

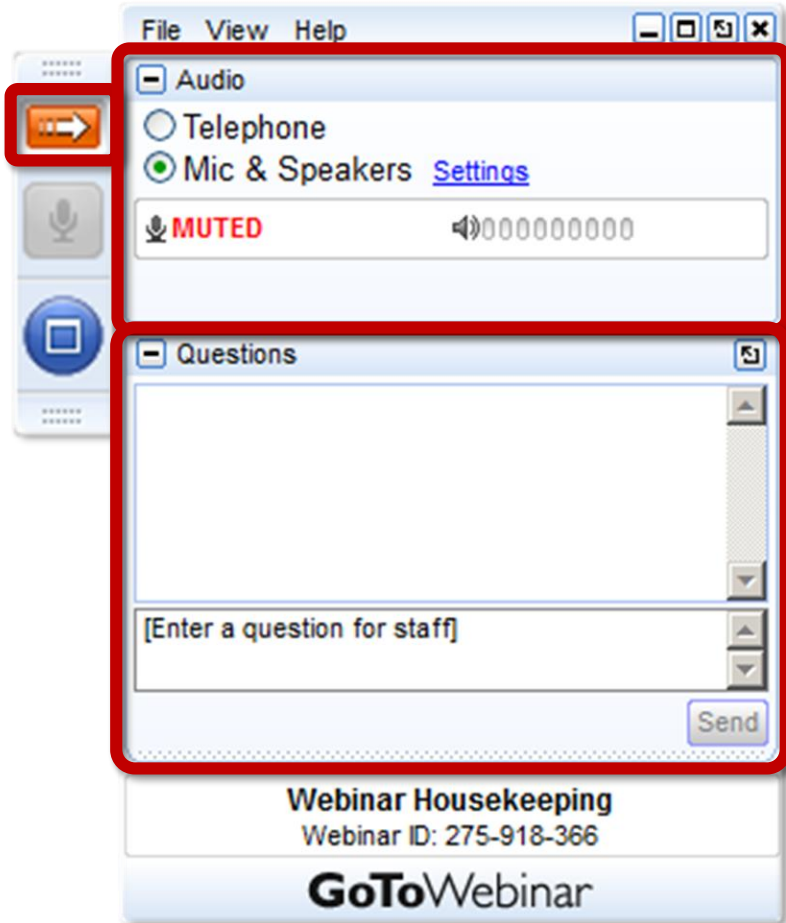
RPS Collaborative Webinar

Renewable Thermal Technologies in the Massachusetts APS

Hosted by
Warren Leon, Executive Director, CESA

January 24, 2018

Housekeeping



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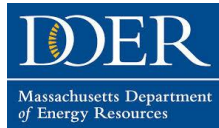
Clean Energy States Alliance



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RPS Collaborative

- With funding from the Energy Foundation and the US Department of Energy, CESA facilitates the **Collaborative**.
- Includes **state RPS administrators, federal agency representatives**, and other stakeholders.
- Advances dialogue and learning about RPS programs by **examining the challenges and potential solutions** for successful implementation of state RPS programs, including **identification of best practices**.
- To sign up for the Collaborative listserv to get the **monthly newsletter** and announcements of **upcoming events**, see: www.cesa.org/projects/renewable-portfolio-standards

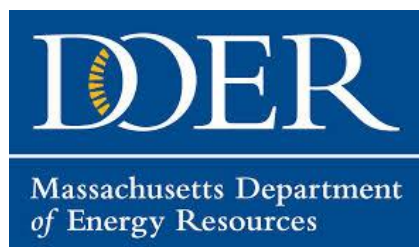


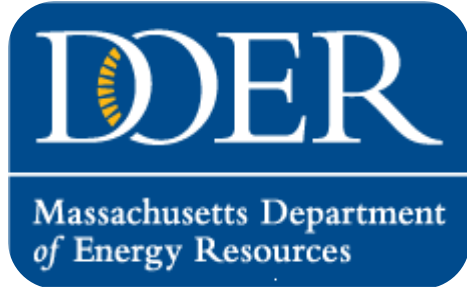
U.S. DEPARTMENT OF
ENERGY



Guest Speaker

Samantha Meserve, Program
Coordinator, Massachusetts
Department of Energy Resources





COMMONWEALTH OF MASSACHUSETTS

Charles D. Baker, Governor

Karyn E. Polito, Lt. Governor

Matthew A. Beaton, Secretary

Judith Judson, Commissioner

Renewable Thermal in the Massachusetts Alternative Energy Portfolio Standard

January 24, 2018

New Technologies in APS

- An Act Relative to Credit for Thermal Energy Generated with Renewable Fuels (S1970) was signed into law in August 2014 and added to the Alternative Energy Portfolio Standard (APS):
“any facility that generates useful thermal energy using sunlight, biomass, bio-gas, liquid bio-fuel or naturally occurring temperature differences in ground, air or water”
- An Act to Promote Energy Diversity was signed into law in August 2016 and added fuel cells and waste-to-energy thermal to the APS

