Massachusetts Environmental Energy Alliance

April 12, 2009

Re: Pioneer Renewable Energy ENF, EOEEA # 14388

Dear Mr. Zavolas:

Thank you for the opportunity to comment on the proposed Pioneer biomass plant in Greenfield, MA. I have scrutinized several chapters of the ENF and find significant issues, which warrant the preparation of a full EIR. I note that Section 11.01(d) of the MEPA regulations state that MEPA review "enables the Proponent and each Participating Agency to consider the positive and negative, short-term and long-term potential environmental impacts for all phases of a Project, and the cumulative impacts of the Project and any other Project or other work or activity in the immediate surroundings and region." As more biomass facilities are proposed in Western Massachusetts, the potential for their cumulative impacts grows. I therefore hope MEPA will not repeat the mistake that occurred with the Palmer biomass plant by allowing the project to proceed with just an ENF, but will require preparation of a full EIR, and require it to assess cumulative impacts. Failure to require review of cumulative impacts in the Palmer and Russell filings was a major omission on the part of MEPA, one that must not be repeated with the Pioneer plant.

I have comments on several sections of the ENF.

Need and Alternatives

To explain the context for my critique of the Pioneer ENF needs and alternatives analysis, I remind you that back in 2007, Governor Patrick promised that his administration would attempt to meet the needs for new electricity generation with conservation. To quote from an article in the Boston Globe,

> "All we're trying to do is fully unleash energy efficiency, so it can compete with generation," said Ian A. Bowles, the state's secretary of energy and environmental affairs.
>
> The plan could create 3,500 jobs for people selling energy- efficiency products and services, Bowles said.
>
> Patrick, in a statement e-mailed to the Globe, said: "Reducing our usage through energy efficiency will save money, create jobs, and boost our clean-energy economy."[1]

Yet today in the Pioneer Valley, apparently now the State's new energy generation colony, we are facing the prospect of five new power plants with a combined total of 815 of generation – the Russell, Palmer,, and Greenfield biomass plants (not even counting the Pittsfield Tamarack plant,

1 Boston Globe, June 25, 2007 "Patrick plans conservation to meet rising energy needs - Aim is to avoid building new power plants"

which is apparently once again under serious consideration); then the Pioneer Valley Energy Center gas/diesel plant, and the Ludlow Stony Brook 3 gas/oil plant.

I question the need for so much new generation, given the current economic circumstances that have caused electricity use to decline. In fact, declining energy use combined with the transition to natural gas means that Northeastern power sector greenhouse gas emissions have fallen 9% since 2007.[2] I question why, even if one accepted ISO New England's prediction of 2,400 MW of new generation needs by 2017 (and I do not accept these numbers) 815 MW of this has to be placed in Western Massachusetts alone.

The rationale behind the ENF needs analysis can only be described as thin. To begin with, the statement that the ISO Regional System plan "identified the need for more than 2,400 MW of new installed capacity in New England by 2017, assuming no retirements"[3] is a misquote. The ISO report actually states:

> "On the basis of representative net ICR values, physical resource additions will not be needed to meet the regional resource adequacy planning criterion through the 2011/2012 capability year, assuming no additions or attrition to the existing capacity within New England. However, New England *may* need approximately 570 MW of additional capacity starting in 2012, and by 2017 a total of approximately 2,400 MW of additional capacity would be needed."[4]

The need for additional capacity is <u>not</u> certain; and the date by which it is needed is more than two years out, giving time for conservation measures to reduce demand, as Governor Patrick claimed was possible in 2007.

The proponents also cite the Pioneer Valley Planning Commission statement that 214 KWh of "clean energy" will be needed by the end of 2009 "and another 440 million kWh by 2020". However, this scenario was developed before the current drop in energy use which we are now enjoying; these numbers can no longer be considered accurate and new ones should be developed. Further, the proponents themselves have provided the best argument for why this plant is not needed. Even if one accepted the PVPC's numbers, why, if the Pioneer Valley can wait until 2020 for 440 million kWh, why does this nearly 400 kWh plant have to be built right now?

Given that 815 MW of new generation is under consideration in Western Mass alone (not including the possible 10 – 20 MW biomass plant possibly to built in Greenfield alongside the Pioneer plant, and the potential 40 MW Pittsfield biomass plant), consideration of the Pioneer plant as if no others are being built is misleading. Further, it is contrary to MEPA's mandate to consider cumulative impacts.

