

Senate Chairman Benjamin B. Downing  
Joint Committee on Telecommunications, Utilities and Energy  
State House, Room 413-F Boston, MA 02133

House Chairman John D. Keenan  
Joint Committee on Telecommunications, Utilities and Energy  
State House, Room 473-B Boston, MA 02133

## **Testimony of the Partnership for Policy Integrity and the Project for Energy Accountability**

### **S.1593, An Act Relative to Credit for Thermal Energy Generated with Renewable Fuels**

#### **Attachments:**

- New York’s “Cleaner, Greener Communities Program: Biomass heating system program requirements” brochure.
- Chapters 3 & 4 of “Biomass Energy in Pennsylvania: Implications for Air Quality, Carbon Emissions, and Forests.” Partnership for Policy Integrity, Dec. 2012.

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August 13, 2013

Dear Chairman Downing, Chairman Keenan, and Members of the Committee,

It was exactly a year ago that Massachusetts finalized regulations on large-scale biomass energy after a long and difficult public process. The Massachusetts rules are the first science-based regulations in the country to recognize that utility-scale biomass energy is a large net source of greenhouse gas emissions,

and as such, should not receive renewable energy subsidies. With regard to conventional air pollution, it is increasingly recognized that biomass energy is very polluting – for instance, the Massachusetts Medical Society has passed a resolution opposing biomass energy because it poses an “unacceptable risk” to human health,<sup>1</sup> and the American Lung Association not only opposes subsidies for bioenergy,<sup>2</sup> but also “strongly opposes the combustion of wood and other biomass sources at schools and institutions with vulnerable populations.”<sup>3</sup>

However, looking at S. 1593, it is as if none of those policy developments ever occurred. As written, the bill shows no awareness or concern for impact that “thermal only” bioenergy may have on greenhouse gas emissions, air quality, or forests. Its construction is so open, even the biomass energy proponents who have commented on the bill have called for it to be made more restrictive.<sup>4</sup>

We believe the inclusion of biomass energy in S. 1593 is like a rotten apple that is going to spoil the barrel for the truly “clean” technologies that would be promoted by this bill, and that it should be excluded altogether. This bill would subsidize a technology, wood burning, that is one of the largest sources of air pollution in the U.S., a technology that actually causes people to get sick and die. This is not an exaggeration. The effects of particulate pollution on respiratory and cardiac health are well-known and characterized by a linear response that extends below the current EPA health threshold. “Natural experiments,” such as the example of how traffic restrictions during the Atlanta Olympics led to decreased particulate levels and lower hospitalization rates for asthma,<sup>5</sup> confirm that reducing pollution pays dividends virtually immediately in improved health and reduced medical costs. Conversely, “bad air days” are accompanied by increased rates of respiratory and cardiac incidents. Regional air quality monitoring does not reflect the intense patches of air pollution that can develop in certain areas, so that air quality is very poorly characterized at the local level. If you are an asthmatic, the pollution emitted by even a “well controlled” biomass burner in your neighborhood can put you in the hospital, particularly if it is adding to the existing burden of air pollution.

It also seems strange to see bill 1593 offered as it is, given the efforts that were expended by all in recent years – citizens, environmental groups, and government officials – to enact a serious and science-based policy on utility-scale bioenergy. In that context, the present promotion of “thermal-only” bioenergy with absolutely no scrutiny or side-rails of any kind is incompatible with the standard previously set by the State. The bill almost looks like an “end-run” around Massachusetts’ new biomass regulations, given that it contains no efficiency standards, which are essential to reducing net greenhouse gas emissions from bioenergy and therefore a critical component of the new rules. If biomass energy continues to be included in S. 1593, the bill needs to be dramatically rewritten, but only after a science-driven public process that scrutinizes the real impacts of “thermal only” bioenergy on greenhouse gas emissions, air quality, and forests. The people of Massachusetts deserve no less.

### **Greenhouse gas emissions from “thermal-only” biomass units exceed those from fossil fuels**

There is now broad consensus in the scientific community that burning biomass for energy creates a “carbon debt,” increasing the amount of CO<sub>2</sub> in the atmosphere over what would be emitted if fossil fuels

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<sup>1</sup> Massachusetts Medical Society. “Massachusetts Medical Society Adopts Policy Opposing Biomass Power Plants.” Press release, December 9, 2009

<sup>2</sup> Letter from American Lung Association to Representatives Waxman and Markey, requesting that bioenergy not be subsidized as renewable energy under the American Clean Energy and Security Act. June 24, 2009.

<sup>3</sup> American Lung Association Public Policy Position on Energy. Approved June 11, 2011.

<sup>4</sup> Testimony of the Massachusetts Renewable Thermal Coalition on S. 1593, July 16, 2013.

