PFPI
driven by data

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March 21, 2011

Dear Mr. Hirai and Mr. Lum,

Please accept the following comments by Partnership for Policy Integrity and the Biomass Accountability Project on the Hu Honua biomass energy draft air permit. Our organizations seek to provide public education, outreach and science on the impacts of biomass electricity being promoted as renewable energy throughout the U.S. We have reviewed and analyzed at least ten similar air pollution permits for biomass electricity projects in the last year to determine whether the Clean Air Act standards are being met and whether permit conditions are consistent with the Act's standards and purposes. In each case, as with the Hu Honua draft permit, there are substantial concerns about whether the proposed permits are consistent with the Clean Air Act. In particular, with respect to the Hu Honua draft permit, based on the facility's proximity to residences just 300 feet from the facility, and schoolchildren just a mile downwind of the plant, we expect that the Hawaii Department of Health will do everything in its capacity to improve the permit as written and to assure that the public health and environment are protected to the maximum extent required by law. Considerable room for improvement remains.

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The draft permit does not follow EPA regulations for determining "potential to emit"
The draft permit improperly concludes that the facility is exempt from PSD permitting, because the procedure for determining "potential to emit" has been misapplied. Although the Hu Honua facility plans to operate a 407 mmbtu boiler, which if operated at capacity would require 3,565,320 mmbtu of heat input per year, the pollutant emissions have been calculated on the basis of a heat input of only 2,800,000 mmbtu/yr. Federal regulations define "potential to emit" as:

> the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of fuel combusted, stored or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable. (40 C.F.R Sections 52.21(b) (4), 51.165(a) (1) (iii), 51.166(b) (4).)

EPA guidance[1] on the definition of "potential to emit" does recognize that some operational limitations can legitimately reduce the calculation of potential emissions:

> In fact, any permit limitation can legally restrict potential to emit if it meets two criteria: 1) it is federally enforceable as defined by 40 C.F.R. Sections 52.21(b) (17), 51.165(a) (1) (xiv), 51.166(b) (17), i.e., contained in a permit issued pursuant to an EPA-approved permitting program or a permit directly issued by EPA, or has been submitted to EPA as a revision to a State Implementation Plan and approved as such by EPA; and 2) it is enforceable as a practical matter. The second criterion is an implied requirement of the first criterion. A permit requirement may purport to be federally enforceable, but, in reality cannot be federally enforceable if it cannot be enforced as a practical matter.

The calculation of "potential to emit" thus clearly requires multiplying the maximal capacity of the boiler by the number of hours in a year. Rare exceptions to this are allowed under two conditions, both of which must be met: that operational limitations that constrain a source's potential to emit be *federally* enforceable, and that they be *practically* enforceable. Constraining Hu Honua's operation to 2,800,000 mmbtu/year meets neither of these criteria, therefore, this facility is a "sham" minor source, as defined in EPA's guidance.

The following clip from the application shows the tiny margin by which this facility avoids triggering key thresholds, followed by the immediate conclusion that PSD does not apply:

[1] EPA webpage: "Limiting potential to emit (PTE) in New Source Review permitting (http://www.epa.gov/reg3artd/permitting/limitPTEmmo.htm)

Best Available Control Technology (BACT):

A Best Available Control Technology (BACT) analysis is required for new covered sources and significant modifications to covered sources that have the potential to emit or cause a net emissions increase above significant levels as defined in HAR §11-60.1-1. The potential to emit for NO_x, CO, PM and PM_{10} are greater than the significant levels for these pollutants. Thus, BACT analyses are required for these pollutants.

Pollutant	Potential to Emit (PTE) (tpy)	Significant Level (tpy)	Significant?
NO_x	210.0	40	yes
SO_2	39.2	40	no
CO	246.4	100	yes
PM	33.6	25	yes
PM_{10}	33.6	15	yes
VOC	39.2	40	no
Pb	3.29 E-03	0.6	no

Pollutant	lb/MMBtu	Equivalent Control Technology
NO_x	0.15	Equivalent to Nalco ROFA and ROTAMIX
CO	0.176	Good combustion practices, Nalco ROFA equivalent air mixing
FPM_{10} (filterable)	0.012	ESP and baghouse

Prevention of Significant Deterioration (PSD):

This source is not a major stationary source. Therefore, PSD is not applicable.