The proponent states that the Pioneer facility is being designed as a base load plant,[5] and as such, the power it generates will directly offset an equivalent amount of electricity that "would otherwise have been produced by the marginal generating unit, generally a natural gas-fired unit in New England." This statement needs to be proved, otherwise it is misleading. The MEPA process needs to demonstrate what fossil fuel capacity is being taken offline and replaced with the Pioneer biomass plant. Given that two new natural gas/diesel/oil facilities with a combined generation capacity of 680 MW are proposed for Western Massachusetts, it appears this statement may in fact be inaccurate.

The proponent further states on page A-1 of the ENF that energy price volatility will be reduced with local generation at the biomass plant. In fact, the opposite may be true, since creation of a

2 Boston Globe, March 11, 2009. "Recession byproduct – a drop in emissions."

3 p. A-1 of Needs and Alternatives chapter

4 p. 37 of ISO report (p. 40 of the pdf)

5 p. E-4 of the Greenhouse Gas chapter

significant market for wood biomass may drive up the price of wood for people who heat their homes with wood or pellet stoves, and for small, building-scale biomass heating plants. There is no valid reason to believe that energy price volatility will be reduced, and its inclusion in the MEPA filing is superfluous and misleading. The proponent also claims (p. A-2) that the plant will have "substantially lower levels of sulfur dioxide, particulate matter and nitrogen oxides emission relative to oil and coal-fired plants". Since no coal or 100% oil-burning plants are proposed to be built in the area, this is a false comparison; and since the proponent has not demonstrated that fossil fuel generation capacity will be taken offline if the Pioneer plant is built, the statement is doubly misleading.

In light of these facts, why has the needs and alternatives analysis not included a "no build alternative"? This can not be considered a true needs and alternatives analysis unless a full analysis of the impacts and costs of energy conservation is included. MEPA should require such an analysis in the EIR.

Wood Supply

The Pioneer plant ENF chapter on wood supply contains serious errors and misrepresentations which demonstrate the need for preparation of an EIR. There are two main problems with the wood supply analysis presented in the ENF:

1. Characterization of the amount of wood available, and the kinds of wood available
2. Failure to perform a comprehensive impacts analysis as required by MEPA

The amount and kinds of wood available for fuel are mischaracterized

The ENF misrepresents the amount of wood actually available as fuel, stating "one study found that the **current production** of clean biomass residues is 750,000 tons in the five counties" (referring to the five "core" counties studied in the DOER/DCR biomass availability report[6]). One wonders whether the proponent read past the executive summary of the biomass report, since in the body of the report, it states (p. 31)

"Biomass residue available from existing forest harvesting activity, forest industry residues, urban wood residues and (limited) agricultural residues is equivalent to roughly 340,000 dry tons (629,000 green tons) in the core counties."

In fact, the 750,000 tons referenced in the executive summary of the biomass availability report appears to include the "paper cubes" referenced in the report which actually contain waste, not renewable biomass. Further, a significant portion of the 629,000 tons of "green biomass" referenced in the body report is actually C&D waste, which constitutes "much" of the 186,470 tons of "urban wood residues" [7] reported for the five core counties. Is the proponent even aware that despite having promised to only burn "clean" wood, a significant proportion of the supply cited as ostensibly available to the Greenfield plant is construction and demolition debris? The figure of 750,000 tons is not supported by the data in the report, and the figure of 629,000 tons contains elements which the proponent has promised not to use at the Pioneer plant.

From the way the ENF discusses wood supply, one would imagine that someone was running around with clippers trimming off *just that amount of growth the trees can do without* to provide the fuel supply. In fact, this plant (and the others proposed in Western Massachusetts) will require a significant increase in whole-tree logging to meet supply. The DOER/DCR biomass

6 Innovative Natural Resource Solutions, LLC. 2007. Biomass Availability Analysis – Five Counties of Western Massachusetts. Portland, ME.

