condensable salts such as potassium). (Commenter 2)

*Response: The Agency did not rely on the use of the $PM_{10}$ surrogate policy for evaluating $PM_{2.5}$ impacts. For the BWE project, all PM emissions from the main boiler and rotary dryer are conservatively assumed to be $PM_{2.5}$. The total PM emission limits from both of these sources include condensable (organic) PM. The air dispersion modeling for $PM_{2.5}$ was based on the total PM emission rate from each of these sources. The EPA has not developed guidance on how to estimate the mass of $PM_{2.5}$ that is due to the formation of secondary PM from a given source. The current EPA guidance recommends modeling for $PM_{2.5}$ by using of the $PM_{2.5}$ ambient air monitoring data, which includes $PM_{2.5}$ from both primary PM and PM due to secondary formation; with modeled impacts from primary $PM_{2.5}$ emissions (primary emissions do not include secondary formation of $PM_{2.5}$ due to ammonia, $SO_2$ and NOx emissions from the source). The BWE project's $PM_{2.5}$ modeling followed the current EPA guidance.*

Comment #24: Condition 29 allows for a fairly broad allowance for opacity exceedances during startups and soot blowing. Although some opacity is almost unavoidable for a solid fuel fired plant during startup and soot blowing, this condition is very open ended. Also, since opacity is composed of particulates, ARG sees nothing in the application detailing the estimated particulates from startups and soot blowing. In fact it appears that the potentials to emit for particulates are drawn from historic compliance testing done at full operating load baseline conditions and not from startup and soot blowing conditions. Startups and soot blowing have the potential to result in significant releases of particulate matter and must be fully accounted for in the potential to emit estimates. (Commenter 2)

*Response: Condition 29 limits the visible emissions from the facility. The Agency will remove from Condition 29, (a) and (b), which cited exceptions for wood fuel burning equipment and would have allowed higher emission rates during startup and soot blowing operations.*

*Note that in Attachment B of the permit application, the Permittee did supply emission estimates from the main boiler during startup. The Agency's experience with the other large wood fired boilers in the state indicates that the ESP does an excellent job at controlling the emission of PM during soot blowing activities.*

## Estimating HAP and HAC emissions:

Comment #25: In estimating hazardous air pollutant (HAP) emissions, BWE has picked from a selected suite of emissions factors drawn from emissions testing, NCASI, and the EPA AP-42 document. However, there is no reason provided as to why NCASI and other emission factors were chosen instead of AP-42 factors, which in many cases have an "A" rating for quality and reliability. Fair Haven proposes a combination of hazardous air pollutant (HAPs) emission factors from EPA's AP-42 and from the National Council for Air and Stream Improvement (NCASI—a paper industry technical association). The reviewer cannot glean whether the industry developed factor is more robust, equivalent, or less robust than the AP-42 factor. VT DEC should require BWE to provide greater transparency in HAPs emission calculations. (Commenter 2 & 3)

*Response: The EPA AP-42 emission factors for wood combustion in boilers is based on emission testing at facilities that are wide ranging in size that burn wood residue in the form of hogged wood, bark, sawdust, shavings, chips, mill rejects, sander dust, or wood trim. For some of the facilities included in the AP-42 database, the wood fuel included waste plywood/particle board, wood contaminated with up to 15% urea formaldehyde resins, laminated wood, paper mill sludge, or wood finishing waste. The emissions from the combustion of these contaminated wood fuel types is not considered to be representative of the combustion of unadulterated, natural wood that is the allowable wood fuel for BWEFH.*

*The NCASI data from Technical Bulletin No. 858 was based on the combustion of unadulterated natural wood from mostly larger boilers. The Agency believes that the NCASI data is more representative of the HAP emissions from the combustion of natural wood from larger boilers. Note that if the NCASI data did not include an emission factor for a specific HAP, such as chlorine, then the AP-42 emission factor was used in the review.*

Comment #26: Main Boiler compliance testing Condition (35) should also include at least a one-time requirement for principal hazardous air contaminants testing upon initial compliance testing of the unit. Without testing of the major hazardous air contaminants, no information will be available on actual emissions of these contaminants. (Commenter 2)

*Response: The Agency agrees that an initial testing for HAPs from the Main Boiler will help confirm the appropriateness of the emission factors used and help to establish the actual HAP emissions from this Facility. The Agency will revise the permit to require testing for a subset of HAP compounds from the Main Boiler that that are projected to comprise a large majority of the HAP emissions from the Main Boiler..*

## Comments on Monitoring and Compliance Plans:

Comment #27: Condition 24 allows the facility to choose between a continuous emissions monitoring system (CEMS) for $CO_2$ and an $O_2$ monitor to determine compliance with the $CO_2$ emission rate of 2993lbsIMW-hr (gross) electrical output. Since the cost of an $O_2$ monitor and a $CO_2$ monitor are similar, we encourage Vermont to consider removing the option of using an $O_2$ monitor because a $CO_2$ CEMS will directly measure the pollutant of concern and therefore provide a more accurate measure of compliance (as opposed to calculating the pollutant concentration from stoichiometric factors). Data from a $CO_2$ CEMS can then be combined with data from the volumetric flow rate monitor required in Condition 41 to determine the measured $CO_2$ mass emission rate. (Commenter #1)

*Response: In two major rules, 40 CFR Part 75 - Acid Rain Program and 40 CFR Part 98 – Greenhouse Gas Reporting rule, the EPA has provided extensive information on how to calculate $CO_2$ emissions based on other exhaust parameters including the use of $O_2$ concentration. In drafting the proposed permit, the Agency proposed to make these established methods available for the BWE project. However, upon further review the Agency notes that Part 75 and Part 98 both use $CO_2$ emission data for reporting purposes and not direct compliance with a CO2 emission limit. Since the BWE main boiler is subject to a GHG emission limit, a $CO_2$ CEMS will be required in the final Air Pollution Control Permit to Construct.*

Comment #28: Condition 33 provides general restriction on fugitive emissions. A typical requirement for a facility is to prepare a Fugitive Dust Management Plan for inclusion as a monitoring and compliance requirement in the Title V permit. A preliminary Fugitive Dust Management Plan should be prepared by the applicant prior to the commencement of operations and approved by the VT DEC and released for public comment. (Commenter 2)

*Response: The Agency expects that the existing requirements of Condition 33 will be sufficient for the control of fugitive dust because the facility is not expected to be a significant source of fugitive dust. Should any fugitive dust issues arise, the condition provides adequate authority to address such issues, and, if necessary, a fugitive dust management plan for the facility will be included in the Title V Operating Permit.*

Comment #29: Compliance Plans (Condition 33-39) and Monitoring Plans (Conditions 40 and 41) should be prepared by the applicant and submitted to VT DEC prior to startup so that the public has the opportunity for comment. (Commenter 2)

*Response: The Agency has found that a permittee needs to operate and optimize the equipment for a period of time to be able to identify the necessary parameters and operating ranges for proper operation and monitoring. For this reason, the Agency requires compliance and monitoring plans to be submitted to the Agency within 6 – 12 months of the initial startup of the equipment. This is consistent with the EPA's timeline (within 1 year of startup) for the submission of Continuous Assurance Monitoring (CAM) plan that is part of the application for a Title V Operating permit. Once developed and submitted, these plans are part of the public record and the public may provide the Agency with comments and suggestions for improvement of the plans.*

Comment #30: The applicant should be required to prepare a startup/shutdown/malfunction plan in advance of the facility startup. This document should also be made available for public comment. (Commenter 2)

*Response: The Agency agrees that a startup/shutdown/malfunction (SSM) plan is appropriate for the main boiler and the pellet dryer. A condition requiring an Operation and Maintenance (O&M) Plan for these sources will be added to the final permit. This condition will include a requirement for a SSM plan as part of the overall O&M Plan. As noted above, once developed and submitted, these plans are part of the public record and the public may provide the Agency with comments and suggestions for improvement of the plans.*

## Comments pertaining to Class 1 Area:

Comment #31: With EPA's recent background information on PM2.5 precursors, the visibility analysis should be revisited at 20 km rather than 52 km, use the PM PTE of 65.4 tons rather than 51 tons, and should include primary sulfate emissions, soot, and other condensables such as ammonia slip and potassium salts. (Commenter 2)

*Response: Note that the more comprehensive visibility analysis for the Lye Brook Class 1 Area was not required for this project since the facility is to be located greater than 50 km from Lye Brook and the conservative Q/d screening tool indicated that further review was not warranted.*

*However, to be thorough the applicant also conducted a Level-1 plume visual impact analysis using EPA's VISCREEN model to confirm there will be no adverse visual impact in the Lye Brook Class 1 Area due to the BWE plume. When using the VISCREEN model for a Level-1screeing analysis, for most sources it is recommended to use the default inputs offered in VISCREEN. The default values for soot and sulfate are zero. Further, the BWE project is not projected to have significant emissions of either soot or sulfates. The SCREENING used 51 tons/year to represent the PM emissions from the main boiler and the pellet plant rotary dryer. Since this screening analysis was for the Lye Brook Class 1 Area, and it is located 52 km away from the BWE project, the distance of 52 km was used as the input for the model. If a plume*

*visual impact screening were to be done for the Class II area, then shorter distances such as 20 – 30 km might be considered for the distance from the observer to the source.*

Comment #32: Key assumptions used by Beaver Wood for the visibility analysis may be insufficient, including the use of 195.7 tons of net facility emissions instead of 212.34 tons and using 52 km rather than 20 km. If these assumptions were used instead, the result would be 10.617 for the screening factor calculation for an Air Quality Related Values (AQRV) analysis. (Commenter 2)

*Response: The "Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report—Revised (2010) FLAG 2010" (FLAG 2010) describes how the Q/d screening is to be calculated and how to interpret the Q/d value. FLAG 2010 states 'd' is the distance from the source to the affected Class 1 Area. For the BWEFH project d = 52 km. Using the higher value noted by the commenter for Q (212.34 tons/yr) the Q/d value is 4.1, which is much lower than the trigger of 10.*

Comment #33: Impact on Class I Areas - Vermont included in an e-mail to EPA on September 30, 2011 the distance between the proposed project and the nearest Class I area, along with a range of Q/d values. However, EPA recommends Vermont include this information on page 39 of the TSD along with the recommended *Q/d* value from the Federal Land Manager. (Commenter 1)

*Response: The Agency will provide additional details in the TSD for the Q/d discussion.*

## Comments on Air Dispersion Modeling:

Comment #34: Met data was used from 1998---2002. EPA prefers the most recent data in its modeling guidance. Was more current data considered as a requirement for modeling? (Commenter 2)

*Response: The Agency provided the applicant with the 1998 – 2002 dataset, which was most current processed AERMET data that was available at the time the modeling protocol was being developed. Moreover, the 1998 – 2002 dataset is representative of the project area.*

Comment #35: ARG can't tell what version of BPIP was used for development of downwash parameters. (Commenter 2)

*Response: For the Building Profile Input Program (BPIP), the applicant used BPIP-Prime.*

Comment #36: It appears that the burner dryer stack may have cavity impacts (downwash and backwash) that were not addressed. Cavity impacts result from the interaction of air flow patterns with building heights and emissions release points. If cavity impacts were fully evaluated using EPA approved modeling techniques, that should be clearly noted in the modeling report and Technical Review and sufficient information provided for independent verification. (Commenter 2)

*Response: The air dispersion modeling was conducted using AERMOD (v 09292), building dimensions were input to the model and BPIP Prime was run so that building downwash would be accounted for in the modeling. Plume impacts that occur on the facility property where the public does not have access are not considered ambient air and not addressed in the analysis.*

Comment #37: ARG was unable to determine what background air quality dataset was used as it appears not to match VT DEC's 2006---2008 dataset. (Commenter 2)

*Response: The background air quality dataset was for 2007 – 2009 and was from the Rutland ambient air monitoring station.*

Comment #38: The Beaver Wood AERMOD modeling report in Appendix G of the VT DEC technical review does not show short-term scenarios for 3- and 24-hour SO2, 1- and 8-hour CO, 24-hour PM10, and 24-hour PM2.5. Typically, a modeling report should contain all information on all regulatory standards and significant impact levels that serve as trigger thresholds for the project. (Commenter 2)

*Response: The results for 3-hr $SO_2$, 24- hr $SO_2$, 1-hr CO, 8-hr CO, and 24-hr $PM_{2.5}$ are all available in Appendix G3 of the permit application. Since all PM is assumed to be $PM_{2.5}$, the modeled impacts for $PM_{10}$ are the same as $PM_{2.5}$. Table 6-4 in the Technical Support Document summarizes the modeled impact, background concentrations and the total modeled impact, and compares them to the NAAQS values showing that the proposed project is in compliance for these standards.*

Comment #39: In the AERMOD analysis a fine resolution grid (100 m) was only extended to 1 km from the main boiler stack. This is an unusually small fine grid area in our experience. The locations of the maximum modeled concentrations were not provided. Without identification of the maximum predicted concentration locations, it is not possible to determine how refined grid spacing should be applied. Since the site is approximately 2 km from the center of Fair Haven, ARG suggests that at least a 2 km refined grid with greater density of nodes should have been used for Fair Haven. (Commenter 2)

*Response: The grid resolution for BWE was adequate for identifying the near field distribution of pollutants such as $PM_{10}$ and $PM_{2.5}$. The modeling results show that the highest 24-hr PM impacts are within 1 km of the proposed facility. Had higher impacts been suggested outside this area the more refined grid would have been extended.*

## Comments on Startup/Shutdown and Intermittent Emissions:

Comment #40: No emissions source data was provided for startup modes, soot blowing, or the generator operating scenarios. The applicant's assumptions that startup emissions are lower than full load is not necessarily accurate for particulates and products of incomplete combustion. More support should be provided for this assertion. It is ARG's experience that PM and NOx may be significantly higher instantaneously during startups than during baseload. (Commenter 2)

*Response: In Attachment B of the application, there are emission calculations for a startup scenario. The emissions from this startup were included in a modeling run and found to not violate any of the NAAQS. It should be noted that this startup scenario includes a short term NOx emission rate of 0.33 lb/MMBtu: acknowledging that the boiler's NOx emissions during startup could be higher than the emission rate during steady state operation. Soot blowing in the boiler is conducted to remove the buildup of soot on the heat transfer surface areas in the boiler. The particulate dislodged from soot blowing must pass through the PM control equipment, including the ESP. The ESP is expected to continue to control these PM emissions in compliance with the respective emission limit even during soot blowing.*

Comment #40: The permit does not adequately address elevated emission rates during startup and shutdown conditions. It appears that in BWE's case, the maximum hourly NOx rate is set to cover emissions during startup and shutdown, when the MSCR system is not at optimum operating temperature. It seems likely that actual startup and shutdown emissions may be higher than the 0.06 lb/mmbtu set for the hourly rate – for instance, the DTE Stockton plant in CA specifies a startup emissions rate for NOx that is more permit to assume that the maximum hourly rate covers startup and shutdown events, as BWE's does. Having reviewed more than 60 permits for biomass facilities around the country, we can say it is typical for biomass facility air permits to state that pollution control rates do not apply during startup and shutdown, or to specify different rates for these periods, and atypical for a permit to assume that the maximum hourly rate covers startup and shutdown events, as BWE's does. Other pollutants should be similarly evaluated for their true emissions during startup and shutdown. (Commenter 3)

*Response: As noted previously, all the emission limits for the BWE main boiler with the exception of the 0.060 lbs/MMBtu NOx 1-hour limit apply at all times including startup and shutdown. During startup and shutdown an 8-hour NOx emission limit applies.*

