

**Commonwealth of Massachusetts  
Executive Office of Energy & Environmental Affairs  
DEPARTMENT OF ENERGY RESOURCES**

**ALTERNATIVE ENERGY PORTFOLIO STANDARD**

**GUIDELINE**

**ON BIOMASS, BIOGAS, AND BIOFUELS FOR  
ELIGIBLE RENEWABLE THERMAL GENERATION UNITS**

**December 29, 2017**

*Pursuant to the Alternative Energy Portfolio Standard Regulations at 225 CMR 16.00*

This Guideline provides the detailed criteria by which Alternative Portfolio Standard (APS) Renewable Thermal Generation Units (RTGU) using solid biomass, biogas, and liquid biofuels shall be evaluated as to their eligibility, including qualifying types and sources, emission performance, fuel conversion efficiency, life-cycle greenhouse gas (GHG) emission reductions, and mitigation of performance deterioration due to boiler cycling, as well as sustainability in the case of forest-derived biomass.

The purpose of this Guideline is to provide clear criteria by which RTGU owners, operators, developers, output aggregators, and others can ascertain the likelihood of qualification of their projects that use such fuels.

This Guideline is effective immediately upon issuance. However, the Department of Energy Resources (Department) may consider variance from the Guideline in the case of systems that went into commercial operation prior to the issuance date.

**1. Provisions in the APS Statute**

The APS statute at M.G.L. Chapter 25A, Section 11F<sup>1/2</sup>(a) and(b)<sup>1</sup>, as amended by Chapter 251 of the Acts of 2014, mandates the following as an eligible Alternative Energy Generating Source, with certain conditions required for eligible biomass, biogas, and liquid biofuel technologies:

(a) . . . “alternative energy generating source” shall mean a source which generates energy using any of the following: . . . (iv) any facility that generates useful thermal energy using sunlight, biomass, biogas, liquid biofuel or naturally occurring temperature differences in ground, air or water, provided, however, that facilities using biomass fuel shall be low emission, use efficient energy conversion technologies and fuel that is produced by means of sustainable forestry practices; . . .

(b) The department, in consultation with the department of environmental protection, shall set: (i) emission performance standards that are protective of public health, including standards for eligible biomass, biogas and liquid biofuel technologies that limit eligibility only to best-in-class commercially-feasible technologies, inclusive of energy conversion and emissions controls, with regard to reducing emissions of particulate matter sized 2.5 microns or less and carbon monoxide and other air pollutants; (ii) for eligible biomass, biogas and liquid biofuel technologies, a requirement of 50 per cent reduction in life-cycle greenhouse gas emissions compared to a high efficiency unit utilizing the fuel that is being displaced or, for a new load, a high-efficiency natural gas unit, if natural gas is available at reasonable cost to the site or otherwise the fuel that is most likely to be utilized; (iii) for eligible biomass, biogas and liquid biofuel technologies, requirements for thermal storage or other means to minimize any significant

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<sup>1</sup> The APS statute is available at <https://malegislature.gov/Laws/GeneralLaws/PartI/TitleII/Chapter25A/Section11F1~2>. These were amended by sections 1, 2, 3, and 9 of [Chapter 251 of the Acts of 2014](#).

deterioration of efficiency or emissions due to boiler cycling, if feasible; (iv) for eligible biomass, biogas and liquid biofuel technologies, fuel conversion efficiency performance standards achievable by best-in-class commercially-feasible technologies; and (v) in consultation with the department of conservation and recreation, for forest-derived biomass, requirements that fuel shall be provided by means of sustainable forestry practices; provided, however, that the department shall adopt any existing or new biomass fuel sustainability standards if deemed appropriate by the department after a public comment process.

Additional restrictions on the use and eligibility of biomass, biogas, and biofuel can be found in 225 CMR 16.05(4)(g) through 225 CMR 16.05(4)(l).

## **2. Applicability**

This Guideline is applicable to all facilities utilizing biomass, biogas, and biofuels that seek qualification as APS RTGUs under 225 CMR 16.00.