Rulemaking Process

- Stakeholder meetings were held in late 2014 and early 2015 to discuss implementation of statutory changes
- Draft regulation initially filed on May 19, 2016
- Second draft of the APS Regulations incorporating 2016 statutory changes and changes in response to the first public comment period was filed on June 2, 2017
- On October 16, 2017, DOER filed with the Joint Committee on Telecommunications, Utilities, who recommended no changes to the draft
- On December 15, 2017 the final version of the regulation was filed with the SOS
- The final regulations were promulgated on December 29, 2017
- Applications began being accepted on January 16, 2018

New Eligible Fuel and Technology Types

- Renewable thermal technologies:
 - Heat pumps (air source and ground source)
 - Solar thermal
 - Liquid biofuels
 - Biomass
 - Biogas
 - Compost heat exchange systems
- Non-renewable fuel cells (i.e. natural gas)
- Waste-to-energy thermal

Program Logistics

- System must have come online after January 1st 2015
- Systems operating since January 1st 2015 are eligible to receive retroactive credits, but must apply and be qualified before the Q4 2017 minting on April 15th 2018
- All systems must deliver a useful thermal load to Massachusetts
- Systems which received 80% or more of total construction and installation costs from DOER or another state entity, prior to December 29th 2017 are not eligible

Small, Intermediate, and Large Generators

- All renewable thermal generators are divided into three size categories as follows:

	Size Classification			
	Small	Intermediate		Large
AEC calculation basis	Calculated net renewable thermal output	Calculated net renewable thermal based on <u>indirect</u> metering	Calculated net renewable thermal output based on <u>direct</u> metering of fuel input	Metered net renewable thermal output
Solar thermal: evacuated tube and flat plate solar hot water	Collector surface area less than or equal to 660 sq ft	Collector surface area between 660 and 4,000 sq ft	-	Collector surface area greater than or equal to 4,000 sq ft
Solar thermal: solar hot air	-	Collector surface area less than or equal to 10,000 sq ft	-	Collector surface area greater than 10,000 sq ft
Solar sludge dryer	-	-	-	All
Eligible Biomass Fuel	-	-	Capacity less than or equal to 1,000,000 Btu per hour	Capacity greater than 1,000,000 Btu per hour
Compost heat exchange system	-	-	-	All
Air source heat pump: electric motor or engine driven	Output capacity less than or equal to 134,000 Btu per hour	-	Output capacity between 134,000 and 1,000,000 Btu per hour	Output capacity greater than or equal to 1,000,000 Btu per hour
Ground source heat pump	Output capacity less than or equal to 134,000 Btu per hour	-	Output capacity between 134,000 and 1,000,000 Btu per hour	Output capacity greater than or equal to 1,000,000 Btu per hour
Deep geothermal	-	-	-	All

- Classification determines how generators meter and report their thermal output
- Not all technologies have all three classifications

Pre-Minting and Forward Minting

Small heat pumps and solar thermal systems may choose to pre-mint their AECs

- **Pre-minting** of AECs allows certain generators to receive 10 years of AECs upfront in the first quarter of operation

However, if the APS market switches from being more than 25% undersupplied, to less than 25% undersupplied, pre-minting is replaced by Forward minting

- **Forward minting** of AECs allows generators to receive a pre-determined number of AECs each quarter over a period of 10 years

Biomass, biogas, and liquid biofuel generators may not pre-mint or forward mint their AECs

Certificate Multipliers

- The statute allows for DOER to establish credit multipliers for “non-emitting renewable thermal technologies”
- DOER has established the following multipliers for non-emitting renewable thermal technologies:

System size	APS Renewable Thermal Generation Unit multiplier		
	Small	Intermediate	Large
Active solar hot water systems used for domestic hot water	3	3	3
Active solar hot water systems used for domestic hot water, space condition, or process loads	1	1	1
Active solar hot air systems	-	5	5
Solar sludge dryer	-	-	1
Ground source heat pumps	5	5	5
Deep geothermal	-	-	1
Air source heat pumps (electric or engine driven) – supplying less than 100% of building heating load ²	2	-	-
Air source heat pump (electric or engine driven) – all other ²	3	3	3
Compost heat exchange system	-	-	1
Biomass, biofuels, biogas	N/A	N/A	N/A

