

Michael Judge
Director, Renewables Division
Massachusetts Department of Energy Resources
100 Cambridge Street, Suite 1020
Boston, MA 02114

RE: Comments on the Draft Changes to the Alternative Portfolio Standard Regulations -
225 CMR 16.00

August 7, 2017

Dear Director Judge,

I am a neuroscientist by training and an environmentalist at heart. My professional life as a research scientist is focused on understanding brain function, preventing and treating brain disease and promoting and supporting brain health. I have published nearly 100 papers and I am the senior editor on three edited volumes focused on brain homeostasis and health.

It is now crystal clear that our lifestyles and environment matter enormously to everyone's brain health, and matter the most to children, older people, and those with any preexisting vulnerability. **My professional advocacy for brain health works alongside my advocacy for a healthy environment.** This advocacy includes healthy forests and the best forms of clean renewable energy. I am involved in a number of community groups including the Grange, Keep the Woods, Friends of Peru State Forest, and Safe Routes to School.

Massachusetts is a leader in many ways and has the chance to do so again. **I applaud and fully support APS Regulations for solar thermal, heat pumps and geothermal energy.** These energy sources provide local jobs and clean, on-site thermal energy. Geothermal offers stable and reliable cooling as well as and heating. These established and long-lasting technologies remain underutilized and should be the real focus of a clean energy portfolio. They are our best energy options because they are manufactured in the US, they provide local jobs, they are quiet and do not pollute, and they do not kill wildlife

or take up farmland and habitats. In short they lack the negative impacts of other forms of renewable energy. **I hope that Massachusetts seizes the opportunity to promote these energy technologies very aggressively.**

I do not support burning wood and I am surprised that burning woody biomass would or could be considered part of Massachusetts' progressive energy portfolio. It is simply not clean energy. Health impacts are already clear and continue to mount. Burning is an inherently dirty energy source – and even at its cleanest, wood is one of the worst! **It has now been confirmed that PM2.5 particulates go directly into the brain; particulate pollution of the size and quantity created by wood burning and allowed by these regulations has been linked to poor cognitive function, an acceleration of brain aging and Alzheimer's disease.** It affects people of all ages. And this is just the tip of the iceberg – new research shows that these effects act synergistically with other common stressors and vulnerabilities - such as immune compromise and metabolic syndrome - to increase the disease risk.

Alzheimer's is poised to bankrupt healthcare, and we have no effective treatments. It was acknowledged at the Alzheimer's Association International Conference in July 2017 that prevention through lifestyle changes is currently our best and by far our most cost-effective strategy. This same conclusion is true for many other conditions. **I recognize that some of the most compelling recent papers on brain health impacts were not considered when these portfolio standards were written. However as a field neuroscience is focusing more on brain health and this effort is gaining momentum.** I attend several major conferences each year and there is a lot of evidence coming down the pipeline. **Brain health should be a cornerstone of public policy at all levels and in all agencies.**

Beyond impacts on brain function, and risk of Alzheimer's disease, **changes due to inhaled particles occur at the cellular level** - by altering the level of methylation and expression of specific genes that are functionally linked to cytokine and immune responses, cellular motility, angiogenesis, inflammation, wound healing, cell growth, differentiation and development. **The genes that are altered are known to participate in dominant cancer-related signaling pathways.**

Conversely, forests provide documentable benefits for health and brain health. One of the best things anyone can do is be outside in an intact forest, regularly – even for a

few minutes, even once a week. Just a few of the benefits are improved immune function and mental health and reduced stress and depression. Living near a forest increases longevity. It can even help veterans with PTSD – a prevalent and difficult to treat condition. Forests also have significant economic potential beyond cutting trees, and woody biomass does not need to be burned. **The forest industry and the state must expand their vision - there are many positive examples of forest-based economic opportunities – and help landowners take advantage of them.**

We know that people will continue to burn wood; it already contributes to our mix of energy sources. The process is cleaner than it used to be – but so is coal, oil and gas. None should be incentivized by the State and paid for with tax dollars allocated for clean energy. It is shocking to me that burning wood could be included in a clean energy portfolio. **Just because it is there does not mean we should burn it – or that burning it is the only option.**

I often hear environmentalist say “we must do something.” This is irrational thinking. We should take a lesson from medicine and “first do no harm.” We need focus on doing the right thing as effectively as possible. **Thank you for your efforts toward our renewable energy future. Please remove incentives for biomass and be a national leader in advocating for and educating the public on solar thermal, geothermal and heat pumps.**

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "Susan A. Masino".

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