<sup>5</sup> Friedman M.S., et al. 2001. Impact of changes in transportation and commuting behaviors during the 1996 Summer Olympic games in Atlanta on air quality and childhood asthma. *Journal of the American Medical Association* 285:897-905.

were used.<sup>6</sup> This occurs not only because burning biomass for energy emits more CO<sub>2</sub> at the stack than fossil fuels, but also because harvesting forests for fuel decreases their CO<sub>2</sub> uptake capacity for some period of time, and the reduction in this “sink” for CO<sub>2</sub> increases CO<sub>2</sub> in the atmosphere just as much as increasing emissions does. It is true that the Manomet Study, which underlies the Massachusetts regulations governing bioenergy eligibility for the RPS, did conclude that small-scale thermal biomass burners can have shorter “payback” times of this carbon debt than utility-scale facilities. This is because while there is a large difference in efficiency between utility-scale biomass power plants and fossil-fueled power plants (24 percent, versus 32 percent to more than 45 percent), there is less of a difference in efficiency between thermal-only biomass burners and thermal-only oil or gas burners. The smaller efficiency gap reduces the amount of excess CO<sub>2</sub> that is emitted by burning biomass in a thermal-only burner, relative to burning fossil fuels.

However, there should be no confusion on this point – even for the highest-efficiency thermal-only systems, biomass burners still emit more CO<sub>2</sub> at the stack than fossil-fuel burners per unit energy generated. If, after being harvested for biomass fuel, trees are allowed to fully grow back for several decades (which assumes no further harvesting, a condition that is rarely met) the bioenergy carbon debt can be paid off. For thermal-only systems, paying off the carbon debt – meaning that biomass CO<sub>2</sub> emissions have been drawn down by forest regrowth so that net emissions are now equivalent to those from an oil burner – takes 15 - 30 years to when a mixture of whole trees and residues is used as fuel. It takes 60 - 90 years to re-sequester the extra CO<sub>2</sub> from burning biomass compared to a natural gas thermal-only system.<sup>7</sup>

#### *The pellet dilemma: tradeoffs in reducing conventional pollutants and greenhouse gases*

In fact, these time-spans are very likely underestimates, because the Manomet Study did not fully characterize the carbon debt associated with wood pellets, the fuel that many thermal-only biomass systems are likely to burn. Pellets are much “cleaner burning” than green wood chips – in fact, many units that promise reduced emissions of particulate matter (PM) require pellets to be used as fuel. Wood chips tend to be fairly wet (the industry standard for water content is 45%) and also they can be quite dirty, making increasing CO and PM emissions and making combustion uneven. A major problem with pellets, however, is that they are even more “carbon intensive” a fuel than regular wood chips. It takes more than two tons of trees to make one ton of pellets, because high-quality pellets are made from debarked trunkwood, not low-diameter “waste” wood or bark. Further, once the trees are harvested, they must be ground up, cooked, and then extruded in a die to make the pellets – a process that is quite energy-intensive.

We’ve seen the advocacy letter filed by the Massachusetts Renewable Thermal Energy Coalition on S. 1593. The letter claims that the bill would reduce emissions of greenhouse gases, which is arguably a

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<sup>6</sup> For example: Colnes, A., et al. 2012. Biomass supply and carbon accounting for Southeastern Forests. Biomass Energy Resource Center, Montpelier, VT.; Mitchell, S., et al. 2012. Carbon debt and carbon sequestration parity in forest bioenergy production. GCB Bioenergy (2012) doi:10.1111/j.1757-1707.2012.01173.x; McKechnie, J. et al. 2011. Forest bioenergy or forest carbon? Assessing trade-offs in greenhouse gas mitigation with wood-based fuels. Environmental Science and Technology, 45: 789-795. Hudiberg, T., et al. 2011. Regional carbon dioxide implication of forest bioenergy production. Nature Climate Change 1, 419-423. EPA’s Science Advisory Panel Review of EPA’s Accounting Framework for Biogenic CO<sub>2</sub> Emissions from Stationary Sources (September 2011) concluded, “Carbon neutrality cannot be assumed for all biomass energy a priori... For logging residues and other feedstocks that decay over longer periods, decomposition cannot be assumed to be instantaneous.” Burning forest residues is considered to have emissions that affect the climate.”

<sup>7</sup> Walker, T., et al. 2013. Carbon accounting for woody biomass from Massachusetts (USA) managed forests: a framework for determining the temporal impacts of wood biomass energy on atmospheric greenhouse gas levels. Journal of Sustainable Forestry 32:1-2, 130-158

misrepresentation, given that the letter does not specify a timeframe. Given the Manomet Study's conclusions that even thermal-only systems increase CO<sub>2</sub> emissions for a period of years to decades, and given the amount of time and effort that went into crafting new bioenergy regulations that were reasonably defensible from a scientific perspective, it is really unacceptable for the state to be contemplating extending subsidies to thermal-only biomass energy without due consideration of the greenhouse gas implications.

