Governor Charlie Baker
Massachusetts State House
Office of the Governor
24 Beacon St. Room 280
Boston, MA 02133

April 30, 2019

Dear Governor Baker,

We write on behalf of a coalition of groups opposed to subsidies for wood burning. We wrote you a letter on March 20, 2019, requesting that you end subsidies for using wood for energy.[1] We also support H. 853, "An Act to assure the attainment of greenhouse gas emissions goals in the alternative portfolio standard," which would eliminate subsidies for wood burning in the APS. In response to our letter and the proposed legislation, the Massachusetts Forest Alliance, New England Forestry Foundation, and others wrote you a letter on April 18.[2] The MFA letter makes a variety of unsubstantiated and misleading claims, thus we are responding to those here. We will be posting this as an open letter on the PFPI website.

MFA claim: *Wood is a local, affordable, renewable resource that has been termed "the people's fuel."*

Response: Contrary to the impression given by MFA, fewer than 2% of MA households burn wood as the primary heating source,[3] yet woodburning is responsible for 83% of particulate matter (PM) emissions from the MA heating sector, and 25% of PM emissions from all sectors.[4] That's shockingly disproportionate. And when it comes to being "the peoples' fuel," medical professionals seem to agree it's best if those "people" don't include children. For instance, the webpage of Doctors and Scientists Against Wood Smoke Pollution[5] summarizes studies linking the following outcomes to wood smoke exposure:

- Increase in infant mortality, stillbirth, low birthweight, reduction in fetal head size with effects similar to those of smoking during pregnancy
- Neurological development, autism, lowered IQ
- Genetic defects linked to COPD and asthma, changes in immune response
- Bronchitis, increased asthma attacks and emergency room visits; ear infections
- Cancer, including childhood brain tumors, lymphoblastic leukemia, and higher likelihood of lung cancer

A number of the studies cited have found no "safe" level of particulate matter at which the adverse effects disappear.

Here's what the professionals at the Massachusetts Department of Environmental Protection (DEP) have to say about particulate matter impacts[6]:

"In Massachusetts, $PM_{2.5}$ is thought to be associated with the state's high rate of asthma. The Massachusetts Department of Public Health and the Asthma Regional Council, in the most comprehensive examination of asthma in New England in 2006 found that 1 in 10 children in the state had asthma. For 2016 it had increased to 1 in 7 children. Asthma affects over 1,140,000 Massachusetts residents (approximately 17%), including about 210,000 children (approximately 16%). For the 110,000 Massachusetts children who live with asthma, $PM_{2.5}$ causes 55% of them to limit their physical activity and 41% to miss days at school. It also causes 60% and 24% of 500,000 adults living with asthma to limit their physical activity and miss work, respectively. Asthma is also expensive, costing Massachusetts $172 million in 2011."

MFA claim: *We're reaching capacity for natural gas in Massachusetts, and short of investing in widely-opposed new infrastructure such as pipelines and compressor stations, we need to look for alternatives for heat*

Response: This is a false dichotomy that implies natural gas is the only alternative to wood. Clean and climate-smart alternatives include increased efficiency, retrofits, and heat from solar and geothermal. Pouring funding into wood heating decreases resources for these other technologies. For instance, the administration just allocated $2.8 million to build infrastructure, including purchasing vehicles, for facilities that are going to chip wood as fuel and otherwise promote thermal bioenergy.[7] This funding could have been used to support about 300 residential solar installations, instead.

MFA claim: *Wood can sustainably heat homes and businesses in Massachusetts - displacing fossil fuels, offering a climate benefit, and improving forest health and resilience.*

Response: There is no evidence that wood heat "improves health", but instead, as noted above it threatens public health. We're highlighting this as an example of the kind of unsubstantiated claim that the MFA letter includes.

Similarly, claims of "climate benefit" are not backed by objective science. Even Massachusetts Department of Conservation and Recreation (DCR) acknowledges that uncut forests sequester more carbon than logged forests. Claims that logging "improves forest health and resilience" are nothing more than forest industry rhetoric. Compare Massachusetts' magnificent last old-growth stands with most other forests in the state today, and it is clear that forest management does not lead to "health" and "resilience." Removing aggressive invasive species can be a legitimate goal for management, but this is most effectively done through small-scale, selective removal of vegetation, not commercial logging. In fact, it is well documented that the disruption of forest ecosystems caused by logging increases susceptibility to invasives and the spread of insect pests and disease.

