November 29, 2010

Attn: RGGI and Participating States (c/o info@rggi.org)
From: Mary S. Booth, Massachusetts Environmental Energy Alliance
Re: Comments on development of RGGI Reference Case

My comments are brief, and are focused on one topic only: the treatment of biomass power as carbon neutral by RGGI.

The central distinguishing feature of biomass power is that a small amount of power is produced, accompanied by a disproportionately large emission of carbon. At the stack, carbon emissions from direct-fired biomass plants are 50% greater than from coal, and 300 – 400% greater than from natural gas. Despite this large impact, RGGI carbon accounting still treats biomass emissions as if they were nonexistent. These uncounted carbon emissions threaten the integrity of the RGGI program, and RGGI's emissions projections will not be complete until carbon from biomass combustion is taken into account.

Carbon neutrality of biomass is a myth

Very simply, the assumption of carbon neutrality for biomass emissions is no longer credible. The Manomet Study, commissioned by the State of Massachusetts, demonstrated that net CO2 flux from whole-tree biomass burned as fuel is greater than net flux from fossil fuels, even after forty years.

The main message of the Manomet Study was twofold: Biomass power cannot be considered carbon neutral, "low-carbon", or even close to low-carbon if carbon when trees are harvested to provide fuel. Second, "sustainable harvesting" does not guarantee carbon neutrality. Keeping harvesting levels for biomass fuels low, and even keeping them below the growth rate of the forest, does not ensure carbon neutrality, because those trees, when left uncut, play a vital role in sequestering carbon emitted by fossil fuels, and cutting them degrades this function. Biomass power emissions are not occurring *de novo* in some carbon-free atmosphere – they are occurring in a context of an existing level of emissions, and an existing forest "infrastructure" that provides ongoing carbon sequestration, and thus must be assessed accordingly. Accelerating forest harvesting to provide biomass fuel moves terrestrial carbon into the atmosphere and sets forest carbon sequestration back for decades. From this, it may be concluded that RGGI provision that biomass fuel be harvested "sustainably" means little.

The State of Massachusetts has taken the results of the Manomet Study seriously enough to issue new regulations that will restrict the receipt of renewable energy credits to facilities that can demonstrate that net lifecycle emissions over 20 years are no greater than 50% of emissions from natural gas. The rules governing how RGGI treats biomass emissions should be similarly updated. Even the Energy Information Administration has acknowledged that the blanket assumption of carbon neutrality for biomass is no longer justified. Last spring EIA recalculated energy-related emissions to include biomass CO2 under their reference scenario, and estimated that if they had been wrong about biomass carbon neutrality, including emissions in total power sector emissions would increase total 2008 emissions by 6.1%, and that by 2035, the increase would be 12.9%. This is not insignificant. If similar or greater discrepancies exist for RGGI, then how can true reductions in power sector emissions occur, except on paper?

It's not waste wood

One argument sometimes offered in support of the idea that biomass emissions do not need to be counted is that biomass fuels consist of "waste" materials (chiefly wood) that if not burned, would decompose in any case, thus emitting carbon dioxide. There are three problems with this assertion.

1. Decomposition of wood cut and left in the forest takes years, if not decades, whereas burning this material emits carbon instantaneously.
2. There is actually relatively little waste wood available for use as fuel. Forest Service inventory data show that RGGI states generate about 2.6 million green tons of "logging residues" each year. If 50% of this material were used as fuel, this would support about 390 MW of capacity. Mill wastes would similarly support another 367 MW if *all* mill wastes were burned for fuel (and we know that a substantial portion is used for other purposes). Thus, the amount of biomass power capacity that exists now in RGGI states is already around the theoretical maximum that can be supported using these "waste" wood sources.
3. The argument that waste is carbon neutral when burned creates an incentive to call everything waste.