## **3. Biomass Sustainability**

Per 225 CMR 16.05(4)(g)(3), facilities using woody biomass in the form of pellets, chips, cord wood, or biogas (through biomass gasification) will need to demonstrate that any Forest Derived Residues or Forest Derived Thinnings they use to generate Useful Thermal Energy is sourced from forests managed according to Sustainable Forestry Management practices. The definition of Sustainable Forestry Management, which can be found in 225 CMR 16.02, is based off the definition of Sustainable Forestry from the *Dictionary of Forestry* provided by the Society of American Foresters. Non-Forest Derived Residues and Forest Salvage (as defined in 225 CMR 16.02) are considered to meet the sustainability requirements, so for these resources, no further sustainability demonstration is required.

Per 225 CMR 16.05(4)(k), the Department will establish and maintain a Biomass Suppliers List with manufacturers and retail suppliers of eligible fuel that meets the biomass sustainability and fuel quality requirements. Facilities seeking qualification as APS RTGUs using woody biomass will be required to either use fuel from a supplier on the Department's list and keep purchase records or complete an annual report that documents the sustainability of the woody fuel used in the RTGU. The Department reserves the right to audit these records at any time during the RTGU's qualification period.

Fuel suppliers and RTGU owner or operators will need to demonstrate to the Department's satisfaction the sustainable management of the forest from which woody biomass was sourced to the extent that forest derived biomass is used to manufacture the biomass fuel. Fuel suppliers and RTGU owner or operators will need to document the chain of custody from the forest to the retail supplier and on to the end customer.

The following options are sufficient to demonstrate Sustainable Forest Management:

### **A) Licensed Forester Attestation**

The licensed forester attests that all the lands from where Eligible Biomass Woody Fuel was sourced were covered by a cutting plan that adhered to best management practices, and implemented the operational guidelines for biomass retention and harvesting within the publication titled Biomass Harvesting and Retention Guidelines for the Northeast (Forest Guild, 2010). For forests located in the Commonwealth of Massachusetts these requirements shall be met through a Commonwealth of Massachusetts Department of Conservation and Recreation (DCR) cutting plan pursuant to 304 CMR 11.00, under the long term management option, and include a signature from a state forester attesting to compliance of the requirements. For forests

located outside of the Commonwealth of Massachusetts, these requirements can be met by a cutting plan with a signature of a licensed forester attesting that the cutting plan adhered to Sustainable Forest Management (225 CMR 16.02), adhered to the best management practices (either voluntary or regulatory) of the host state, and implemented operational guidelines for biomass retention and harvesting within the publication titled Biomass Harvesting and Retention Guidelines for the Northeast (Forest Guild, 2010).

Chain of custody is documented through bills of lading. Eligible Biomass Woody Fuel must be reported on a consignment basis to ensure sufficient disaggregation of sustainability data. Each consignment should constitute the same characteristics in terms of feedstock types, biomass form, and geographical origin.

## **B) Independent Certification**

The Department recognizes independent third-party certification programs as meeting the sustainability requirements for Eligible Biomass Woody Fuel land. At time of writing, these are the Forest Stewardship Council (FSC) and Program for the Endorsement of Forest Certification (PEFC), which includes the Sustainable Forestry Initiative (SFI) and American Tree Farm System (ATFS). The Department will continue benchmarking other independent certification programs and may update this Guideline as necessary.

To demonstrate that Eligible Biomass Woody Fuel is supplied under one of the approved programs, the raw material needs to be supplied with a valid claim under that approved program (i.e. it must be certified against that program). Valid will mean that the claim covers the product delivered, the expiration date has not passed and it issued to the supplier making the claim. A supplier cannot supply raw material or fuel as certified by one of the approved programs if the material or fuel is not itself certified to that program. The raw material or fuel must be covered under the scope of the supplier's certification.

The independent certification method to verify sustainability requirements is only available to Eligible Biomass Woody Fuel that is harvested from outside of the Commonwealth of Massachusetts.

If the Eligible Biomass Woody Fuel for an APS RTGU is sourced from property owned by the RTGU owner, this RTGU will be considered a self-supplier. Self-suppliers must register with the Department and demonstrate that they have the legal right to source the fuel, through ownership, rental, or other relevant arrangement. Self-supplier will need to show compliance with all sustainable forestry related requirements laid out in this Guideline.

For the purpose of this program, a licensed forester is considered someone who is certified by the Society of American Foresters or has a valid forestry license issued by the Commonwealth of Massachusetts, or other comparable government entity.