*The emission limit for CO is a 24-hr rolling average that includes startup and shutdown operation. While the CO levels may be elevated during phases of startup, the facility must offset this with lower levels of CO during that 24-hr period to meet the emission limit.*

## Other Comments:

Comment #41: BACT - When a control technology is removed from consideration during the BACT analysis based on cost, cost data to support the decision should be provided. For example, on page 30 of the Technical Support Document (TSD), Vermont concludes the installation of a regenerative thermal oxidizer (RTO) on the pellet dryer to control VOC's is not economically feasible. In order to support this statement, Vermont should determine the annualized cost per ton of VOC removed of installing and operating an RTO at the proposed Beaver Wood facility and include this information in the TSD along with their rationale for why the costs are excessive, such as similar cost findings in other permitting actions. (Commenter 1)

*Response: The Agency will add the requested supporting information into the TSD.*

Comment #42: Ammonia: An ammonia management plan should be prepared prior to startup. Furthermore, ALOHA (Areal Locations of Hazardous Atmospheres) or similar emergency release modeling using EPA's Accidental Release Program criteria should be required by VT DEC. (Commenter 2)

*Response: The oversight of the design and approval of above ground chemical storage tanks such as the aqueous ammonia storage tank that is to be sited at the BWE facility, is handled by the Vermont Division of Fire Safety and not the Vermont Department of Environmental Conservation. The Agency has forwarded this comment and concern to the Division of Fire Safety's Rutland Regional Office.*

Comment #43: Mitigation Measures: In the Palmer Renewable conditional approval the State of Massachusetts obtained numerous commitments from the developer for efficiency improvements and net benefits. For example, Palmer agreed to provide diesel retrofits for trucks with catalyzed diesel particulate filters (CDPF). Palmer agreed to provide the host city with $2 million as mitigation for the impacts of the project and Palmer also agreed to provide emission reduction credits (ERCs) as offsets for the NOx emissions even though the project is non-major. Project mitigation measures may be appropriate for the Fair Haven project as well. (Commenter 2)

*Response: The Agency has no authority to require such supplemental mitigation measures in the context of this air permit. Further, the applicant has not proposed any mitigation measures as part of the permit application and therefore no such measures will be included in the Air Pollution Control Permit to Construct. The Agency reserves its right to request or require, as appropriate, supplemental mitigation measures in the context of other proceedings such as Act 250, Section 248 and other permitting regimes.*

Comment #44: Intermittent Sources: The NAAQS and PSD increment analysis does not show all information. It also appears not to include several emissions sources. Without all the information, it would be difficult to duplicate and verify the modeling used by Beaver Wood. ARG believes that the following were not included in modeling: two 500 kw generators; 400 hp fire pump; the pellet building baghouse; the fly ash silo vent; 2 pellet storage silo vents; all fugitives. (Commenter 2)

*Response: Following the EPA's March 1, 2011 guidance for the treatment of intermittent emissions, the emergency generators and fire pump were not modeled. Condition 22 restricts the non-emergency operation of these engines. The emissions from the pellet building baghouse, fly ash silo vent, pellet storage silo vents, and fugitives are considered inconsequential compared to the two main stacks and were therefore not included in the modeling Had the modeling results projected near violations then further refinement would have been required.*

Comment #45: Backup generators: Stack data was not provided for the IC engine generators. (Commenter 2)

*Response: The permit application did not provide stack data for the stationary diesel engines. The installation of the diesel powered generators was authorized in a previous Air Pollution Control Permit to Construct and Operate: AOP-10-042. That permit specifies that the engines must be exhausted through a stack that extends 4 feet above the roof where the stack penetrates, or 10 feet above ground level.*

Comment #45: The Clean Air Act requires that potential to emit (PTE) be calculated for the purposes of determining whether a facility is a major emissions source for regulatory purposes. PTE is calculated by multiplying the boiler capacity (mmbtu/hr) by a pollutant's emission rate (lb/mmbtu) by the number of hours in a year (8,760), and dividing by 2,000 to convert from pounds to tons. However, BWE's potential to emit does not appear to have been calculated in this way. Table 3-1, in the Technical Analysis document, states that a capacity factor of 96% is used to calculate allowable emissions. An exception to the PTE rule can be made under some circumstances. According to EPA guidance, a facility can put limits on operations that ensure that it remains a "synthetic minor" source that does not trigger key permitting thresholds. However, EPA requires that these limits must be stated in the permit and be practicably enforceable. BWE's air permit does not state practicably enforceable limits that will guarantee that emissions of NOx remain below 100 tons and emissions of VOCs remain below 50 tons. Therefore, BWE's permit and avoidance of requirements to purchase ERCs are not legitimate. (Commenter 3)

*Response: The review of this permit application followed the guidance in the U.S. EPA 'New Source Review Workshop Manual (Draft October 1990). In this guidance document, the potential to emit (PTE) may include limitations such as restrictions on design capacity utilizations, restrictions on hours of operation and restrictions on the types or amount of material processed.*

*In the draft permit the pellet manufacturing process has limitations for the throughput of the rotary dryer (Condition 15) as well as a VOC limit in terms of lb/ODT of dryer output (Condition 25), thus limiting the allowable VOC emissions from the rotary dryer.*

*The draft permit similarly limits the NOx emission from the rotary dryer in terms of lb/MMBtu heat input (Condition 25). The NOx emission rate from the rotary dryer shall be established by periodic stack testing (Condition 36). The draft permit does lack a specific limit for the energy input to the Coen burner. The final permit will include a limit on the heat input to the Coen burner.*

*For the main boiler the draft permit establishes a NOx limit of 0.030 lb/MMBtu and 60.8 tons/year (Condition 24). To ensure that the main boiler does not exceed these limits, it is also required to monitor the $NO_X$ emissions with a PS-2 (Performance Specification) NOx CEMS. Condition (25) further limits total NOx emissions from the facility to 100 tons per year and is an enforceable limit.*

*The draft permit establishes a VOC emission limit from the main boiler (Condition 24), and requires periodic stack testing (Condition 35) to determine the VOC emission rate. The draft permit does lack an annual heat input limit for the main boiler. Since the emissions from the proposed facility were based on a combination of maximum boiler*

*heat input and a capacity factor of 96%, the final permit will include an annual heat input limit for the main boiler.*

*Since the permit limits the allowable NOx emissions to less than 100 tons/yr (Condition 23) and VOC emissions to less than 50 tons/yr (Condition 30), in addition to the permit limitations noted above, the Permittee is not required to purchase emission reduction credits.*

Comment #46: Besides the incorrect calculation of PTE for the power boiler, emissions from the pellet dryer burner also appear to contain a discrepancy with regard to PTE. The permit contains the following table:

| **Burner/Rotary Dryer Emission Limitations** | | | | |
|---|---|---|---|---|
| Pollutant | Emission Limitations | | | Compliance Test Method [1] |
| | Emission Limit | | Averaging period | |
| $NO_X$ | 0.35 lb/MMBtu | 5.25 lb/hr | 1-hour | Reference Method 7E |
| CO | 0.35 lb/MMBtu | 5.25 lb/hr | 1-hour | Reference Method 10 |
| Total PM | 0.2 lb/ODT | 3.0 lb/hr | 1-hour | Reference Method 5 and 202 |
| Filterable | 0.005 gr/dscf [2] | 2.3 lb/hr | 1-hour | Reference Method 5 |
| $SO_2$ | 0.025 lb/MMBtu | 0.75 lb/hr | 1-hour | Reference Method 6C |
| VOC | 0.69 lb/ODT | 10.3 lb/hr | 1-hour | Reference Method 18 or 25 |
| GHG | 427 lb CO2e/ ton finished pellets | - | Monthly average | Calculation based on wood fuel usage and pellet production. |

The pellet dryer burner is a 30 mmbtu/hr unit. The permit does not contain any practicably enforceable limits on its operation. Therefore, its hourly emissions of NOx are calculated as 30 mmbtu/hr x 0.35 lb/mmbtu = 10.5 lb/hr. Inexplicably, however, the table contains an hourly NOx limit of one-half this amount, at 5.25 lb/hr. The same mathematical discrepancy exists for CO and PM.

If the potential to emit for VOCs from the pellet dryer is based on the hourly limit, then the dryer's VOC PTE is 45.11 tons/yr (10.3 lb/hr x 8760 hrs/2000 = 45.11 tons).

If the potential to emit for NOx were calculated correctly for the 30 mmbtu boiler, the PTE would be 45.99 tons. (Commenter 3)

*Response: The Agency would like to thank the Commenter for pointing out an error in the emission table in Condition 25 of the draft permit. The lb/hr emission limit for both*

*NOx and CO are incorrectly shown as 5.25 lb/hr. As noted by the Commenter, the correct emission rate should be 10.5 lb/hr. This will be corrected in the final permit.*

*There is not a similar error in the Total PM hourly limit as suggested by the Commenter.*

*The VOC hourly limit is based on the emission limit 0.69 lb/ODT multiplied by the rated rotary dryer throughput of 15 ODT/hr. The annual allowable VOC emission from the rotary dryer is based on the annual production limit of 115,000 ODT/yr and the 0.69 lb/ODT emission limit, resulting in an annual allowable VOC emission of 39.9 tons/yr, and not the 45.11 tons noted by the Commenter.*

*The annual allowable emission of NOx from the rotary dryer is based on the emission limit of 0.35 lb/MMBtu, the rated heat input for the Coen burner (30 MMBtu/hr), and a burner capacity factor of 82%. As noted in the Agency's response to the previous comment, the final permit will include a heat input limit for the Coen burner. This will limit the allowable NOx emission from the rotary dryer to 37.7 tons/yr rather than the 45.99 tons noted by the Commenter.*

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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BOSTON, MA 02109-3912

October 17, 2011

Douglas R. Elliott, Chief
Permit Section
Vermont Air Pollution Control Division
103 South Main Street, Building 3 South
Waterbury, VT 05671-0402

RE: Beaver Wood Energy Fair Haven LLC, Fairhaven, Vermont – Prevention of Significant Deterioration (PSD) Permit No. AP-11-015

Dear Mr. Elliott,

We have reviewed the above referenced draft permit for the Beaver Wood wood-fired generating unit and wood pellet manufacturing plant transmitted via e-mail by the Vermont Air Pollution Control Division (Vermont) on September 15, 2011. Based on our review of the draft PSD permit, we have the following comments. We provide these comments to help ensure that the project meets federal CAA requirements, that the permit will provide necessary information so that the basis for the permit decision is transparent and readily accessible to the public, and that the permit record provides adequate support for the decision.

**BACT Analysis**

When a control technology is removed from consideration during the BACT analysis based on cost, cost data to support the decision should be provided. For example, on page 30 of the Technical Support Document (TSD), Vermont concludes the installation of a regenerative thermal oxidizer (RTO) on the pellet dryer to control VOC's is not economically feasible. In order to support this statement, Vermont should determine the annualized cost per ton of VOC removed of installing and operating an RTO at the proposed Beaver Wood facility and include this information in the TSD along with their rationale for why the costs are excessive, such as similar cost findings in other permitting actions.

**Impact on Class I Areas**

Vermont included in an e-mail to EPA on September 30, 2011 the distance between the proposed project and the nearest Class I area, along with a range of Q/d values. However, EPA recommends Vermont include this information on page 39 of the TSD along with the recommended Q/d value from the Federal Land Manager.

**Draft Air Pollution Control Permit to Construct**

1. Conditions 18 (as required by 40 CFR part 63) and 24 (as determined to meet the most stringent emission rate) of the permit both contain an emission limit for particulate matter (PM). EPA recommends that Vermont include an addendum to Condition 18 stating the PM emission limit in Condition 24 is more stringent and must also be followed.

2. Condition 24 allows the facility to choose between a continuous emissions monitoring system (CEMS) for $CO_2$ and an $O_2$ monitor to determine compliance with the $CO_2e$ emission rate of 2993 lbs/MW-hr (gross) electrical output. Since the cost of an $O_2$ monitor and a $CO_2$ monitor are similar, we encourage Vermont to consider removing the option of using an $O_2$ monitor because a $CO_2$ CEMS will directly measure the pollutant of concern and therefore provide a more accurate measure of compliance (as opposed to calculating the pollutant concentration from stoichiometric factors). Data from a $CO_2$ CEMS can then be combined with data from the volumetric flow rate monitor required in Condition 41 to determine the measured $CO_2$ mass emission rate.

3. In Condition 24, Vermont requires the measurement of $CO_2$ in determining compliance with the GHG emissions limit (stated on a $CO_2e$ basis). However, the measurement of $CO_2$ does not account for the non-$CO_2$ GHG (e.g., methane and nitrous oxide) that are emitted by the facility. These non-$CO_2$ GHGs are typically emitted in small amounts compared to $CO_2$, but should nevertheless be included in showing compliance with the total GHG emissions limit. Thus, EPA recommends Vermont require the facility to determine the amount of non-$CO_2$ GHG pollutants emitted by the facility and add the amount (on a $CO_2e$ basis) to the amount of $CO_2$ measured by the CEMS, or provide an explanation in the record as to why such measurement is not necessary to ensure compliance with the GHG emissions limit. Instead of direct measurement, Vermont could allow the source to used established fuel factors (e.g., from EPA's Greenhouse Gas Mandatory Reporting Rule at 40 CFR 98) or develop site-specific fuel factors to calculate the amount of the non-$CO_2$ GHG pollutants.

4. It is unclear how the facility will calculate the GHG emission rate from the pellet dryer in Condition 25 (427 lbs $CO_2e$/ton finished pellets emitted) from data on wood fuel usage and pellet production. The permit should contain the necessary steps and assumptions the facility will use in such a calculation.

If you have any questions regarding these comments or need additional information please contact Donald Dahl at (617) 918-1657.

Sincerely,

Donald F Dahl, acting for

Ida E. McDonnell, Manager
Air, Permits, Toxics and Indoor Programs Unit

Southern Vermont Citizens for Environmental Conservation
and Sustainable Energy
P.O. Box 393
Pownal, VT 05261

October 14, 2011

Dear Mr. Snook,

We write as co-directors of Southern Vermont Citizens for Environmental Conservation and Sustainable Energy (SVCECSE), a Vermont non-profit organization with over 500 members. Our group was founded in 2010 in response to Beaver Wood Energy's proposed wood-fired, utility-scale power plant in Pownal, Vermont. Part of our mission is to work with all appropriate authorities to ensure that if new generating facilities are constructed, they will conform to the highest environmental standards available.

We recognize that the air quality permit granted for any new plant will set a precedent for the standards to which all new wood-powered facilities would be held. Therefore, we hired David Alexander of Air Resources Group in Albany, NY to review the draft air permit issued by the Vermont Agency of Natural Resources. We have enclosed his report for your consideration.

In his review of the draft permit, Mr. Alexander outlined a number of issues that should be addressed in the final permit. Below, we highlight some, but not all, of the concerns discussed in his report.

Throughout the process, Beaver Wood Energy has claimed that their new facilities will be the cleanest burning in the nation. Given the size and location of the proposed plants, we believe they should be held to that standard.

To be the cleanest, and to employ truly best available control technology (BACT), there should be no discrepancy between the emissions levels permitted for Beaver Wood and those for other plants that have either been permitted or constructed. In several cases, other plants have been permitted with lower emissions levels (see pages 2-4 of the report).

We also note that the Beaver Wood draft permit does not specify the exact treatment chain for all emissions. Notably, the permit calls for electrostatic precipitator (ESP) *or* baghouse filtration. In the absence of a firm decision on this matter, it is not reasonable for the public to be able to judge what actual emissions levels will be (see page 2 of the report).