In fact, it's easy to demonstrate that facilities in RGGI states are already burning whole trees, not "waste". The following are all from web-based company literature for biomass power plants in the Northeast:

- **MA:** "The Fitchburg Power Station is a 17 MW waste wood and landfill gas fired power facility. **The facility burns whole tree chips**"
- **NH:** "Tamworth Power Station is a 22.5 MW waste wood power facility … The facility uses **wood from trees unsuitable for lumber or pulp**"
- **NH:** "The Bethlehem Power Station burns low quality wood, which is continuously replenished through the natural forest cycles. **The facility uses approximately 675 tons (per day) of whole tree chips**"
- **NH:** Schiller Station: "Currently, PSNH's Schiller Station in Portsmouth operates three 50 megawatt coal-fired steam boilers built in the 1950s. PSNH will replace one of these coal boilers with a new fluidized-bed boiler. This state-of-the-art boiler **will burn whole-tree wood chips** and other clean low-grade wood materials to generate electricity."
- **VT:** "The Ryegate Power Station **burns 250,000 tons of whole tree chips per year"**
- **VT:** McNeil Station (Burlington Electric): "Seventy percent of the wood chips that fuel the McNeil Station are **called whole-tree chips** and come from low quality trees and harvest residues. The trees, a majority of which are on privately owned woodlands, are cut and chipped in the forest. **Clearcutting of woodlands is limited to areas that need to establish a new crop of trees**. It may also be used in some instances to improve wildlife habitat. In these cases, the size of the area cleared is limited to a maximum of 25 acres. To run McNeil at full load, **approximately 76 tons of whole-tree chips are consumed per hour.** That amounts to about 30 cords per hour (there are about 2.5 tons of chips per cord of green wood)"

Why doesn't the reference case reflect the situation on the ground?

I have a particular comment on the RGGI reference case that perhaps simply reflects my lack of understanding of the modeling. I do not understand why the reference case does not envision a new build-out of biomass, when industry data show a total of about 637 MW of new biomass capacity in the planning and permitting stages in RGGI states. These plants will be larger than existing facilities, and tend to be stand-alone units built for the purpose of delivering energy to the grid, rather than end-use facilities associated with mill operations.

Existing	Proposed
• ~35 plants • 793 MW • Average size 22 MW • Most plants use wood as 1º fuel • Use around 5.4 million tons of wood per year* *assume 60% capacity, and 21% plant efficiency	• 24 plants • 637 MW • Average size 28 MW • All will use wood as fuel • Potential to use 7.1 million tons wood/year* *assume 73% capacity, 23% plant efficiency

If the RGGI reference case is in fact accurate, and the economics of new biomass plants are *not* supported in the context of our existing energy infrastructure, then this will come as a relief to those of us who worry about the impacts of these facilities. We only need hope that the developers of these projects will realize what the RGGI model knows, and then the projects will dematerialize. However, considering the number of projects currently proposed in the Northeast, and the aggressiveness of the biomass industry in getting these projects underway so that they can collect stimulus funds, and escape regulation under the tailoring rule,[1] I am put in mind of a saying I heard once from a modeler: "Reality is a special case".

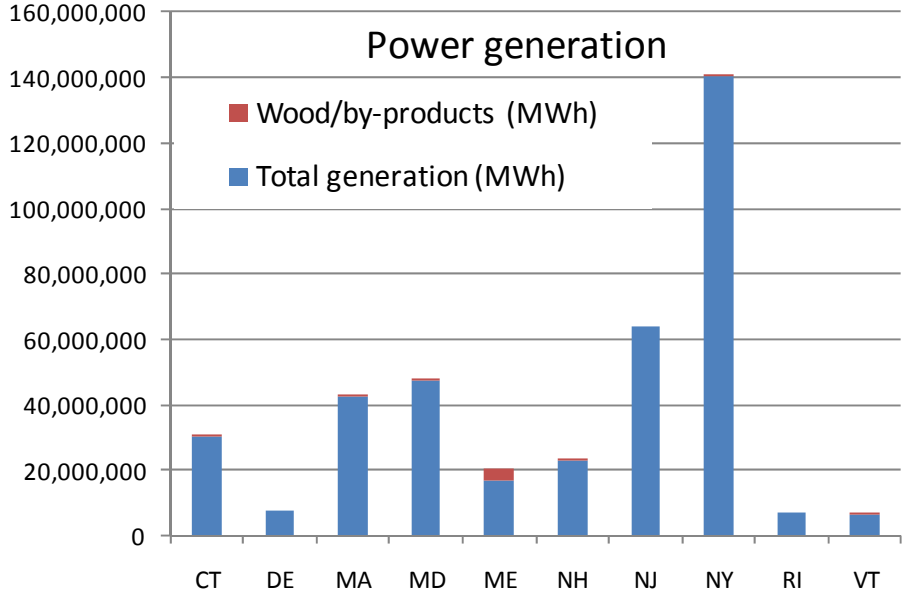
Perhaps biomass power has become so heavily subsidized that RGGI modeling simply can't reflect the true economics that are driving biomass power development. One certain "subsidy" for biomass power, though, is provided by RGGI itself – the provision that biomass power plants do not have to pay for carbon allowances, thus saving these facilities millions of dollars. In this sense, the treatment of biogenic carbon by RGGI itself creates a perverse incentive for biomass power development in absence of any evidence that biomass emissions should count for zero. This in turn may be displacing development of truly low-carbon technologies like wind and solar.