#### **4. Verification**

As established in 225 CMR 16.05(4)(g)(7), qualified APS RTGUs using Eligible Biomass Woody Fuel are required to keep records that show only eligible fuel was used in the RTGU to generate Useful Thermal Energy. This record must clearly state the following elements and can consist of invoices, delivery notes, or any other documentation provided by the fuel supplier. The records must be kept for a period of at least five (5) years.

- A) Supplier of the fuel
- B) Amount of fuel delivered
- C) Date of delivery
- D) Fuel quality specifications prescribed 225 CMR 16.05(4)(g)(2), including a certification that any emission control device was operated and maintained in accordance with the manufacturer's specifications in order to comply with the applicable particulate matter emission limit in 225 CMR 16.05(4)(g)(6).

The independent verifier for intermediate RTGUs using eligible woody biomass will perform spot checks to verify the use of eligible fuel. The independent verifier for large RTGU using Eligible Biomass Woody Fuel will include in their meter reading audit a check of the eligibility of the biomass fuel used.

#### **5. Greenhouse Gas Reduction**

All qualified RTGUs using biomass, biogas, and biofuel must provide a 50% reduction in lifecycle GHG emissions, per M.G.L. Chapter 25A, Section 11F<sup>1</sup>/<sub>2</sub> and 225 CMR 16.05(4)(i). The details per calculating this reduction are below.

##### **A) Generation Units Using a Fuel Supplier from the Department's Biomass Suppliers List**

All RTGUs which purchase fuel from a fuel supplier on the Department's Biomass Suppliers list are assumed to have met the requirement for a 50% reduction in lifecycle GHG emissions and are not required to provide any further analysis, unless requested by the Department.

##### **B) Generation Units Not Using a Fuel Supplier from the Department's Biomass Suppliers List**

All RTGUs which purchase fuel from a fuel supplier not on the Department's Biomass Suppliers list, or produce their own fuel, are required to submit to the Department a completed copy of the Department's *Guideline on Reduction of Greenhouse Gases for Eligible Renewable Thermal Generation Units Using Eligible Woody Biomass*. If the analysis shows a GHG emissions reduction less than 50% in 30 years the RTGU will be subject to the provisions in 225 CMR 16.05(4)(i).

##### **C) Generation Units Using Eligible Liquid Biofuel and Bio-oil**

All Eligible Liquid Biofuel and bio-oil are required to meet the standards for advanced biofuels under the Federal Renewable Fuel Standard (RFS) program, which requires a 50% reduction in lifecycle GHG emissions, compared to number 2 fuel oil. Because of this provision all Eligible Liquid Biofuel and bio-oil is considered to have met the 50% reduction in GHG emissions and is not required to provide additional analysis, unless requested by the Department.

##### **D) Generation Units Using Eligible Biogas Fuel**

The analysis for the reduction of GHG for RTGUs using Eligible Biogas Fuel will be conducted on a case by case basis.

## **6. Biomass Suppliers List**

The Department shall provide a list of prescreened fuel suppliers, which qualified RTGUs may use to source their fuel in order to ensure they meet the required biomass sustainability and GHG thresholds. Any supplier who wishes to be included in the Department’s Biomass Suppliers List must apply to the Department, using an application provided by the Department on its website. At this time, the Department will not prescreen suppliers of green wood chips, as information regarding biomass sustainability and greenhouse gas reduction will be collected from each individual RTGU.

Suppliers on the Biomass Suppliers List will annually report to the Department the source of the fuel, disaggregated into Forest Derived Residues, Non-Forest Derived Residues, Forest Derived Salvage, and Forest Derived Thinnings, and the demonstration of the biomass sustainability for applicable Forest Derived Woody Biomass. The Biomass Suppliers List shall contain three (3) Classes, which will be based on the percentage of residues and thinnings used in the fuel and fuel source which the biomass system will be replacing or supplementing. Fuel suppliers are able to qualify for one (1), two (2), or all Classes based on the makeup of their fuel. The minimum combined percentage of Forest Derived Residues, Non-Forest Derived Residues, and Forest Salvage per Class can be found in 225 CMR 16.05(4)(k) and seen in the table below. For example, a wood chip system replacing a natural gas unit would need to use fuel that has an annual average of fifty five percent (55%) Forest Derived Residues, Non-Forest Derived Residues, and Forest Salvage combined.

