

Comment [01]:

My name is Patrick Devlin and I live in Greenfield. I served for 6 years on the Greenfield Town Council. I served as Chair of the Economic Development Committee, and am proud to say that I chaired the Committee which developed an Ordinance (200-7.19) dated May 2015 to prevent Large Scale Biomass Incineration. A copy of this ordinance is appended. A group of concerned citizens and scientists worked with our committee to craft this legislation, which was spurred by a town wide vote to prevent a Biomass burning plant to be constructed in our Town. Our work was informed by scientific evidence and testimony based on a state mandated committee called the Manomet Study. To date, we have no scientific data which contravenes that study. I wonder what new scientific evidence you have which makes this study outdated?

I probably don't need to remind you that there is ample scientific and medical proof that burning in any form adds to the increase in health related respiratory problems among our citizens, most notably lung cancer and childhood asthma. This assertion is amply supported by the American Lung Association and the American Medical Association.

WE CAN NOT take a step backward now and allow burning to harm our citizenry. The science behind the Manomet Study was unflawed, and I do not understand why you consider burning in any form, to be safe, except perhaps because you are being strongly pressured AGAIN by individuals who would profit from it. It doesn't matter if you are burning for electricity or thermal applications.

Honestly folks, this is not the way Massachusetts wants to go as they strive to meet their emission standards. This will INCREASE emissions not reduce them.

Patrick J. Devlin 8/6/17
Patrick J. Devlin

921 Bernardston Road, Greenfield, MA 01301

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(2) No building shall be constructed or changed in use or configuration, until the Inspector of Buildings has issued a permit. No permit shall be issued until a sewage disposal works permit, when applicable, has first been obtained from the Board of Health and the proposed building and location thereof conform with the town's laws and ordinances. Any new building or structure shall conform to all adopted state and town laws, ordinances, codes and regulations. No Accessory Dwelling Unit shall be occupied until a certificate of occupancy has been issued by the Inspector of Buildings where required.

(3) The Inspector of Buildings shall refuse to issue any permit, which would result in a violation of any provision of this ordinance or in a violation of the conditions or terms of any special permit or variance granted by the Special Permit Granting Authority or its agent.

(4) The Inspector of Buildings shall issue a cease and desist order on any work in progress or on the use of any premises, either of which are in violation of the provisions of this chapter.

(5) Upon request of the homeowner applicant, the Planning Board as SPGA may, after making findings of fact that a waiver is merited given the totality of circumstances, waive standards of Section D of this ordinance.

~ 200-7.19. Biomass and Wood Burning Energy Systems

- A. Purpose. Commercial Scale wood burning is a common practice in Greenfield. The health effects of wood smoke exposure have been well documented and the American Lung Association and other health organizations advise against wood combustion because of the adverse health outcomes. In order to minimize wood smoke exposure to the residents of Greenfield, it is important to establish clear and enforceable standards that take into consideration already existing uses of wood for fuel and the need to reduce air pollution exposures.

The rules governing Biomass and Wood Burning Energy Systems set forth in this ordinance are subject to review as biomass and wood burning energy system technologies improve efficiency and operating standards.

- B. Applicability. Any new or existing commercial biomass energy systems, located in the Town of Greenfield, for thermal, electricity or Combined Heat and Power (CHP) use located on any property shall be subject to all requirements of this ordinance. Commercial biomass energy systems shall be allowed by right within the Planning Industry (PI) and General Industry (GI) Zoning Districts with site plan review by the Planning Board. Commercial biomass energy systems shall be allowed by special permit from the Zoning Board of Appeals within the Central Commercial (CC), Limited Commercial (LC), General Commercial (GC), Health Service (H), and Office (O) Zoning Districts. Commercial biomass energy systems shall be prohibited within the Rural Residential (RC), Suburban Residential (RB), Urban Residential (RA), and Semi-residential (SR) Zoning Districts.

- C. Definitions:

ANAEROBIC DIGESTER -- Anaerobic Digester means the naturally occurring process that converts organic compounds such as wastewater sludge and regional or local organic waste to produce biogas (methane), which can be used as a fuel for thermal use, electricity production, CHP, or as compressed natural gas.

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BIOMASS ENERGY SYSTEM-- Biomass energy system means a thermal and/or energy producing energy system that uses wood pellets, wood chips or stick wood for fuel.

CLEAN DRY WOOD -- Clean dry wood means wood that has no paint, stains, or other types of coatings, and wood that has not been treated with preservatives, including but not limited to, copper chromium arsenate, creosote, or pentachlorophenol, and with a moisture content of 20% or less.