### **Wood smoke is a significant pollution problem**

Residential wood smoke is a significant source of pollution in many rural areas of the United States, for instance contributing over 90% of total carbon-containing particulate emissions in rural areas of New York.<sup>8</sup> Ameliorating this can have direct effects on health. A study conducted in the inversion-prone region of Libby, Montana, found that a woodstove change-out program that replaced around 1100 residential stoves with new, EPA-certified models significantly reduced both ambient particulate matter levels and incidence of “wheeze” and other respiratory symptoms including cold, bronchitis, influenza, and throat infection in children.<sup>9</sup> Adding new sources of woodsmoke to a community, as S. 1593 intends to do by offering subsidies, can only increase air pollution and in turn the incidence of respiratory and heart disease.

#### *Emissions from biomass combustion are of special concern for health*

An important characteristic of particulate matter (PM) from biomass combustion is the large proportion that is emitted in 2.5 micron (PM<sub>2.5</sub>) size class and below, with a substantial fraction and often the majority in the sub-1 micron size class,<sup>10</sup> the hardest size fraction to capture with emissions controls and one that has special implications for health, due to its ability to penetrate deep into the lungs. The impacts of a single residential woodstove on a neighborhood's air quality can be profound. Yet S. 1593 would subsidize units with far greater emissions than a woodstove. EPA-certified woodstoves are supposed to emit no more than 7.5 grams per hour of particulate matter. If a wood stove were operated year-round at this rate, it would emit about 145 pounds of PM, or 0.0725 tons. In contrast, a 2.5 MMBtu/hr biomass burner (the size that might be installed in a public building) emitting 0.1 lb/MMBtu particulate matter (the Massachusetts standard for small biomass burners) would emit 1.095 tons of particulate matter over the course of a year, which would be the equivalent of having 15 EPA-certified woodstoves venting out of that single stack. As stacks for small burners tend to be rather short, biomass burners installed at schools and other public buildings disperse their pollution right where people are. However, air quality modeling is rarely if ever conducted for small facilities, even though their emissions rates are greater than the emissions rates for utility-scale burners where modeling is required, and their potential impacts on air quality in the vicinity can be just as large.

#### *Emissions from biomass combustion are especially dangerous for children's health*

Given these facts, the portrayal of bioenergy as a “clean” source of heat in states with “fuels for schools” programs really depends on keeping people in the dark about what the emissions are, refraining from air quality modeling and local air quality monitoring, and assuming that schools and other public places

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<sup>8</sup> Johnson, P., et al. 2008. Assessment of carbonaceous PM<sub>2.5</sub> for New York and the region. Final report 08-01. Report prepared by Northeast States for Coordinated Air Use Management for the New York State Energy Research and Development Authority. March, 2008

<sup>9</sup> Noonan, C.W. et al. 2012. A rural community intervention targeting biomass combustion sources: effects on air quality and reporting of children's respiratory outcomes. *Occup. Environ. Med.* 69:354-360. Doi: 10.1136/oemed-2011-100394

<sup>10</sup> Sippula, O. 2010. Fine particle formation and emissions in biomass combustion. Dissertation, Department of Environmental Science, University of Eastern Finland, Kuopio, Finland.

where such boilers are installed don't keep good records on incidence of asthma and other health problems before and after installation of a biomass burner. In Massachusetts, we have to do better. With a high rate of pediatric asthma in the state (10.9 percent in 2009<sup>11</sup>), it is fair to say that children are an exceptionally "susceptible" population for health problems from air pollution that would be impacted by any increase in the number of woodburners in Massachusetts communities.