7 Ibid, p. 25: "Urban wood residues include most wood generated as a result of activity in and around urban and suburban areas, and include tree trimmings, utility right-of-way clearing, ground pallets, and the woody fraction of construction and demolition debris. Table 10 is presented in dry tons, as much of the wood (pallets and the woody fraction of construction & demolition debris) is delivered dry."

availability study estimates that there are actually just 110,000 tons of true forestry "residues" available in the five core counties,[8] a small fraction of what is required by one plant. Sawmill residues are considered to already have a market and are not even included in the total of 629,000 tons of wood products given on p. 31 of the report. An alternate analysis of biomass availability included in the "Silvicultural and Ecological Considerations" section of the DOER/DCR biomass study[9] concludes that in fact, the highest possible yield that can be "sustainably" harvested from forestlands (using a combination of crown thinning and low thinning) yields on average 25 dry tons/acre, which at a moisture content of 0.45 translates to about 45.5 green tons/acre. At this harvest rate, were the Pioneer plant to get the majority of its 500,000 annual tons of green biomass fuel from "sustainably harvested" forestlands as the ENF claims, this would require up to 11,000 acres a year to be heavily cut to support *just this one plant*.

The recklessness of the state in promoting a number of large biomass plants to be built is nowhere more in evidence than regarding this issue of fuel availability. In particular, considering that the biomass study put out by DOER and DCR generally acknowledges that wood should come from within a 50-mile radius to minimize transport costs, it is amazing that it does not acknowledge that the 50-mile radius circles of the Pioneer, Russell, and Palmer biomass plants, as well as the potential Tamarack plant in Pittsfield, actually overlap.

Further, one wonders whether anyone consulted New York, Vermont, Connecticut and New Hampshire about their plans for their own wood when the DOER/DCR biomass availability reports were being prepared. The Pioneer ENF claims that biomass residues are currently being landfilled or "shipped out of state", which would imply that markets already exist for this Massachusetts wood, never mind what surrounding states may plan for their own wood. Indeed, the ENF cites the Vermont (BERC) study that found it would take wood supplies from four counties to supply just one million tons - barely enough for two biomass plants – suggesting that Vermont is already looking to Massachusetts for its wood supply. Has the proponent made enquiries with surrounding states to see if they might have plans for their own wood? Has DCR?

Further, and just as importantly, **none** of the calculations of the amount of wood currently being harvested take into account the amount of wood currently allocated to domestic firewood, wood pellet generation, to say nothing of small-scale biomass for heat.

The definition of "forest residues" used by the proponent is extremely broad, including not only the material typically left in the forest after a logging operation, but also "undesirable, diseased, or invasive species cut as part of timber stand improvement". Knowing as we do that current cutting levels provide nowhere near the amount of branches and tops of trees that would be required to support even one plant, let alone the three or four being proposed, it is hard to not see this definition as a "Trojan horse" for allowing enhanced cutting for fuel generation to occur. There is much general talk about "sustainable" forest practices, but the definition given: that sustainable harvest is a "harvest rate less than or equal to net growth, meaning that the forest can sustain this harvest rate indefinitely" is not even appropriate for northeastern forests, being generally used with regard to regulated forests and plantations, not with regard to native forests like those of Massachusetts.

Further, responsible foresters understand that "sustainable" forestry requires leaving branches and tops of trees on the site for replenishment of soil nutrients and protection and replenishment of soil carbon stocks, a point made even in the silviculture section of the DOER/DCR report on biomass availability. Citing this report, the lesson the proponents take from it is that "One SFBI study found that biomass power generation, by creating a market for low-grade biomass, will be an important tool in improving forest management in the state, leading to improved timber

8 Ibid, page 15

9 Kelty, M.J., D'Amato, A.W., and Barten, P.K. 2008. Silvicultural and Ecological Considerations of Forest Biomass Harvesting in Massachusetts. Department of Natural Resources Conservation, University of Massachusetts, Amherst, MA.

productivity and the preservation of wildlife habitat, clean air, and clean water" – a conclusion almost completely contrary to that contained in the body of the report. In fact, the Silvicultural and Ecological Considerations report actually paints a quite cautionary picture of the impacts of biomass harvesting, warning of nutrient depletion, soil compaction, and stream sediment and nutrient loading.

Given the poor quality of the analysis of wood supply for just this one plant, it is vital that an EIR be completed for the Pioneer plant, and that a cumulative effects analysis be included that accounts for potential wood needs of the proposed Russell and Palmer biomass plants, as well as the proposed Pittsfield plant and any other plants in other states that may also be taking wood from the 14-county "buffer" area identified in the DOER/DCR biomass availability report. In any case, it would seem in the proponent's best interest to carry out such an analysis.