**Table 1. Biomass Suppliers List, Class Characteristic**

| Class     | Fuel being displaced  | Minimum combined percentage of Forest Derived Residues, Non-Forest Derived Residues, and Forest Salvage |
|-----------|---|---|
| Class I   | Natural gas, electric resistance, propane, fuel oil #6, fuel oil #2 | 55%   |
| Class II  | Electric resistance, propane, fuel oil #6, fuel oil #2              | 50%   |
| Class III | Fuel oil #6, fuel oil #2  | 35%   |

If the fuel supplier does not report to the Department annually, or does not meet the required breakdown of Forest Derived Residues and Forest Derived Thinnings, the fuel supplier will be taken off the list for the upcoming year. Fuel suppliers may reapply to be placed back on the list at the end of the year, if they can meet the Department’s standards.

## 7. System Performance

The APS RTGUs using Eligible Biomass Fuels must meet the system requirements in 225 CMR 16.05(4)(g), which can also be seen below.

**Table 2. Air Emission Limits for Biomass Fuel Boilers and Furnaces at Nominal Output**

| <b>A boiler or furnace of less than 3,000,000 Btu per hour rated heat input must meet applicable emissions limits below:</b> |  |  |
|--|--|--|
|  | <b>Pellets / Liquid Biofuels / Biogas</b>  | <b>Chips</b>   |
| Particulate Matter emissions (PM)  | $\leq 0.08 \text{ lb PM}_{2.5} \text{ per MMBtu}_{\text{input}}$<br>or<br>$\leq 0.03 \text{ lb PM}_{2.5} \text{ per MMBtu}_{\text{input}}$ at sensitive populations <sup>2</sup> | $\leq 0.10 \text{ lb PM}_{2.5} \text{ per MMBtu}_{\text{input}}$<br>or<br>$\leq 0.05 \text{ lbs total PM per MMBtu}_{\text{input}}$ if EN303-5 is used to verify emissions<br>or<br>$\leq 0.03 \text{ lb PM}_{2.5} \text{ per MMBtu}_{\text{input}}$ at sensitive populations <sup>3</sup> |
| Carbon monoxide (CO) <sup>4</sup>  | 270 ppm at 7% oxygen   | 270 ppm at 7% oxygen   |
| <b>A boiler or furnace of greater than or equal to 3,000,000 Btu per hour rated heat input:</b>                              |  |  |
| PM, CO, and other relevant criteria pollutants   | Commonwealth of Massachusetts Department of Environmental Protection (MassDEP) plan approval required, pursuant to 310 CMR 7.02(5).  |  |

<sup>2</sup> Sensitive populations include schools, hospitals, nursing homes, or additional facilities determined by the Department.

<sup>3</sup> Sensitive populations include schools, hospitals, nursing homes, or additional facilities determined by the Department.

<sup>4</sup> May require a portable CO and O<sub>2</sub> analyzer for concentration determinations.

**Table 3. Performance Requirements**

| Performance Requirement              | Pellets   | Chips  |
|--------------------------------------|---|--|
| Thermal efficiency at nominal output | ≥ 85% Higher Heating Value  | ≥ 75% Higher Heating Value<br>or<br>≥ 80% Lower Heating Value if EN303-5 is used to verify particulate emissions |
| Start up                             | Adhere to manufacturer’s ignition protocol  |  |
| Modulation/shut off                  | The system must automatically modulate to lower output and/or turn itself off when the heating load decreases or is satisfied |  |
| Pressurized portion of the system    | Compliant with 522 CMR 4.00   |  |
| Thermal storage                      | Required, unless an exception is issued by the Department   |  |
| Fuel storage                         | The system must have covered bulk storage   |  |
| Feedstock conveyance                 | The system must be automatically fed from feedstock storage to the furnace or boiler  |  |

A heat load calculation of the building must be provided to ensure proper sizing of the system. The heat load calculation must be based on Manual J of Air Conditioning Contractors of America or an equivalent method.

All cordwood systems will be reviewed on a case by case basis and qualified if the testing results for particulate emissions are equivalent or lower than the standards established for a wood pellet or wood chip system, efficiency is equivalent or greater than the established standards for wood pellet or a wood chip system, and the fuel quality standards are equivalent or more stringent than those standards for a wood pellet or wood chip system. Qualified cordwood systems will need to meet the sizing and installation requirements in New York State Energy Research and Development Authority’s (NYSERDA) Advance Cordwood Boiler program under Renewable Heat New York.