Additional Multiplier for Heat Pumps

- Any air or ground source heat pump installed in a building shall be eligible for an additional multiplier of 2 (added to the base multiplier) if the building meets any of the following criteria:
 - achieves Home Energy Rating System (HERS) rating of 50 or less
 - meets the Department of Energy definition of “Zero Energy”
 - achieves PHIUS+ Certification by the Passive House Institute US (PHIUS)
 - registers as a Certified Passive House Building or an EnerPHit Retrofit by the International Passive House Association (iPHA)

Air Source Heat Pumps

- Can only receive Alternative Energy Certificates (AECs) when operating in heating mode
- Small air source heat pumps must:
 - be ENERGY STAR™ certified;
 - meet the Cold Climate Air Source Heat Pump Specification published by NEEP
 - have a variable speed compressor;
 - be part of an AHRI matched system; and
 - have a coefficient of performance greater than or equal to 1.9 at 5 degree Fahrenheit and greater than or equal to 2.5 at 17 degree Fahrenheit.
- For new construction, small air source heat pumps must supply 100% of a building's total annual heating and cannot have any supplemental, non-renewable heating sources.
- In retrofit construction or existing buildings, small air source heat pumps must:
 - be used as the primary source of heat;
 - supply at least 90% of the total annual heating;
 - be integrated to a heating distribution system;
 - Be capable of distributing produced heat to all conditioned areas of the building; and
 - have a heat-rate capacity at five degrees Fahrenheit that is at least 50% of the nameplate capacity of the existing heating source equipment.
- Large and intermediate air source heat pumps are not required to comply with any of the above requirements

Small ASHP AEC Formula

If conditioned building area is less than or equal to 1,500 sf:

Useful Thermal Energy = 3.0 MWh/year

Example

Useful Thermal Energy = 3 MWh/yr * 10 (years) = 30 MWh

Apply multiplier:

Option 1: 30 MWh * 2 (ASHP, < 100%) = 60 AECs

Option 2: 30 MWh * 3 (ASHP, all other) = 90 AECs

Option 3: 30 MWh * [3 (ASHP, all other) + 2 (Eff. Bldg)] = 150 AECs

Small ASHP AEC Formula

If conditioned building area is greater than 1,500 sf:

$$\text{Useful Thermal Energy} = \left(3.0 + \left(2.0 * \left(\frac{A - 1,500}{1,000} \right) \right) \right)$$

Where:

- Useful Thermal Energy = MWh/year
- A = Conditioned space in square feet (sf)

Example: 2,000 sf building

$$\text{Useful Thermal Energy} = \left(3.0 + \left(2.0 * \left(\frac{2,000 - 1,500}{1,000} \right) \right) \right) = 4 \text{MWh}$$

4MWh * 10 (years) = 40 MWh

Apply multiplier:

Option 1: 40 MWh * 2 (ASHP, < 100%) = 80 AECs

Option 2: 40 MWh * 3 (ASHP, all other) = 120 AECs

Option 3: 40 MWh * [3 (ASHP, all other) + 2 (Eff. Bldg)] = 200 AECs

Creating A Clean, Affordable, and Resilient Energy Future For the Commonwealth

Ground Source Heat Pumps

- Can only receive Alternative Energy Certificates (AECs) when operating in heating mode
- Small ground source heat pumps must:
 - be certified to specific International Organization for Standards
 - meet specific AHRI rated operating coefficient of performance and operating energy efficiency ratios for their type of ground source heat pump;
 - be installed by licensed contractors and/or plumbers in accordance with the National Electric Code and manufacturer's specifications;
 - conform to all applicable municipal, state, and federal codes, standards, regulations, and certifications;
 - have blowers that are multi-speed or variable-speed, high-efficiency motors;
 - use compressors that are two-stage, multi-speed, or variable-speed drives, unless they are water-to-water units;
 - comply with specific parameters regarding well depths and drilling;
 - have at least 15 feet of separation between closed-loop bore holes;
 - comply with all applicable MassDEP regulations; and
 - supply 100% of a building's total annual heating
- Large and intermediate ground source heat pumps are not required to comply with any of the above requirements

Small GSHP AEC Formula

If conditioned building area is less than or equal to 1,500 sf:

Useful Thermal Energy = 4.6 MWh/year

Example:

Useful Thermal Energy = 4.6 MWh/yr * 10 (years) = 46 MWh

Apply multiplier:

46 MWh * 5 = 230 AECs

Small GSHP AEC Formula

If conditioned building area is greater than 1,500 sf:

$$\text{Useful Thermal Energy} = \left(4.6 + \left(3.1 * \left(\frac{A - 1,500}{1,000} \right) \right) \right)$$

Where:

- Useful Thermal Energy = MWh/year
- A = Conditioned space in square feet (sf)