MFA claim: *The APS has rigorous particulate emissions standards that only the cleanest-burning and most modern wood heating systems can meet.*

Response: This statement is highly misleading. The APS standard is actually quite lax, only requiring units located around "sensitive populations" to meet a 0.03 lb/MMBtu standard, and

allowing others to emit 0.08 lb/MMBtu for pellets and 0.10 lb/MMBtu for wood chips. However, as shown in Table 1, these emissions standards exceed PM emissions from the best-performing wood-burning units by hundreds of times, and exceed emissions from modern oil and gas units by thousands of times.

Technology	PM emissions (lb/MMBtu)	APS 0.03 rate as %	APS 0.08 rate as %	APS 0.1 rate as %
Austrian pellet stoves	0.01 - 0.02	300% - 150%	800% - 400%	
Austrian wood-fired boilers (wood chips)	0.01 - 0.04			1,000% - 250%
No. 2 oil-fired burners	0.005	600%	1,600%	
15 ppm Ultra Low Sulfur oil-fired burners	0.00002 -0.00004	150,000% - 75,000%	400,000% - 200,000%	
Natural gas-fired boilers	0.00002	150,000%	400,000%	

Table 1. Emission rates required by the APS compared to emissions from modern wood and fossil-fueled units.[8]

It does not make sense for the APS to have a different standard for "sensitive" and other populations, because it dismisses the reality that sensitive populations live everywhere, and include kids with asthma, older people, people with lung and heart disease, people with allergies, and in fact *everyone* on days when ambient air pollution levels are high, as they often are in the winter. If Massachusetts continues allowing these lax standards, it will have truly abdicated its traditional role as an environmental and health leader.

MFA claim: *Adding an emissions control device such as an electrostatic precipitator (which some installers do by default right now) to a modern wood heating system results in particulate emissions being almost entirely eliminated.*

Response: An electrostatic precipitator for a school-sized boiler can add more than $60,000 to the cost of the installation, and require ongoing maintenance, operational expertise, and disposal of ash and other waste. In contrast, geothermal or solar panels don't emit pollution, don't require additional expense, and don't produce waste materials.

MFA claim: *A scientific air-sampling study comparing particulate emissions of modern wood heating systems to conventional fossil fuel systems, funded by DOER and MassCEC and conducted by UMass Amherst, is nearing completion, and we expect it will show little to no difference in particulate emissions between the two types of systems.*

Response: We've seen the preliminary results[9] of this study, too, which is evaluating concentrations of air pollutants, including PM, in the vicinity of pellet burners located at schools and other institutions. The study does *not* compare oil and wood burners, so the MFA letter is incorrect to state that the study will show "little to no difference" between the types of systems. Also, we wonder if MFA has really looked at the preliminary results. Are they sure they want to tout this study as showing the air quality benefits of wood heat? The early data show that pellet

boilers nearly doubled particulate matter loading over background levels in the vicinity of schools. Concentrations of pollutants varied greatly among sites, and short-term spikes in black carbon (just one component of total particulate matter) were extremely high. It's too bad the administration didn't commission this study *before* they decided to allocate millions to this polluting technology.

MFA claim: *The Massachusetts Clean Energy Center offers installation rebates for modern wood pellet or chip boilers, and includes a "bounty" on outdoor wood boilers to remove them from use. MassCEC also offers a wood stove changeout program that encourages people to replace old wood stoves with newer, more efficient EPA-certified models that reduce particulate emissions by as much as 90%.*

Response: If MFA is trying to imply that PFPI and allied groups don't support cleaner woodstoves, then this is misleading. Generally, we support woodstove change-out programs, though we are somewhat skeptical about how much of an effect these programs have, as discussed below. We also would prefer more of the funds were allocated to those who truly need them (only 50% of funding is going to low-income households, according to the state's press release[10]). What we oppose is programs that expand dependence on wood heat. The state should not be expending any funds that pay people to switch to wood heating which, as we have discussed above, worsens climate change and harms public health.