**8. Qualifying a Central Wood Heating System**

**A) Boiler and furnaces ≤ 1 MMBtu/hr<sup>5</sup> rated heat input**

In order to provide regional consistency for central wood heating system qualification, the Department, along with the Commonwealth of Massachusetts Clean Energy Center (MassCEC), will utilize NYSERDA’s list of qualifying technologies for its Small Pellet Boiler program under Renewable Heat New York.

The Department and MassCEC highly encourage and prefer manufacturers to seek qualification through NYSERDA for pellet wood fired hydronic heaters tested in accordance with EN-303-5<sup>6</sup>,

<sup>5</sup> MMBtu = 1 million Btu, MBtu = 1 thousand Btu

that are subject to the United States Environmental Protection Agency (EPA) Residential Heater NSPS 40 CFR Part 60 subpart QQQQ. As NYSERDA does not currently qualify wood chip fired hydronic heaters, the manufacturer of a wood chip fired hydronic heater subject to the Residential Heater NSPS, should test in accordance to the NSPS testing requirements, obtain EPA certification, and demonstrate that the hydronic heater meets the emission standards in this Guideline. If a wood chip fired hydronic heater or boiler is not subject to the Residential Heater NSPS, then the manufacturer may submit results of independent tests performed by an accredited lab based on EN303-5, EPA CTM-039, ASTM E2515-11, or ASTM E2618-13 for continuously fed biomass hydronic heaters. If using EN303-5 the system's PM emissions must be tested at both nominal and 30% load capacity levels. Alternatively, an accredited lab approved by the EPA to conduct EPA Test Method 28 WHH or EPA test method 28 WHH Partial Thermal Storage ("PTS"), may conduct a test according to one of these methods, or CSA B415. Full test reports including calculations and raw data should be submitted to the Department for review and evaluation by the Department, MassCEC, and MassDEP. If a wood chip fired boiler or furnace will be equipped with an emission control device (e.g., electrostatic precipitator), the owner or operator of the biomass heating system shall submit to the Department a statement from the biomass heating system installer that the system has been designed to meet the applicable emission limits.

#### **B) Boilers and furnaces > 1 MMBtu/hr and < 3MMBtu/hr rated heat input**

For boilers and furnaces with rated heat input capacity equal to or greater than 1 MMBtu/hr, PM and carbon monoxide shall be measured using one of the two following methods.

- 1) The United States EPA reference test methods 5 or 201A (front half filterable) and 202 (back half condensable) to assess PM 2.5 and EPA reference test method 10 for carbon monoxide.
- 2) EN303-5 to assess total PM and carbon monoxide. If using EN303-5 the system must be tested at both nominal and 30% load capacities.

Performance testing shall be conducted initially within ninety (90) days of achieving maximum capacity or within one hundred and eighty (180) days of start up, and then every three (3) years of operation. A manufacturer guarantee and/or evidence of testing for similar units of the same model are sufficient. If a wood chip fired boiler or furnace will be equipped with an emission control device (e.g., electrostatic precipitator), the owner or operator of the biomass heating system shall submit to the Department a statement from the biomass heating system installer that the system has been designed to meet the applicable emission limits.

PM 2.5 means particulate matter sized 2.5 microns or less collected using a filter and back half impinger set for condensables or a dilution tunnel method such as EPA reference test method 28 WHH that collects filterable and the condensable fraction.

#### **C) Boilers and furnaces $\geq$ 3MMBtu/h rated heat input**

Prior to installing a solid fuel automatic fed biomass heating boiler or furnace rated at 3 MMBtu/hr or greater heat input, the owner or operator must submit a Comprehensive Plan

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<sup>6</sup> Manufacturers that submit lab results based on the EN 303-5 method must include measurements for dust (i.e. total PM), as well as volatile organic compounds (VOCs), also known as organic gaseous carbon (OGC) in units of mg/MJ, so that MassCEC's or the Department's reviewers can calculate PM2.5 emissions. The lab results should also include the fuel's water content (in lb/lb or percent by weight), energy content (in kWh/kg or J/g or Btu/lb), and hydrogen content (in lb/lb or percent by weight).