Example: 2,000 sf building

$$\text{Useful Thermal Energy} = \left(4.6 + \left(3.1 * \left(\frac{2,000 - 1,500}{1,000} \right) \right) \right) = 6.15 \text{ MWh}$$

$$6.15 \text{ MWh} * 10 \text{ (years)} = 61.5 \text{ MWh}$$

Apply multiplier:

$$61.5 \text{ MWh} * 5 = 307 \text{ AECs}$$

$$61.5 \text{ MWh} * [5 \text{ (base)} + 2 \text{ (Eff. Bldg)}] = 430 \text{ AECs}$$

Solar Thermal

- Must be an active system
- Solar thermal collectors must have a performance certification to either OG-100 or OG-300. Rating certification entities may include:
 - Solar Rating and Certification Corporation
 - International Association of Plumbing and Mechanical Officials
 - Other certification entities as approved by DOER
- Unglazed flat plate collectors for pool heating are not eligible to qualify as an APS Renewable Thermal Generation Unit
- Solar hot air systems are eligible, if they meet the rating certification requirements

Small Solar Hot Water AEC Formula Using OG-300

$$\text{Useful Thermal Energy} = \frac{R}{1,000} * \text{SOF} * S * t$$

Where:

R = OG-300 Rating for (kWh/year)

SOF = Surface Orientation Factor

S = Annual, average solar shading

t = Time, 10 years

Small Solar Hot Water AEC Formula Using OG-300

Example:

Useful Thermal Energy = $4,391(\text{kWh/year}) / 1,000 * 1.0 * 1.0 * 10 \text{ (years)}$

Useful Thermal Energy = 43.9 MWh equivalent

Apply multiplier:

$43.9 \text{ MWh} * 3 \text{ (DHW only)} = 131 \text{ AECs}$

Small Solar Hot Water AEC Formula Using OG-100

$$\text{Useful Thermal Energy} = \frac{R}{1,000} * C * \text{SOF} * S * t$$

Where:

R = OG-100 Solar Collector Rating (kWh/panel/day)

C = Number of solar thermal collectors

SOF = Surface Orientation Factor

S = Annual, average solar shading

t = Time, 3650 days

Small Solar Hot Water AEC Formula Using OG-100

Example:

Useful Thermal Energy = 2,445 (kWh/year) / 1,000 *
3 (collectors) * 1.0 * 1.0 * 10 (years)

Useful Thermal Energy = 73.35 MWh equivalent

Apply multiplier:

73.35 MWh * 3 (DHW only) = 220 AECs

Liquid Biofuels

- Eligible Liquid Biofuel must be made from organic waste feedstocks such as
 - waste vegetable oils
 - waste animal fats
 - grease trap waste
- Liquid Biofuel Generation Units may co-fire with other fuels, but must contain at least 10% by volume Eligible Liquid Biofuel
- Fuel distributors will receive the AECs based on the quantity of Eligible Liquid Biofuel delivered to an end user for intermediate systems
- System owners will receive the AECs based on the quantity of Eligible Liquid Biofuel delivered to an end user for large systems
- The number of AECs that can collectively be generated by liquid biofuel generators is capped at 20% of the total projected annual compliance obligation for retail suppliers

Intermediate Eligible Liquid Biofuel AEC Formula

$$\text{Useful Thermal Energy} = (\text{Fuel} * \text{Volume} * \text{EFC} * \text{Eff}) / 3,412,000$$

Where:

Useful Thermal Energy = Net thermal energy output equivalent (MWH/quarter)

Fuel = Btu content of the fuel delivered to the RTGU, established as 127,000 Btu/gal for biofuel and determined on a case by case basis for biogas

Volume = The total volume of fuel delivered

EFC = Eligible fuel content (the percentage of the fuel delivered to the RTGU that qualifies as either an Eligible Biogas Fuel or Eligible Liquid Biofuel)

Eff = The efficiency of the RTGU, established as 85% for boilers and 80% for furnaces

Intermediate Eligible Liquid Biofuel AEC Formula

Useful Thermal Energy= (127,000 Btu/gal * 10,000
gal * 0.20 * 0.80) / 3,412,000

Useful Thermal Energy = 59.55 MWh equivalent

59.55 MWh equivalent = 59 AECs

Cap on the Available AECs for Biofuel Generation Units

- In each Compliance Year the total number of AECs minted to Generation Units using Eligible Liquid Biofuel may not exceed 20% of the total projected annual compliance obligation for the Compliance Year
 - No more than 10% of the Attributes generated prior to July 1st.
- If 100% of the Attributes available prior to July 1st are not allocated, the remaining number of available Attributes shall be rolled over and allocated during either of the remaining quarters in that calendar year
- If the number of Attributes reported by Generation Units exceeds the available Attributes, the number of available Attributes shall be allocated on a prorated basis