CLEAN WOOD CHIPS -- Clean wood chips means wood chips that are derived from wood that has no paint, stains, or other types of coatings, and wood that has not been treated with preservatives, including but not limited to, copper chromium arsenate, creosote, or pentachlorophenol.

CLEAN WOOD PELLETS -- Clean wood pellets means pellets that are of 100% wood composition with no construction or demolition debris such as pressure treated or painted wood (which may contain heavy metals such as copper, chromium, arsenic, lead and cadmium) or plastic binders or fillers. Pellets must have a calorific value of no less than 8000 Btu/lb, low ash content (<1%), low moisture content (<8%), chlorides less than 300 ppm and no other additives (0%).

COMMERCIAL BIOMASS ENERGY SYSTEM -- Commercial biomass energy system means any biomass burning energy system for thermal, electricity or Combined Heat and Power located on a single property with a total and combined capacity over 250,000 and up to 1 million btu's per hour rated heat input as rated by the test method identified in 310 CMR 7.26(54)(c)2.

EXISTING BIOMASS BURNING ENERGY SYSTEMS -- Existing biomass burning energy systems means any biomass energy system contracted and paid for, or installed before June 17, 2015.

INDUSTRIAL WOOD BURNING ENERGY SYSTEM -- Industrial wood burning energy system means any biomass energy system for thermal, electricity or Combined Heat and Power located on a single property with a total and combined capacity of more than 1 million btu per hour rated heat input as rated by the test method identified in 310 CMR 7.26(54)(c)2.

NEW BIOMASS ENERGY SYSTEM -- New biomass energy system means any biomass energy system contracted and paid for, or installed, after June 17, 2015.

NON-COMPLIANT ENERGY SYSTEMS, APPLIANCES OR DEVICES -- Non-compliant energy systems, appliances or devices means any biomass burning use that does not meet the criteria of this ordinance.

OWNER -- Owner means the owner of any wood burning energy system or appliance and/or the authorized agent of the owner and /or the person who has overall responsibility for the operation of a biomass energy system.

RESIDENTIAL BIOMASS ENERGY SYSTEM -- A biomass burner or boiler that delivers heat to a home or apartment.

SENSITIVE RECEPTOR SITES -- All institutional applications at schools, health care facilities, nursing homes, or other locations with similar sensitive populations.

STICK WOOD BOILER -- A boiler that burns logs or other unprocessed wood, rather than wood chips or pellets.

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TOTAL COMBINED CAPACITY -- Total or combined capacity means the number of btu's for all uses on a single property based on the thermal only btu capacity.

WASTE-TO-ENERGY SYSTEM -- Waste-to-Energy energy system means any energy system that produces thermal energy, electrical energy or combined heat and power from solid waste relying on combustion, pyrolization or other advance combustion technologies.

D. Prohibited Uses.

- (1) Waste-to- energy systems shall be prohibited in the Town.
- (2) Industrial biomass energy systems shall be prohibited in the Town.

E. Exemptions. This ordinance shall not apply to:

- (1) Anaerobic digesters.
- (2) Residential biomass energy systems.

F. Allowable fuels for all new and existing commercial wood burning energy systems:

- (1) Only clean dry wood, clean wood pellets or clean wood chips are allowed.

G. Prohibited fuels. No person shall cause, suffer, allow or permit the burning of any of the following items in a biomass energy system:

- (1) any wood that does not meet the definition of clean dry wood;
- (2) garbage;
- (3) tires;
- (4) lawn clippings, leaves, brush trimmings, or general yard waste;
- (5) materials containing asbestos;
- (6) materials containing lead, mercury, or other heavy or toxic metals;
- (7) materials containing plastic;
- (8) materials containing rubber;
- (9) waste petroleum products;
- (10) paints and paint thinners;
- (11) chemicals;
- (12) coal;
- (13) glossy or colored papers;
- (14) construction and demolition debris;
- (15) plywood;
- (16) particleboard;
- (17) salt water driftwood and other previously salt water saturated materials;
- (18) manure;
- (19) animal carcasses; and
- (20) asphalt products.
- (21) medical waste.

H. Nuisances for all new or existing commercial wood burning energy systems.

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(1) No person shall cause, suffer, allow or permit the operation of any wood burning energy system in such a manner as to create a condition of air pollution as defined in 310 CMR 7.00.

(2) No person shall cause, suffer, allow or permit the operation of any biomass energy system except in conformance with the manufacturer's operating and maintenance instructions.

