



June 30, 2016

Massachusetts Dept of Energy Resources  
100 Cambridge Street, Suite 1020  
Boston, MA 02114  
Attention: Samantha Meserve,

Dear Ms. Meserve,

We thank you for the opportunity to respond to the APS Guideline regulation changes proposed by your office dated June 8, 2016. Jim Van Valkenburgh spoke at the public hearing in Amherst but here we have some additional written suggestions.

Thank you for this opportunity to comment on and propose changes to the regulations. It is our goal to have these regulations to be fair, equitable and enforceable.

Sincerely,



Mark Froling  
President and CEO  
Froling Energy

## OUR COMMENTS

### SECTION 1 Provisions in the APS Statute & Regulations

SECTION 1 d, iii Greenhouse Gas Emission Reduction states that APS Renewable Thermal Generation Units “shall reduce life-cycle greenhouse gas emissions by at least 50%...” We feel that sustainably harvested biomass (as defined by d, ii) should be considered as a “Near CO<sub>2</sub> Neutral” fuel and therefore complies with this requirement. For this we point to a peer reviewed study co-authored by Robert Malmshiemer of SUNY College of Environmental Science and Forestry as noted in an article in the *Journal of Forestry* (Miner, R.A., R.C. Abt, J.L. Bowyer, M.A. Buford, **R.W. Malmshiemer**, J. O’Laughlin, E.E. Oneil, R.A. Sedjo, and K.E. Skog. 2014. Forest Carbon Accounting Considerations in U.S. Bioenergy Policy. *Journal of Forestry* 112(6):590-605.)

We also point to a study authored by Robert Strauss of FutureMetrics LLC in Bethel, Maine “Debunking two so-called “facts” about Wood Pellets” which is attached.

We are pointing to these studies as the most factual way to refute comments made at the hearing in Amherst by Mary Booth and James McCaffrey of the “Partnership for Policy Integrity”. We strongly disagree with their wholesale condemnation of biomass as a near carbon neutral fuel.

SECTION 1 d,iii This section imposes a requirement for “Eligible-Biomass Woody Fuel shall contain at least 50% Residues or Forest Salvage and not more than 50% Thinnings. Are we correct that this rule is only for when natural gas is an optional fuel at a candidate site? If so we feel that using 50% such “dirty” woody fuels as forest salvage and Thinnings would potentially result in very poor emissions and should not be considered as a viable fuel in this quantity. This requirement should be reduced to requiring “a maximum of 10% of Residues or Forest Salvage and not more than 10% Thinnings”. However, having no requirement at all for using these kinds of fuels would be better.

SECTION 1, d, iv System Performance requirements are laid out here. Our experience with over 150 wood pellet and dry chip boilers installed by our crews, shows that on/off cycling has a number of causes and that the presence of a buffer tank has not proved to be a significant singular factor, especially when the boiler manufacturer does not recommend the use of a buffer tank. Yes, sometimes the size or presence of a buffer tank has some impact on cycling—generally this is if a smaller than recommended tank is used.

We have found that the number one cause of on/off cycling is not having proper modulation of the boiler output—or in cases of multiple boilers, poor synchronization and modulation of all boilers. We have often found frequent on/off cycling to be caused by the boiler controls but other times it was caused

by a design flaw in the boiler room piping or by improper circulating pump sizing.

We have also found situations where any benefits of having a buffer tank are negated for other reasons such as moving water too quickly through the distribution system or running all of the water in the distribution loop through the buffer tank. These situations often lead to extreme on/off boiler cycling.

Some boilers are not designed to work with a buffer tank. We have found that adding a buffer tank into a system utilizing one of these boilers therefore has little or no impact on either boiler performance or on/off cycling.

In cases of district heating systems and large buildings the distribution piping often contains a substantial amount of water which often should be considered as part of the buffer tank volume. Currently we as the installation contractor ask the boiler manufacturer for their advice on buffer tank sizing with the piping in mind. Engineers are usually consulted as well.

**OUR RECOMMENDATION ON BUFFER TANKS:** Froling Energy would like the requirement for the use of a buffer tank to be removed from all regulations. Our suggestion for this regulation is as follows:

“ALL biomass boilers (with and without thermal storage) must be able to automatically modulate their heat output according to varying load conditions, down to a minimum of 25% of their nominal output. At all modulation levels a qualifying boiler must comply with all performance and air emission standards.”

(NOTE: This recommendation of modulation “down to 25% of their nominal output” is because we know of no currently available biomass boilers that can modulate any lower than 25% and all of the boilers that we now install which meet all other Mass DOER requirements modulate no lower than 25% of maximum.)

Regarding buffer tank capacity Froling Energy recommends this statement: “If the Manufacturer of a specific model biomass boiler being used in a project requires the use of a buffer tank for type of installation being done, then a buffer tank shall be utilized, of a type and capacity recommended by the manufacturer.”