The permit does not contain practically enforceable restrictions that will limit operations to the capacity stated. The power plant is a baseload facility, meaning demand for power may increase and so may hours and capacity of plant operation. The application states that the facility will operate at maximum capacity 14 hours a day, and minimal capacity 10 hours a day, but this limit is not justified with any analysis; instead, it appears the purported restrictions were chosen to avoid major source Prevention of Significant Deterioration permitting. There is no practical means of federal enforcement of the conditions of operation that can limit the operation of the facility – indeed, the conditions stated in the application as justification for a boiler heat input of 2,800,000 mmbtu/yr <u>are not stated in the permit</u>, thus are not enforceable by the state. Also missing is any constraint on hours of operation, although the most recent application for the air permit,[2] dated December 2010, states the following[3]:

[2] Environmental Resources Management, December 2010. Revised application for new covered source permit, Hu Honua Bioenergy LLC.

[3] Clipped from page 2 of Form S-2, included with the application, and located at page 55 of the pdf.

C. Maximum Operating Schedule (to the extent needed to determine or regulate emissions):

1. Total hours per day, per week, and/or per month.

Boiler

Peak Load – 14 hours per day

Non-Peak Loads – 10 hours per day

2. Total hours per year.

Boiler

8,040 hours per year

3. If operation is seasonal or irregular, describe.

Typically, the boiler will operate at peak load for a maximum of 14 hours per day and will operate at fluxuating non-peak loading for a maximum of 10 hours per day during the evenings when electricity demand is less.

The exempt generator will only operate to provide on-site electricity during emergency operations such as when the facility loses power.

The applicant appears to have modeled emissions using constraints and limitations which do not appear in the permit. Nowhere in the permit is to be found a condition limiting operation of the facility to 8,040 hours per year. The permit application and the permit itself are inconsistent with regard to actual means of limiting heat input to the boiler to 2,800,000 mmbtu/yr.

The permit must include BACT for VOCs and SO_2

Calculating emissions on the basis of 2,800,000 mmbtu of heat input also allows the applicant to avoid BACT for key pollutants. The emission rate for VOCs (0.028 lb/mmbtu) apparently was chosen to avoid triggering BACT, as was the emission rate for SO_2, which is identical to that for VOCs. However, it is important to note that while the current draft of the permit includes an emission limit for VOCs, it does not include one for SO_2, even though the emission rate of 0.028 lb/mmbtu for SO_2 is discussed in the air application documents.

The fact that the VOC emission rate appears to have been deliberately chosen to avoid BACT, and is not based on any attempt to minimize emissions, is stated in the following email, which is from the environmental consultant to Mr. Lum at the Hawaii Department of Health:

Lum, Darin W C

From: Rick Shih [Rick.Shih@erm.com]
Sent: Monday, January 11, 2010 9:51 AM
To: Lum, Darin W C
Cc: Lynn McGuire
Subject: Hu Honua-Response to Emissions Questions
Attachments: Criteria_Emissions_Rev6Ex_HDOH.xls; HAP_Emissions_Rev11_HDOH.xls

Hello Darin,

Here are responses to your three questions.

1) The VOC emission factor of 0.028 lb/MMBtu is an emission level the boiler is expected to meet. Using this value results in annual emissions of VOC just under 40 tons per year so we did not believe it would trigger BACT (it was selected specifically to stay under the BACT trigger for VOC).

2) I actually don't see why we did not include these three HAPs, so I have updated the HAP spreadsheet accordingly (attached). Thanks for the catch.

3) I believe the 4 hours per day is a typo and should have said 10 hours. This cell is not used for any of the numbers presented in the application (including the modeling). I've included an updated criteria pollutant spreadsheet.

As usual, let me know if you have further questions.

Rick
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Please consider the environment before printing this email

The emission rate of 0.028 lb/mmbtu for VOCs is possible only because the heat input to the burner has been artificially constrained by the applicant's air modeling and does not reflect the actual potential hours and capacity of boiler operation. Potential to emit for both SO_2 and VOCs, if calculated correctly, would be 407 mmbtu/hr x 0.028 lb/mmbtu x 8760 hrs, which comes to 49.9 tons per year for both pollutants.