Water Supply

The amount of water to be used by the PRE plant for cooling and tower and boiler blowdown is large: 550,000 – 880,000 gpd, including approximately 50,000 gpd of groundwater withdrawals. Maximum use will occur under the hottest summer conditions. Several aspects of the water supply analysis of the ENF require significant clarification and require preparation of a full EIR. These issues fall into three main categories:

1. Impacts of takings from the wastewater stream and municipal water supplies need to be better explained
2. Impacts of wastewater discharges need to be modeled and claims of benefits verified
3. Impacts of groundwater withdrawals on the Fall River need to be investigated

Use of wastewater for cooling under high flow conditions

The PRE facility's reliance on Greenfield's wastewater infrastructure to provide cooling water is likely to exacerbate existing problems with wastewater discharge under high flow conditions. Examining EPA's NPDES violations database reveals that under high flow conditions, the Greenfield WPCP frequently exceeds its NPDES discharge volumes by 300 – 400%, discharging up to 12 mgd (the design flow for the plant is 3.4 mgd). High infiltration/inflow (I/I) rates are already driving the plant into non-compliance. The additional 161,000 gpd contributed by the return water from the Pioneer plant will further contribute to this non-compliance, yet no real analysis of this has been included in the ENF. Further, given that effluent from the WPCP already will require pre-treatment filtration and chemical addition to achieve "Class A" standards prior to being used in the cooling process, it is likely that even more chemical and energy inputs will be required to bring wastewater to Class A standards during periods of high I/I when inflows to the WPCP exceed treatment capacity. According the ENF (p. F-6) this additional treatment of wastewater prior to its use at the PRE plant will produce a "small, concentrated wastewater stream" – hardly the detailed analysis that one would hope to see in a document that is being promoted as the final report on environmental impacts of the plant.

Plant cooling needs when wastewater flows are low

In fact, because wastewater flows are sometimes less than the amount of cooling water required by the plant, building the plant could actually be seen as a disincentive for Greenfield to address the I/I issues with its wastewater system that support current flows. While the ENF is somewhat unclear on this point, it appears that PRE facility would need to obtain up to 400,000 gpd of municipal water when wastewater flows were low, as an "emergency backup supply" of cooling water and also for dilution of treated wastewater when effluent TSS and BOD are high. The explanation of the conditions under which these conditions would occur, and the frequency of their occurrence, is completely lacking in the ENF. The proponent's assurance that spikes in TSS and BOD occur "only" about 5% of the time is overshadowed by the admission that municipal

water use could be 400,000 "for a few days at a time". At what time of year is this likely to occur, and how often? Do they occur under high flows, or under low flows? There is no discussion of what happens when wastewater effluent is simply inadequate to meet cooling needs at the plant - does this constitute the "emergency conditions" under which municipal water may be used?

Greenfield is already close to using its registered volume of 2.12 mgd on many days; if the PRE facility took water from the municipal system in the summer, when municipal water use is highest and groundwater and reservoir supplies are most stressed, water use by the plant could push the town into non-compliance with its Water Management Act withdrawal limit and potentially stress municipal water supplies. It is therefore especially surprising, given the admitted need to use municipal water for cooling, that page A-14 of the Alternatives Analysis claims "Discussions with the Greenfield Department of Public Works (DPW) indicate that there is sufficient flow in the treated effluent from the WPCP to meet the cooling needs of the proposed facility (approximately 640,000 gpd). " This is quite contrary to the statements that are found in the water supply chapter.

The ENF itself admits that significant portions of the water supply analysis remain incomplete. Regarding use of municipal water, page F-10 states "the final design details will be confirmed following additional WPCP effluent water quality testing and statistical analysis to determine if municipal water could be used to dilute the spikes as needed based on monitoring of TSS (turbidity) and BOD". Are the proponents assuming that acquisition of municipal water is a done deal? Is it really the case that the only details left to be worked out are whether municipal water would make a good diluent? The potential taking of municipal water merits an environmental impact report all to itself, yet the ENF treats the issue as trivial.

Given these questions, it is truly questionable at this point whether the water needs of the PRE facility are supportable. Under climate change, which is predicted to worsen the severity and frequency of both extreme precipitation events and droughts, impacts of the PRE facility's water use will only intensify. MEPA should require that the EIR contain an analysis of wastewater availability, and impacts on municipal supplies, under potential climate change scenarios to ascertain the sustainability of the plant's cooling infrastructure.