Regarding piping of buffer tanks, which is not referred to in your document, we recommend this statement: “When utilized in conjunction with a biomass boiler system, Buffer tanks should be tied into heat distribution systems in an injection style. Using closely spaced Ts in the distribution system Return pipe a properly sized injection pump shall push hot water from the top of the buffer tank into the downstream T while pulling cooler water from the upstream T which would flow into the bottom of the tank. In this approach the biomass boilers controls are mainly monitoring the buffer tank temperature using

multiple temperature sensors installed along the height of the buffer tank which sense changes in stratification temperatures.

On Page 6 of 9 are Tables 1 and 2:

Table 1: We agree with the details shown in this chart

Table 2: We recommend that the Thermal Efficiency at nominal output (HHV) be lowered to 82%. This is because many currently available and widely used pellet boilers with very good performance characteristics cannot meet the 85% level. Most of these can achieve 84% in laboratory settings but in field tests of specific boilers it may be difficult to get those same results. Therefore we ask that this be changed to 82% some would require.

Chips burning at 75% or better is OK using the same criteria as above.

Also in Table 2: Modulation/shut off is noted here again. We strongly recommend that ALL approved boilers (with or without thermal storage) should be able to automatically modulated down to 25% (or at least to 30%) of nominal output, according to changes in heat demand by the building.

Also in Table 2: Thermal Storage—as stated in our Recommendation above, we feel that thermal storage should be required only if the boiler manufacturer requires it and that the volume of thermal storage should also be determined by the boiler manufacturer

In Table 3: The Moisture content of wood pellets is required to be less than 6%. This conflicts with the Pellet Fuels Institute which allows less than 8%. The ENplus A1 pellet standard also calls for less than 8%. We recommend increasing this to 8% to coincide with industry standards.

Also in Table 3: The Moisture content of Wood chips is required to be less than 30%. While we strongly agree that burning refined wood chips with less than 30% moisture content in boilers made for that kind of fuel has many advantages, we feel that if a boiler can meet your other regulations regarding emissions and efficiency while burning fuels with moisture contents of greater than 30%, then they should be allowed and even encouraged to do so.

#### SECTION 6 on Page 7 of 9

We agree with all requirements stated in these tables.

With specific regard to particulate requirements, we recommend that MA DOER accept EN 303-5 test results which consider total particulate matter measurement of less than .08 lb/MMBTU for pellet systems or .10 lb/MMBTU for chip systems as this is a simpler and generally more accurate method. Specifically, it is impossible for PM 2.5 measurements to be higher than total PM measurements, so meeting EN 303-5 total PM Measurements will ensure that a system is meeting all vital particulate emissions requirements.



#### SECTION 7 on Pages 7 and 8 of 9

As stated above, we feel that thermal storage should be required only if the boiler manufacturer requires it and that the volume of thermal storage should also be determined by the boiler manufacturer.

We do not agree with boilers larger than 1 million BTU/hour input being required to have 2 gallons per 1000 BTU of nameplate output which is double the volume of storage required of smaller units. We have many systems which function perfectly well with 1 gallon per 1000 BTUs on the nameplates—all designed according to manufacturer's requirements. This rule is especially problematic when multiple staged boilers are being employed with a buffer tank which significantly alters the way the tank is utilized.

#### SECTION 9 on Page 8 of 9 Biomass Fuel Quality

The chart shows Calorific value for Pellets and Chips BUT it does not say what method is used. We recommend that it is the HHV or High Heat Value method that is used, and if that is the case, then we agree with the numbers. If this is the case, a notation stating it is the fuel's HHV being used here needs to be written on the chart.

The chart's moisture content requirement is moot as the Calorific value requirement overrides and inherently limits the moisture content of any fuel.

**OUR RECOMMENDATION ON FUEL MOISTURE CONTENT:** We recommend that wood chips have no moisture content limit applied to them—only a Calorific HHV value of >5,950 BTU/lb needs to be met. Beyond this value, MA DOER should be more concerned with the Output emissions and overall efficiency of a boiler system. If a boiler system can burn high moisture content fuel and meet all emissions regulations, then there is no reason to discourage or prevent it from operating.