Biofuels Suppliers List

- DOER will establish and maintain a list of suppliers of Eligible Liquid Biofuel
 - Fuel supplier must complete and submit an application to the DOER to be included on the list
 - Suppliers must be registered in the EPA's Renewable Fuel Standard (RFS2) and must verify that they produce biodiesel from organic waste feedstocks
 - Fuel suppliers may be required to provide documentation to the DOER after being added to the list in order to demonstrate continued compliance
- Suppliers will provide information to DOER each quarter regarding the quantities of Eligible Liquid Biofuel delivered to customers

Biogas and Compost Heat Exchange Systems

- Eligible Biogas Fuel is defined as follows in the Regulation:
 - A gaseous fuel that is produced by the contemporaneous bacterial decomposition or thermal gasification of Eligible Biomass Fuel. Eligible Biogas Fuel does not include natural gas but does include renewable natural gas, which is Eligible Biogas Fuel upgraded to a quality similar to natural gas
- A biogas Generation Unit must use Eligible Biogas Fuel derived from either an anaerobic digester, as defined by MassDEP, or a landfill that has received all applicable permits from the MassDEP or comparable environmental agency responsible for regulating such facilities
- Eligible Biogas Fuel must be conveyed directly from its source to the biogas Generation Unit in a dedicated pipeline.
- A Compost Heat Exchange System is a Generation Unit that uses a facility to recover or exchange heat from the aerobic biodegradation of organic matter during the production of compost
- Compost Heat Exchange Systems must have their thermal output directly metered

Woody Biomass Requirements

- The statute requires DOER to set the following standards for biomass facilities:
 - in consultation with MassDEP, set emission performance standards that are protective of public health and limit eligibility only to best-in-class commercially-feasible technologies, with regard to reducing emissions of particulate matter sized 2.5 microns or less and carbon monoxide and other air pollutants;
 - establish a requirement of 50 percent reduction in life-cycle greenhouse gas emissions compared to a high efficiency unit utilizing the fuel that is being displaced;
 - establish requirements for thermal storage or other means to minimize any significant deterioration of efficiency or emissions due to boiler cycling, if feasible;
 - establish fuel conversion efficiency performance standards achievable by best-in-class commercially-feasible technologies; and
 - in consultation with DCR, for forest-derived biomass, establish requirements that fuel shall be provided by means of sustainable forestry practices.

Eligible Woody Biomass Feedstock

- 100% of the feedstock used by a Generation Unit must be Eligible Biomass Woody Fuels.
- Eligible Woody Biomass is divided into four categories:
 - Forest-Derived Residues (Residues)
 - Forest-Derived Thinnings (Thinnings)
 - Forest Salvage
 - Non-Forest-Derived Residues
- 30% of the feedstock used by a Generation Unit must come from a combination of the following:
 - Forest Derived Residues
 - Forest-Derived Thinnings
 - Forest Salvage, or
 - residues derived from wood products manufacturing consisting of Clean Wood

Emission Performance Standards

- DOER has worked closely with MassDEP to ensure that particulate matter emissions performance standards are protective of public health.
- Standards are well below those currently required by the EPA for comparable systems and are differentiated by system size and fuel type:

A boiler or furnace of less than 3,000,000 Btu per hour rated heat input must meet applicable emissions limits below:		
	Pellets / Liquid Biofuels / Biogas	Chips
Particulate Matter emissions (PM)	$\leq 0.08 \text{ lb PM}_{2.5} \text{ per MMBtu}_{\text{input}}$ or $\leq 0.03 \text{ lb PM}_{2.5} \text{ per MMBtu}_{\text{input}}$ at sensitive populations	$\leq 0.10 \text{ lb PM}_{2.5} \text{ per MMBtu}_{\text{input}}$ or $\leq 0.05 \text{ lbs total PM per MMBtu}_{\text{input}}$ if EN303-5 is used to verify emissions or $\leq 0.03 \text{ lb PM}_{2.5} \text{ per MMBtu}_{\text{input}}$ at sensitive populations
Carbon monoxide (CO)	270 ppm at 7% oxygen	270 ppm at 7% oxygen
A boiler or furnace of greater than or equal to 3,000,000 Btu per hour rated heat input:		
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).	

For the purpose of this provision, sensitive populations include schools, hospitals, nursing homes, or additional facilities determined by the Department.