Plans to pump 50,000 gpd of groundwater for boiler blowdown from an area next to a river classified as optimal salmon habitat also need a better impacts analysis, since there is no discussion in the ENF of any kind of how groundwater pumping might affect stream levels or the surrounding areas. The EOEA watershed report for the Deerfield River[10] actually makes particular note of the linkages between ground- and surface water in this region, stating

> "A study conducted by the USGS (Friesz 1996) found that stratified drift thickness ranged from 0 to 385 feet along 7.4 miles of the Deerfield River east of Interstate 91 to its confluence with the Connecticut River. The thick deposit fills a deep north-south trending valley with coarse-grained alluvium below finer glacial lake deposits. The deposit is a valuable source of groundwater.... It was found that groundwater levels within stratified drift areas adjacent to the Deerfield River responded instantaneously to streamflow fluctuations."

Such small tributaries play a vital role in the restoration of wildlife and habitat in the Connecticut River system. Again, in addition to the impacts analysis of water takings, an analysis of how climate change may affect water availability should be conducted.

A perhaps minor point, but one somewhat indicative of the sometimes inadequate level of explanation that characterizes the ENF, is that there are references to two apparently separate supplies for everyday water needs at the plant. On page F-7 it is stated first that "Treated reclaim water from the raw water storage tank will also be used to meet an estimated average 1,440 gpd

10 Executive Office of Environmental Affairs, 2004. Deerfield River Watershed Assessment Report. 2004 – 2008. Boston, MA. p. 21.

attributed to miscellaneous plant service water uses, and will serve as a back-up to the municipal main for the facility's fire protection system." A paragraph later, it states that "Plant domestic and potable water needs will be met with municipal water. Typical uses include sinks, eye wash stations, lavatories, etc. These plant uses will consume an estimated 1,440 gpd." Are these two different sources of need that each just coincidentally use 1,440 gpd, or are they the same?

Claims about PRE effluent discharges need further modeling and substantiation

Claims by the proponent that the net effect ot the plant "should be an overall decrease in pollutant loading from the Greenfield WPCP, and an improvement in the water quality of the waters that are discharged to the Deerfield River"[11] need substantiation. Without modeling, this claim is insupportable, since while water takings by the plant would reduce the volume entering the Deerfield River from the Greenfield WCPC, pollutant *loading* may actually increase, or the variety of contaminants may increase. The treatment of wastewater to Class A standards prior to its use as cooling water at the PRE facility would require chemical inputs which themselves can serve as pollutants; further, concentration and treatment of groundwater pumped for boiler blowdown would add to the waste stream. Boiler and cooling tower blowdown can contain significant quantities of metals and additives, including sodium hypochlorite, sodium bromide, aqueous ammonium, tri-sodium phosphate, carbohydrazide, and sulfuric acid and sodium hydroxide for pH control. One supposes that the failure to include such details in the ENF is due to the assumption that all such additives and products will be eliminated when wastewater returns for treatment to the Greenfield WPCP, but given the treatment plant's numerous flow and water quality violations, more explanation of how the PRE facility wastewater will affect municipal treatment and pollutant discharges to the Deerfield River is called for.

Air Quality

Since practically the entire school-age population of Greenfield and some of that from other towns attends school within the 6 – 7 km zone around the plant identified in the ENF as having the most severe deposition of air pollutants, it is particularly important to accurately characterize the air quality impacts of this project. Western Massachusetts is already out of compliance with the EPA 8-hr ozone standard on many days, and perilously close to being out of compliance with the PM2.5 standard. Although air quality impacts by the PRE facility are likely to be significant, the ENF characterizes them as minor, to the point of misrepresenting their actual magnitude.

Particulate matter emissions

Particulate matter emissions by the plant are relatively high. I notice that the proponent has attributed a significant amount of PM emissions to fugitive dust on the site, but even without this component, stack emissions by the plant would be significantly in excess of the EPA significant impact level (SIL) levels for 24-hr and annual PM2.5 emissions. This fact triggers a review of other major sources in the region, but finding none at this time, the proponent has concluded effects on air quality will be negligible. However, MEPA regulations require a cumulative impacts analysis which includes impacts of even *proposed* projects. Particulate matter impacts should therefore be reassessed in light of future impacts of at least the Russell and Palmer biomass plants and the Pioneer Valley Energy Center gas/diesel and Ludlow Stony Brook 3 gas/oil plants that are proposed for the region, as well as the proposed Pittsfield biomass plant that is now under discussion.