In addition, the permit is based around performance of a multi-pollutant selective catalytic reduction unit (MSCR). These devices have been permitted in other projects, but there is no database to substantiate the performance claims. We are concerned that this technology is best suited for higher temperature applications, and we are further concerned that chemical compounds present in biomass and not in fossil fuels will reduce the effectiveness of this device. The Agency of Natural Resources should require additional performance data to substantiate the claims (see page 3 of the report).

We find no analysis of PM 2.5 emissions in the draft permit. We are particularly concerned about PM 2.5 given recent research on the health impacts of the smallest particulates. It is our understanding that any permit issued after May 16, 2011 must address this issue directly. When this is addressed, we expect that ANR will require an analysis of condensable particles as part of this documentation (see page 5 of the report).

We are concerned that the emission factors proposed by Beaver Wood come from a combination of industry estimates and EPA estimates. No justification was given for using emissions factors other than those of the EPA, raising the possibility that the company chose emissions factors most favorable to them (see pages 5 and 6 of the report).

We also expect that the final permit will quantify and limit the particulate emissions from start up and soot blowing operations (see pages 5 and 7 of the report).

We find it impossible to review the quality of the air emissions modeling that was performed, in that key assumptions about the background air quality dataset were not reported. We would also note that model results for the fine grid were reported for a relatively small geographic area. We would expect that the fine grid would extend at least as far as the center of Fair Haven (approximately 2 km). Any report must include detail about the maximum modeled concentrations. Beaver Wood must provide significantly more modeling data for public review, so that public health impacts from this plant can be adequately understood and addressed (see pages 8 and 9 of the report).

In addition, in our review of the draft permit we found no specific limit on the amount of oil that could be used as fuel for the boiler. We hope that in the final permit, strict limits on oil combustion will be specified. In the absence of clear limits, we see that the Fair Haven plant could be operated as a fossil fuel facility, should that be advantageous for the operator.

We sincerely appreciate the careful review that your agency provides. Our comments and the report we commissioned are intended to support and encourage your role in preserving the environmental quality of Vermont and the health of the people who live here.

In responding to this draft permit, we have communicated with other groups, notably the Partnership for Policy Integrity and the Center for Biological Diversity. We share the concerns about this draft permit that they will raise in separate communications with the Agency of Natural Resources.

Sincerely,

William Gentry
Lara Shore-Sheppard
Charley Stevenson

Co-Directors, SVCECSE

# Beaver Wood Fair Haven Project Issues and Discussion

Prepared by David Alexander, Managing Principal

Air Resources Group, LLC Albany, NY

6281 Johnston Road, Albany, NY 12203

Beaver Wood proposes to construct and operate a new biomass fired power station and wood pellet plant facility at Fair Haven, VT. The facility will be located on Route 4 in the town of Fair Haven.

- Vermont DEC issued a draft air permit to construct on September 15, 2011. The Notice provides for public comments on the draft until October 17, 2011.
- The proposed facility will include a 34 MW biomass fired electric generating station and 115,000 ton per year wood pellet plant.
- The plant can operate up to six days per week.

## Issues of Interest in the Draft Air Permit

- The VT DEC accepts the applicant's selection of proposed controls as best available control technology (BACT). BACT is a top down evaluation process defined by the US EPA and is the minimum standard that a State must use in developing permit conditions for projects in areas that attain the national ambient air quality standards (NAAQS). Vermont is generally in attainment for the NAAQS. Vermont refers to its BACT process as the Most Stringent Emission Rate (MSER) analysis. The BACT analysis must look at the lowest emission rates nationally for similar facilities and equipment and determine the feasibility and cost reasonableness for use of those lowest rates in this project. BACT limits are then set for criteria and PSD pollutants for which the facility will have significant emissions. The BACT analysis is both a technical review of the application and proposed equipment as well as a review of the permit levels or emissions standards set throughout the US. The EPA provides a resource for finding permit determinations in other states through the RACT/BACT/LAER Clearinghouse (RBLC). In theory, the RBLC is to contain every RACT, BACT, and LAER permit decision approved by a state agency, although in practice the system is often not up to date. Thus, one also needs to review databases maintained in other states such as California, Wisconsin, Florida, etc., to develop a comprehensive analysis of permit conditions. BACT is not final for a project until the second portion of the permit is issued (the Permit to Operate). Thus, between the initial draft permit (the one we are reviewing) and completion of the project the

BACT is subject to additional review and possible modification clear up to the final issuance of the permit to operate.

- The Beaver Wood project proposes to use a stoker boiler system with overfire air rated at 482 mmBtus/hour. Emissions will be controlled by a multi-clone, followed by an electrostatic precipitator (ESP) or a baghouse, followed by a multi-pollutant selective catalytic reduction unit (MSCR).

- The boiler design is fairly standard and has operational history. Generally, no major technical issues are noted with this boiler technology selection.

- The multi-clone and the ESP or baghouse add-on controls are designed to remove particulates. Baghouses tend to provide higher overall particulate control, but are subject to operating issues such as fires. ESPs function by passing the gas stream through a strong electric field. Particulates migrate towards the positive or negative plates depending upon their charges. ESPs are finicky and subject to periodic outages and maintenance problems. Neither will do anything for gaseous emissions and for ultrafine materials in the PM2.5 range that are acting as quasi-gases (in other words, don't act as particulates). Generally, combustion will create particulates near the smallest end of the size range and will also result in some emissions for which particulate removal technologies are generally not effective. At this stage in the draft permit the VT DEC should pin down the applicant to specifying the control technology in some detail so that it can be fully evaluated during the public comment process. As part of this assessment of the Beaver Wood draft permit and support materials, ARG obtained and reviewed many BACT analyses for other projects, such as a well done control technology review for a biomass burn facility (Domtar, Rothschild Plant). That application specifically selected baghouse technology with felted fabric filters as the BACT technology for both the PM and PM2.5 particulate fractions. The proposed particulate emission rates for Beaver Wood are 0.012 lbs/mmBtu for filterable particulates and 0.019 lbs/mmBtu for total particulates. Several other facilities have demonstrated (with compliance testing) significantly better performance with baghouse and ESP controls than the levels presented in the Beaver Wood draft permit. The Beaver Wood technical review prepared by VT DEC notes several permits with actual test data well below the proposed Beaver Wood limits demonstrating that lower particulate controls are achievable as MSER. Actual data for four facilities reported in the Beaver Wood technical support document show filterable PM ranging from as low as 0.00015 lbs/mmBtu to 0.001 lbs/mmBtu. Massachusetts issued an April 18, 2007 Biomass BACT guidance memo setting a PM BACT baseline starting point at 0.012

lbs/mmBtu (a level that Massachusetts DEP says is readily achievable in practice). While a reasonable compliance cushion is necessary and appropriate in setting limits, the actual results for several facilities referenced in the MSER analysis, as well as other BACTs such as the Massachusetts Biomass BACT, show that PM at a much lower level is readily achievable. Interestingly, the Palmer Renewable draft permit also calls for the installation and operation of a continuous emissions monitoring system for filterable particulates. Continuous particulate monitoring provides an additional level of assurance that the combustion process and control equipment is performing to manufacturer's specification and within the compliance parameters. VT DEC should address the appropriateness of both a lower set of PM limits (perhaps as low as Seneca Energy, but certainly as low as the nearby Massachusetts BACT standard for biomass plants), as well as the benefits of a continuous emissions monitoring system for PM.

- After filtration the gas stream will flow through a multi-pollutant selective catalytic reduction (MSCR) unit. This is a Babcock proprietary technology that has been permitted primarily in applications for biomass facilities. MSCR is intended to reduce the nitrogen oxides (NOx) and is reported as having similar benefits for carbon monoxide and volatile organic compounds. Unlike SCR that is only effective when placed in the gas stream in an area between 580-800+$^{o}$F, the MSCR will receive a gas stream at only 425$^{o}$F. No SCR vendor would guarantee performance at this low temperature since the catalyst and ammonia reactant are not in the correct temperature range for the reaction to proceed rapidly and to completion. So the MSCR performance is dependent upon achieving a reactant temperature range by passing hot gases back through the catalyst media essentially as a preheater. Although there are several of these MSCR units permitted, ARG has not seen sufficient test results to properly analyze their performance. Thus, it is difficult to assess their ability to achieve the proposed standards for these pollutants. VT DEC should be able to produce or obtain actual compliance test data or other verification information from Beaver Wood and from other facilities to support its conclusion that MSCR will meet the permit limits. The draft permit proposes limits of 0.06 lbs of NOx/mmBtu of heat input. Most of the other permitted plants presented in the VT DEC technical review have higher limits and the only operating information reported is for PSNH Schiller Station with a 1$^{st}$ quarter of 2011 reported rate of 0.064 lbs/mmBtu. However, the Palmer Renewable Energy conditional draft permit in Massachusetts proposes a one-hour limit of 0.055 lbs of NOx/mmBtu. VT DEC dismisses the Palmer limit as not demonstrated. Such a conclusion by VT DEC must be construed by the public as an interpretation that the Palmer Renewable BACT analysis performed by Massachusetts is technically flawed. VT DEC has not provided any substantive evidence that Massachusetts errored in its BACT

analysis; thus, it should either do so or use the current lowest one-hour emission rate limit of 0.055 lbs of NOx/mmBtu as contained in the Palmer Renewable Energy conditional permit.

- The Fair Haven application notes that the vendor provided information that supports the emission estimates. The application and technical review also note that the vendor has provided guarantees for the proposed emissions levels. Vendor guarantees are not uncommon in many permit applications. Usually, these guarantees have numerous caveats and limitations that define the conditions under which the guarantees will be supported by the vendor. Also, such guarantees are notorious for containing lots of comfort room between actual performance and the guarantee level so as to protect the vendor from performance claims after startup. Since these vendor provided emissions assumptions are critical to the ability of *the* permittee to meet the permit limit after startup, it is not unreasonable for the VT DEC to obtain and make public the specifics of the vendor guarantees including any limitations to those guarantees and the degree to which the guarantees are conservative from actual performance. Thus, for example, if Babcock has performance data showing that its technology can routinely meet a lower level, why should the permit limit be set at 0.06 lbs of NOx/mmBtu? Further, if Babcock concurs that its technology can meet the permit limits set for Palmer following the Massachusetts BACT determination, then it should also be capable of meeting those levels for Fair Haven.

- Vehicle impacts for the project are not adequately addressed. The operating hours can be as much as 11 per week day and six (6) on Saturday. Heavy truck traffic can enter and exit the site all during this time. Offsite vehicle emissions should be included in the net air quality impact analysis in order to show the net overall impacts of the project.

- The applicant notes that fugitive emissions are not part of the PSD analysis for this facility. This is not correct. EPA requires fugitives to be included for any of the 28 PSD named source categories. On March 30, 2011, EPA issued a rule regarding the use of fugitives in New Source Review [both NNSR (Non-Attainment New Source Review) and PSD]. EPA's rule reaffirms that fugitive emissions are to be included for any of the 28 named source categories (Beaver Wood falls in two categories: as a fossil fuel fired steam electric generating unit greater than 250 mmBtus/hour and as an industrial boiler greater than 250 mmBtus/hour). Since the draft permit contains no restrictions on the amount of fuel oil that Beaver Wood may burn in the boilers, the appropriate interpretation is that Beaver Wood should be treated as qualifying as a fossil fuel fired boiler greater than 250 mmBtus/hour as defined in 40 CFR 51.166(b)(1)(i)(c)(iii) source

categories u and z. VT DEC should respond with more feedback whether fugitives should have been calculated and included in the emissions totals for PSD analysis as required by 40 CFR Part 51 PSD regulations for a facility permitted to burn fossil fuels (as is Beaver Wood Fair Haven).

- On May 10, 2011, EPA issued a new rule detailing the implementation of NSR for particulate matter less than 2.5 micrometers (PM2.5). EPA officially ends the use of the 1997 PM10 Surrogate Policy as of May 16, 2011. ARG did not see an analysis of the differences between PM10 and PM2.5 in either the applicant's documents or in the VT DEC technical document and draft permit for this facility, although we have seen such discussions in many other recent permit decision documents. As of January 2011 the states are required to account for the condensable portion of the particulates in the PM2.5 analysis. While the most immediate impact for this rule is in PM2.5 non-attainment areas (VT is PM2.5 attainment), a consequence of the rule for PSD purposes is the necessity to provide a more definitive analysis of the condensables portion of the gas stream that will condense to form PM2.5. In this regard Beaver Wood relies only on the historic approach of the PM10 as the surrogate for PM2.5. They have not estimated the contribution of in-stream condensables, such as the ammonia slip from the MSCR as to its contribution to PM2.5. Palmer Renewable does include a brief discussion in the PM BACT section of the condensation contribution of SO2, but does not discuss ammonia (NH3 or other condensable salts such as potassium).

- Condition 29 allows for a fairly broad allowance for opacity exceedances during startups and soot blowing. Although some opacity is almost unavoidable for a solid fuel fired plant during startup and soot blowing, this condition is very open ended. Also, since opacity is composed of particulates, ARG sees nothing in the application detailing the estimated particulates from startups and soot blowing. In fact it appears that the potentials to emit for particulates are drawn from historic compliance testing done at full operating load baseline conditions and not from startup and soot blowing conditions. Startups and soot blowing have the potential to result in significant releases of particulate matter and must be fully accounted for in the potential to emit estimates.

- Fair Haven proposes a combination of hazardous air pollutant (HAPs) emission factors from EPA's AP-42 and from the National Council for Air and Stream Improvement (NCASI—a paper industry technical association). While generally ARG has no problem with the use of some industry generated emissions factors, neither Beaver Wood nor VT DEC justified the reasons for using emissions factors from sources other than those in AP-42. The emissions factors in AP-42 show a broad range of ratings (A to E ratings

based on EPA's assessment of the quality and quantity of information supporting each emission factor); however, neither the applicant's materials nor the VT DEC technical review provide insight into the ratings comparison between the EPA AP-42 factors and the NCASI technical paper. Thus, the reviewer cannot glean whether the industry developed factor is more robust, equivalent, or less robust than the AP-42 factor. It is always necessary in an application to technically justify the primary information (emissions factors) that is used for calculation of mass emissions. In fact, this draft permit is predicated upon the applicant's decisions to pick and choose emissions factors without specifics as to the reasons why. VT DEC should rectify this by requiring the applicant to provide justification for selecting alternative emission factors and provide specific regulatory contexts in which the proposed emissions factors have been approved for use.

- Condition 33 Fugitive Emissions provides general restriction on fugitives. A typical requirement for a facility is to prepare a Fugitive Dust Management Plan for inclusion as a monitoring and compliance requirement in the Title V permit. A preliminary Fugitive Dust Management Plan should be prepared by the applicant prior to the commencement of operations and approved by the VT DEC and released for public comment.

- Main Boiler compliance testing Condition 35 should also include at least a one-time requirement for principal hazardous air contaminants testing upon initial compliance testing of the unit. Without testing of the major hazardous air contaminants, no information will be available on actual emissions of these contaminants.

- Compliance Plans (Condition 33-39) and Monitoring Plans (Conditions 40 and 41) should be prepared by the applicant and submitted to VT DEC prior to startup so that the public has the opportunity for comment.

- The applicant should be required to prepare a startup/shutdown/malfunction plan in advance of the facility startup. This document should also be made available for public comment.

- Permanent on-site mobile equipment, such as front end loaders and short haul trucks, should be included in the potential to emit for the facility.

- An ammonia management plan should be prepared prior to startup. Furthermore, ALOHA emergency release modeling using EPA's Accidental Release Program criteria should be required by VT DEC (see further discussion below).