50% Reduction in Lifecycle GHG Analysis and Eligible Biomass Woody Fuel Supplier List

- Generation Unit owners will need to provide an annual analysis that shows, based on the type of woody biomass used, that there was a 50% reduction in greenhouse gases over a 30-year time period
- Analysis closely mirrors that used to demonstrate lifecycle GHG compliance under the RPS and relies closely on data from the Manomet Study
- The greenhouse gas analysis is based on the following inputs:
 - System efficiency
 - Annual thermal load
 - Fuel being displaced
 - Natural gas, fuel oil, electric resistance, etc
 - Type of biomass fuel
 - Wood pellets, dry wood chips, green wood chips
 - Biomass feedstock
 - Residues, thinnings

Massachusetts Department of Energy Resources
Alternative Energy Portfolio Standard - 225 CMR 16.00

Statement of Qualification Application (SQA)
Worksheet for the Calculation of Lifecycle GHG Analysis

Generation Unit Name (as identified in SQA): Typical Residential Biomass Pellet Boiler

Please complete all blue cells

Life Cycle Greenhouse Gas Analysis

Biomass Lifecycle Stack Emissions from Generation Unit		
Fuel Input	Wood Pellets	
		1 dry tons
		16 MMBTU_input annually
CO2 Emissions		218.3 lbs CO2/MMBTU_input
		1.75 tons CO2 annually

Conventional Lifecycle Stack Emissions Displaced		
Thermal Boiler	Electric resistance	chose from drop-down list
		13.6 MMBTU_out
		100% Boiler Efficiency (standard assumption)
		Boiler Efficiency (optional user input)
		13.60 MMBTU_in
		212.8 lbs CO2/MMBTU
		1.45 tons CO2 annually
For Combined Heat and Power units <u>only</u> , enter the following		
Electric Generation	Natural Gas - Combined Cycle	If not NGCC, chose other from drop-down list
		0 MWh annually
		1100 lbs CO2/MWh
		0 tons CO2 annually

Boiler Efficiency (justificaiton if not Standard Assumption):

Carbon Debt/Dividend Analysis		
Carbon Debt	0.3	tons CO2 annually
	17.1%	carbon debt, %
Biomass Supply Information	65.0%	
Residues	55%	% of supply
Forest Derived Thinnings	45%	% of supply (calculated - Supply must sum to 100%)
Net CO2 Emission Reductions		
Regulatory Requirement		
At least 50% reduction	55.8%	% reduction in Year 30

Note on Residues and Thinnings: Residues include Forest and Non-Forest Derived Residues, Forest Salvage, and Dedicated Energy Crops, as defined in 225 CMR 16.00.
<http://www.mass.gov/eea/docs/doer/rps/225cmr1600-052909.pdf>

Biomass Suppliers List

- Suppliers of Eligible Biomass Woody Fuel have the option to be placed on DOER's list of eligible suppliers.
- Depending on the characteristics of the fuel being displaced, there are different requirements on the composition of the woody biomass that must be used by a biomass system:

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 a Generation Unit wishes to be exempt from the required GHG analysis they can simply purchase fuel from a supplier of biomass who DOER has preapproved as meeting the required GHG reductions

Thermal Storage Requirements

- A facility's thermal storage capacity should be sized based on the thresholds below:

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

- Any facility that wishes to omit thermal storage must submit independent test lab results based eligible testing methods that demonstrate the system is capable of the following:
 - Modulating below 20% of maximum building heat load
 - Maintaining emissions rates at the system's minimum tested capacity
 - Maintaining thermal efficiency at the system's minimum tested capacity
- Facilities may also submit requests for a thermal storage exception if they believe that the inclusion of thermal storage would deteriorate the efficiency or air emissions performance of the Generation Unit.

Fuel Conversion Efficiency Standards

- All facilities must comply with the following fuel efficiency standards, which ensure that only best in class commercially feasible technologies will be installed:

Performance Requirement	Pellets	Chips
Thermal efficiency at nominal output	≥ 85% Higher Heating Value	≥ 75% Higher Heating Value or ≥ 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	

Fuel Quality Specifications

- 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), does not have to meet the fuel quality specifications.
- 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 meet the following fuel quality specifications:

Fuel quality specifications	Pellets	Chips
Calorific value	Great than 8,000 Btu per pound	Greater than or equal to 5,500 Btu per pound
Moisture	Less than or equal to 8 percent	Less than or equal to 35 percent
Ash content by weight	Less than or equal to 1 percent	Less than or equal to 1.5 percent
Chip Size (percent retained by a half inch mesh screen)	Not applicable	75 percent or adhere to manufacturer's protocol
Chlorides	Less than or equal to 300 parts per million	Not applicable

- A boiler or furnace of equal to or greater than 3,000,000 Btu per hour rated heat input must receive a MassDEP plan approval pursuant to 310 CMR 7.02(5), which shall dictate fuel quality specifications.