At 0.028 lb/mmbtu, the emission rates for VOCs and SO_2 are more than double those found in several recently-issued permits for similar wood burning biomass facilities. For instance, emission rates in the air permit for the 38 MW Palmer Renewable Energy in Massachusetts are 0.012 lb/mmbtu for SO_2 and 0.01 lb/mmbtu for VOCs. Conducting a BACT analysis would have resulted in more effective emissions controls for both VOCs and SO_2, resulting in increased benefits to public health and the environment.

The Hu Honua facility is a major source and must go through PSD permitting
If calculated correctly using potential to emit, the emissions of carbon monoxide at the Hu Honua facility would be 314 tons per year, triggering PSD permitting requirements. If emissions were calculated

correctly, the applicant would be compelled to reduce CO emissions at the facility. Currently, the facility's 0.176 lb/mmbtu emission rate for carbon monoxide is considerably higher than the rate found in contemporary biomass plant permits. For instance, the 38 MW Palmer Renewable Energy in Massachusetts air permit limits CO emissions to 0.07 lb/mmbtu on a four-hour block average and 0.0365 lb/mmbtu on a 12-month average. A 30-day block average limit of 0.074 lb/mmbtu was proposed for the 65 MW ADAGE plant in Shelton, Washington. Given that the Hu Honua facility proposes to burn wet fuel, and apparently intends to cycle from low to high load on a daily basis, it is not appropriate to set a simple 30-day average for CO emissions that is representative of poor firing conditions at the plant. The permit should specify at a minimum a one-hour block average coupled with one or two longer term averages that are considerably lower.

The Hu Honua permit should include a BACT analysis for greenhouse gases

As a "BACT anyway" source for criteria pollutants, and as a permit that is falling within the window of time when EPA is requiring Step 1 analysis and permitting for greenhouse gas emissions from biogenic sources, EPA and the Hawaii Department of Health should require a BACT analysis for greenhouse gas emissions at the Hu Honua facility. The facility will at a minimum emit 262,000 tons of carbon dioxide from wood combustion alone, and may also be a significant source of methane emissions from its chipped fuel pile. As such it is a major source for greenhouse gases.

As a major source of HAPs the facility is subject to the major source MACT rule

The air permit application states that the Hu Honua facility's emissions of hazardous air pollutants (HAPs) are 23.8 tons per year. This emission estimate is based on the incorrect method for calculating potential to emit, however. Assuming a proportional increase in HAPs emissions if potential to emit were calculated correctly, the facility's emissions will be about 30.3 tons per year, putting it over the major source threshold. Even assuming the facility did control heat input to 2,800,000 mmbtu/yr, the daily cycling between high and low load is likely, as the applicant notes, to cause firing instability and possibly poor combustion conditions. This means that it is not only extremely likely that CO emissions will be higher than the applicant has stated, but that emissions of organic HAPs, which co-vary with CO emissions under poor combustion conditions,[4] have also been understated. The application already admits to a greater emissions of formaldehyde (at 6.1 tons/yr) than HCl emissions (5.47 tons/yr), an organic HAPs emission rate that is outstandingly high. Thus, the applicant's own data appear to indicate that even at a reduced heat input, this facility will be a major source of HAPs.

As a major source for HAPs, the Hu Honua facility is required to comply with EPA's new boiler MACT rule, which sets allowable filterable PM emissions for new biomass facilities at 0.0011 lb/mmbtu, and HCl emissions at 0.0022 lb/mmbtu. If EPA's other emissions limits, for CO, dioxins, and mercury, are more stringent than those included in the permit, the permit must require compliance with those as well. Hu Honua has committed to maintaining its current emissions standards, if the boiler MACT rule standards are less stringent.

The applicant should be required to explain why the facility cannot achieve a lower rate of PM. The draft permit indicates that using both an electrostatic precipitator and an baghouse, the facility can reduce its PM emission rate only to 0.024 lb/mmbtu. By comparison, using just a baghouse, the 38 MW Palmer Renewable Energy facility in Massachusetts has stated its PM emissions will be 0.019 lb/mmbtu. Given the proximity of communities and schools downwind of Hu Honua, the Hawaii Department of Health should adequately explain why the emissions rate currently in the draft permit fails to reflect use of BACT for particulate matter.

