Partnership for Policy Integrity

RGGI PROGRAM REVIEW COMMENTS

January 2022

Submitted via email to info@rggi.org

To Andrew McKeon and Members of the RGGI Board:

Thank you for the opportunity to provide public comment on the basic modeling assumptions for the Integrated Planning Model (IPM), which will inform the Regional Greenhouse Gas Initiative's (RGGI) Third Program Review.

The Partnership for Policy Integrity (PFPI) offers the following comments and recommendations on the treatment of emissions from electric generating units (EGUs) that burn woody biomass. PFPI is a Massachusetts-based non-profit organization that promotes policies that protect the climate, ecosystems, and public health. PFPI works to ensure that laws and policies relating to biomass energy follow the best available science.

Introduction

RGGI is inherently incomplete because it only regulates CO_2 emissions from fossil fuel power plants with a nameplate capacity of 25 MW or greater. As such, it does not account for a wide range of climate and health-harming emissions associated with the power sector, including CO_2 emissions from wood-burning power plants, garbage incinerators, and other non-fossil EGUs and emissions from units with a nameplate capacity of less than 25 MW. Additionally, RGGI does not evaluate (or regulate) any criteria or hazardous air pollutants. Until these flaws are corrected, the program will continue to fall short of its carbon emissions reduction goals, and communities in proximity to these energy facilities will continue to experience disproportionate harm from dangerous pollution.

The Third Model Review must seek to bridge the significant gap between the current program's scope and the needs of our rapidly warming planet, as well as the communities and ecosystems that inhabit it. The IPCC's *Special Report on Global Warming of 1.5°C* found that if we have any chance of holding global warming to below 2°C, we must both rapidly reduce greenhouse gas emissions over the next decade and increase carbon sinks to help draw down residual atmospheric CO_2 levels.[1] As we discuss in our comments below, it is irresponsible, from

[1] Intergovernmental Panel on Climate Change (IPCC), 2018: Global warming of 1.5°C; *see also* https://www.pfpi.net/the-ipccs-recipe-for-a-livable-planet-grow-trees-dont-burn-them

both a climate and a biodiversity perspective, to continue to burn our forests for fuel and treat it as carbon neutral energy. Furthermore, the twin climate and global public health crises have shown that we cannot continue to ignore the health and environmental justice impacts of "co-pollutants" from combustion-derived energy – both from fossil and biogenic fuels.

While PFPI's comments focus specifically on recommendations for modeling CO_2 emissions from woody biomass in the IPM, PFPI strongly supports recommendations made by the Climate Justice Alliance and others to increase RGGI's ambition, close loopholes for smaller facilities under 25 MW; require that all forms of combustion-derived energy be covered under RGGI; and assess and reduce the cumulative burdens in environmental justice communities.[2]

(1) Bioenergy emissions are not "zero" and must be included under the RGGI cap

To treat emissions from biomass energy facilities as having zero emissions – in effect, as being "carbon neutral" – is scientifically and legally indefensible. It has been well documented that direct "stack" emissions of CO_2 from wood-burning power plants are significantly higher than from coal and natural gas electric generating units (EGUs), on a per megawatt hour basis. PFPI found that the average biomass power plant emits approximately 145% the CO_2 of a coal plant and 340% the CO_2 of a combined cycle natural gas plant (see Table 1).[3]

Table 1. Biomass power plants emit more CO_2 than coal or gas plants[4]

Technology	Fuel CO_2 emissions (lb/MMBtu heat input)	Facility efficiency	MMBtu required to produce one MWh	Lb CO_2 emitted per MWh
Gas combined cycle	117.1	45%	7.54	883
Gas steam turbine	117.1	33%	10.40	1,218
Coal steam turbine	206	34%	10.15	2,086
Biomass steam turbine	213	24%	14.22	3,029

[2] Northeast Environmental Justice and Climate Justice Region Wide Stakeholder Comments to RGGI, December 3, 2021, https://www.rggi.org/sites/default/files/Uploads/Program-Review/2021_Comments/Session2/CJA_Public_Comment_2021-12-03.pdf.