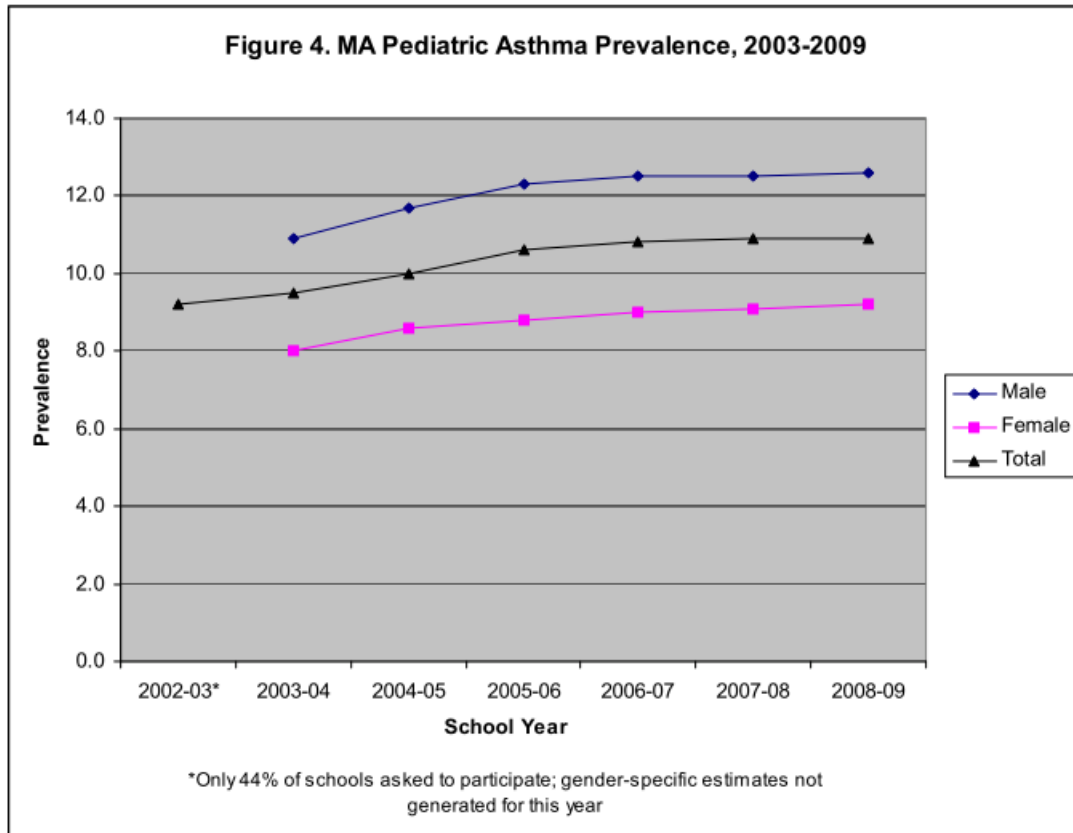


Figure 1. Incidence of pediatric asthma in Massachusetts.<sup>12</sup>

Installing a biomass burner at a public building essentially forces the people in that building to be a "captive audience" for the emissions, which include particulate matter, carbon monoxide, nitrogen oxides, and hazardous air pollutants like benzene and formaldehyde that are emitted even when "clean" wood is burned. Children have higher respiratory rates per unit weight and are more active than adults, taking in a greater volume of air, thus even if they don't have a pre-existing respiratory condition, they are primed to be susceptible to air pollution. Laws restricting school bus idling, and fines for companies that idle excessively (as just occurred in Eastern Massachusetts, where EPA fined a company \$35,000<sup>13</sup>), reflect a growing awareness that air pollution and schools are a bad combination. Replacing old dirty oil burners at homes, schools, and other public buildings with solar thermal heat could help reduce the incidence of

<sup>11</sup> Massachusetts Department of Public Health, Bureau of Environmental Health. Pediatric Asthma in Massachusetts 2008 – 2009. September, 2012. Boston, MA.

<sup>12</sup> Ibid.

<sup>13</sup> U.S. Environmental Protection Agency. Press Release: School Bus Company to Install Automatic Idle Shut-off Controls and Pay Penalties under the Clean Air Act. July 17, 2013. Boston, MA.

asthma, but replacing oil burners with even higher-emissions biomass burners will increase it. Why would the legislature subsidize these technologies equally?

### **S. 1593 apparently subsidizes all thermal technologies no matter how polluting**

The extension of subsidies under S. 1593 to “any facility that generates useful thermal energy” leaves the door open to the most polluting technologies to be subsidized under this bill. Even the word “facility” is not defined in the law that’s being modified, Chapter 25A of the General Laws. Fireplaces, woodstoves burning cordwood, pellet stoves, outdoor wood boilers, larger institutional size pellet boilers, cordwood boilers, wood chip boilers, boilers with thermal storage and boilers with just a water jacket – these are all wood burning technologies that generate useful thermal energy, all of which could apparently receive subsidies under this bill.

#### *Contaminated wood as fuel – a growing concern*

There is nothing in S. 1593 to prevent a unit from burning contaminated materials, such as construction waste or garbage. While the Pellet Fuels Institute has voluntary standards for pellet quality, there is no regulatory pellet fuel standard in the United States, thus there is little control over what wood is used. Some pellet manufacturers do appear to be using contaminated wood in their products. A recent study from New York found elevated levels of arsenic, chromium, cadmium, lead, mercury, nickel, copper and zinc in 15% of a selection of 100 different brands of pellet fuels purchased in the state. In some cases, metals concentrations were thousands of times higher than in the low-concentration, presumably uncontaminated samples.<sup>14</sup> Currently, there is nothing to stop someone who owns a woodburner from burning contaminated fuels.