- In the Palmer Renewable conditional approval the State of Massachusetts obtained numerous commitments from the developer for efficiency improvements and net benefits. For example, Palmer agreed to provide diesel retrofits for trucks with catalyzed diesel particulate filters (CDPF). Palmer agreed to provide the host city with $2 million as mitigation for the impacts of the project and Palmer also agreed to provide emission reduction credits (ERCs) as offsets for the NOx emissions even though the project is non-major. Project mitigation measures may be appropriate for the Fair Haven project as well.

## Air Quality Net Benefit Analysis

- The NAAQS and PSD increment analysis does not show all information. It also appears not to include several emissions sources. Without all the information, it would be difficult to duplicate and verify the modeling used by Beaver Wood. ARG believes that the following were not included in modeling.
    - 2 - 500 kw generators
    - 1 - 400 hp fire pump
    - The pellet building baghouse
    - The fly ash silo vent
    - 2 pellet storage silo vents
    - All fugitives

- The visibility analysis is based on 51 tons of PM impact, but attachment B of the applicants report says that the potential to emit (PTE) for PM is 65.4 tons. Total primary sulfate emissions were also not included. Soot was also not included. The distance of 52 km to the nearest Class 1 area (Lye Brook) was used in the screening calculation. Typically, ARG finds that in most states the visibility assessment is done for a distance of 20-30 km rather than as far out as the 52 km used here. With EPA's recent background information on PM2.5 precursors, the visibility analysis should be revisited at 20 km rather than 52 km, use the PM PTE of 65.4 tons, and should include other condensables such as ammonia slip and potassium salts.

- For the Class 1 area analysis the applicant used 195.7 tons of net facility emissions, although attachment B says the total is 212.34 tons. However, If 20 km (typical) is used

along with the 212.34 tons of facility emissions, the result would be 10.617 for the screening factor calculation for an Air Quality Related Values (AQRV) analysis. This would exceed the screening trigger of 10 and would result in the requirement for Beaver Wood to perform an air quality related value analysis. In other words, key assumptions used by Beaver Wood for the visibility analysis may be insufficient.

- Stack data was not provided for the IC engine generators.

- Met data was used from 1998-2002. EPA prefers the most recent data in its modeling guidance. Was more current data considered as a requirement for modeling?

- ARG can't tell what version of BPIP was used for development of downwash parameters.

- It appears that the burner dryer stack may have cavity impacts (downwash and backwash), but these were apparently not addressed. Cavity impacts result from the interaction of air flow patterns with building heights and emissions release points. Were cavity impacts fully evaluated for the Fair Haven project using EPA approved modeling techniques? If yes, that should be clearly noted in the modeling report and Technical Review and sufficient information provided for independent verification.

- ARG was unable to determine what background air quality dataset was used as it appears not to match VT DEC's 2006-2008 dataset.

- The Beaver Wood AERMOD modeling report in Appendix G of the VT DEC technical review does not show short-term scenarios for 3- and 24-hour SO2, 1- and 8-hour CO, 24-hour PM10, and 24-hour PM2.5. Typically, a modeling report should contain all information on all regulatory standards and significant impact levels that serve as trigger thresholds for the project. Were these standards modeled for compliance? If yes, they should be included in the modeling report attachment for public review.

- No emissions source data was provided for startup modes, soot blowing, or the generator operating scenarios. The applicant's assumptions that startup emissions are lower than full load is not necessarily accurate for particulates and products of incomplete combustion. More support should be provided for this assertion. It is ARG's experience that PM and NOx may be significantly higher instantaneously during startups than during baseload.

- In the AERMOD analysis a fine resolution grid (100 m) was only extended to 1 km from the main boiler stack. This is an unusually small fine grid area in our experience. The locations of the maximum modeled concentrations were not provided. Without identification of the maximum predicted concentration locations, it is not possible to determine how refined grid spacing should be applied. No refined grid was used beyond 1 km. Since the site is approximately 2 km from the center of Fair Haven, a refined grid should have been extended to at least 2 km. Interestingly, the Palmer Renewable modeling used a fine grid to a much more expansive degree (50 m apart out to 1 km, 100 m apart out to 2,500 km, 200 m apart from 2,500-15,000 km plus an additional 177 sensitive receptor points within 15 km of the site). In Palmer a very dense grid of 10 m nodes was placed out to 450 meters for modeling of PM10 and PM2.5 for the particulate and fugitive emissions sources. ARG suggests that at least a 2 km refined grid with greater density of nodes should have been used for Fair Haven. A close-in grid for PM10 and PM2.5 impacts should have been done as was done in Palmer.

- A worst case release scenario should have been performed for the ammonia storage. Even if the project is not subject to the EPA Accidental Release Program, the general duty clause of the Clean Air Act requires an analysis of significant air quality impacts and risks. This should be done using the ALOHA or similar emergency release model. EPA uses the 200 ppm ERPG-2 ambient concentration for ammonia as the endpoint for calculating offsite threat from a catastrophic release. This is particularly relevant because the town is so close (less than 2 km).

PFPI
driven by data

Steven Snook
Vermont Air Pollution Control Division
103 South Main Street, Building 3 South
Waterbury, VT 05671-0402

October 16, 2011

To the Vermont Air Pollution Control Division,
The Partnership for Policy Integrity (PFPI) is a New England-based organization using science, policy analysis and strategic communications to promote sound renewable energy policy. Thank you for the opportunity to submit the following comments on the draft air permit for the Beaver Wood Energy (BWE) wood pellet manufacturing and biomass power facility in Fair Haven, Vermont. We understand that a permit review conducted by Air Resources Group has been submitted as a comment on this facility, and we incorporate that letter by reference. We also have attached an affidavit to the Vermont Public Service Board by Biomass Energy Resource Center founder Tim Maker, testifying as to the impacts of the BWE Pownal plant, and we incorporate that statement by reference. We here confine our comments to a few issues that in our opinion deserve further scrutiny.

## Contents

## Criteria pollutant and Hazardous Air Pollutant (HAP) emissions

### Pollution caps avoiding major source status strain credulity

- Summary: setting allowable emissions for NOx and VOCs just below critical permitting thresholds is not justified.

The air permit covers two biomass burners: the 482 mmbtu main power boiler, and a 30 mmbtu burner used for pellet drying. The main power boiler has emissions controls for NOx, CO, and PM; the pellet dryer burner has controls for PM and relies on "good combustion practices" for control of other pollutants. Neither burner has controls for hydrogen chloride (HCl).

However, despite there being at least two if not three sources of each pollutant, emissions estimates for NOx and VOCs presented in Table 2.5.1 of the application and summarized on page 6 of the permit barely skim under critical emissions thresholds, allowing the facility to escape purchasing emission reduction credits.

**Table 2.5.1 Potential Emissions Comparisons**

| Pollutant | BWE Potential Emissions (tons/yr) | PSD Major Source Thresholds (tons/yr) | Threshold for obtaining emission reduction credits (tons/yr) |
|---|---|---|---|
| $SO_2$ | 45.9 | 50 | not applicable |
| $PM_{10}$ | 65.4 | 50 | not applicable |
| NOx | 99.9 | 50 | 100 |
| CO | 190.5 | 50 | not applicable |
| VOC | 49.8 | 50 | 50 |

Proposed allowable emissions provided in Table 2.5.1 indicate the facility will exceed major source thresholds for NOx, $PM_{10}$ and CO. BWE is proposing a facility-wide cap on NOx of 99.9 tons per year.

Table 1. Facility emissions data from BWE permit application

This is a problem for at least three reasons:

- First, and most importantly, these emission caps appear to have been calculated in a way that is not mathematically correct, legally correct, or practicably enforceable. This is discussed further below.

- Second, it discredits the permitting process for an applicant to behave as if emissions can be controlled to this level of precision, and for the state permitting agency to accept this. It is highly unrealistic to assume that emissions caps will be met when there are three significant sources of VOCs at the facility (VOCs from the main and

pellet dryer burners, plus VOCs emitted from the pellets themselves during the drying process). Both burners also emit significant amounts of NOx; for instance, the smaller 30 mmbtu burner, which has no controls for NOx and no continuous emissions monitoring system, is responsible for large proportion of total NOx emissions at the facility.

- Third, these emission levels are based on allowable emission rates that could be much lower. The emission rates for BWE are higher those guaranteed by Babcock and Wilcox for the Palmer Renewable Energy facility in Massachusetts. Thus, BWE's is not a demonstration of critical analysis of Most Stringent Emission Rate (MSER); it is a demonstration of the applicant setting their own terms, and poor terms at that.

## Emissions for the power boiler have not been estimated on a true Potential to Emit basis

- Summary: BWE is required to properly calculate its potential to emit (PTE) according to the requirements of the Clean Air Act.

The Clean Air Act requires that potential to emit (PTE) be calculated for the purposes of determining whether a facility is a major emissions source for regulatory purposes. PTE is calculated by multiplying the boiler capacity (mmbtu/hr) by a pollutant's emission rate (lb/mmbtu) by the number of hours in a year (8,760), and dividing by 2,000 to convert from pounds to tons. However, BWE's potential to emit does not appear to have been calculated in this way. Table 3-1 in the Technical Analysis document states that a capacity factor of 96% is used to calculate allowable emissions. This limitation is important in the permit, because without it the facility would be calculated as emitting more than 100 tons of NOx and more than 50 tons of VOCs, a condition that would require BWE to purchase emission credits (ERCs). Because the PTE is calculated incorrectly, this factor alone, aside from other factors discussed below, should require that the emissions of NOx , VOCs, and indeed all pollutants be revisited in the permit.

An exception to the PTE rule can be made under some circumstances. According to EPA guidance, a facility can put limits on operations that ensure that it remains a "synthetic minor" source that does not trigger key permitting thresholds. However, EPA requires that these limits must be stated in the permit and be practicably enforceable. BWE's air permit does not state practicably enforceable limits that will guarantee that emissions of NOx remain below 100 tons and emissions of VOCs remain below 50 tons. Therefore, BWE's permit and avoidance of requirements to purchase ERCs are not legitimate.

## Emissions from BWE have been underestimated and the facility is actually a major source

- Summary: Proper calculation of BWE's potential to emit (PTE) demonstrates that BWE is a major source for $NO_x$ and VOCs and should be required to purchase emission reduction credits.

Besides the incorrect calculation of PTE for the power boiler, emissions from the pellet dryer burner also appear to contain a discrepancy with regard to PTE.

The permit contains the following table:

Beaver Wood Energy Fair Haven, LLC *DRAFT 9/15/2011* #AP-11-015

**Burner/Rotary Dryer Emission Limitations**

| Pollutant | Emission Limitations | | | Compliance Test Method [1] |
|---|---|---|---|---|
| | Emission Limit | | Averaging period | |
| $NO_X$ | 0.35 lb/MMBtu | 5.25 lb/hr | Hourly average | Reference Method 7E |
| CO | 0.35 lb/MMBtu | 5.25 lb/hr | Hourly average | Reference Method 10 |
| Total PM | 0.2 lb/ODT | 3.0 lb/hr | Hourly average | Reference Method 5 and 202 |
| Filterable PM | 0.005 gr/dscf [2] | 2.3 lb/hr | Hourly average | Reference Method 5 |
| $SO_2$ | 0.025 lb/MMBtu | 0.75 lb/hr | Hourly average | Reference Method 6C |
| VOC | 0.69 lb/ODT | 10.3 lb/hr | Hourly average | Reference Method 18 or 25 |
| GHG | 427 lb CO2e/ ton finished pellets | - | Monthly average | Calculation based on wood fuel usage and pellet production. |

[1] Any emission testing conducted to demonstrate compliance with the above emission limits shall be performed in accordance with methods shown above, or an alternative method which has been published in 40 *CFR*, provided the federally approved alternative method has been accepted in writing by the Agency before testing.
[2] Emission limit for undiluted exhaust gas.

[10 V.S.A. §556(c)] [§5-502 of the *Regulations*] [Application for #AP-11-015]

Table 2. Emission rates from BWE permit.

The pellet dryer burner is a 30 mmbtu/hr unit. The permit does not contain any practicably enforceable limits on its operation. Therefore, its hourly emissions of NOx are calculated as 30 mmbtu/hr x 0.35 lb/mmbtu = 10.5 lb/hr. Inexplicably, however, the table contains an hourly NOx limit of one-half this amount, at 5.25 lb/hr. The same mathematical discrepancy exists for CO and PM.

Interestingly, VOC emissions, which are expressed in terms of tons of pellets produced, appear to be calculated assuming full-time operation of the burner: 0.69 lb/ODT x 115,000 ODT/yr = 79,350 lb/yr. Dividing this figure by the number of hours in a year: 79,350/8,760 = 9.06 lb/hr of VOCs emissions. This figure is slightly less than the hourly rate in the table of 10.3 lb/hr stated in the table. From this it seems that for VOC emissions, at least, full-time operation of the pellet dryer at full capacity has been assumed. Why then are the hourly rates for the other

pollutants expressed as if the burner were operating at one-half capacity, or only one half the time?

If the potential to emit for VOCs from the pellet dryer (10.3 lb/hr x 8760 hrs/2000 = 45.11 tons) is added to the potential to emit for VOCs from the power boiler (482 mmbtu/hr x 0.005 lb/mmbtu x 8,760/2000 = 10.55 tons), the sum comes to 55.67 tons, making this facility a major source for VOCs, and thereby requiring the facility to purchase Emission Reduction Credits.

If the potential to emit for NOx were calculated correctly for the 30 mmbtu boiler, the PTE would be 45.99 tons. Adding this to the PTE for the power boiler (482 mmbtu x 0.03 lb/mmbtu x 8,760/2000 = 63.33 tons per year) the sum comes to 109.32 tons. This figure is more than the threshold figure of 100 tons that qualifies BWE as a major emitter, thereby requiring the facility to purchase Emission Reduction Credits for NOx.

## Power boiler emission rate for NOx does not represent MSER

- Summary: VT DEC should commit BWE to lower emission rates for $NO_x$ and require BWE to have a separate and enforceable rate for startup and shutdown for $NO_x$ and other pollutants.

In our opinion, VT DEC should not accept the applicant's claim that the emission rates set for the Palmer Renewable Energy facility in Springfield, MA are unachievable. If BWE wishes to demonstrate why the Palmer limits are unachievable, then VT DEC can be assured there will be an attentive audience south of the state border for this discussion, but without such a demonstration, the emission rates set at BWE are not MSER. If BWE is using Babcock technology, then with all the claims made to the press that BWE will be the "cleanest in the nation", the applicant should be the first to insist that Babcock meet the more stringent standards that the company has promised for the Palmer plant. In fact, other facilities around the country have also set low emission rates for NOx; for instance, the Green Hunter Mesquite Lake plant in CA has an annual NOx rate of 0.015 lb/mmbtu.

It is interesting to note, however, that the applicant simultaneously complains of the difficulty in meeting the hourly NOx emissions rate, but then promises an annual rate that is half this, at 0.03 lb/mmbtu. In turn, Palmer's annual NOx emissions rate is 0.017 lb/mmbtu, almost one-half of the BWE rate. Clearly, both facilities plan for "business as usual" emissions to be much lower than the maximum hourly rate, if they are to meet the annual average rate. However, it appears that in BWE's case, the maximum hourly rate is set to cover emissions during startup and shutdown, when the MPSCR system is not at optimum operating temperature. It seems likely that actual startup and shutdown emissions may be higher than the 0.06 lb/mmbtu set for the hourly rate – for instance, the DTE Stockton plant in CA specifies a startup emissions rate for NOx that is more than 10 times the annual average rate at that plant of 0.04 lb/mmbtu. Having reviewed more than 60 permits for biomass facilities around the country, we can say it is typical for biomass facility air permits to state that pollution control rates do not apply during startup and shutdown, or to specify different rates for these periods, and atypical for a

permit to assume that the maximum hourly rate covers startup and shutdown events, as BWE's does. Given the importance of reducing NOx emissions in the Northeast's ozone transport region, the air permit for a new large source of NOx like BWE should contain a separate and enforceable rate for NOx emissions during startup and shutdown, and this emission rate should be modeled to determine its effect on the 1-hour NOx NAAQS standard. Other pollutants should be similarly evaluated for their true emissions during startup and shutdown.