Application and receive approval from MassDEP pursuant to 310 CMR 7.02(5). MassDEP’s approval will require initial emissions testing within ninety (90) days of achieving maximum capacity or within one hundred and eighty (180) days of start up, and then every three (3) years of operation, or as otherwise required in the approval.

**9. Thermal Storage Requirements**

Per 225 CMR 16.05(4)(g)(5), thermal storage is required for all hydronic systems. All thermal storage tanks must have a minimum of R12 insulation and controls, integrating the central heater, and decrease the number of central heater starts and stops. The unit’s thermal storage capacity should be sized based on the thresholds in 225 CMR 16.05(4)(g)(5), and seen below.

**Table 4. Thermal Storage Sizing Requirements**

| <b>Lead boiler system size (heat output)</b> | <b>Thermal storage required</b> |
|--|---------------------------------|
| < 80,000 Btu/hr                              | 80 gallons                      |
| 80,000 Btu/hr - 119,000 Btu/hr               | 1 gallon per 1 MBtu/hr          |
| 119,000 Btu/hr – 1 MMBtu/hr                  | 119 gallons                     |
| > 1 MMBtu/hr                                 | 2 gallons per 1 MBtu/hr         |

Any applicant who wishes to omit thermal storage must submit to the Department independent test lab results based on the EN 303-5<sup>7</sup>, EPA Test Method 28 WHH, or the CSA B415 test method documenting that the boiler system is capable of all of the following:

- A) Modulating below 20% of maximum building heat load
- B) Maintaining emissions rate per Table 2, at the system’s minimum tested capacity<sup>8</sup>
- C) Maintaining thermal efficiency per Table 3, at the system’s minimum tested capacity

Alternatively, a RTGU Owner or an Authorized Representative for the RTGU may submit a request for a thermal storage exception if they believe that the inclusion of thermal storage would deteriorate the efficiency or air emissions performance of the RTGU. The Department will review these requests on a case by case basis. All exception requests should be sent to [thermal.doer@state.ma.us](mailto:thermal.doer@state.ma.us).

**10. Eligible Biomass Woody Fuel Feedstock Requirements**

Per 225 CMR 16.05(1)(a)6.a.v., A woody biomass RTGU must use either Eligible Biomass Woody Fuel, or bio-oil refined through pyrolysis or biogas derived from Eligible Biomass Woody Fuel. On an annual basis, a minimum of 30% of the Eligible Biomass Woody Fuel used by RTGUs shall be sourced from Forest Derived Residues, Forest-Derived Thinnings, Forest Salvage, or residues derived from

<sup>7</sup> Note that EPA’s Residential Heater NSPS (40 CFR Part 60 subpart QQQQ) requires thermal storage for any unit that is subject to the NSPS that is certified using EN303-5 (i.e., thermal storage may not be omitted in this case).

<sup>8</sup> The system’s minimum tested capacity must be ≤ 30% of rated maximum capacity to demonstrate compliance with the emissions and efficiency requirements for conditions b and c.

wood products manufacturing consisting of Clean Wood, as defined in the definition of Eligible Biomass Woody Fuel in 225 CMR 16.02.

### **11. Biomass Fuel Quality and Unit Control Device Requirements**

Eligible Biomass Woody Fuel needs to meet the fuel quality standards in 225 CMR 16.05(4)(g)(2) and seen below, to guarantee optimal, predictable, and uniform performance of the Qualified Unit. Biomass fuel includes wood pellets, wood chips, cord wood, and bio-oil, which is oil derived from woody biomass through pyrolysis.

- A) A boiler or furnace of less than 3,000,000 Btu per hour rated heat input that utilizes an emission control device (e.g., electrostatic precipitator), subject to the approval of the Department in consultation with MassDEP, must use Eligible Biomass Woody fuel, but does not have to meet the fuel quality specifications in Table 5. The emission control device shall be designed and operated to ensure that the boiler or furnace does not exceed the applicable particulate matter emission limit in 225 CMR 16.05(4)(g)(6).
- B) A boiler or furnace of less than 3,000,000 Btu per hour rated heat input that does not utilize an emission control device (e.g., electrostatic precipitator) must use Eligible Biomass Woody Fuel and also meet the following fuel quality specifications:

**Table 5. Fuel Quality Specifications**

| <b>Fuel quality specifications</b>                             | <b>Pellets</b> | <b>Chips</b>                             |
|--|----------------|--|
| Calorific value  | > 8,000 Btu/lb | ≥ 5,500 Btu/lb                           |
| Moisture   | ≤8%            | ≤ 35%                                    |
| Ash content by weight  | ≤ 1%           | ≤ 1.5%                                   |
| Particulate size (percent retained by a half inch mesh screen) | Not applicable | 75% or adhere to manufacturer’s protocol |
| Chlorides  | ≤ 300 ppm      | Not applicable                           |

Compliance with the pellet fuel quality standards can be demonstrated through certification against standards such as the Pellet Fuels Institute (PFI) Premium.