(3) No wood burning energy system shall create a nuisance to the surrounding properties or the public as defined and enforced under MGL Chapter 111 Section 122.

I. Biomass Energy System change out requirements.

(1) Any commercial biomass energy system for thermal, electricity or CHP use located on any property shall be uninstalled, and no longer used on that property in the case that the property changes ownership, unless it meets the requirements for biomass energy systems defined in this ordinance within six (6) months of sale.

J. Performance Standards for Commercial Biomass Energy Systems.

(1) All new commercial scale wood burning devices or energy system shall be subjected to a Board of Health environmental impact site assignment.

(2) New commercial biomass energy systems must achieve the following standards. All systems shall be limited to high-efficiency and low-emissions systems with thermal storage, bulk storage and emission control technology and use a sustainable premium wood pellet fuel or clean dry wood or clean wood chips. The system operation must be optimized using an energy management system to provide maximum efficiency on a seasonal and diurnal basis and minimize boiler cycling. Commercial Biomass Energy Systems must follow each of these criteria

(a) **Efficiency Standards.** Commercial wood pellet energy systems and wood chip energy systems must be fully automatic in the case of pellet boilers, and wood chip boilers must have a fully automated combustion process – though fuel can be delivered manually from the bulk storage container to the combustion day bin. They must be low mass (low volume) and have sensors and controls to optimize combustion performance. This is most easily achieved using a staged combustion design with lambda control. All commercial biomass energy systems must have a minimum efficiency of 85% at rated output using the higher heating value (HHV) of the pellet fuel or wood chip fuel if tested using an input/output method. Alternatively a simple full load, steady-state combustion efficiency measurement by the stack loss method (Canadian Standards Association B415) may be used, but in this case, the minimum efficiency requirement is 88% HHV. Where combustion efficiency is used, the return water temperature must be greater than 130 degrees Fahrenheit.

(1) **Multi-Boiler Cascade System** (recommended for all commercial biomass energy systems) - Cascading two or more biomass boilers allows for the installed equipment to meet seasonal heat demand most efficiently. Boilers are brought online at maximum efficiency as needed to meet the heating load.

(2) **Energy Efficient Motors.** All commercial biomass energy systems must have motors that are National Electrical Manufacturers Association (NEMA) designated "premium efficiency" motors. Motors must meet or exceed NEMA's MG1-1993 standard.

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(b) Emissions Standards.

(1) Fine Particles (PM): The biomass system for commercial installations shall have a PM emissions rate of no more than 0.080 lb/MMBtu. All institutional applications at schools, health care facilities, nursing homes, or other locations with similar sensitive populations, must have a PM emissions rate of no more than 0.030 lb/MMBtu.

Installers and owners shall include advanced emissions control including bag houses and static precipitator technology to achieve emissions rates lower than these basic requirements, including emissions control technologies such as condensing units that can also improve energy efficiency of the heating system. The owner will be required to submit particulate emissions performance verification results. Testing for PM must have been performed by an independent third-party using the U.S. Environmental Protection Agency (EPA) Conditional Test Method 39, EPA Federally Referenced Methods 5 and 202, or EPA Other Test Method 15. Alternatively, European Norm 303-5 test results may also be considered, but must include dust and organic gases.

(2) Carbon Monoxide (CO): Commercial biomass energy systems must have a flue gas CO concentration at rated output of no more than 270 ppm at 7% oxygen at high load. For health and safety, a CO detection system must be included in the boiler room design. The CO monitoring system must have the ability to sound an audible alarm, provide phone notification to energy systems staff and trigger an automatic boiler shutdown if necessary.

(3) Nitrogen Oxide Emissions: Wood pellet and wood chip boilers shall use a staged combustion cycle in order to reduce nitrogen oxide emissions.

(4) Stack Height: The design of the exhaust stack and location should be done carefully to prevent exposure to building occupants and visitors or to people in frequently occupied outdoor areas such as playgrounds. The energy systems boiler stack height must be sufficient to adequately disperse emissions from the immediate vicinity and prevent entrainment of exhaust gases and particles into the building air intakes and to minimize exposure at ground level adjacent to the building on which the stack is being located.

At a minimum, the stack shall be 5 feet above the highest point of the building that it is serving and above the roof height of any other taller building within 100 feet of the unit. In no case should the stack height be at or below the building height. In addition, the stack should not be placed in close proximity to an air intake or operable window. Stack design should also minimize horizontal piping and bends.