## Power boiler PM rate does not represent MSER

- Summary: BWE, in order to comply with MSER requirements, must commit to lower PM emission rates.

With regard to PM emission limits, BWE's permit application states,

*The lowest permit value for total PM (filterable and condensible) is 0.008 lb/MMBtu at Seneca Sustainable Energy. This emission rate is far below that for any known solid-fuel power facility, biomass or otherwise. Efforts to understand the source of the Seneca PM limit yielded no technical basis for an emission rate of its level. Therefore, the Seneca 0.008 lb/MMBtu limit for total PM (filterable and condensible) is considered unattainable. The lowest achievable total PM (filterable and condensible) emission rate proposed is 0.019 lb/MMBtu.*

While the Seneca rate may seem out of reach, other biomass facilities have been transparent about their approach for reducing filterable PM. For instance, the We Energies plant in Wisconsin is guaranteeing a filterable PM rate of 0.008 lb/mmbtu, lower than the 0.012 lb/mmbtu limit in the BWE permit. There are other instances of actual test data showing PM rates lower than that promised by the applicant. Even the Mount Tom coal plant in Massachusetts has test data showing lower PM emissions than are to be met by BWE – recent data from that plant, known at one time as one of the "filthy five" in Massachusetts, shows PM emission rates of 0.0055 lb/mmbtu for filterable PM and 0.0059 lb/mmbtu for total PM. The technology is capable of meeting a more stringent standard, and BWE should comply with this under the requirements of MSER.

## Power boiler CO rate does not represent MSER

- Summary: BWE must guarantee lower emission rates for CO to comply with MSER.

As is the case with NOx, BWE and by extension VT DEC have too quickly dismissed the CO rate that constitutes BACT at the Palmer facility in Massachusetts. The 3-hour emissions limit at Palmer is 0.07 lb/mmbtu, and the annual rate is 0.0365 lb/mmbtu. Reductions in CO are important not only because CO is a criteria pollutant, but also because the same factors that lead to emissions of CO also lead to emissions of organic hazardous air pollutants. Since

Babcock has guaranteed these lower emissions rates at the Palmer facility, they should be guaranteed at the BWE facility as well.

### Applicant has not justified the use of alternate HAP emission factors

- Summary: VT DEC should require BWE to provide greater transparency in HAPs emission calculations.

In estimating hazardous air pollutant (HAP) emissions, BWE has picked from a selected suite of emissions factors drawn from emissions testing, NCASI, and the EPA AP-42 document. However, there is no reason provided as to why NCASI and other emission factors were chosen instead of AP-42 factors, which in many cases have an "A" rating for quality and reliability. The VT DEC should require each alternative emission factor to be justified, and to the extent that test data from operating facilities are used as the basis of emission factors, these data should be clearly and transparently presented.

## MSER Determination for Greenhouse Gas (GHG) Emissions

The Draft Permit would allow BWE to satisfy Vermont DEC's "most stringent emission rate" (MSER) requirement by simply burning biomass fuel in conjunction with energy efficiency measures and good operating and maintenance practices for $CO_2$ control.[1] Underlying this decision is the false notion that the use of biomass for energy combustion is "carbon neutral". The claim of carbon neutrality for biomass energy is not supported by sound science, and if Vermont continues to treat it as such, it will significantly impair the State's ability to reduce greenhouse gas emissions from the power sector.

**Therefore VT DEC, as discussed in detail below, must recognize the following in order for BWE to fully comply with MSER GHG requirements:**

- **"Good combustion practices" does not reduce CO2 emissions and should not be considered MSER for GHG emissions,**
- **Combustion of biomass fails to meet the requirements of MSER for CO2 emissions,**
- **BWE cannot rely on EPA's Bioenergy BACT Guidance or White Paper to determine GHG MSER control since it is based on the false assumption that combustion of biomass is "carbon neutral";**
- **Combustion of biomass emits more $CO_2$ at the stack per energy unit than fossil fuels,**
- **CO2 emissions from BWE will double CO2 emissions from biomass burning in the state, and**

[1] Technical Support Document at 32-33; see also Beaver Wood Energy Fair Haven LLC, "Air Permit Application for Electric Generating Plant and Wood Pellet Production Plant" submitted to Vermont Department of Environmental Conservation, at 3-15 (February 18th 2011). ("Permit Application").

- **CO2 emissions from BWE will remain in the atmosphere for decades before being resequstered, hindering VT from achieving GHG reduction goals.**
- **BWE, and facilities like it, will threaten VT forests carbon stocks**

## BWE is legally required to demonstrate MSER for greenhouse gases

Greenhouse gases are currently "subject to regulation" under the Clean Air Act's prevention of significant deterioration and Title V permitting programs at new stationary sources with the potential to emit more than 100,000 tons per year (measured as $CO_2e$, or $CO_2$-equivalent).[2] Vermont has incorporated these federal requirements into its permitting program.[3] Although EPA subsequently adopted a rule deferring these requirements with respect to biogenic CO2 emissions for a period of three years,[4] the Technical Support Document states that this deferral is not effective in Vermont.[5]

**Therefore, as the Technical Support Document acknowledges, BWE is required to apply Most Stringent Emission Rate (MSER) requirements to GHG emissions. An MSER demonstration must follow a top-down analysis similar to a best available control technology ("BACT") under the federal Clean Air Act**:

1. Identify most stringent emission rates and associated control technologies
2. Eliminate technically infeasible options
3. Rank remaining control technologies by control effectiveness
4. Evaluate most effective controls and document results (case –by-case consideration of energy, environmental, and economic impacts)
5. Select MSER.[6]

In concluding that energy efficiency, biomass fuel, and good operating and maintenance practices were sufficient to meet MSER requirements, DEC relied on a recent EPA guidance document regarding BACT determinations for bioenergy applications.[7] However, as explained below, because GHG emissions from biomass are not carbon neutral, the determination that biomass combustion *itself* constitutes MSER for the emissions associated with biomass combustion is both factually and legally deficient.

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[2] Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule; Final Rule, 75 Fed. Reg. 31,514 (June 3, 2010); 40 C.F.R. §§ 51.166(b)(48), 52.21(b)(49), 70.2, 71.2.

[3] Technical Support Document at 31.

[4] *See* 76 Fed. Reg. 43,490 et seq. (July 20, 2011) ("Biomass Deferral Rule").

[5] Technical Support Document at 32.

[6] Permit Application at 3-1, 3-2.

[7] US EPA, *Guidance for Determining Best Available Control Technology for Reducing Carbon Dioxide Emissions from Bioenergy Production* (March 2011). ("Bioenergy BACT Guidance"). As the guidance itself makes clear, it is neither a rule nor a regulation and does not have the force of law. In any event, such guidance cannot override statutory requirements of the Clean Air Act.

## The use of "good combustion practices" as MSER for GHG emissions

BWE has included "good combustion practices" in the list of measures to be taken to reduce greenhouse gas emissions. It should be noted that typically, the objective of good operating and maintenance practices is to ensure complete combustion and reduce the amount of carbon *monoxide* emissions by ensuring complete oxidation of fuel carbon to carbon dioxide. Therefore, while we agree that a well-run facility is more likely to be an efficient facility, it should be acknowledged that there is really very little that can be done to reduce CO2 emissions from burning fuels, and the goal of "good combustion practices" is to actually increase CO2 emissions.

## Biomass combustion does not satisfy Vermont's MSER requirement for GHG control

In its permit application BWE states that its MSER determination was prepared in anticipation of EPA's Bioenergy BACT Guidance, which would "provide a basis that state permitting authorities may use to conclude that use of biomass as a fuel is the best available control technology for GHG emissions."[8] Both the "White Paper" that BWE relies on, and EPA's subsequent Bioenergy BACT Guidance, propose that use of biomass fuel *can* be considered as a measure to reduce $CO_2$ emissions.[9] DEC appears to have accepted this determination in explicitly relying on EPA's guidance and including biomass combustion among the MSER measures approved in the Draft Permit.[10] However, EPA's guidance is based on the inherently flawed assumption that emissions from combustion of biomass are "carbon neutral," a concept that has never been demonstrated in practice.

## Biomass combustion for energy is not "carbon neutral"

- Summary: VT DEC should require BWE to provide a real and transparent discussion of MSER for greenhouse gases.

According to the draft permit, BWE has the potential to emit 470,900 tpy of GHG.[11] As shown in Table 3, biomass power facilities like BWE emit significantly more CO2 per unit useful energy at the stack than fossil fuel facilities. Given that biomass facilities emit about 45% more CO2 than coal, and 2- 3+ times more CO2 than natural gas facilities, BWE owes the electricity-rate paying public who will subsidize this power plant, as well members of the reality-based community, an explanation of why this technology should be considered the "best available" for controlling greenhouse gasses.

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[8] Permit Application at 3-15; citing US EPA, *Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from Industrial, Commercial, and Institutional Boilers* (October 2010) (White Paper)..

[9] *See White Paper* at 26; *BACT Bioenergy Guidance* at 15.

[10] Technical Support Document at 32-33.

11 State of Vermont Agency of Natural Resources, Department of Environmental Conservation "Air Pollution Control Permit to Construct, Draft Permit" at 6 (September 15th 2011). ("Draft Permit").

| | lb CO2 emitted per mmbtu heat content | facility efficiency | mmbtu heat input to generate 1 MWh | lb CO2 emitted per MWh |
|---|---|---|---|---|
| gas combined cycle | 117.1 | 0.45 | 7.54 | 883 |
| gas steam turbine | 117.1 | 0.33 | 10.40 | 1,218 |
| coal steam turbine | 205.6 | 0.34 | 10.15 | 2,086 |
| biomass steam turbine | 213 | 0.24 | 14.22 | 3,029 |

Table 3. Biomass versus fossil-fueled power generation technologies and their $CO_2$ emissions per megawatt-hour (MWh). Data on facility efficiency and $CO_2$ emissions per mmbtu are from the Energy Information Administration.

A true evaluation of MSER for GHG's would involve discussing the nature and relative carbon impacts of different types of biomass fuels, since EPA's guidance acknowledges that the net carbon impacts of different fuels can differ. However, in the absence of any discussion, the simple fact remains that burning biomass emits more $CO_2$ at the stack per unit energy than does burning coal, oil, or natural gas. BWE's claim that MSER for greenhouse gases is 2,993 lb $CO_2$ per MW-h electrical output, without any discussion of the true carbon impacts of biomass burning, makes a travesty of the MSER determination process.

## BWE will increase carbon emissions at the state level

According to the draft permit, BWE has the potential to emit 470,900 tpy of GHG.[12] Putting this number into context, Energy Information Administration data show that biomass power fueled by wood and wood products provided about 5.4% of Vermont's power in 2009. Vermont was the state with the lowest reported carbon emissions from the power sector in 2009, at 7,257 tons of $CO_2$. However, if EIA had included $CO_2$ emissions from biomass power, this would add another 596,107 tons of $CO_2$, bringing the state's total to 603,364 tons – meaning that biomass $CO_2$ emissions would be 82 times greater than emissions from conventional fuel burning. Emissions from the BWE facility will essentially double the amount of $CO_2$ emitted by biomass burning in the state.

## BWE's carbon emissions are real and lasting

As a pellet manufacturing facility, BWE will already be responsible for liquidating large amounts of forest carbon into the atmosphere. However, even the amount of tops and limbs generated by forest harvesting for pellets will not be sufficient to meet BWE's demand for 362,000 tons of biomass fuel per year, which the facility claims it will supply with forest residues, bark, and mill waste,[13] a claim that appears highly implausible and deserves critical evaluation.

12 State of Vermont Agency of Natural Resources, Department of Environmental Conservation "Air Pollution Control Permit to Construct, Draft Permit" at 6 (September 15th 2011). ("Draft Permit").

13 Permit Application at 2-1.

Vermont currently generates around 522,000 green tons of logging residues yearly.[14] Since half of these residues should remain in place to retain soil nutrient stocks, the amount of residue available for fuel is 261,000 tpy.[15] This amount of residue is already well below what BWE requires for fuel supply, even without accounting for other uses for this material. Since residues will not suffice to meet fuel demand, BWE will inevitably harvest additional "low grade trees" that are harvested specifically for fuel.[16]

We are aware of several studies that evaluate the net carbon effect of cutting and burning trees for energy on atmospheric $CO_2$ emissions. The Massachusetts-commissioned Manomet Study is by far the most detailed and most transparent of these. The Manomet Study concluded that lifecycle carbon emissions from burning whole trees for power in low-efficiency facilities like BWE emits more $CO_2$ than burning coal for a period of more than 40 years.

The idea that burning whole trees for energy is carbon neutral has been justified by the claim that so long as forests regrow, the carbon released from harvesting will be resequestered.[17] However, the Manomet Study showed that increasing forest harvesting for fuel leads to dramatic decadal increases in net $CO_2$ emissions in the exact timeframe when it is most critical to reduce emissions. This occurs for two reasons. First, combustion of biomass results in greater $CO_2$ emissions per unit of energy produced than combustion of fossil fuels, as explained above. Second, when this increase in emissions is coupled with the loss of sequestration due to forests being harvested, the result is greater net $CO_2$ emissions in the atmosphere that will take decades or even centuries to resequester.[18] The vital carbon sequestration function of forests is recognized by the carbon accounting protocols of the Intergovernmental Panel on Climate Change (IPCC) and the EPA. To ignore the liquidation of carbon stocks and label this as carbon neutral is contrary to sound science.

We understand that BWE's managing director has described the Manomet Study as "trash",[19] but considering that Vermont's Deputy Secretary at Air and Natural Resources, Chris Recchia, served on the panel that produced the study, we hope that VT DEC will take into consideration the findings of the study. Despite BWE's considered opinion, it should also be noted that the results of the Manomet Study were considered "untrashlike" enough by Vermont's neighbor Massachusetts to serve as the basis for revising eligibility requirements for receipt of renewable energy credits by biomass power facilities. Massachusetts is serious about reducing

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[14] Smith, W.B., et al. 2007. Forest Resources of the United States, 2007. United States Forest Service, Gen.Tech Report WO-78. December, 2008.

[15] Id.

[16] Id.

17 M.Booth & R. Wiles at 3.

18 M. Booth & R. Wiles at 3; citing Manomet Center for Conservation Sciences. 2010. Massachusetts Biomass Sustainability and Carbon Policy Study: Report to the Commonwealth of Massachusetts Department of Energy Resources. Walker, T. (Ed.). Contributors: Cardellichio, P., Colnes, A., Gunn, J., Kittler, B., Perschel, R., Recchia, C., Saah, D., and Walker, T. Natural Capital Initiative Report NCI-2010- 03. Brunswick, Maine.

[19] Bromage, A. Renewable or Retrograde? A biomass plant proposed for Fair Haven sparks controversy. Vermont Seven Days, October 5, 2011.

greenhouse gas emissions – the Massachusetts Global Warming Solutions Act mandates the state to do so. If Vermont is serious about this goal as well, then DEC will not sign off on a determination that burning biomass, which emits more $CO_2$ than fossil fuels, is the best way to reduce emissions. There is no way around the fact that putting forest carbon into the air raises atmospheric carbon stocks and reduces terrestrial stocks. Considering this to be "best available control technology" beggars common sense, as well as the best available science.