## **ADDITIONAL COMMENTS on ISSUES RAISED AT THE STAKEHOLDER MEETING IN AMHERST, MA**

### **ISSUE A:**

**At the hearing in Amherst on June 15<sup>th</sup> some comments were made regarding allowing homeowners to collect Thermal RECs for pellet stoves and wood stoves—including for wood cut from their own property.** At face value this sounds quite charitable and sensible. But we caution DOER from going down this path for multiple reasons:

- 1) The verification of heat generation is a technical matter involving sensitive equipment and human inspectors. Who pays for the inspections and the monitoring equipment? Who verifies how much heat has been generated?
- 2) What will it cost for Mass DOER to administer and regulate such a program?
- 3) How can one verify how much useful heat a wood stove generates and supplies into a home?
- 4) If a wood boiler is used, a BTU Meter should be employed to verify the output precisely. These are very costly and must be calibrated professionally at least every few years.
- 5) If an outdoor wood boiler is used, where are the BTU meter sensors placed for the most realistic recording of the heat produced by the boiler?
- 6) On the financial side: If each cord of wood generated 3 RECs and if an average household burns 5 cords, that amounts to 15 T-RECs which may sell for an average of \$20, netting the wood stove owner \$300. It is probable that the cost of hiring an inspector would eat up at least \$100 of that money.
- 7) It is also probable that the average homeowner will not be able to log into NEPOOL or to sell their small quantities of RECs to utility company buyers? Aggregators will probably become involved, consolidating multiple home owners together, and taking a further cut of the sale price of each REC.
- 8) Considering all the above we believe it is sensible to keep small systems such as wood stoves, pellet stoves and outdoor boilers out of the REC program.
- 9) How will anyone determine if the wood burned in a stove or outdoor boiler was harvested sustainably if from their own property or bought from a neighbor?
- 10) **IN OUR OPINION:** The REC program should be only for commercial or institutional boiler installations with a minimum of 300,000 BTU/hr (or perhaps 500,000 BTU/hr) total biomass boiler nominal output with assured efficiency and emissions outputs. The limit needs to be set to a reasonable level by Mass DOER to encourage significant investments in biomass infrastructure. All sites wishing to claim RECs must have proper, accurate equipment set up and verified to tabulate biomass sourced heat that is utilized for space and water heating.

### **ISSUE B:**

**A few stakeholders stated this Mass DOER program should NOT include all types of biomass fuels and biomass boilers.**

Stakeholders from one organization in particular, “The Partnership for Policy Integrity” argued this point that the entire DOER program should be stripped of encouraging all forms of biomass. To support this stand, misleading or inaccurate or misleading statements were made such as “It takes 2.5 tons of trees to create one ton of pellets” as if pellets were an inherently wasteful use of trees. On this specific point, if one digs into



the facts about burning wood, one will understand the following: green chips, dry chips and wood pellets are all closely related to each other in net output of heat per unit volume of kiln dry wood. The difference between these fuels is moisture content. One ton of green wood chips containing 50% moisture, if dried down to a mere 5% moisture (the same as what most wood pellets are) will naturally weigh a lot less. In fact, many wood species lose half their weight, simply by going from fresh cut to completely dry.

A wood pellet manufacturer told us that about 15% of the total weight of green chips that they purchase are utilized to drive off the moisture in the wood to be used for pellets. Using that information you can surmise the following: If they take in 100 tons of green chips at 50% moisture content, 15 of those tons are burned to dry the remaining tons for pellets. If the remaining 85 tons lose half their weight in the drying process then the dry wood in the pellets will weigh 42.5 tons.

The result: 100 tons becomes 42.5 tons of pellets. If you divide 100 tons by 42.5 tons you can see that it actually does take 2.35 tons of green wood to make 1 ton of pellets. But is this a negative thing? No it is not. The burning of ANY wood, at whatever moisture content is impacted by the moisture itself. Green chip boilers must use a large portion of the heat generated within the boiler to drive out the moisture in the chips as they enter the firebox. Considering the full supply chain, a wood pellet boiler has a very similar use of raw wood as does a dry chip or green chip boiler. One may also count other forms of energy utilized to produce the pellets such as electricity to run machines and gasoline for vehicles—but these factors are true for all other common fuels.

They also stated that over a period of 30 to 40 years, burning biomass as a heating fuel is less carbon friendly than burning natural gas. We heartily disagree with this statement. Their position was very skeptical of the natural carbon cycle of biomass: burning trees releases carbon while living trees sequester carbon from the atmosphere in a continuing cycle. We know that in the cycle the carbon released is not 100% renewed—it is probably more like 90% to 95%. But still this is a much more carbon friendly process than the outright burning of any fossil fuels such as natural gas which has no sequestration possible and emits massive quantities of methane into the atmosphere in its production and transit to points of use.

Should we stop the burning of all biomass now and keep all possible trees growing so that they can “eat up” all of the carbon being spewed into the atmosphere by the burning of fossil fuels in our region and in the world? Should MA DOER cancel their support of Biomass? No. Considering both the current rate of use of fossil fuels and the continuing expansion of the burning of all types of fossil fuels, we don’t think it is possible for the trees to keep up no matter what we do with the trees. The only way to significantly reduce carbon in the atmosphere is to take steps to reduce the burning of fossil fuels!

At the same time it is a good thing that government agencies look beyond the current CO2 crisis and foster the growth of renewable industries such as the biomass heating industry in New England. Properly managed sustainable forests are at the core of this industry. So long as this is the case, the biomass industry is truly sustainable.