(c) Health and Environmental Impact Assessment. To reduce exposure to outdoor air pollutants with a particular focus on burdened neighborhoods commercial biomass energy systems at schools, hospitals or locations with similar populations, the owner will be required to perform a health assessment (e.g. air impact assessment) to evaluate the potential public health risks associated with burning biomass. This assessment consists of modeling the anticipated emissions due to the new commercial biomass system and evaluating the resulting concentrations with a focus on ambient concentrations in the schoolyard, near doors and windows, and at building air intakes. An estimate of the number of deliveries by the pellet trucks or wood chip trucks and a comparison to the current fuel delivery schedule must be included as well. The resulting ambient particulate and gaseous concentrations are then compared to the conditions existing prior to the pellet or wood chip heating system installation. If there is a net increase in ambient concentrations,

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then an assessment of exposure is performed. Owners shall include an assessment of any higher emitting biomass sources (e.g. outdoor wood boilers or pre-certification wood stoves) to be switched-out with a cleaner burning unit to result in no net increase in emissions for the immediate vicinity.

(d) Proper Boiler Sizing. Commercial Biomass energy systems shall be sized to meet the current heat load of the building, not the anticipated heat load or the peak load. Cascading boilers using biomass or existing fossil fuel boilers shall cover peak heat loads. Additionally, the biomass energy system must be designed for installation in a weatherproof, insulated space inside a building, either in a basement or a room designed specifically to accommodate the system. If space does not permit, it may be installed in a separate structure. Boilers and systems must be sized and systems planned to optimize performance throughout the heating season using thermal storage. Use of a cleaner heat source during heating season shoulders (late October or March) and for supplemental needs is strongly encouraged. These cleaner heat sources may include, for example, natural gas-, propane-, or oil-fired boilers and solar thermal sources. A bin-hour analysis of heating needs based on an energy audit, previous heating needs, and historical local temperatures during the heating season should be performed. The annual heat load profile, diurnal heat load profile on demand day, and diurnal heat load profile on a shoulder day should also be determined. Biomass energy systems shall be sized to $\leq 60\%$ of the design load as it will capture the majority of the heating season and promote higher performance. Higher loads may be met by utilizing an existing natural gas, propane, or oil-fired boiler, a new boiler, staging of wood fired boilers, or some other strategy involving careful energy management and thermal storage. Low loads, common during shoulder months, can be met by an auxiliary boiler or other energy management strategy. The energy system must be sized based on the heat load of the building where the heat load is determined using a well defined protocol such as Manual J of the Air Conditioning Contractors of America (ACCA) or an equivalent energy simulation program.

(e) Thermal Storage. Commercial scale systems must include thermal storage to minimize boiler cycling and to assist in energy management strategies. The minimum size thermal storage should be based on the boiler manufacturer's recommendation for the application and size of the boiler but must not be less than 20 gallons per 10,000 Btu/h. For example, a commercial 1.0 MMBtu/h boiler would require a minimum storage of 2,000 gallons.

(f) Pellet and woodchip storage. The risks of exposures of high levels of dust and off-gas CO shall be minimized. Due to concerns regarding explosive dust and CO exposure and the absence of a documented effective ventilation strategy for pellet and wood chip storage, all pellets and woodchips storage must be outside of the building. That may include confined spaces that are: 1) large enough for a person to enter to perform work, 2) have limited means of ingress and egress, and 3) are not intended for human occupancy. Pellet storage silos meet these criteria and because of the CO off-gassing, require an Occupational Safety and Health and Administration (OSHA) permit. Owners shall identify fire and building code and health and safety features including all applicable training requirements for personnel. Signs communicating potential CO hazards associated with bulk pellet and wood chip storage must also be posted. In addition:

- (1) Pellet Boiler systems must utilize an appropriately sized covered bulk fuel storage unit suitable for the capacity of the proposed boiler; and must receive bulk pellet delivery.
- (2) Wood chip boiler systems must utilize an appropriately sized covered bulk fuel storage unit suitable for the capacity of the proposed boiler. Recommended: Bulk chip storage units utilizing air flow to partially remove water vapor from wood chip surfaces

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and to improve the caloric value of the feedstock is HIGHLY recommended. Owners should evaluate incorporating any technology utilizing passive evaporation from airflow such as solar hot air, waste or by-product heating or active heating such as fan blown air to partially pre-dry chips. An accumulator tank is recommended to prolong pump life.

(g) Energy Management System.