Sustainable Forestry Practices

- DOER has established a minimum threshold of 30% forest derived materials for all woody biomass fuels in order to support the local and regional forest product industry.
- Sustainable Forestry Management is defined as follows:
 - Practicing a land stewardship ethic that integrates the reforestation, managing, growing, nurturing, and harvesting of trees for useful products with the conservation of soil, air and water quality, wildlife and fish habitat, and aesthetics and the stewardship and use of forests and forest lands in a way, and a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality, and potential to fulfill, now and in the future, relevant ecological, economic, and social functions at local, national, and global levels, and that does not cause damage to other ecosystems. Criteria for sustainable forestry include:
 - conservation of biological diversity;
 - maintenance of productive capacity of forest ecosystems;
 - maintenance of forest ecosystem health and vitality;
 - conservation and maintenance of soil and water resources;
 - maintenance of forest contributions to global carbon cycles;
 - maintenance and enhancement of long-term multiple socioeconomic benefits to meet the needs of societies; and
 - a legal, institutional, and economic framework for forest conservation and sustainable management.

Sustainable Forestry Practices

- All Forest Derived Residues and Thinnings must be sourced from sustainably managed forests. Sustainable Forest Managed must be verified as follows:
 - All MA forest derived products must have a DCR approved cutting plan under the long term management option, and signed by a state forester that attests to best management practices, and biomass harvesting and retention guidelines.
 - All non-MA forest derived products must either:
 - Have a cutting plan that is approved by a licensed or certified forester attesting that the harvest complied Sustainable Forestry Management definition, best management practices of the host state, and biomass harvesting and retention guidelines.
 - Biomass fuel is certified to an independent third-party certification that includes 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).
- DOER plans to implement an auditing program to ensure compliance.

Intermediate Woody Biomass AEC Formula (Less than 134,000 Btu/hr)

$$\text{Useful Thermal Energy} = (\text{HHV} * \text{Eff} * \text{Fuel}) / 3,412,000$$

Where:

Thermal Useful Energy = MWh/quarter

HHV = Higher Heating Value of the fuel delivered

HHV Fixed for green chips and pellets

HHV for dry chips allows for sliding scale for moisture content

Eff = The efficiency of the RTGU

Fuel= The amount of eligible fuel delivered to the RTGU

Intermediate Woody Biomass AEC Formula (Less than 134,000 Btu/hr)

Useful Thermal Energy = $8,000 \text{ Btu/lb} * 0.85 * 10,000 \text{ lbs}$ /
 $3,412,000$

Useful Thermal Energy = 19.9 MWh equivalence

19.9 MWh = 19 AECs

Qualification Procedure

- Generation Unit submits a Statement of Qualification Application to DOER
- DOER reviews and approves the application
- The Independent Verifier (IV) begins recording and verifying production
 - MassCEC will be the IV for all small systems and intermediate biomass systems
- The Independent Verifier reports the production to the NEPOOL GIS
- The AECs are minted once a quarter
 - Small systems receive all their AECs in their first qualified minting

Application Portal

- Opened January 16th 2018
- Hosted by the Massachusetts Clean Energy Center
- The application is six steps, with the ability to save and exit after each step
- Includes in-portal communication function and automatic email updates

Renewable Thermal Application

Step 1

Step 2

Step 3

Step 4

Step 5

Step 6

System Information

System name **REQUIRED**

A personalized name for your project

System Address

Street **REQUIRED**

Apartment or Suite

City **REQUIRED**State **REQUIRED**Zip **REQUIRED**

Enter five digit zip code (12345) or five digit code with four digit extension (12345-8789)

About this Application

Systems may choose to size up their classification (Small to Intermediate or Large; Intermediate to Large) if they wish to implement additional metering technology. System owners should refer to the Department's Guideline on Metering for further information.

Please complete all required fields prior to moving to the next Step. Changes to this page will not be saved until the 'Save and Continue' option has moved the application to the next Step.

Contact Us

Tel	(617) 626-1180
Email	thermal.doer@state.ma.us

System Details

Electric Distribution Company **REQUIRED**Gas Distribution Company **REQUIRED**Facility Type **REQUIRED**

Hello Rhonda.

Welcome to your Massachusetts Renewable Thermal application dashboard, where you can check the status of a submitted application or create a new application.