The proponent should also be required to do preconstruction monitoring of air quality. Despite DEP having already waived this requirement, the issue should be revisited. The proponent states an unsubstantiated opinion that air quality is likely to be improved by the plant, since the site's current use is probably a major source of particulates from fugitive dust, and dust control

11 p. F-20 of ENF

measures could improve once the biomass plant is built. I hope for DEP's sake that this is not one of the reasons provided to them, and accepted by them, as a justification for waiving preconstruction air monitoring. As the proponent acknowledges, MassDEP guidance suggests using data within 10 km of a proposed building site to provide ambient air data; instead, however, the proponent has used data from Chicopee, 50 km from the site. This alone is a good argument for requiring preconstruction air monitoring. In any case, the need for this plant has not been demonstrated; therefore delaying its construction so a year of air quality monitoring data can be collected is the most responsible course of action.

A minor observation regarding particulates: Table 2-7 shows the NAAQS in g/m^3, instead of $\mu g/m^3$, and shows the 24-hour standard as 65 $\mu g/m^3$ instead of 35 $\mu g/m^3$, which is the correct value. And finally, why does this air quality chapter not include modeling of truck diesel particulate matter emissions? Are 17,000 truck trips per year by 25-ton trucks considered to represent a negligible source of diesel emissions? In fact, the EPA has stated that there is no safe level for truck diesel emissions, and MassDEP's own diesel emissions study states

> "Studies have not found a safe exposure level for PM2.5; in other words, exposure to even small amounts of PM2.5 is associated with adverse health effects... Exposure to PM has been causally linked with increased mortality from cardiopulmonary diseases and lung cancer. Studies show that heart attacks may be linked with very brief exposures of less than 24 hours. Other health effects include lung damage, respiratory distress, and exacerbation of bronchitis and existing allergies. Population groups that are especially susceptible to the health effects associated with PM exposure include the elderly, children and people with existing heart disease, lung disease and diabetes."[12]

Diesel emissions are significant sources of ozone-forming NOx and volatile organic compounds (VOCs), and over 90 percent of diesel particulate emissions are PM2.5. These emissions should be accounted for in the air quality permitting for the plant, since they represent a significant source of pollutants that will occur only if the plant is built.

NOx emissions

Treatment of NOx emissions in the ENF suffers from some of the same deficiencies as the analysis of PM – that is, a downplaying of impacts and a failure to perform a cumulative impacts analysis. Purchase of NOx offsets must occur within the State, but not necessarily within the local region of the plant. The Secretary's Certificate on the Palmer Biomass ENF states a strong preference for offsets to be purchased locally, but it is questionable whether enough local offsets exist for this to occur. Mitigated at a ratio of 1.26 to 1, the combined NOx emissions of the Palmer Biomass plant of 134 tpy, the Russell Biomass emissions of 195 tpy, and the 164 tpy of NOx from the Pioneer plant comes to a total of 621 tons of NOx offsets to be purchased locally, a figure that does not even include the offsets that will be required by the 400 MW PVEC gas/diesel plant in Westfield and the 280 MW Ludlow Stony Brook 3 gas/oil plant.

If sufficient offsets can not be purchased locally, this will most likely lead to an increase in NOx emissions and therefore ground-level ozone in the Pioneer Valley, which already exceeds the EPA health standard for ozone. This fact needs to be acknowledged not only in an EIR prepared for the Pioneer plant, but also by MEPA, and by EOEEA and DOER. It should be made absolutely clear what the air impacts will be of generating what is actually a trivial amount of energy compared to total needs in Massachusetts, an amount of energy that could easily be saved by conservation measures with no increase in generation.

---

12 Lyons, S. 2007. The Massachusetts 2002 diesel particulate matter inventory. Massachusetts Department of Environmental Protection, Boston, MA. September 2007.