(1) The commercial biomass energy system must use an energy management system and optimize boiler operation to meet seasonal and diurnal heating needs of the particular building's heat load. The system design should use a strategy that optimizes the use of both the pellet or woodchip boiler and thermal storage and the temperature requirements of the heat distribution system. By using a large enough thermal storage tank to help meet the peak demand and a properly sized boiler, the call for heat may be met with a smaller boiler without the need for additional heat input from the existing oil-fired boilers. The hot water storage can be recharged during periods when there is little call for heat in the building, which is several hours each day.

(2) All systems shall modulate to lower output and/or shut down when the heating load decreases or has been satisfied.

(3) Pellet boilers and wood chip boilers must use a multipass heat exchanger.

(4) Containerized high-efficiency biomass systems that offer substantial savings compared to boiler room renovations are encouraged, but not required. When containers are used, the stack height must be sufficient to adequately disperse emissions from the immediate vicinity and prevent entrainment of exhaust gases and particles into the building air intakes. Steps should be taken to minimize thermal losses to non-heated spaces including, but not limited to insulating the container that houses the boiler and insulating pipes between the container and building(s) being served.

(h) Integration of Solar Thermal. The integration of solar thermal water heating technology is encouraged. Solar thermal integration reduces fuel consumption and can prolong the life of the biomass boiler. A solar thermal system would be integrated into the biomass heating system using best engineering practices.

- K. Air Plan Application. All solid fuel hand fed Biomass Boilers over 1 MMBTU heat input rating, and solid fuel automatic fed Biomass Boilers over 3 MMBTU heat input rating, as subject to 310 CMR 7.00, must submit a Comprehensive Plan Application to MassDEP.
- L. Continuous Compliance. All Institutional, Commercial and Industrial boilers, as defined in 40 CFR Part 63 subpart JJJJJ section 63.11237 are subject to a biennial tune-up as defined in 40 CFR Part 63 subpart JJJJJ section 63.11223, and annual tune ups according to MGL Chapter 146.
- M. Severability. Each part of this regulation shall be construed as separate to the end that if any paragraph, sentence, clause, or phrase thereof shall be held invalid for any reason, the remainder of that regulation and all other regulations shall continue in full force. If regulations are promulgated by the Greenfield Board of Health, or state, federal or other local agencies that are more restrictive than the present regulations, the state, federal or local regulations will supersede only those portions of this regulation that are less restrictive than those state, federal or local regulations.

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- N. Remedies. The owner of any biomass energy system operated in violation of this ordinance shall be warned on two separate occasions. Thereafter, the owner will be punished for the first offense, by a fine of not less than fifty dollars not more than one hundred dollars and for a subsequent offense, by a fine of not less than two hundred dollars nor more than three hundred dollars. For the purpose of this paragraph each day or part thereof of violation of these regulations whether such a violation is continuous or intermittent shall be construed as a separate and succeeding offense. The enforcement agents shall order the energy system cease its operation if the energy system is deemed a continued nuisance or a health hazard.
- O. Enforcement. This ordinance shall be enforced by the Board of Health, Fire Department, Building Inspector, or their designees.

The rules governing Biomass and Wood Burning Energy Systems set forth in this ordinance are subject to review as biomass and wood burning energy system technologies improve efficiency and operating standards.

ARTICLE VIII Administration

~ 200-8.1. Enforcement.

- A. Inspector of Buildings.
- (1) The Inspector of Buildings shall enforce this ordinance.
 - (2) The construction, alteration, or use of any building, structure, or premises shall require a permit from the Inspector of Buildings.
 - (3) The Inspector of Buildings shall not issue a permit for the construction, alteration or use of any building, structure or premises in violation of any provision of this ordinance.
 - (4) Whenever any permit or license is refused because of some provision of this ordinance, the reason therefor shall be clearly stated in writing.
- B. Violations. Any person violating any of the provisions of this ordinance, or any of the conditions under which a permit, special permit, variance, or appeal is issued or granted, shall upon conviction be fined not more than one hundred dollars (\$100) for each day that each violation continues following written notification by the Inspector of Buildings of such violation.

~ 200-8.2. Permits.

- A. This ordinance or any amendment to it shall not affect any lawful permits issued or buildings begun previous to notice of hearings on the ordinance or amendments to it, as provided in MGL c. 40A, ~ 6, as amended.
- B. Construction or operations under a building or special permit shall conform to any subsequent amendment of this ordinance unless the use or construction is commenced within a period of six (6) months after the issuance of the permit and in cases involving construction, unless such construction is continued through to completion as continuously and expeditiously as is reasonable.

~ 200-8.3. Special permits.