MFA claim: *These incentives are making a real difference – wood smoke pollution has actually been declining for years and continues its downward plunge as more people move to cleaner, more modern wood heat systems. In short, if particulate emissions from wood smoke are the focus, H. 853 is exactly the wrong approach – it would encourage people to stay with older outdoor wood boilers and other old systems that emit much larger amounts of particulates.*

Response: The claim that the incentives are driving PM levels down is far-fetched, so we asked MFA how they could justify it. Chis Egan, MFA's executive director, responded in an email that this claim is based on "looking at particulate emissions in general; relying on data, information, and public statements from a variety of sources; and making some common-sense inferences," and that "While we can't definitively show causation (because it hasn't been studied), there is clearly correlation between the incentivizing of cleaner-burning wood heat equipment and a decline in 24-hour $PM_{2.5}$ in the areas where wood heat is widely used." In other words, despite their confident assertions, MFA appears to have confused correlation with causation.

While switching to a lower-emissions woodstove is likely to provide some benefit at a household level, it's extremely unlikely that woodstove change-outs have driven an overall decrease in PM concentrations in MA. Wood burning in the state is poorly quantified, but according to data from the American Community Survey, about 1 – 2 % of households burn wood for primary heating. However, the number changes over time, as Figure 1 shows.

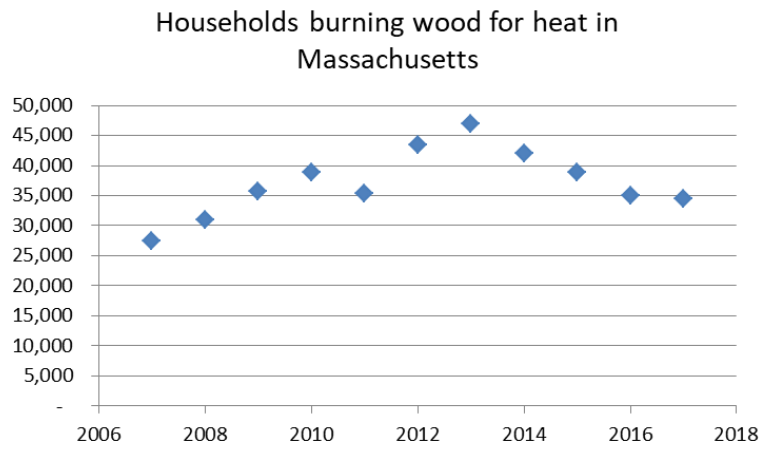

Figure 1. Households burning wood for heating in Massachusetts. Data from American Community Survey yearly datasets.[11]

The data show a 21% decline in the number of households burning wood from the recent peak in 2013 to 2017, which is likely helping decrease PM emissions at the state level. However, MFA does not mention this decline, and — with no factual basis — instead attributes it to people purchasing cleaner-burning woodstoves.

Could cleaner stoves be contributing to the reduction? The state says the woodstove change-out program has replaced 2,300 stoves since 2012. That's about 6 percent of the average number of households burning wood in MA between 2012 and 2017 (good job!). However, EPA's National Emissions Inventory indicates wood burning was responsible for 25% of MA $PM_{2.5}$ emissions in 2014, thus even if the newly replaced units emitted *zero* pollution (which they do not), this would still only account for a decline of about 1.5% of total $PM_{2.5}$ emissions. MFA states that stove shops have also been selling EPA-certified units without the financial incentives, so perhaps this is contributing – but that's still not an argument for subsidizing *more* people to switch to wood-burning.

MFA also ignores another factor likely driving the decrease in PM levels in the state: the switch to low-sulfur transportation diesel. According to a report from the DEP,[12] there has been an incredible 65% drop in diesel $PM_{2.5}$ emissions between 2002 (3,947 tons) and 2016 (1,375 tons), due to use of cleaner fuels.

MFA claim: *The other attack on modern wood heat systems revolves around carbon emissions. Wood heat opponents charge that our careful and heavily-regulated forest management practices are depleting the carbon sink of our forests.*

Response: We did not allege this in our last letter, so we are not sure what MFA bases this on. However, the state's own greenhouse gas inventory shows that wood harvesting for energy, especially residential heating, reduces the net forest carbon sink.