[4] EPA treats CO as a proxy for organic hazardous air pollutants in the boiler MACT rule.

The permit must include a limit on SO_2 emissions

The draft permit as written improperly fails to include any limit on sulfur dioxide emissions. The applicant and the Department of Health should provide a complete explanation of the basis for this omission particularly considering that an emission limit for VOCs is proposed. The only mention of sulfur dioxide in the permit is in a section on Operational Limitations, which states

> The permittee shall take measures to operate applicable insignificant activities in accordance with the provisions of HAR Subchapter 2 for visible emissions, fugitive dust, incineration, process industries, sulfur oxides form fuel combustion…

Sulfur dioxide emissions from the Hu Honua facility may be of special concern. The facility's one-hour modeled impact of SO_2 is 12.8 ug/m^3, compared to a background concentration of 44 ug/m^3 – in other words, emissions from the facility would represent a further 29% above ambient SO_2 concentrations. This is a disproportionately large impact from a single facility, which warrants a top down BACT analysis for SO_2 emissions. The area is already pushed into nonattainment with the EPA sulfur dioxide standard by volcanic emissions[5] - for instance, Hilo was out of attainment 19 times in the last 12 months or so - thus adding to this burden on a daily basis may have a disproportionate impact on a community that is already suffering from high SO_2 levels. It is important to note that the World Health Organization standard for SO_2, at 20 ug/m^3 and about 8 ppm,[6] is considerably lower than EPA 24-hr NAAQS for SO_2, at 365 ug/m^3 or 140 ppm.

Nitrogen oxide emissions do not represent BACT

The air permit application estimates that nitrogen dioxide emissions at the Hu Honua facility will be 210 tons per year. If calculated correctly using EPA's procedure for potential to emit, NO_2 emissions would be around 278 tons, making the source eligible for PSD permitting. The Department of Health must recalculate the emissions correctly. Further, the 0.15 lb/mmbtu NO_2 emissions rate does not represent BACT. Again, EPA's BACT clearinghouse provides examples of biomass facilties with lower emission rates for NO_2. To take an example from a recently issued air permit, the air permit for the ADAGE biomass plant in Washington state limits NOx emissions to 0.07 lb/mmbtu, less than half the rate in the Hu Honua permit. The emission rate permitted for the Hu Honua plant is representative of outdated plants that lack modern emissions controls, and is not representative of emissions that can be achieved using modern control technologies.

Ammonia emissions are inexplicably high

The draft permit states that the facility will emit 38.3 tons of ammonia per year. This figure is inexplicably high for a biomass electricity generating facilities of this size. For example, the 116 MW (gross) Gainesville Renewable Energy facility in Florida is projected to emit 37 tons of NH_3. The 38 MW (net) Palmer Renewable Energy plant in Massachusetts will emit 13.4 tons of ammonia. The applicant should be required to provide a full explanation of why ammonia emissions at the Hu Honua facility total 38.3 tons per year. The applicant should also explain the effect this ammonia level has on the estimation of condensable particulate matter. It is not clear whether total PM_{10} emissions reflect the portion of ammonia emissions that will contribute to condensable particulate matter. This is significant because by reducing ammonia emissions it may be possible to decrease the total PM emissions from the facility. This would result in increased protection for public health and the environment.

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[5] Recent exceedences documented at http://hawaii.gov/health/environmental/air/cab/cab/cab/cab_notification/notification_pdf/exceedances_2011_03_03_06.pdf

[6] http://www.who.int/mediacentre/factsheets/fs313/en/#

Mercury emissions are of concern and must be addressed
The Hu Honua plant will emit approximately 10 pounds of mercury a year. Considering the adiabatic rain-out effect of the rising slopes of the volcano located just 15 – 20 miles from the plant, it seems likely that local deposition of mercury could be unusually high in this region. However, the plant's air permitting application states that it is proposing zero controls for mercury emissions. The amount of mercury to be emitted by this plant is a serious public health concern and should be addressed by the agency.