#### *Outdoor wood boilers should be banned, not subsidized*

With regard to the types of units S. 1593 would subsidize, there does not appear to be anything in the bill that would prevent outdoor wood boilers (OWBs) from getting subsidies. Legislators are probably aware that OWBs are a significant emerging health concern, noted for their ability to pollute entire neighborhoods. Though a typical OWB can emit 10 lb of particulate matter a day, they are barely regulated at the federal level, which is why the State of Massachusetts has just joined a Notice of Intent to Sue that was filed against EPA,<sup>15</sup> noting that the Agency is overdue in issuing protective regulations on OWBs. Until the EPA gets its regulatory house in order, the States are responsible for protecting citizens from wood smoke pollution, but unfortunately, far from doing that, S. 1593 actually incentivizes the most polluting technologies.

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<sup>14</sup> Rector, L., et al. 2011. Residential wood pellets: elemental composition, market analysis and policy implications. Presentation at “Environmental monitoring, evaluation and protection in New York: linking science and policy” Conference hosted by New York State Energy Research and Development Authority, November 15 & 16, Albany, N.Y. (available at <http://www.nyserda.ny.gov/Page-Sections/Environmental-Research/EMEP/Conferences/2011-EMEP-Conference/~media/Files/Events/Events%20and%20Conferences/EMEP%202011/presentations/Rector.ashx>).

<sup>15</sup> Attorneys General of New York, Connecticut, Maryland, Massachusetts, Oregon, Rhode Island, and Vermont, and the Puget Sound Clean Air Agency. New Source Performance Standards for Residential Wood Burning Heaters - Notice of Intent to Sue Pursuant to 42 U.S.C. § 7604(b)(2). August 1, 2013.



Figure 2. Outdoor wood boiler. Photo credit Phil Etter; photo borrowed from Burkhard, 2013.<sup>16</sup>

*Current particulate matter emissions standards in Massachusetts not protective enough*

Currently, Massachusetts requires an air permit for any biomass burner greater than 1 MMBtu/hr, and restricts emissions to 0.1 lb/MMBtu on heat input basis. While this is the most rigorous standard in the Northeast, it needs to be updated. The 0.1 lb/MMBtu standard is much higher than the emissions levels that can now be achieved by many thermal-only wood-burning devices (and again, it is orders of magnitude higher than typical emissions from new gas or oil boilers). Further, as low as the 1 MMBtu permitting threshold may seem, in fact, many institutional and all residential boilers are smaller than this, meaning that a large portion of the boilers subsidized by S. 1593 could be exempt from *any* regulation on emissions under the current regulations in Massachusetts. It is also important to note that the Massachusetts emissions rules for small burners currently only apply to particulate matter, and there are no emissions standards for other pollutants, including carbon monoxide (CO), which is emitted in large and sometimes health-threatening quantities by wood-burners, and is a particular safety concern for units installed indoors.<sup>17</sup>

*All biomass burners are not created equal*

Wood burning technologies can have wildly differing emissions rates, and it requires a fair degree of knowledge to install and operate one correctly. Figure 3 is from research performed by the New York State Energy Research and Development Authority (NYSERDA). It shows the very large difference in particulate emissions rates from various wood- and oil-burning technologies, with a conventional hydronic heater (“HH”, a burner that uses a water tank for external thermal storage), emitting around 10 lb of particulate matter a day.

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<sup>16</sup> Burkhard, Ellen. Presentation of New York State Energy Development Authority to NASA Air Quality Applied Sciences Team Meeting. University of Maryland, June 5, 2013.

<sup>17</sup> Butcher, T., and Russell, N. Review of EPA Method 28: Outdoor wood hydronic heater test results. Final report, prepared for the New York State Energy Research and Development Authority. September, 2011. Albany, NY.