Incorrect fuel moisture values affect pollution emission estimates

In fact, deficiencies in the modeling used to calculate pollutant emissions mean that actual air quality impacts by the PRE facility will be higher than reported in the ENF. The proponent states (p. B-17) that "projected annual emissions for NOx, SO2, PM-10/PM-2.5, CO and VOC have been calculated based on an annual average heat input of 622.5 MMBTU/hr, *corresponding to an average wood moisture content of 40%.* Maximum hourly emissions used for short term average air modeling were based on a maximum heat input of 663 MMBTU/hr, corresponding to a maximum wood moisture content of 50%" (emphasis added). However, assuming a 40% value for wood moisture content is assuming a physical impossibility given the sources of wood the proponent claims will be used at the plant. The proponent states (p. B-1) that

> "Pioneer Renewable Energy's principal sources of wood fuel will be clean forest management residue from approved forest management operations, forest timber stand improvements, tree trimmings produced by municipal and utility maintenance crews, and stumps and other material from land conversion activities. It is anticipated that some amount of primary mill waste (clean sawdust or chipped slab wood) and recycled wood waste (shipping pallets) may also be made available to the facility."

The DOER/DCR biomass availability study, upon which the proponent relies for documenting the adequacy of the wood supply, states that the moisture content of logging residues, sawmill chips, and land clearing residues is 45%; only that of pallet grindings and secondary forest product residue (categories that the proponent states "may" be made available) is lower, at 20% and 10%.

The moisture content of wood has a large impact on air emissions. A NESCAUM report on wood burning found that increases in wood moisture content of 10% cause emissions of pollutants to increase 65% o 167% in uncontrolled systems.[13] Using the proponent's own data to calculate the difference in emissions for the "24-hour maximum emission rate" (corresponding to a wood moisture content of 50%) and the "average annual rate" (corresponding to a moisture content of 40%) it appears that there is a 6% to 7% increase in pollutant emissions with this 10% increase in wood moisture content. The following table shows how moisture content will affect emissions (spreadsheet with derivations available on request):

Pollutant	TPY at 40% mc	TPY at 45% mc	TPY at 50% mc
NOx	163.8	169.1	174.3
CO	204.5	211.1	217.7
VOC	27.2	28.0	28.9
PM-2.5	51.7	53.4	55.2
PM-10	51.7	53.4	55.2
SO2	68.3	70.5	72.7
NH3	16.4	16.9	17.4
HAPs	23.7	24.5	25.2

Since the proponent steadfastly maintains that there is no need to cover the fuel pile, it is probably fair to assume that fuel moisture content at the PRE facility will be even higher than 45%. To be conservative, all pollution modeling should therefore be redone assuming a worst-case scenario of 50% fuel moisture content, as occurred in the Russell Biomass EIR. It is particularly interesting to note that the proponent's emissions estimate of 23.7 tons per year of Hazardous Air Pollutants (HAPs), estimated with a fuel moisture content of 40%, just squeaks under the regulatory "major source" threshold of 25 tpy, but that more realistic assumptions about fuel moisture content do raise it above that level.

13 NESCAUM, 2008. Contribution of wood smoke to particle matter levels in Connecticut: Source characterization of outdoor wood furnaces.

Discrepancies with estimates from the Russell plant raise questions

It is difficult as a non-expert to analyze the kinds of technology to be employed by the Pioneer plant, but it is at least clear that the boiler technology and pollution control systems are similar in many respects to those proposed at the Russell Biomass plant. It is therefore puzzling that such large discrepancies exist between pollutant emission rates that are reported in the Pioneer ENF and the Russell Biomass EIR. Even the background concentration values for pollutants differ, which may be due to data from different monitoring stations being used, although this is not completely clear. The following table shows background pollutant concentrations, plant additional increments, and total impact from the two reports, with Pioneer values expressed as a percent of Russell Biomass values.

Backgr Cns	NO2 ann	SO2 3-hr	SO2-24 hr	SO2 ann	PM10 24 hr	PM10 ann	PM2.5 24 hr	PM2.5 ann	CO 1 hr	CO 8 hr
RB	18.8	99.6	60.3	15.7	53	23	26.7	9.8	5405	3565
G'fld	9.4	39.15	28.71	7.83	31	11	28.1	9.3	3876	2850
G'fd / RB	50%	39%	48%	50%	58%	48%	105%	95%	72%	80%
Plant Increment										
RB	1.3	43.1	6.4	0.7	2.1	0.2	**0.9**	**0.2**	275	34
G'fld	0.4	11.6	2	0.15	46.6	8.5	**3.7**	**1**	70.5	15.7
G'fd / RB	31%	27%	31%	21%	2219%	4250%	411%	500%	26%	46%
NAAQS	100	1300	365	80	150	50	**35**	**15**	40,000	10,000
Impact										
RB	20.1	142.7	66.7	16.4	55.1	23.2	**27.6**	**10**	5680	3599
G'fld	9.8	50.75	30.71	7.98	77.6	19.5	**31.8**	**10.3**	3946.5	2865.7