## BWE represents a threat to forests

Even a "pro-biomass" report from the Cary Institute of Ecosystem Studies (co-authored by Thomas Buchholz, of University of Vermont's Rubenstein School of Environment and Natural Resources) suggests that current estimates of "low grade wood" potentially available as biomass fuel in New England are likely overstated. [20] Some conclusions from the Cary Institute report include:

- The magnitude of the sustainable forest biomass supply is far smaller than most previous studies have suggested.
- Overharvesting would lead to degradation of northeastern forests and release more carbon to the atmosphere than would comparable energy production from fossil fuels.
- Total carbon storage in the forests would be expected to continue to increase for many years as carbon stocks in the "reserved" (legally or otherwise) lands continued to increase, **but any increase in harvests above current levels would come at the expense of a decline in the total stock of forest biomass in the working forests**.
- The current harvest regime over the entire Northeast is very close to (if not greater than) a sustainable rate, when limited to the available land base.

A key factor distinguishing the Cary Institute report is that it does not simply evaluate forest harvest and mortality versus forest growth over the whole landscape, but acknowledges that some forests are heavily utilized, and others less so. The report paints a dark picture of the ability of Northeastern forests to meet emerging energy wood demand. In light of the complete failure and apparent inability of BWE to critically evaluate carbon emissions from biomass burning, VT DEC thus should at a minimum evaluate the net effect of this facility on Vermont's forest carbon stocks before allowing it to move forward. To fail to do so is a betrayal not only of the permitting process, but also the trust of citizens that the State's agency will protect resources and act to mitigate climate change, in accordance with its mandate.

Thank you for the opportunity to comment.

Mary S. Booth, PhD.
Sarah Herbert
Partnership for Policy Integrity

[20] Cary Institute of Ecosystem Studies. *Forest Biomass and Bioenergy: Opportunities and Constraints in the Northeastern United States,* 2011. http://www.ecostudies.org/report_biomass_2011.pdf

**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

CENTER *for* BIOLOGICAL DIVERSITY

October 17, 2011

***Via E-mail:*** ***steven.snook@state.vt.us***

Steven K. Snook
Air Pollution Control Division
Department of Environmental Conservation
103 South Main Street, Building 3 South
Waterbury, Vermont 05671-0402

**Re: Draft Permit to Construct No. AP-11-015**
**Beaver Wood Energy Fair Haven, LLC**

Dear Mr. Snook:

Please accept the following comments on behalf of the Center for Biological Diversity (the "Center") regarding the Draft Permit to Construct and accompanying Technical Support Document ("TSD") prepared by the Vermont Air Pollution Control Division (the "Division") for a 31-MW biomass-fired power plant and wood pellet manufacturing facility proposed by Beaver Wood Energy Fair Haven LLC (the "Project").

The Center is a non-profit organization with more than 320,000 members and online activists, and offices throughout the United States. The Center's mission is to ensure the preservation, protection, and restoration of biodiversity, native species, ecosystems, public lands and waters, and public health. The Center also has worked for many years to protect the biodiversity and ecological integrity of the nation's forests. In furtherance of these goals, the Center's Climate Law Institute seeks to reduce U.S. greenhouse gas emissions and other air pollution to protect biological diversity, the environment, and human health and welfare. One of the Center's top priorities is ensuring that the Clean Air Act is implemented in an expeditious and effective manner to reduce emissions of the pollutants causing global warming, including emissions associated with biomass combustion.

We have reviewed the detailed report on the Draft Permit prepared by the Air Resources Group on behalf of the Southern Vermont Citizens for Environmental Conservation and Sustainable Energy. We concur fully in the Air Resources Group report, which is hereby incorporated by reference. We also have reviewed and concur fully in comments submitted by the Partnership for Policy Integrity; those comments are hereby incorporated by reference as well.

We write separately to express our additional concerns with the Division's reliance in the TSD on recent Environmental Protection Agency ("EPA") guidance



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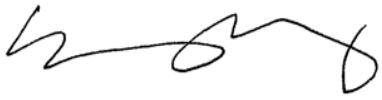
regarding consideration of biomass fuels and biogenic greenhouse gas emissions in best available control technology ("BACT") demonstrations under the federal prevention of significant deterioration program.[1] As detailed in the attached comments, EPA's BACT guidance deviates significantly from both the statutory text of the Clean Air Act and the procedures and principles outlined in EPA's New Source Review Workshop Manual.[2] In short, EPA's BACT guidance is unlawful, and as such cannot provide support for the Division's conclusion that biomass combustion in and of itself constitutes MSER for the boiler and the pellet manufacturing facility.[3]

In addition, EPA's guidance does not support the Division's determination that no alternative fuels—biomass or otherwise—may be considered in determining MSER. It is the applicant's burden to demonstrate that changes in the proposed fuel mix for the Project would be infeasible or would redefine the source. No such demonstration was made here. Alternative fuels and control technologies thus should have been considered in the MSER process.

As a result of its reliance on unlawful EPA guidance and its failure to consider alternative control technologies, the Draft Permit does not meet applicable requirements and should not be approved as currently written. Thank you very much for your consideration of our comments in this matter.

Sincerely,



Kevin P. Bundy
Senior Attorney

Cc: Jared Margolis, Esq.

Encl.

[1] U.S. Environmental Protection Agency, Guidance for Determining Best Available Control Technology for Reducing Carbon Dioxide Emissions from Bioenergy Production (March 2011), *available at* http://www.epa.gov/nsr/ghgdocs/bioenergyguidance.pdf.
[2] The attached comments are excerpted from a letter submitted by Clean Air Task Force on behalf of the Center and numerous other organizations objecting to EPA's proposal to exempt biogenic $CO_2$ emissions from regulation under the Clean Air Act's prevention of significant deterioration and Title V permitting programs for a period of three years. The full comment letter has been assigned EPA Docket No. EPA-HQ-OAR-2011-0083-0350 and is available at www.regulations.gov.
[3] TSD at 32-33.

**Comments Regarding the Environmental Protection Agency's Guidance for Determining Best Available Control Technology for Reducing Carbon Dioxide Emissions from Bioenergy Production (March 2011)**

To the extent that biogenic $CO_2$ emissions have unique lifecycle characteristics that warrant different treatment under the Clean Air Act ("CAA") from other pollutants, these characteristics cannot form the basis of a broad exemption from PSD and Title V permitting. Rather, biomass feedstocks and the resulting $CO_2$ emissions must be analyzed in the context of facility-specific, case-by-case best available control technology ("BACT") determinations. These comments address the appropriate treatment of $CO_2$ emissions from the combustion of biomass in BACT determinations. Appropriate treatment of biomass in the BACT process is critical to achieving the real greenhouse gas ("GHG") emissions reductions necessary to combating climate change.

EPA released BACT guidance for bioenergy emissions ("Bioenergy BACT Guidance") concurrently with its proposal to defer regulation of biogenic $CO_2$ emissions under the Clean Air Act's prevention of significant deterioration ("PSD") and Title V permitting programs.[1] As explained below, the Bioenergy BACT Guidance fails to provide necessary technical support for case-by-case BACT determinations. Instead, in a dramatic departure from past EPA practice, the Bioenergy BACT Guidance explicitly encourages permitting authorities to substitute broad policy judgments for the case-by-case analysis required by statute and regulations. Indeed, the real purpose of the Bioenergy BACT Guidance appears to be to provide an effective exemption from BACT analysis for all bioenergy facilities that might not be covered by the deferral rule's absolute exemption from PSD permitting. EPA's approach in the Bioenergy BACT

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[1] Deferral for CO2 Emissions From Bioenergy and Other Biogenic Sources Under the Prevention of Significant Deterioration (PSD) and Title V Programs: Proposed Rule, 76 Fed. Reg. 15,249 (March 21, 2011); U.S. EPA, *Guidance for Determining Best Available Control Technology for Reducing Carbon Dioxide Emissions from Bioenergy Production* (Mar. 2011) (hereafter "Bioenergy BACT Guidance"). We reemphasize EPA's Disclaimer in the Bioenergy BACT Guidance that "[t]his document is not a rule or regulation" and "does not change or substitute for any law, regulation, or any other legally binding requirement *and is not legally enforceable*." Bioenergy BACT Guidance ("Disclaimer"). Therefore, despite the comments below demonstrating the patent unlawfulness of much of this guidance, we do not concede, and EPA correctly recognizes, that this guidance has no binding effect on permitting authorities and cannot override the express requirements of the Clean Air Act and validly promulgated and lawful EPA regulations.

Guidance—like the deferral rule overall—is arbitrary, unsupportable, and all but certain to encourage legally and factually deficient BACT determinations.

1. EPA Has Not Demonstrated that Biomass Combustion *Per se* Constitutes BACT

Once EPA has determined that a facility is a "major emitting facility," the next relevant inquiry is whether the source has complied with mandatory PSD requirements, including the BACT requirement. While the applicability determination is straightforward, the question of when biomass may – if ever – qualify as BACT is less so.

a. EPA Has Not Shown that Biomass Is a "Clean Fuel"

EPA has not directly proposed that biomass be considered a "clean fuel" based on an accounting of the $CO_2$ emissions associated with the full lifecycle, production and use of the feedstock. We have previously noted that the legal basis for incorporating this type of lifecycle analysis into the BACT determination is unclear.[2] However, should EPA determine that it has such authority, any determination that biomass constitutes a "clean fuel" must be made in accordance with the Clean Air Act and EPA regulatory precedent. That is, it must be made in accordance with the top-down, five step process in the 1990 New Source Review Workshop Manual[3] and must be made on a case-by-case basis.

The statute defines BACT as "an emission limitation based on the maximum degree of reduction of each pollutant subject to regulation under this chapter emitted from or which from any major emitting facility, which the permitting authority on a case-by-case basis, . . . determines is achievable for such facility though the application of production processes and available methods, systems, and techniques, including fuel cleaning, [and] clean fuels."[4] Although there has been little guidance as to what constitutes a clean fuel, historically the focus on whether a given fuel type constitutes a "clean fuel" has focused on a facility's at the stack emissions – that is, whether the fuel is

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[2] *See* Comments of Clean Air Task Force, et al., and Comments of Center for Biological Diversity, in response to EPA's Call for Information (EPA Docket ID Nos. EPA-HQ-OAR-2010-0560-0432 and EPA-HQ-OAR-2010-0560-0157); see also Center for Biological Diversity, Re: PSD and Title V Permitting Guidance For Greenhouse Gases, 75 Fed. Reg. 70,254 (Nov. 17, 2010) (EPA Docket ID No. EPA-HQ-OAR-2010-0841-0058).

[3] New Source Review Workshop Manual; Prevention of Significant Deterioration and Nonattainment Area Permitting (Oct. 1990) ("1990 NSR Manual").

[4] 42 U.S.C. § 7545(3).

"inherently cleaner" in terms of at the stack emission than an alternative.[5] If a fuel could only be considered "clean" in these terms, however, biomass could never qualify as BACT because, per unit of energy, biomass combustion emits more $CO_2$ than coal and significantly more than natural gas. Therefore, any determination that biomass is "cleaner" than fossil fuels must necessarily be based on an accounting of the $CO_2$ emissions associated with the full lifecycle of the feedstock.

As EPA recognizes, with fossil fuel combustion, there is effectively no way to restore the carbon stocks lost by combusting those fuels in any near term timeframe.[6] EPA claims that biomass is different because the potential growth of additional biomass arguably results in resequestration of carbon dioxide; however, biomass combustion also incurs a "carbon debt" that can persist for decades or even centuries depending on the time needed for resequestration. EPA itself has properly acknowledged that different types of biomass have different types of lifecycle emissions. For example, current studies have shown that burning whole green trees causes more near term climate change damage than burning coal or natural gas.[7] For these reasons, if EPA were to propose that any particular biomass feedstock be treated as a clean fuel, it would have to do so based on appropriate lifecycle analyses.[8]

Any such determination, however, must be made in accordance with the CAA. Namely, the analysis must be made on a case-by-case basis and in accordance with the top-down, five-step BACT analysis, which is consistent with the Clean Air Act's requirements for BACT.

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[5] Comments of Clean Air Task Force on PSD and Title V Greenhouse Gas Tailoring Rule at 17-18 (EPA Docket ID No. EPA-HQ-OAR-2009-0517-6200.1).

[6] 76 Fed. Reg. at 15,254.

[7] *See* Manomet Study at 7.

[8] We do not concede that, in general, a lifecycle analysis is appropriate for determining that combustion of a particular fuel by itself constitutes BACT. For instance, we do not concede, as was suggested in EPA's BACT GHG guidance white paper, that methane emissions from coal or natural gas extraction should be considered in the BACT process. U.S. EPA, *Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from Coal-fired Electric Generating Units***,** 20 (Oct. 2010). Moreover, BACT has generally been read as requiring that the "emission limitation" established through the analysis be immediately applicable upon receipt of the permit and commencement of operation. Any consideration of potential future resequestration in determining a BACT emissions limitation therefore contradicts long-term EPA precedent.

First and foremost, the CAA requires that each BACT determination must be made "on a case-by-case basis" wherein the permitting authority may take into account "energy, environmental, and economic impacts and other costs[.]"[9] We are aware of no authority that allows a permitting authority to deviate from this requirement. While EPA objects that such a case-by-case analysis would be "complex" and "time consuming" with respect to biomass, EPA has not offered any facts or evidence demonstrating that this will be the case in every instance. Nor has the agency adequately explained why this "complexity" justifies a de facto exemption from the case-by-case BACT analysis requirement.[10] This contravenes the plain language of the statute. There are more legally defensible ways for EPA to assist permitting authorities in this process, such as by identifying carbon lifecycle accounting methods from the scientific literature that may be appropriate for assessing the impacts of using a particular feedstock. In any event, the permitting authority must still engage in a case-by-case accounting at the facility level of emissions associated with the full chain of fuel production and use.[11]

Second, as EPA recognizes, permitting authorities should continue to apply the five-step, top down analysis when permitting new or modified sources of GHGs.[12] Even though EPA's assertion is correct on its face, its application of the top-down BACT analysis in the Bioenergy BACT Guidance is misguided. EPA there asserts that "[s]tep 4 of the BACT analysis seems well-suited to enable permitting authorities to consider the potential sequestration of carbon in biogenic resources outside the boundaries of the facility when evaluating BACT for greenhouse gases."[13] However, as is explained here and in comments by Clean Air Task Force on the November 2010 BACT GHG Guidance,[14] this presupposes without explanation that biomass should be listed as a control technology at Step 1 in the first instance.

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[9] 42 U.S.C. § 7479(3).

[10] See Bioenergy BACT Guidance at 23.

[11] 76 Fed. Reg. at 15,529. For instance, as noted above, a permitting authority would have to take into account whether use of these feedstocks would result in increased, indirect emissions. This could occur, for instance, if feedstocks that were originally being used for consumer goods, such as furniture, are proposed to be diverted for bioenergy purposes.

[12] Bioenergy BACT Guidance at 11.

[13] *Id.* at 21.