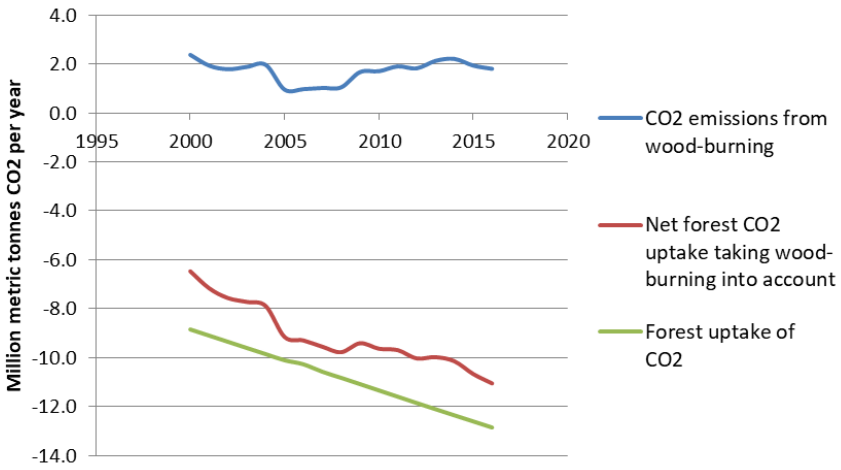

Figure 2. Forest CO_2 sequestration and net sequestration, which deducts emissions from residential and industrial wood-burning in Massachusetts.[13] The less negative values of the net forest CO_2 uptake data (red line) represents a smaller amount of carbon sequestered into forests.

MFA claim: *In fact, carbon storage in Massachusetts forests is increasing, and has been for years. The most recent federal inventory shows Massachusetts forests are growing nearly five times more wood than is being harvested. Our forests contain some of the densest concentrations of stored carbon in New England, and the carbon stored in them will continue to grow.*

Response: That's exactly the point – carbon is stored in forests, and burning it releases it to the atmosphere, where it warms the climate. The science is clear that to avoid catastrophic climate change, we must massively reduce emissions and increase forest carbon uptake. This requires preserving intact forests, restoring degraded forests, and expanding forests. Some wood-burning may always be part of the energy scene in Massachusetts, but expanding bioenergy dependence can't be part of the plan. Indeed, the Intergovernmental Panel on Climate Change (IPCC) most recent report shows a *decrease* in bioenergy use, along with a reduction in energy use, as part of the primary pathway for climate mitigation.[14]

It is also important to note that due to past deforestation, Massachusetts forests only sequester about half of what they did in 1620. So, even if we cut less wood than we grow, there is a huge deficit in terms of the carbon stored in our forests. Massachusetts forests are still relatively young and could store a lot more carbon, if we don't gut them for bioenergy. The state will show itself to be a true climate leader if it puts all hands on deck to prioritize forest carbon uptake.

MFA claim: *The carbon benefits of building with wood are clear. The production of concrete and steel are responsible for nearly 15% of all global carbon emissions. Wood products are less carbon-intensive to produce, and a piece of wood is also 50% stored carbon by dry weight. By using wood in building products, furniture, or flooring, the carbon sequestered by the tree in that*

wood continues to be stored for the life of the wood product – or even longer, if reused or recycled.

Response: Suddenly the MFA letter starts making claims about building with wood, a topic we haven't broached previously, as our concern has been with subsidized wood burning. However, as long as the topic is raised, it's important to note that the science is far from settled on the net impact of harvested wood products. One detailed analysis showed that only 18% of the original carbon stores were preserved when a site is logged and converted into wood products, while the remaining 82% of the carbon is released into the atmosphere within a short period of time.[15] If, as was found in this study, the carbon lost from harvesting and manipulating the wood is truly excessive, then it is better from a carbon standpoint to leave forests unharvested.[16]

MFA claim: *Massachusetts based its incentivizing of wood heat on the Manomet study (which has since been amplified by similar peer-reviewed studies published in scientific journals). In their letter, PFPI concedes that science shows there is a carbon benefit to wood heat compared to fossil fuels, with an initial carbon debt that is eliminated in less than a decade and then a carbon dividend going forward for wood heat sourced from residues.*

Response: It's good to see MFA acknowledge the findings of the Manomet Study, since we've been hearing that various MFA members don't subscribe to the idea that burning wood adds carbon to the atmosphere. The key point here however is that forestry "residues" has a specific meaning in the Manomet Study – it is the tops and branches left over from sawtimber harvesting, material that is generated "anyway" and that would decompose if not burned for energy. Harvesting wood for energy and simply *calling* it residues, as the APS does, violates the carbon accounting principles and increases the net carbon impact. It's an open secret in the wood products industry that clean wood pellets and chips are mostly *not* made from forestry residues. If they're not made from clean mill residues, then they're made from larger-diameter trunkwood, i.e., trees, which dramatically increases the net carbon emissions. For instance, a recent survey of pellet plants in Maine found that only 2% of the pellet feedstock sourced from forestry operations came from tops and limbs, and the rest was classified as pulpwood or trees.[17]

There are more misleading claims in the MFA letter to which we could respond, but this should provide a good sense of how far their assertions have diverged from objective facts. As we assume that you are sincere in your wish to make Massachusetts a leader on climate and the environment, we hope this letter was helpful. We would be glad to answer any further questions you have about these issues. Thank you for your consideration.