Dioxin/furan emissions are high for a facility so close to residences and schools
At 5.75 grams per year, summed dioxin/furan emissions from the Hu Honua facility are significant. This is a large amount of dioxin considering that the community of Pepeekeo is located a very short distance downwind. The record appears to be devoid of information about how to minimize or mitigate these emissions. Fuel chlorine content is implicated in dioxin formation, thus it is of concern that the permit conditions merely stipulate that chlorine content of fuel be tested, but fail to set dioxin limits. Additionally, it is of concern that the permit requires chlorine content of fuel to be represented on the basis of the lower heating value of wood. This is contrary to accepted practice and the permit should require an alternative method of representing chlorine that is consistent with sound practices.

Permit conditions fail to adequately control fugitive emissions
Biomass electricity plants such as this facility, and the attendant fuel piles, and the constant stream of heavy trucks delivering wood chips are known sources of fugitive emissions. However, due to a loophole in the Clean Air Act, fugitive emissions from biomass electricity projects are not required to be calculated in the "potential to emit" for PSD applicability determination purposes. In other words, if this project were burning fossil fuels, fugitive emissions would have to be taken into account. Indeed it appears that the applicant has not been required to model this source of particulate matter and its impact on the local population, some of whom own homes located about 300 feet from the plant. The permit conditions for control of fugitive emissions are fail to meet current practices compared to those at other comparable facilities in the United States, where, for instance, street sweeping and street watering are often imposed as a means of reducing dust from trucks. The Department of Health should use the full range of state air pollution control and public health laws to address the issue of fugitive emissions for the protection of public health.

Calculation of wood heat input is incorrect and underestimates wood use
The permit states that the amount of heat input to the boiler is based on the amount of wood fuel:

> Annual Capacity Factor
> i. Annual capacity factor is defined as the ratio between the actual heat input to the boiler from a particular fuel during a calendar year and the potential heat input to the steam generating unit had the boiler been operated for 8,760 hours during a calendar year at its maximum steady state design heat input capacity.
> ii. The annual capacity factor shall be calculated for wood fuel. The annual capacity factor shall be determined on a twelve-month (12-month) rolling average basis with a new annual capacity factor calculated at the end of each calendar month.

It then explains how the capacity factor will be calculated for wood fuel, by relying on its lower heating value:

> ii. Wood Heat Input
> Total wood heat input to the boiler shall be recorded on a monthly and rolling twelve-month (12-month) basis. The total monthly wood heat input to the boiler shall be determined by multiplying the total pounds of wood fed to the boiler for each month from Attachment II, Special Condition No. E.2.c.i.(1)(b)(i) by the wood's **lower heating value** of Attachment II, Special Condition No. E.2.c.iii.(1) for the month.

This approach fails to meet current standards in the industry, and should not be allowed to form the basis for the permit. Since the lower heating value of green wood is less than the higher heating value, this condition will inevitably obscure the actual amount of wood used at the plant, and to the extent that is designed to limit heat input to 2,800,000 mmbtu/yr, it will significantly underestimate the actual heat input to the boiler and the amount of wood burned. By definition, "heat input" to a biomass burner is calculated using the higher heating value of fuel. The permit must be rewritten so that the amount of fuel used to achieve boiler heat input rating is reflected accurately.

Similarly, the following provision in the permit does not appear to be grounded in standard procedures:

> The test report (as required by Attachment II, Special Condition No. G.8) for the initial and each annual source performance test for HCl shall include:
>
> (1) The operating conditions of the boiler at the time of the test;
> (2) The HCl emission rate in lb/MMBtu (lower heating value) and lb/hr;

The applicant should be required to explain why the HCl emission rate is expressed in terms of "lower heating value" since this appears to lack a sound scientific basis. The applicant should be required to explain what is referred to by the "lower heating value." The "mmbtu" term in the units for emission rates refers to the heat input rating of the burner – there is no "lower heating value" for the burner.

The permit and application contain conflicting information on the amount of biodiesel used

The document titled "review.draft.dl", with review by Darin Lum in February 2011, states:

> "While only wood will be burned at full load, at lower loads during normal operation (approximately 60% of maximum load or less), wood pellets or biodiesel may be burned. Given the relatively low heat content of the unpelletized wood, wood pellets or biodiesel **may** be needed to stabilize the fire in the boiler at the lower loads."