[14] Comments of Clean Air Task Force et al. on PSD and Title V Permitting Guidance for Greenhouse Gases at 3 (EPA Docket ID No. EPA-HQ-OAR-2010-0841-0085). This

EPA's own guidance, which has been in effect and applied by permitting authorities for decades, demonstrates that the available BACT options, including clean fuels, must be determined at *step 1* to even proceed to the subsequent steps of the BACT analysis: "The first step in a 'top-down' analysis is to indentify, for the emission unit in question . . ., all 'available' control options."[15] Only once something has been identified as a valid "control technology" may it be discounted at further steps in the analysis (including based on environmental considerations at step 4). Therefore, EPA's November 2011 BACT GHG Guidance and the Bioenergy BACT Guidance simply put the cart before the horse by presupposing, without any explanation, that biomass should be listed as even a threshold matter. This is particularly true with respect to biomass combustions because it will inevitably result in more $CO_2$ emissions per unit of energy than other types of fuel. Therefore, if permitting authorities are to conclude that biomass constitutes an available control technology based on a lifecycle analysis, this must occur at step 1 and not at step 4.[16]

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guidance was updated in March 2011 by EPA. This guidance was originally issued in November 2010 and was updated by EPA in March 2011, *see* U.S. EPA, *PSD and Title V Permitting Guidance for Greenhouse Gases* (Mar. 2011). References to the original guidance issued in November are referred to as the "November 2010 BACT GHG Guidance." References to the updated BACT GHG Guidance are "BACT GHG Guidance (updated March 2011)."

[15] 1990 NSR Manual at B.5.

[16] Clean Air Task Force and other environmental organizations commented on the relationship between Step 3 and Step 4 of the BACT analysis as discussed in the November 2010 BACT GHG Guidance. In that guidance, EPA suggested that a less effective control technology could be chosen on the basis of environmental considerations despite the availability of more stringent control technologies. (EPA has since updated this guidance in March of this year). Clean Air Task Force and others noted that historically, as EPA continues to recognize, "[t]he top-ranked options should be established as BACT unless the permit applicant demonstrates to the satisfaction of the permitting authority that technical considerations, or energy, environmental, or economic impacts justify a conclusion that the top-ranked technology is not 'achievable' in that case. If the most effective control strategy is eliminated in this fashion, then the next most effective alternative should be evaluated, and so on, until an option is selected as BACT." BACT GHG Guidance (updated March 2011) at 19; *see also* 1990 NSR Manual at B.26-29. Despite this well established precedent, EPA seems to suggest that a permitting authority may choose a lesser effective control technology based solely on step 4 environmental, energy, or economic considerations even though other more stringent technologies have not been eliminated. BACT GHG Guidance (updated March 2011) at 41. These two approaches cannot be reconciled and as was stated in comments on the November 2010 BACT GHG Guidance, EPA has not provided any authority to

In sum, if EPA determines that it has authority to determine that biomass constitutes a clean fuel based on a full lifecycle emissions analysis, then such an analysis must be conducted in accordance with the requirements of the CAA. First and foremost, the analysis must be done on a case-by-case basis. While EPA may prefer to determine that certain types of biomass probably constitute BACT, it must nonetheless conduct an analysis at the facility level to demonstrate that this is indeed the case.

Finally, we continue to object to EPA's conclusion that a lifecycle analysis may be conducted at step 4 of the top-down analysis. This is contrary to decades-long EPA precedent, which requires that a fuel must be listed as a control technology – because of its effectiveness in reducing emissions – at *step 1* of the analysis

2. EPA's Proposed Expansion of the Step 4 Analysis Is Unprecedented and Unlawful

The BACT Bioenergy Guidance does not actually propose that careful, case-by-case lifecycle analysis be conducted at step 4 of the BACT process. Rather, EPA proposes that the step 4 inquiry be used to avoid the necessity for analysis in the first place. In essence, EPA counsels permitting authorities to conduct a rigged analysis that substitutes preconceived policy judgments for pollution control technologies and ignores the environmental, economic, and energy drawbacks of widespread biomass energy generation. The real purpose of EPA's proposal—to create a de facto exemption from real BACT analysis for bioenergy facilities that cannot avail themselves of the broader exemption in the proposed deferral rule—is as unlawful as it is obvious.

The flaws in EPA's approach pervade each area of Step 4 analysis: environmental, economic, and energy impacts.

a. Environmental Impacts

EPA's guidance for assessment of environmental impacts is deeply problematic. First, EPA deviates from past practice by proposing that the analysis consider the effects of $CO_2$ emissions, namely the fact that "the production of biomass entails carbon

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demonstrate that step 4 considerations may be the sole basis for determining the BACT emissions limitation. Comments of Clean Air Task Force et al. on "PSD and Title V Permitting Guidance for Greenhouse Gases" at 6 (EPA Docket ID No. EPA-HQ-OAR-2010-0841-0085). The Bioenergy BACT Guidance would appear to apply this faulty reasoning, and to the extent it does, the guidance continues to be without legal support and contrary to the statutory and regulatory requirements of the BACT analysis. *See* Bioenergy BACT Guidance at 16-18. In other words, if there is a control technology with demonstrably lower emissions than biomass that has not been eliminated due to a step 4 consideration, it is that technology that must be chosen as BACT.

sequestration."[17] This is true as far as it goes, but it proves only that biomass contains carbon. EPA, however, apparently takes this statement to mean that the *combustion* of biomass entails carbon sequestration, which is an entirely different proposition, and not necessarily a true one. Burning biomass does not by itself guarantee future land-based sequestration.

EPA also proposes that permitting authorities measure bioenergy emissions against a land-based "business as usual" sequestration baseline. EPA's baseline concept, however, is underdeveloped.[18] Even if a future land-based "baseline" were developed for use in case-by-case BACT determinations, it would need to be far more robust and inclusive than the approach contemplated in either the proposal or the Bioenergy BACT Guidance. Such an approach must consider the effects of policy actions and incentives (including deregulatory actions like the proposal) on forest and land management. It also must accurately account for the short-term climate impacts associated with immediate combustion of materials that would otherwise decompose over time; even "waste" biomass materials like forest residues can take decades to decompose, and combustion of these materials will transform stored carbon into climate-forcing $CO_2$ far more rapidly and efficiently.[19] Such an approach also must account for the lost capacity for additional sequestration associated with biomass removal and combustion. Over time, a growing forest may sequester far more carbon if left alone than if harvested and burned for energy, even if the carbon lost to combustion is eventually replaced with new growth.[20] EPA's skeletal "baseline" proposal does not seem to consider lost sequestration capacity at all.

EPA further repeats the proposal's unsupported conclusions that certain biomass feedstocks (such as mill waste and dead trees) have "negligible" climate impacts. As previously discussed, these assertions lack adequate explanation or scientific support and, as such, cannot be used to justify a determination that burning these feedstocks constitutes BACT.

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[17] Bioenergy BACT Guidance at 20.

[18] *See* Bioenergy BACT Guidance at 22.

[19] *See* Anna Repo, Indirect Carbon Dioxide Emissions from Producing Bioenergy from Forest Residues, GLOBAL CHANGE BIOLOGY BIOENERGY (2010) (doi: 10.1111/j.1757-1707.2010.01065.x ).

[20] *See* Eric Johnson, *Goodbye to Carbon Neutral: Getting Biomass Footprints Right*, 29 ENVTL. IMPACT ASSESSMENT R. 165 (2008).

Finally, EPA's guidance completely ignores the wider environmental impacts of widespread bioenergy generation. As discussed elsewhere in this letter, implementation of policies favoring bioenergy—including favorable regulatory policies such as contemplated in the proposal and the Bioenergy BACT Guidance—will result in increased demand for woody biomass fuel. EPA even admits as much in extolling the economic benefits of bioenergy generation. But this increased demand will necessarily affect forest and land management, degrade forest habitat, result in more aggressive logging operations that degrade water quality, and cause impacts to human health resulting from conventional pollutant emissions from a new fleet of biomass facilities. In effect, EPA advises permitting authorities to consider only the purported benefits of biomass energy generation—benefits that EPA has not shown to exist—and none of the drawbacks. A BACT analysis should include an honest assessment of the environmental consequences of any particular control technology. The Bioenergy BACT Guidance, in contrast, rigs the game, sending permitting authorities on an outcome-oriented path toward a preordained conclusion.

b. Economic Impacts

Once again, EPA deviates from past practice in recommending that permitting authorities consider the "indirect" economic impacts—or, more accurately, the "potential economic benefits"—of bioenergy generation.[21] EPA does not even attempt to explain why such analysis is appropriate in the context of bioenergy facilities, when it has not been appropriate for any other type of facility.

Going one step further, EPA openly recommends that permitting authorities substitute policy preferences for actual analysis of economic impacts. EPA asserts that the "underlying objectives" of policies promoting bioenergy "may be considered as a relevant indirect economic impact or benefit" under step 4—regardless of whether such an impact or benefit actually occurs. EPA likewise states that where selection of a "particular option" (i.e., biomass combustion) as BACT would "further the goals" of such a policy, this may form "part of the basis" of selecting that option as BACT. These objectives, goals, and policy judgments, however, have nothing to do with whether the choice of any particular facility to burn biomass will have any particular economic impact. This aspect of step 4 analysis should be concerned with establishing the cost-effectiveness of pollution control measures, not with advancing unrelated "goals" and "objectives." These policy judgments have no place in BACT analysis.

[21] Bioenergy BACT Guidance at 25.

c. Energy Impacts

EPA again advises permitting authorities to "broaden the scope" of energy impacts analysis beyond what has traditionally occurred at step 4. Once again, the rationale for this broadening is that "a variety of state and federal policies" favor bioenergy.[22] EPA thus again recommends that permitting agencies substitute policy judgments for analysis under step 4.

Even if such an expansion of scope were permissible, EPA's policy-driven guidance would skew the resulting analysis. For example, EPA recommends consideration of policies that require replacement of fossil fuels with "renewable" fuels. Yet EPA fails to acknowledge that many of these policies establish a renewable "portfolio" target that could be satisfied by any number of renewable generation technologies, including far less carbon-intensive technologies like solar and wind. Under these policies, biomass generation does not necessarily replace fossil fuel generation, but rather competes with other forms of renewable generation. In effect, making a policy judgment in favor of a carbon-intensive, low-efficiency, and highly polluting biomass facility could have the effect of foreclosing a far cleaner and less carbon-intensive alternative. By focusing solely on the purported benefits of biomass energy generation, and by resolutely ingoring any possible drawbacks, EPA precludes any real analysis of indirect energy impacts.

3. The "Bioenergy BACT Guidance" Effectively Constitutes Presumptive BACT

The Bioenergy BACT Guidance, in effect, advises permitting authorities to presume that biomass combustion is BACT for itself. EPA accomplishes this by stating that where a bioenergy facility is projected to provide energy and economic benefits in accordance with state and federal policies promoting bioenergy generation, these considerations may justify selecting a biomass fuel as BACT for CO2 emissions from the facility.[23] Put more succinctly, if a bioenergy facility advances policies promoting bioenergy, the BACT analysis for $CO_2$ is presumed to be satisfied.

Of course, what EPA proposes is nothing more than a tautology. Bioenergy facilities will almost always advance policies favoring bioenergy facilities. Yet this conclusion tells permitting authorities absolutely nothing about the environmental, economic, or energy impacts of a particular biomass fuel or facility. This conclusion, in other words, is a mere presumptive judgment that cannot substitute for BACT analysis. Any such presumption, moreover, is patently unlawful. First, the requirement that BACT be

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[22] Bioenergy BACT Guidance at 27.

[23] Bioenergy BACT Guidance at 29.

conducted on a "case-by-case" basis is a statutory requirement.[24] EPA has not met the especially high burden associated with justifying a deviation from this requirement. It states merely that "such a case-by-case analysis of the net atmospheric impact of biomass fuels would likely be prohibitively time-consuming and expensive" and "would require extensive analysis" and "extensive workload requirements." [25] EPA, however, provides no support for this conclusion.[26] Therefore, EPA has failed to meet the "especially high burden" of deviating from the plain language of the Clean Air Act by justifying its action unsubstantiated future predictions of regulatory difficulty.[27]

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[24] 42 U.S.C. § 7479(3); *see also* 1990 NSR Workshop Manual at B.1 & B.5.

[25] Bioenergy BACT Guidance at 23.

[26] *Compare* 75 Fed. Reg. at 31,556-57 (noting that failure to tailor the PSD thresholds would "increase the size of the PSD program at least an order of magnitude beyond what Congress seems to have expected" and noting the total additional workload and cost to permitting authorities absent tailoring).

[27] *Alabama Power Co. v. Costle,* 636 F.2d 323, 359-60 (D.C. Cir. 1980).




Steven Snook, Environmental Engineer
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October 17, 2011

Re: Draft Air Pollution Control Permit Issued September 15, 2011, Beaver Wood Energy Fair Haven, LLC

Dear Mr. Snook:

Vermont's draft air pollution control permit for the Beaver Wood Fair Haven, LLC biomass electricity and wood pellet operation considers, for the first time, limits to carbon dioxide emissions. The Wilderness Society, the National Wildlife Federation and the Vermont Natural Resources Council support this. We are especially interested in the accounting methodology for greenhouse gas emissions from woody biomass, particularly ensuring that such accounting recognizes potential impacts on carbon stored in our region's forests. Our comments on the Beaver Wood Fair Haven, LLC air permit are primarily oriented to this topic. In addition, although the regulation of common air pollutants from conventional biomass stoker boilers is well understood in Vermont, we also have questions about the rigorousness of the proposed PM standard.

It is unclear whether Vermont is at this time merely requiring reporting of these biogenic GHG emissions or whether quantitative limits will be enforced. Greenhouse gases (GHGs, measured as tons of $CO_2e$ per year), are listed in a table of Future Allowable Air Contaminant Emissions, but a footnote in the Technical Support Document p. 3 indicates that "this is not a facility limit". We recommend that Vermont clarify the extent to which the permit actually limits GHG emissions from this facility. While awaiting the results of an EPA study process to determine how to quantify net biogenic GHG emissions, Vermont should require proposed facilities to use feasible approaches which are already recognized as an effective means to reduce those emissions. For example, documenting the types and sources of wood fuel procured and encouraging strict oversight of forest management activities generating wood fuel are two approaches for limiting net GHG emissions.

BACT Determinations and Efficiency

The draft air pollution control permit for Beaver Wood Fair Haven, LLC follows fairly closely EPA's Guidance for Determining Best Available Control Technology for Reducing Carbon Dioxide Emissions from Bioenergy Production, issued March, 2011 to guide state regulators while EPA's three-year study process proceeds. That guidance explains the Best Available Control Technology (BACT) process

(analogous to Vermont's Most Stringent Emission Rate or MSER), and how it should apply to biogenic emissions sources. In Step 1 BACT options are defined. EPA recommends considering use of wood fuel alone to be BACT, as conversion to an alternative fuel would fundamentally redefine the nature of a proposed biomass energy facility. EPA also recommends that permitting authorities consider energy efficiency improvements and carbon capture and storage (CCS) as BACT options. In Step 2 of the BACT process, technically infeasible options are rejected. Step 3 ranks the feasible BACT options in order of effectiveness, and Step 4 considers environmental, economic, and energy impacts. It is at this fourth step that EPA recommends considering implications beyond the facility site, including the differential net GHG emissions from distinct types of biomass fuel which depend upon the alternative fates of those materials.

Beaver Wood's proposed facility has two primary sources of greenhouse gas emissions (mostly carbon dioxide): a wood-fired boiler used to generate steam for electricity generation and a wood-fired rotary drier for chips used to manufacture wood pellets. The draft permit proposes MSER for the boiler as: use of wood fuel, energy efficiency, and good operations and maintenance practices. MSER for the boiler is listed as 2,993 lbs. CO2e/MWh (Draft Permit p. 8). Proposed MSER for the pellet drier is: use of wood fuel and use of waste heat from the main boiler. MSER for the drier is listed a 427 lbs. CO2e/ton of pellets (Draft Permit p. 8).