Given that the Russell plant is 50 MW, and the Pioneer plant is 47 MW, one would not expect such large differences in emission rates if the technologies employed are fairly similar. Further discrepancies include a figure of 49.1 tpy for HAP emissions at the Russell plant, in contrast to 23.7 tpy at the Pioneer plant, and ammonia emissions of 32.41 tpy at the Russell plant in contrast to 16.40 tpy at the Pioneer plant (with "ammonia slip" specifications of 13 ppm at 3% O2 pertaining at both plants). Of dubious comfort is the fact that lead and mercury emission rates appear fairly similar at the two plants, though emissions at the Pioneer plant are somewhat lower. Whether or not these discrepancies are meaningful relative to the NAAQS, they do not in any case serve to inspire confidence in the modeling done in these reports.

A further point casting doubt on the reliability of emissions estimates is the fact that there exists very little information on actual contamination levels in wood. The NESCAUM wood burning report states (emphasis added)

> "NESCAUM also completed elemental analysis of a limited sample of the fuel used for testing. This analysis revealed elemental sulfur levels fifty times higher than anticipated based on EPA studies. While the data set completed under this project is too limited to make conclusive findings, it does raise concerns regarding the potential emissions of other pollutants, especially in areas prone to acid deposition and other pollutants often related to the burning of coal. Specific pollutants of concern include sulfur dioxide and mercury. **To this day, there has been no study of the elemental constituents of wood in the Northeast. Based upon these preliminary findings, NESCAUM recommends that emission tests on all wood burning in the Northeast should include characterization of sulfur dioxide and mercury emissions.** Additionally, research regarding the effects of soil constituents and

> air pollution on the elemental composition of wood would provide further insights."[14]

To what extent do emission rates in the Pioneer ENF rely on "standard" values for elemental and contaminant content of wood? The EIR should make clear the sources of data upon which the analyses of pollutant emissions rely. If there are few current data on wood composition, then this point needs to be made clear. How confident is the proponent about contaminant levels?

A better plan for ash disposal needs to be articulated

Although ash disposal is treated in the wood supply chapter of the ENF, I comment on it here because contamination of fuel wood is not only a problem for air emissions, but also for ash disposal, given that whatever does not go out the plant's stack will be retained in ash. Despite the proponent's optimistic projections that agricultural application by the "burgeoning" organic farming community in the Greenfield area may provide an outlet for the 8,500 tons of ash that will be generated by the plant each year, significant questions remain. Recent research demonstrates that wood ash can contain extremely high levels of contaminants. A recent study examining wood ash from combusted spruce and birch in Norway[15] found concentrations that, if multiplied by the 8,500 tons per year of ash to be generated by the Pioneer plant, would produce 11 lb of mercury, 230 lb of arsenic, 867 lb of cadmium, 9,427 lb of lead, and 27,200 lb of strontium, as well as high levels of other contaminants.[16] These numbers seem incredibly high; indeed the authors of the study were themselves surprised at the levels they found. Has work in the US tested ash contaminant levels and reliably established they are acceptably low in ash derived from Northeastern forests? Unless this is the case, it is irresponsible to promote ash as a soil additive.

Finally, where in the ENF is the explanation of how hazardous substances will be stored on site? To take one example, the plant will require very large amounts of aqueous ammonia, thousands of gallons of which will presumably be stored at the plant. Containment and leak prevention systems need to be described. A spill in the fast-perking alluvial soils, on topography that breaks toward the river, would be a disaster.

Thank you for the opportunity to comment.

Sincerely,

Mary S. Booth, PhD.

Senior Scientist,
Massachusetts Environmental Energy Alliance (MEEA)

---

14 Ibid.

15 Reimann, C., et al. 2008. Element levels in birch and spruce wood ashes – green energy? Science of the total environment, 292: 191-197.

16 Totals were derived by multiplying the mean of the ash elemental content for spruce and birch (ppm) by weight of ash given in Wood Supply chapter of ENF (8,500 tpy). Contaminant levels for birch and spruce, respectively (all as ppm) were Arsenic: 15, 12; Mercury: 0.7, 0.6; Cadmium: 65, 37; Lead: 965, 144; Strontium: 1490, 1710.