The potential use of biodiesel is also made clear in the following table from the application documents, which shows the potential use of biodiesel for ten hours a day at 41 mmbtu/hr:

Project Emissions:

Boiler

Biomass Boiler Heat Input at Peak Load * - 407 MMBtu/hr	Max Days of Boiler Operation – 335 days/yr
Biomass Boiler Heat Input at Min Load *– 163 MMBtu/hr	Typical Time at Peak Load – 14 hrs/day
Biodiesel Boiler Heat Input at Min Load *– 41 MMBtu/hr	Typical Time at Minimum Load – 10 hrs/day
Boiler Hours of Normal Operation – 8040 hrs/yr	Startups – 3 per year
Annual Boiler Heat Input During Normal Operation – 2,800,000 MMBtu/yr	Startup – 3 hrs/startup
Biodiesel HHV – 0.019 MMBtu/lb	Startup Fuel Usage – 1100 gallons/startup
Biodiesel Density – 7.34 lbs/gal	Startup Firing Rate – 51 MMBtu/hr
Sulfur Content of Biodiesel – 15 ppm	
Biomass Boiler Annual Heat Input – 2,732,800 MMBtu/yr	
Biodiesel Boiler Annual Heat Input – 67,200 MMBtu/yr	

* Peak Load would only burn biomass. Minimum load would burn a combination of biomass and biodiesel

This suggests that the total potential use of biodiesel is 137,350 mmbtu per year, using the applicant's calculations. Potential biodiesel use calculated correctly (i.e., assuming 8,760 hours of operation) is 149,650 mmbtu/year.

Again using the applicant's numbers, and assuming the facility really did only fire 2,800,000 mmbtu of heat input per year, the total amount of biodiesel potentially used under this scenario would be 984,870 gallons annually.

However, the permit contains the following stipulation, under Section D, "Operational Limits":

i. Biodiesel usage shall not exceed a maximum of 3,300 gallons per rolling twelve-month (12-month) period;

The discrepancy between the figures of 3,800 and 984,870 gallons should be resolved. The applicant should be required to state whether or not the plant will routinely firing biodiesel. The permit should set operational limits on the amount of biodiesel to be used in normal operations, and not just startup conditions.

If the plant does not plan to fire biodiesel on a routine basis, then this means that wood will be the only fuel used when the facility reduces its heat input rate. This makes it very likely that CO emissions will vary dramatically. The final permit should set CO emissions limits that are based on hourly block averages to ensure that spiking CO emissions are controlled.

Biomass use will be higher than has been represented

We note that although in the past, Hu Honua has been represented as consuming about 260,000 tons per year of biomass, the current draft air permit contains no limitations on the amount of wood that will be burned at the plant.

In fact, if biodiesel use is truly limited to three startups a year, and the plant is to be otherwise fueled solely by wood, then more than 260,000 tons per year will be needed to deliver net 21 MW to the grid. Assuming a higher heating value for wood of 8,134 btu/lb for bone dry wood, as stated in the document "Appendix D: Eucalyptus analysis results", this translates to a lower heating value[7] of 4,001 mmbtu/lb at

[7] For determining the amount of useful energy available to generate electricity, it is appropriate to use the lower heating value of wood. This value represents the btu's that are available in fuel to generate useful energy, after some btu's have been expended driving off water. Often when this calculation is performed it becomes apparent that a

45% moisture. Under these conditions, 260,000 tons of wood will generate 121,917 megawatt-hours, or the equivalent of about 15 MW of power if the plant were operated at a constant capacity year-round. Given the inconsistencies in the permit about the actual mmbtu of heat input to the burner and the actual hours of operation in a year, the actual volume of wood to be used to generate the amount of electricity promised to the grid is vague and difficult to determine. However, it is highly likely to be more than the figure of 260,000 tons that has been stated in the past.

Thank you for the opportunity to comment.

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stated amount of wood will not be sufficient to provide a stated amount of electrical output, because the 10 - 15% penalty of btu's devoted to driving off fuel moisture have not been taken into account.

Once the actual amount of electricity that can be generated with a specific amount of fuel has been calculated, it may become apparent that the facility will need more fuel to achieve the electrical output it has said it will deliver. If the facility burns more fuel to accomplish this output, then it is likely that pollution emissions will also increase, since despite the formal method of calculating pollution output on the basis of pounds of pollutant emitted per mmbtu of boiler capacity, pollution output is ultimately tied to the amount of fuel burned.