## PM2.5 Emissions (lb/day) from Residential Heating Systems for a January day in Upstate NY

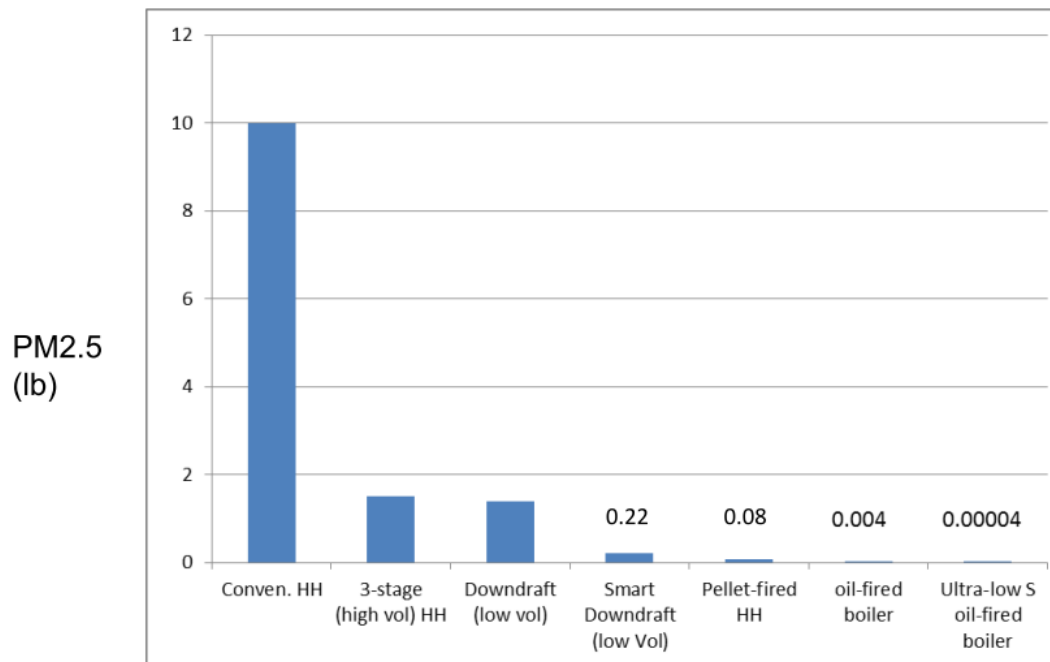


Figure 3. Particulate matter emissions from wood- and oil-fired thermal only technologies.<sup>18</sup>

The graph shows that even though wood pellet burners are “cleaner burning” than other fuels, the particulate matter emissions from even a well-controlled pellet-fired hydronic heater (at 0.08 lb/day) are 2,000 times greater than a boiler firing ultra-low sulfur fuel oil (at 0.00004 lb/day). The presentation from which this graph was taken concludes that wood heating appliances are “gross emitters” compared to conventional technologies/fuels.

For larger institutional biomass burners that burn chips or pellets, “two stage” combustors – where the combustion of the volatile gases driven off from wood heating is spatially separated from the fuel itself – are “cleaner burning” and more efficient than devices where the combustion occurs within the fuel pile. Such “staged combustion” allows greater control of oxygen flow and reduces carbon monoxide emissions. European burner technology has made strides in this regard and there has been a large improvement in unit efficiency and decrease in CO emissions over the last 30 years, but units available in the United States are generally not as advanced. In Europe, 25 percent of wood boilers now achieve a thermal efficiency of 87 percent, based on the higher heating value of wood.<sup>19</sup>

### *Emissions vary depending on how systems are operated*

However, having the most advanced technologies only goes part of the way in reducing pollution from wood-burning devices. Correct operation is also essential for controlling emissions, which is another

<sup>18</sup> Burkhard, Ellen. Presentation of New York State Energy Development Authority to NASA Air Quality Applied Sciences Team Meeting. University of Maryland, June 5, 2013.

<sup>19</sup> Gibbs, R. and Butcher, T. Staged combustion biomass boilers: linking high-efficiency combustion technology to regulatory test methods, Final Report 10-19. New York State Energy Research and Development Authority, August, 2010.



feature of bioenergy that distinguishes it from “plug and play” technologies like solar panels, which once installed, simply operate with no emissions. Wood burners have the lowest emissions rates when they are operated at full capacity, where optimal combustion conditions ensure that carbon is oxidized to CO<sub>2</sub>, rather than being partially oxidized to carbon monoxide (CO), or burned incompletely and emitted as particulate matter (“soot” and “black carbon” are products of incomplete combustion). “Cycling” of small-scale biomass burners, where heat output varies over time, is associated with greatly increased CO and PM emissions, compared to consistent operation at high temperature. There is a strong inverse relationship between energy efficiency and emissions, such that as efficiency decreases, the emissions rate per unit energy increases, often in a nonlinear fashion.<sup>20</sup> Figure 4 shows the increase in particulate matter emissions for outdoor wood boilers as the units are operated at decreasing capacity.