Sincerely,
Mary S. Booth, PFPI
Michael Kellett, RESTORE

[1] At http://www.pfpi.net/wp-content/uploads/2019/04/PFPI-Coalition-Letter-to-Governor-Baker.pdf

[2] At http://www.pfpi.net/wp-content/uploads/2019/04/MFA-Coalition-Letter-on-Wood-Heat.pdf

[3] The American Community Survey data for 2017 indicate that 1.32% of MA households have wood as their primiary heating fuel. 2015 data from the Energy Information Administration for the Northeast as a whole show a higher number that the ACS, and additionally includes households that use wood as a secondary heating fuel. However, EIA data are not available at the state level. This does suggest that the actual number of households heating with wood in Massachusetts is greater than the ACS data indicate.

[4] Partnership for Policy Integrity. Massachusetts tops New England in air pollution from wood burning. August 1, 2017. At http://www.pfpi.net/massachusetts-tops-northeast-in-air-pollution-from-wood-burning

[5] https://www.woodsmokepollution.org/children.html

[6] Mass. DEP, Bureau of Air and Waste. Massachusetts 2066 Diesel Particulate Matter Inventory. At https://www.mass.gov/files/documents/2018/04/24/Massachusetts-2016-Diesel-Particulate-Matter-Inventory-Report-April-23-FINAL.pdf

[7] At https://www.mass.gov/news/baker-polito-administration-announces-28-million-in-matching-funding-for-renewable-heating

[8] Albrecht, R.J. Ultra-low Emissions, European-style Wood and Biomass Combustion Technology. NYSERDA. At http://www.marama.org/calendar/events/presentations/2007_09RWC/Albrecht-UltralowEmissionsEuropeanWood-RWC07.pdf

[9] Peltier, R. Preliminary Findings of the UMass Wood Heat & Air Quality Study. October, 2019. At https://ag.umass.edu/sites/ag.umass.edu/files/pdf-doc-ppt/mtwp_-_air_emissions_preliminary_results_peltier_101618.pdf

[10] https://www.masscec.com/about-masscec/news/baker-polito-administration-announces-funding-woodstove-rebate-program-0

[11] At https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml

[12] Mass. DEP, Bureau of Air and Waste. Massachusetts 2066 Diesel Particulate Matter Inventory. At https://www.mass.gov/files/documents/2018/04/24/Massachusetts-2016-Diesel-Particulate-Matter-Inventory-Report-April-23-FINAL.pdf

[13] Massachusetts DEP. Greenhouse Gas Baseline, Inventory and Projection. Open XLSX file, 746.24 KB, for Appendix C: Massachusetts Annual Greenhouse Gas Emissions Inventory: 1990-2016, with Partial 2017 Data. At https://www.mass.gov/doc/appendix-c-massachusetts-annual-greenhouse-gas-emissions-inventory-1990-2016-with-partial-2017/download

[14] Partnership for Policy Integrity. The IPCC's Recipe for a Livable Planet: Grow Trees, Don't Burn Them. October 7, 2018. At http://www.pfpi.net/the-ipccs-recipe-for-a-livable-planet-grow-trees-dont-burn-them

[15] John Talberth, Dominick DellaSala, and Erik Fernandez. 2015. Clearcutting our Carbon Accounts: How State and Private Forest Practices Are Subverting Oregon's Climate Agenda. Center for Sustainable Economy and GEOS Institute. November 2015 https://sustainable-economy.org/wp-content/uploads/2015/11/Clearcutting-our-Carbon-Accounts-Final-11-16.pdf

[16] Keith, H., et al. 2015. "Under What Circumstances Do Wood Products from Native Forests Benefit Climate Change Mitigation?" PLoS ONE 10(10): e0139640.

[17] Buchholz, T., J. S. Gunn and D. S. Saah (2017). "Greenhouse gas emissions of local wood pellet heat from northeastern US forests." Energy 141: 483-491. At https://mypages.unh.edu/sites/default/files/gunnlab/files/2017_buchholz_et_al_ne_wood_pellets.pdf