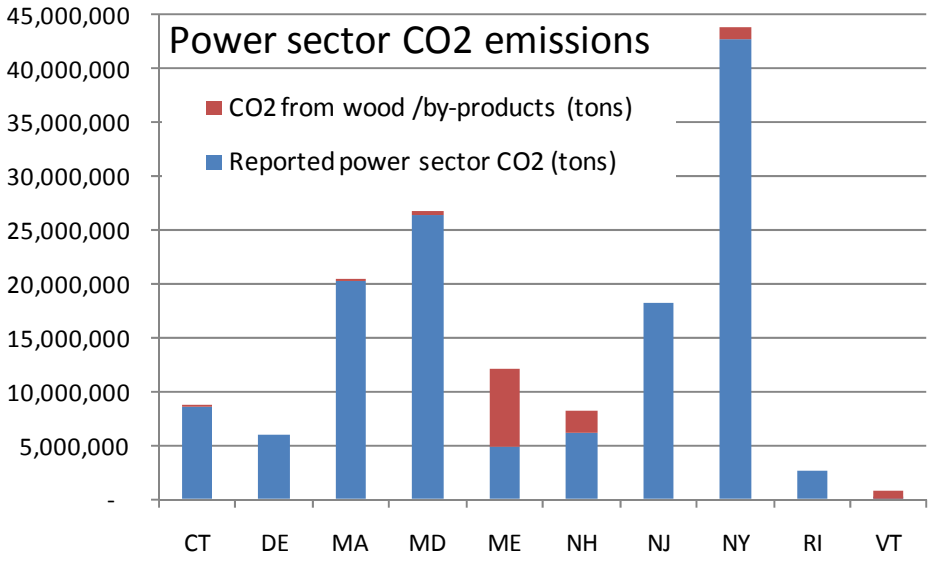
The magnitude of zero biomass emissions

To illustrate the problem that uncounted biomass emissions present for RGGI, here are two graphs, the first of biomass power generation in the context of total generation, and the second of biomass carbon emissions in the context of power sector emissions (the generation data and emissions data for fossil fuels are from EIA; emissions data for biomass were calculated using EPA's protocol for the tailoring

[1] Project filings for the 38 MW Palmer Renewable Energy facility in Springfield, Massachusetts, state that getting the facility built quickly will allow it to avoid Prevention of Significant Deterioration requirements that will come into effect when the tailoring rule is enacted.

rule). These data are for biomass power derived from wood and by-products, only, and not the portion of municipal waste considered "other" biomass by EIA.





These graphs demonstrate that the relative contribution of biomass emissions far outweighs the relative contribution of power generation. The combined emissions from biomass alone are equivalent to the total power sector emissions for some states.

Maine is the most obvious problem. On paper, greenhouse gas emissions from Maine's electricity generation sector are relatively low, because biomass emissions are not counted, and (according to EIA) the state generates about 23 percent of its electricity from hydropower, which has no stack emissions. The state gets another 41 percent of its power from natural gas, which has the lowest emissions per unit energy of any fossil fuel. Thus Maine's reported carbon dioxide emissions from the power sector were 5.57 million tons for 2007. However, if stack emissions from biomass power generation were counted, it would more than double total emissions from the power sector,

contributing an *additional* 7.9 million tons of carbon dioxide each year. How much of this carbon is emitted from "waste" sources that would emit carbon anyway? No one can say, but it is significant that the state's forest cutting practices allow clear cuts of up to 250 acres for "forest products," the definition of which includes biomass fuel.

RGGI has gone to a great deal of trouble to ensure that offsets under the program are real, additional verifiable, permanent and enforceable. Yet the open ended commitment to biomass as a carbon neutral fuel is a leak in the tub that drains away carbon savings and the credibility of the program alike. Accounting for biomass emissions in RGGI modeling will increase the integrity of the program significantly, particularly in the face of a rapidly growing biomass power industry.