- C) A boiler or furnace of equal to or greater than 3 MMBtu/hour rated heat input must use Eligible Biomass Woody Fuel and also receive a MassDEP plan approval pursuant to 310 CMR 7.02(5), which shall dictate fuel quality specifications.

Cordwood fuel in advanced cordwood boilers must be properly dried and seasoned so that the wet-basis moisture content of the wood is approximately 20%. The wood should be stored under cover with sufficient ventilation to allow the wood to dry to approximately 20% moisture content. It is imperative that the wood fuel be at moisture content of 20% or below so that good combustion of the fuel is

achieved. When wood above 20% moisture content or greenwood is used in advanced cord wood boilers seasonal efficiency decreases significantly while smoke emissions drastically increases.

All bio-oil that is made through pyrolysis must be made using Eligible Biomass Woody Fuel, meet *ASTM D7544 - 12 Standard Specification for Pyrolysis Liquid Biofuel*, and comply with all standards in the Federal Renewable Fuel program for biomass-based diesel.

## **12. Eligible Biogas Fuel**

Biogas must be conveyed directly from its source to the RTGU in a dedicated pipeline.

Units may co-fire with other fuels subject to the provisions in 225 CMR 16.05(2).

## **13. Eligible Liquid Biofuels**

Only organic waste derived liquid biofuels will be considered Eligible Liquid Biofuel, as stated in 225 CMR 16.02. Eligible Liquid Biofuels need to meet quality standard ASTM Standard D6751 (Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels or ASTM D396 - 15C (Standard Specification for Fuel Oils) and be certified as Advanced Biofuel under EPA's Renewable Fuel Standard.

Per 225 CMR 16.05(4)(1), the Department will establish and maintain a Biofuel Suppliers List with retail suppliers of Eligible Liquid Biofuel that meets the resource and fuel quality requirements. Fuel suppliers must be registered in the Environmental Protection Agency's Renewable Fuel Standard (RFS2), 40 C.F.R. §§ 80.1400-80.14.74 to ensure that the fuel reduces lifecycle greenhouse gas emissions by at least 50% when compared to the fuel being displaced, and must separately verify with the Department that they produce biodiesel from organic waste feedstocks. Facilities seeking qualification as APS RTGUs using liquid biofuels will be required to only use fuel from a supplier on the Department list of suppliers for the duration of the APS qualification of the thermal energy generating unit, and keep records to demonstrate compliance with this requirement.

Fuel suppliers wishing to be included on the list will need to demonstrate to the Department's satisfaction the sourcing of the organic waste from which the liquid biofuel was made. Fuel distributors will need to document the chain of custody from the fuel supplier on to the end customer.

## **14. APS Eligible Liquid Biofuels Generation Unit Qualification**

A qualified facility must demonstrate purchase of advanced biofuel from an approved vendor, on the Department's Biofuels Suppliers List, with a minimum component greater than ten percent (> 10%) advanced biofuels.

An APS RTGU using Eligible Liquid Biofuels blended with heating oil or neat shall seek qualification as an APS RTGU only as part of an Aggregation, as provided for in 225 CMR 16.05(4)(h).

It is expected that heating fuel distributors will act as Aggregators for these RTGUs. Large RTGUs using Eligible Liquid Biofuels will need to submit a Statement of Qualification Application, be individually qualified, and are subject to the metering requirements in the Department's *Guideline on*

*Metering and Calculating the Useful Thermal Output for Renewable Thermal Generation Units – Part 2  
(Metering for Intermediate and Large Generation Units).*

**15. Miscellaneous**

The Department may permit an exception from any provision of this Guideline for good cause, so long as the exception is consistent with the requirements set out in G.L. c. 25A, § 11F ½ and regulations promulgated thereunder.