[New Application](#)

My Applications

Application ID	System Name	Application Status	DOER Application Details
Applications In Process			
81	Samantha Test 1 <i>(Technology Type-Evac Tube Collector Solar Thermal)</i>	Need Info	Needs to revise DIS
91	Test 2 <i>(Technology Type-Air Source Heat Pump)</i>	Awaiting DOER / MassCEC Review Submitted View »	
120	TEST 2 <i>(Technology Type-Ground Source Heat Pump)</i>	<div style="display: flex; align-items: center;"> <div style="width: 80%; height: 10px; background-color: #007bff; margin-right: 5px;"></div> 80% </div> Step 5 of 6 Continue »	
172	Test Biomass <i>(Technology Type-Pure Methane Biogas)</i>	Awaiting DOER / MassCEC Review Submitted View »	
173	Test Biomass <i>(Technology Type-Air Source Heat Pump)</i>	Awaiting DOER / MassCEC Review Submitted View »	
174	Test ASHP <i>(Technology Type-Air Source Heat Pump)</i>	<div style="display: flex; align-items: center;"> <div style="width: 80%; height: 10px; background-color: #007bff; margin-right: 5px;"></div> 80% </div> Step 5 of 6 Continue »	
175	Test GSHP <i>(Technology Type-Ground Source Heat Pump)</i>	<div style="display: flex; align-items: center;"> <div style="width: 80%; height: 10px; background-color: #007bff; margin-right: 5px;"></div> 80% </div> Step 5 of 6 Continue »	
176	Test <i>(Technology Type-Wood Pellet Biomass)</i>	<div style="display: flex; align-items: center;"> <div style="width: 60%; height: 10px; background-color: #007bff; margin-right: 5px;"></div> 60% </div> Step 4 of 6 Continue »	
177	SM_ST_SmSHWEvacTubeColl_112717 <i>(Technology Type-Evac Tube Collector Solar Thermal)</i>	Awaiting DOER / MassCEC Review Submitted View »	
178	SM_ST_IntSHWEvacTubeColl_112717 <i>(Technology Type-Evac Tube Collector Solar Thermal)</i>	Awaiting DOER / MassCEC Review Submitted View »	

DOER Application Dashboard

Applications

Filter by Technology

- Heat Pump
- Biomass
- Biogas
- Solar Thermal

Clear Tech Filter

Filter by Applicant Status

- Step 2
- Step 3
- Step 4
- Step 5
- Submitted

Clear Status Filter

Filter by DOER Status

- Returned
- Qualified
- Approved
- Rejected
- Withdrawn

Clear Status Filter

Filter by CEC Status

- PTS Reported
- PTS Recorded
- PTS Cancelled

Clear Status Filter

Show 10 ▾

App ID	Applicant Name	System Name	Technology	Size Non-Solar	Class Non-Solar	Size Solar	Class Solar	City	Application Start Date	Last Updated	Applicant Status	DOER Status	Mass/CEC Status
233		TEST_ST_LrgEvacTubeColl_Jan092018	Evac Tube Collector Solar Thermal			5500.00	Large	Burlington	01-09-2018	01-09-2018	Submitted		
231		test	Pyrolysis Oil Biomass	12.00	Intermediate			derry	01-08-2018	01-08-2018	Step 2		
230		pump it	Ground Source Heat Pump	12.00	Small			Ashfield	01-08-2018	01-09-2018	Submitted		
229		Test	Air Source Heat Pump	1300.00	Large			Boston	01-08-2018	01-08-2018	Step 2		
228		TEST_BG_IntAnaerobicDig_Jan082018	Anaerobic Digester Biogas	95.00	Intermediate			Groton	01-08-2018	01-08-2018	Submitted		
227		rhodeo	Air Source Heat Pump	10.00	Small			Ashby	01-08-2018	01-08-2018	Submitted		
226		Break Time	Cordwood Biomass	12.00	Intermediate			boston	01-08-2018	01-08-2018	Submitted		
225		Dilly Dilly	Flat Plate Collector Solar Thermal			10.00	Small	Amesbury	01-08-2018	01-08-2018	Submitted		

Helpful Links

- [225 CMR 16.00](#)
- [Guideline on Metering and Calculating the Useful Thermal Output for Renewable Thermal Generation Units – Part 1 \(Calculations for Small and Intermediate Generation Units\)](#)
- [Guideline on Metering and Calculating the Useful Thermal Output for Renewable Thermal Generation Units – Part 2 \(Metering for Intermediate and Large Generation Units\)](#)
- [Guideline on Biomass, Biogas, and Biofuels for Eligible Renewable Thermal Generation Units](#)
- [Guideline on Multipliers for Renewable Thermal Generation Units](#)
- [Guideline on Reduction of Greenhouse Gases for Eligible Renewable Thermal Generation Units Using Eligible Woody Biomass](#)
- [Guideline on Biomass Reporting Procedures](#)
- [APS Renewable Thermal Application Portal](#)

Questions?

Thank you for attending our webinar

Warren Leon

RPS Project Director, CESA Executive Director

wleon@cleanegroup.org

Visit our website to learn more about the RPS Collaborative
and to sign up for our e-newsletter:

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