EPA encourages permitting authorities to "*use the discretion available under the PSD program to include the most energy efficient options in BACT analyses for both GHG and other regulated New Source Review (NSR) pollutants*" and EPA's guidance states that *"Use of inherently lower-emitting technologies, including energy efficiency measures, represents an opportunity for GHG reductions in these BACT reviews"* (EPA Guidance p. 14). According to the guidance, "*the "top" control option should be established as BACT unless the applicant demonstrates, and the permitting authority agrees, that the energy, environmental, or economic impacts justify a conclusion that the most stringent technology is not "achievable" in that case*" (EPA Guidance p. 17). In the case of the proposed Beaver Wood Fair Haven, LLC boiler, the top option would be maximum feasible utilization of waste heat for beneficial energy uses.

Vermont DEC narrowly interpreted efficiency measures for the boiler to mean alternative boiler designs (stoker fired and bubbling fluidized bed). The Technical Support Document for the permit lists Combined Heat and Power (CHP) as a distinct MSER option for the boiler, separate from efficiency (TSD p. 32), but CHP is not selected as part of the MSER defined for this facility. In reality, CHP is a tool to increase efficiency, which in turn reduces GHG emissions per unit of useful energy. Yet the permit indicates only that "*at times, waste heat… from the Main Boiler will be used to replace an equivalent amount of fuel input to the pellet plant wood fried burner*" (Draft Permit p. 2). The quantitative MSER $CO_2e$ limit assumes *no* heat capture, and hence no credit for thermal energy. We believe that MSER should require a minimum feasible rate of heat capture, which would limit GHG emissions per unit of energy generated, and that DEC should define a stringent minimum standard.

Massachusetts' draft revisions to Renewable Portfolio Standards offer a model methodology for computing energy efficiency for CHP. The formula proposed for these standards might serve as a model

for efficiency requirements incorporated in an air pollution permit for carbon dioxide that are aimed at limiting GHG emissions per unit of energy generated. Efficiency is calculated as the sum of electricity and useful thermal energy (converted to electricity-equivalent at 3412 thousand BTUs per MWh), with a credit for co-produced bioproducts, divided by the heat content of biomass fuel. Useful thermal energy is defined as "*Energy (a) in the form of direct heat, steam, hot water, or other thermal form that is used in production and beneficial measures for heating, cooling, humidity control, process use, or other valid thermal end use energy requirements and (b) for which fuel or electricity would otherwise be consumed. Thermal energy used for the purpose of drying or refining biomass fuel shall not be considered Useful Thermal Energy*" (MA RPS proposed revisions p. 9).

Unlike the boiler MSER, CHP *is* explicitly listed as part of MSER for the pellet dryer, but the required contribution is not quantified. Instead, the description indicates that "*up to 40%*" of drier heat will be provided by boiler waste heat, and the MSER definition states that "*when available, heat energy from the Main Boiler*" will be used in the pellet operation (TSD p. 3). In order for CHP to serve as an effective emissions-reduction strategy, quantitative thresholds should be set for the amount of energy obtained from waste boiler heat, averaged over a rolling 12-month period, and the MSER GHG emissions rate per ton of pellets should reflect this minimum required sourcing of drier heat.

With CHP, where heat energy is a by-product of one process and an input to another, the emissions from the shared heat must be allocated between the two processes, in this case the electricity plant and the wood pellet facility. CHP can be seen to enhance the efficiency, and hence lower the GHG emissions per unit of useful energy, for either or both of these operations. Since Vermont DEC is issuing a single air pollution control permit for both facilities, the simplest solution would be to set a target for waste heat utilization, split the credit between the two facilities, and adjust the permitted emissions rates accordingly.

<u>Role of Forests and GHG Emissions</u>

In addition to recognizing efficiency as an aspect of BACT for biomass facilities, EPA also recognizes that a portion of biogenic emissions may be offset by $CO_2$ absorption elsewhere on the landscape.[1] EPA has initiated a three-year-long study process to determine how to account for net emissions by incorporating landscape-level carbon impacts, and the preliminary draft framework has been issued for consideration by a Scientific Advisory Board.

The ability of biomass energy to achieve carbon neutrality and/or lower GHG emissions relative to other fuels will strongly rely on feedstock sources and how they respond to two widely held (but potentially misleading) assumptions: 1) that new carbon sequestration from "replacement" forest growth will necessarily always occur and not be double counted against other uses or emission sources, and 2) that reliance on wood residues and the avoidance of emissions from wood residue decay is valid across different types of feedstocks. In the interim guidance to states, EPA has acknowledged the importance of this rationale, "… *Within the context of the PSD program, a potential justification that biogenic $CO_2$*

[1] This position departs from the historic assumption that *all* biogenic emissions are offset in this way, and consequently the typical assumption of "carbon neutrality" no longer holds in every case.

*emissions can be accounted for differently than non-biogenic CO2 emissions at the facility* ***relies on the argument*** *that sequestration occurs*"[2] (emphasis added).

Vermont can take advantage of this preliminary EPA work on greenhouse gas accounting and begin collecting the data that will be needed for a full accounting of net emissions. EPA's recently-released draft framework points out that different categories of forest-derived residues (which are Beaver Wood's proposed feedstocks) generate different amounts of net GHG emissions. EPA's proposed categories for forest-derived woody biomass are:

- Forest residues
- Mill residues
- Non-merchantable forest biomass
- Timber roundwood harvest in a commercial market area
- Roundwood harvest from a dedicated source
- Salvage and fuel thinning harvest

For purposes of assessing net GHG effects, we suggest grouping these, in order of increasing GHG impact, into three basic categories which may merit distinct treatment in order to minimize GHG emissions.

- Wood waste includes urban tree waste, mill waste, clean construction debris, and clean recovered post-consumer wood. These materials would generally emit $CO_2$ and $CH_4$ fairly rapidly as they decompose over several years, hence combusting these materials has minimal net GHG impact.
- Forest residues include tops and limbs from pre-existing commercial roundwood harvest. These materials would likewise decompose relatively rapidly if not combusted for energy. They merit special treatment, however, because if left to decompose at the harvest site they fill important functions. Decaying wood provides habitat and food for a variety of organisms and wildlife, replenishes soil nutrients, and a portion of the carbon will be transformed into long-lived soil carbon. Mechanized removal of these materials also needs to be carefully managed to minimize damage to soils and residual stands. For all these reasons, removal of tops and limbs, and the retention of organic matter on nutrient-impaired sites, should be addressed through enforceable procurement standards, which should be incorporated as a condition in any potential air pollution permit.
- New roundwood removals include live trees that would otherwise continue growing and absorbing $CO_2$ if not combusted for energy. Removing this material reduces the quantity of carbon stored in source forests. If harvests are performed carefully and land remains forested, post-harvest forests may recover this carbon over several decades. This category is the major focus of EPA's investigations about how to account for net GHG impacts, and should also be addressed through procurement standards.

[2] *Guidance for Determining Best Available Control Technology For Reducing Carbon Dioxide Emissions from Bioenergy Production,* USA EPA, March 2011, (p. 20).

As stated above, the impact of biogenic emissions relies on either an offset of new sequestration or avoided emissions from decay. Because DEC has acknowledged its responsibility to regulate GHG emissions from biogenic sources, it needs to develop a comprehensive approach to accounting for those emissions, and it would be most appropriate to determine this before permitting any facilities.[3] As part of a comprehensive accounting approach, DEC should require tracking and reporting of the quantities of feedstock in each category, in order to assess the probable GHG effects of proposed facilities, which would be helpful to future permitting processes. DEC might also choose to establish a minimum proportion of wood from waste categories, and require carbon-conserving elements in wood procurement standards, in order to minimize net GHG emissions. This could be achieved in the context of an overall wood fuel procurement protocol that sets out the types and sources of "acceptable" wood sources based on verifiable management practices and feedstock tracking. Since the overall profile of GHG emissions is strongly reliant on such landscape considerations, we believe that such a protocol should be handled directly through the air permit, in concert with enforceable permit conditions through the Public Service Board Section 248 review of the electricity facility and Act 250's review of the pellet facility.

Particulates

Finally, while Vermont is in attainment for ambient particulate standards there is increasing attention, as you know, being focused on the health effects of particulate matter, especially that of fine particles or "nano-particulates" and their appropriate emissions standards. We encourage Vermont DEC to ensure that this permit achieves MSER for particulates, especially for fine particles and to evaluate whether the allowable emissions rates are really the best this facility can do. In particular, it is unclear whether an ESP or fabric filter is being specified and it appears from the Technical Support document (p. 21-23) that other wood fired facilities are contemplated to achieve lower PM emissions in practice.

Thank you for the opportunity to comment. We would be happy to further discuss these comments. Please contact Ann Ingerson at ann_ingerson@tws.org or Eric Palola at palola@nwf.org.

Sincerely,

Ann Ingerson, Senior Economist
Ben Rose, Northeast Regional Director
The Wilderness Society

Eric Palola,
Senior Director, Forests
National Wildlife Federation

Jamey Fidel
Forest and Biodiversity Program
Director and General Counsel
Vermont Natural Resources Council

[3] Vermont's Draft Comprehensive Energy Plan indicates that preliminary efforts are underway at the Agency of Natural Resources to evaluate life-cycle carbon accounting as it applies to biomass. Specifically, the Draft Plan states that it is "*recommended that the Agency of Natural Resources continue its efforts to evaluate tools that elucidate the relative carbon impacts of all biomass resources used for electricity, thermal uses and transportation purposes in Vermont. These life-cycle analysis tools can then be used to evaluate levels of carbon neutrality for different forms of bioenergy usage in Vermont under different scenarios*" (Vermont's Comprehensive Energy Plan, Public Review Draft at pp. 102-103).

**Agency of Natural Resources**
**Department of Environmental Conservation**

**Air Pollution Control Division**
**802-241-3841**

## Memorandum

To: Doug Elliott, Dick Valentinetti, and Elaine O'Grady

From: Steven Snook, Environmental Engineer

Date: October 17, 2011

Subject: Summary of Beaver Wood Energy Fair Haven Draft Air Permit Public Meeting

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The Vermont Air Pollution Control Division held a public meeting on Thursday, October 13, 2011, at the Fair Haven Grade School to receive comments from the public on the draft Air Pollution Control Permit to Construct for the proposed 34 MW wood fired electrical generating station and wood pellet manufacturing operation.

In attendance from APCD were Richard Valentinetti, Elaine O'Grady, Doug Elliott and Steven Snook. Bill Bousquet and Tom Emero from Beaver Wood Energy Fair Haven were also in attendance. Shown at the end of this memorandum is a table with the information from the people who provided information on the sign in sheet.

At 6:02 pm, Elaine O'Grady started the meeting by welcoming the attendees. She introduced the APCD staff in attendance, explained the purpose of the meeting, and requested that the comments be limited to the draft permit. For those with comments and concerns that do not relate to air pollution and that are beyond the authority of the Air Pollution Control Division, she recommended participating in the Act 248 proceeding and any other relevant permit proceedings (e.g., wastewater, stormwater, etc.). A brief description of the Act 248 process was provided. She laid out the process for those who wish to provide comments: please state name and if they have any affiliations and requested that speakers limit their comment to 3 – 4 minutes: if time is available later in the meeting people can provide additional information. It was noted that we won't be responding to the comments at this meeting, but will produce a written response. Written comments concerning the draft permit may also be submitted to the APCD by 4:00 pm on 10/17/2011.

Doug Elliott reviewed the sign in sheet and observed that there were very few people present who were checked off as wanting to present comments. The following is a summary/ paraphrasing of the comments that were presented.

Ron Adams (Fair Haven resident): Mr. Adams is seeking a common sense approach to the air quality permitting of the proposed project. He considers the McNeil Station as a good example

of a biomass plant that has a good record for air quality. He noted that recently the citizens of Burlington supported the McNeil plant by passing a bond vote, by a wide margin, for investments to upgrade the plant. He also noted that McNeil is located downhill & upwind from two of the largest institutions: UVM and Fletcher Allen Health Care. He felt that if there were air quality issues with McNeil, it would be in the news. Also the Burlington area is one of the most densely populated areas in Vermont, which would also increase the likely hood of problems at McNeil to be observed and made newsworthy. Since there is very little negative information in the news about the ongoing operation of McNeil it is evidence that there are not air quality issues associated with that biomass plant.

Neil Robinson (Fair Haven resident): Mr. Robinson commented about people who are against this project and other biomass projects. These people get in the press and present false claims, but they don't come to meetings such as this one to state their concerns. He believes that the Vermont Law School would also raise objections to new projects that would pollute. Also the respiratory department at the University of Vermont medical school would have objected to the McNeil plant if there were issues. Mr. Robinson cited the existence of 50 schools in Vermont being heated with wood chip fuel. Even with all the school units in place, there are no complaints about their operation. He understands the proposed project will pollute less than the schools. The project is good for the state, and good for the environment. The proposed project is state of the art; a world class facility. It aligns with Vermont's interest in being at the cutting edge.

Roy Newton (Lakeside News): Mr. Newton stated that he agrees with Ron Adams. He reiterated that McNeil has years of operating history that shows it does not cause complaints in Burlington. He cites that Green Mountain College also has installed a wood chip boiler. GMC is one of the most environmentally focused schools in the country; and they are using wood as a fuel. Middlebury College, one of the most prestigious institutions in the country, has also installed a wood fueled boiler. If there were issues with the Middlebury wood boiler, we would have heard about them. The BWE project will be a benefit for the local area, Rutland County, and all of Vermont.

Phil Stannard (Fair Haven resident/forester): Mr. Stannard feels that the article in The Rutland Herald on October 13, 2011, is erroneous, and not based on facts or quotable sources. It was written from a civil engineer in Massachusetts who is assumed to be connected with other groups in Massachusetts who are against biomass. The Commenter was looking for someone at this meeting to refute the emissions information in the article. As a forester, he could refute the erroneous regarding the forestry issues and the biomass inventory.

There were no more people who wished to present comments so at 6:20 pm, the public meeting was closed.

Informal discussions followed the meeting.

Names from sign in sheet. Note that there were approximately 34 people in attendance including APCD.

| Name | Affiliation | Address/email | Are you here to provide comments? |
|---|---|---|---|
| Claire Stanley | Selectman | 9 Brooklyn Hgts, Fair Haven, VT | |
| John Lulek | | 48 West St. Fair Haven, VT | |
| Lucia Suarez | Rutland Herald | | |
| Chris Cole | Resident | | |
| Ralph Perron | U.S. Forest Service | rperron@fs.fed.us | |
| Roy Newton | Lakeside News | lakesidenews@me.com | |
| Larry Hugher | Resident | 843 Scotch Hill Rd. | |
| Neil Robinson | Resident | 35 West | Probably |
| Fred Capron | Resident | 6 Phelps | Yes |
| Ron Adams | Resident | 24 Pleasant | |
| Bill Canfield | Legislature | wcanfield@leg.state.vt.us | No |
| Nancy Hay | | 1 Lockburr, Fair Haven, VT | No |
| David Eighmey | Town Planning Commission | PO Box 336, Fair Haven, VT | ? |
| John Larkin | | Mechanic St. | No |
| Phil Stannard | Live here | Fair Haven | Maybe |
| Ray Phillips | Taxpayer | brjkphillips@msn.com | No |
| Francis Owen | Taxpayer | | ? |
| George Stannard | Taxpayer | | ? |
| Jackson ? | Taxpayer | | ? |
| Rod Holzworth II | Taxpayer | thornhill@together.net | |
| Tim Donnelly | MacMillan & Donnelly, Inc. | tdonnelly@mdeec.com | No |
| Amy Shollerberger | Beaverwood | amybeth@together.net | No |
| Jeff Thomson | Beaverwood | Jeff@iddream.com | No |