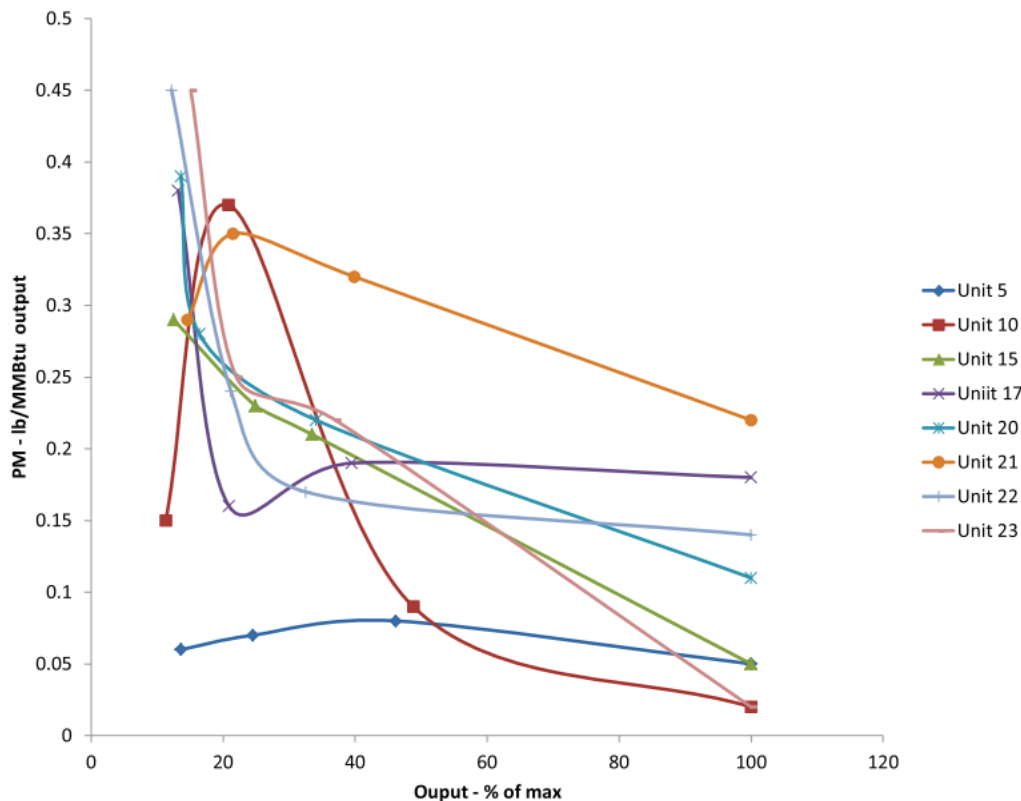


Figure 4. Relationship between particulate matter emissions and heat output for several outdoor wood boilers.<sup>21</sup>

One design feature that can significantly reduce emissions is combining wood heaters with external thermal storage, because having a large thermal storage tank allows all the fuel in the firebox to be burned at high efficiency, and that heat to be stored for later use, avoiding periods of oxygen starvation and smoldering, which is when the greatest emissions occur.<sup>22</sup>

<sup>20</sup> Ibid.

<sup>21</sup> Butcher, T., and Russell, N. Review of EPA Method 28: Outdoor wood hydronic heater test results. Final report, prepared for the New York State Energy Research and Development Authority. September, 2011. Albany, NY.

<sup>22</sup> Gibbs, R. and Butcher, T. Staged combustion biomass boilers: linking high-efficiency combustion technology to regulatory test methods, Final Report 10-19. New York State Energy Research and Development Authority, August, 2010..

*Correct unit sizing is essential to reducing emissions*

Because of the inverse relationship between heat output and emissions rate, correct sizing of a unit is very important for controlling emissions. Wood boilers are often inherently sized to pollute, because they are often installed to meet the “design load” – that is, the heating load required on the coldest day, which generally occurs less than 2% of the year. An evaluation of wood-fired hydronic heaters found that boilers that are sized to meet heat demand on the coldest day operate most of the time in a much reduced capacity, thus greatly increasing emissions. For instance, boilers spend 90 percent of their time at less than 16% of design load in a “cold” (New York) climate, and at less than 7 percent of design load in a “moderate” (Maryland) climate.<sup>23</sup> Incorrect sizing thus means that these boilers spend most of their time in a highly polluting mode, and are nowhere near meeting the “advertised” emissions rate, which is tested when boilers are operating at maximal capacity and efficiency. While the most efficient pellet systems approach the efficiency of an oil-fired furnace when they are operated at high load, there are no seasonal/part load efficiency standards in place for wood-burners as there are for ENERGY STAR-rated oil-fired boilers.<sup>24</sup>

*New York’s standard for subsidized bioenergy - a possible model*

The Committee might be interested in learning about what a more rigorous standard for a thermal bioenergy program could look like. New York’s “Cleaner Greener Communities Program” gives grants for alternative energy, including bioenergy (we are including the program brochure as an attachment with this letter; it is also available online.<sup>25</sup>) The program requirements were developed by NYSERDA, the agency that has done more credible work characterizing emissions from small-scale bioenergy than any other group in the country. The types of bioenergy units the program allows are very restricted. Projects must be less than 5 MMBtu/hr and use an energy management system to reduce cycling and increase efficiency. Particulate matter emissions can be no more than 0.08 lb/mmBtu, and for units installed at schools, nursing homes, health care facilities, etc, the PM emissions rate can be no more than 0.03 lb/MMBtu. However, this is still considerably higher than can be achieved by facilities using the most effective particulate matter controls, that is, either a baghouse or an electrostatic precipitator, which are capable of reducing filterable PM emissions to lower than 0.01 lb/MMBtu.

Most importantly, the New York program requires projects installed near vulnerable communities to perform air quality modeling, including assessing the number of deliveries by fuel truck in comparison to the existing heating system. Such modeling takes into account the ambient levels of air pollution in the region and assesses whether the additional pollution from the facility will cause EPA’s health standards to be exceeded. Bioenergy facilities receiving grants under the New York program must meet a CO standard as well, and the program requires a the boiler room to include a CO detection system (a feature that is now also being required by the New Hampshire Public Utilities Commission for its biomass heating incentive program.<sup>26</sup>) Wood fuels can only be premium pellets, with no construction and demolition wood content, and have high energy content, low ash, low chloride, and low moisture content. Importantly, the brochure states that “other commercially available fuel types in NYS (for example green wood chips and grass pellets) cannot facilitate high-efficiency and low emission performance even in advanced

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<sup>23</sup> Butcher, T., and Russell, N. Review of EPA Method 28: Outdoor wood hydronic heater test results. Final report, prepared for the New York State Energy Research and Development Authority. September, 2011. Albany, NY.

<sup>24</sup> Energy and Resource Solutions. Emerging Technologies Research Report, prepared for the Regional Evaluation, Measurement and Verification Forum. February 13, 2013. North Andover, MA.

<sup>25</sup> Available at <http://www.nyserda.ny.gov/Statewide-Initiatives/Cleaner-Greener-Communities/Implementing-Smart-Development-Projects/-/media/Files/About/Statewide%20Initiatives/CGC%20Plans/Guidance/Biomass%20Heating%20System%20Program%20Requirements.pdf>

<sup>26</sup> Energy and Resource Solutions. Emerging Technologies Research Report, prepared for the Regional Evaluation, Measurement and Verification Forum. February 13, 2013. North Andover, MA.

technology boilers at this time.” This is a critical point – that there are no small-scale systems that burn green wood chips that can reliably achieve acceptably low PM emission rates (the addition of a fabric filter or an electrostatic precipitator would reduce rates considerably, but these technologies are relatively expensive for institutional-scale burners).

The New York program also requires that burners are fully automatic and have sensors and controls to optimize combustion. Units must have an thermal efficiency of at least 85% using the higher heating value of the pellet fuel when an input/output efficiency method is used. Thermal storage is required, at no less than 20 gallons per 10,000 Btu/hr of boiler capacity. There are also requirements for pellet storage, as the program recognizes that “pellets can produce high levels of dust and off-gas CO in storage presenting an explosion hazard and health and safety concerns... there have been cases of fatalities aboard ships carrying pellets and in commercial bulk storage facilities in Europe.” The program also requires that bulk pellet storage be located out-of-doors.

While the New York standard provides an example of a more carefully thought out policy, it is important to note that it completely ignores greenhouse gas emissions. NYSERDA’s research has focused extensively but exclusively on technologies to reduce particulate matter and other emissions from biomass burning, and has not considered the greenhouse gas implications of bioenergy at all, and particularly has ignored the substantial greenhouse gas emissions (to say nothing of conventional pollutant emissions) from pellet manufacture.

We don’t imagine that the bioenergy industry would support regulations like the New York standard, though a few responsible and informed entities might. But such regulations are essential for a program subsidizing biomass burning to be even minimally protective, and even the PM emission rates set by the New York standard, it is still entirely possible for a biomass burner to cause local air pollution levels to spike to unacceptable levels that exceed EPA’s National Ambient Air Quality Standards (NAAQS). Because of this, it is essential for air quality modeling to be a condition for approval of any unit receiving public subsidies. Further, even high-efficiency burners are larger sources of greenhouse gases than fossil fuel burners. While the bioenergy industry claims that the trees will grow back ensuring carbon neutrality over time, they are generally silent on the real timeframe for carbon resequstration. This is why detailed carbon modeling is essential before any plan to subsidize thermal-only bioenergy goes forward. Such modeling must take special care to analyze the potential impacts of wood pellet manufacture on forests and net CO<sub>2</sub> emissions, as this area was only examined perfunctorily by the Manomet Study.

Subsidizing people to install heating systems that increase air pollution in their neighborhoods and towns is bad public policy. Subsidizing wood burners alongside solar thermal units, as if they are equivalent, will mean that many people will chose the more polluting option, increasing the burden of wood smoke pollution, which is already recognized as a significant public health concern. Are legislators ready to explain to families with asthmatic children why the state is paying their neighbors to increase air pollution? We encourage you to take biomass energy out of S. 1593 altogether, or failing that, put the bill aside until a credible scientific study is done evaluating all the impacts of thermal-only bioenergy, on forests, climate, and air quality.

Thank you for your consideration of these comments.

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