[3] Mary S. Booth, *Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal*, Partnership for Policy Integrity, (Apr. 2014), p 16. *Available at:* https://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf.

[4] *Id.,* Table 1 at p. 16 (citing to U.S. Energy Information Administration (EIA) data).

Furthermore, as shown by a growing number of studies, the net emissions from bioenergy can exceed emissions from fossil fuels for timespans ranging from decades to over a century.[5] Highly relevant to the RGGI states is the Manomet study, which was commissioned by the State of Massachusetts to determine the "carbon debt" associated with burning forest wood for energy. The Manomet study found that it would take more than 45 years for carbon uptake from new tree growth to offset the emissions from a boiler that burns "mixed" wood (i.e., a mixture of wood residues and whole trees) to the point of equivalency with emissions from a coal-fired power plant, and more than 90 years to "pay off" the carbon debt relative to a natural gas plant. A more recent analysis by PFPI found that *even if only true logging residues are burned*, such as treetops, limbs, and slash, the carbon emissions are still net additive to the atmosphere for decades, and thus cannot be construed as "carbon neutral."[6] Furthermore, these analyses do not include all of the carbon impacts associated with bioenergy production, such as methane emissions from wood chip piles stored at biomass facilities, soil carbon loss, and depletion of forest carbon sinks.

Since the last RGGI program review, the U.S Environmental Protection Agency (EPA) has confirmed that emissions from biomass power plants exceed those from fossil fuel-fired EGUs. EPA's 2019 "Affordable Clean Energy Rule" stated that "when measuring stack emissions, combustion of biomass emits *more mass of emissions per Btu* than that from combustion of fossil fuels, thereby increasing CO_2 emissions at the source" (emphasis added).[7] Likewise, the IPCC has acknowledged on numerous occasions that biomass combustion should not be considered "carbon neutral" "*even in cases where the biomass is thought to be produced sustainably*" (emphasis added).[8] These conclusions have likewise been affirmed by the court

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[5] Walker, T., P. Cardellichio, J. S. Gunn, D. S. Saah and J. M. Hagan (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; Mary S. Booth, Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy. *Environmental Research Letters*, Feb. 21, 2018, at https://iopscience.iop.org/article/10.1088/1748-9326/aaac88; John D. Sterman, Lori Siegel and Juliette N Rooney-Varga, Does replacing coal with wood lower CO_2 emissions? Dynamic lifecycle analysis of wood bioenergy, *Environmental Research Letters*, Jan 18, 2018, at https://iopscience.iop.org/article/10.1088/1748-9326/aaa512/meta

[6] Mary S. Booth, Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy. *Environmental Research Letters*, Feb. 21, 2018, at https://iopscience.iop.org/article/10.1088/1748-9326/aaac88;

[7] U.S. Envtl. Protection Agency, Repeal of the Clean Power Plan; Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units; Revisions to Emission Guidelines Implementing Regulations, 84 Fed. Reg. 32,520 at 32,546 (July 8, 2019) (Note that the ACE Rule has since been vacated by the D.C Court of appeals, in *American Lung Association v. EPA,* 985 F.3d 914 (D.C. Cir. 2021). However, with regard to the specific issue of biomass emissions accounting, the D.C Court of Appeals did not overturn that aspect of the ACE Rule; therefore, the judicial reasoning provided in the ACE Rule is still valid, with respect to the treatment of biomass emissions.)

[8] *See e.g.* FAQ Q2-10 (noting that "*the IPCC Guidelines do not automatically consider or assume biomass used for energy as 'carbon neutral*,' even in cases where the biomass is thought to be produced sustainably.") (emphasis added). Available at: https://www.ipcc-nggip.iges.or.jp/faq/faq.html

system; then D.C. Circuit Court of Appeals Judge (and now U.S. Supreme Court Justice) Kavanaugh held that "the atmosphere makes no distinction between carbon dioxide emitted by biogenic and fossil-fuel sources," noting that there is "zero basis" to "distinguish biogenic carbon dioxide from other sources of carbon dioxide."[9]

From its inception, the RGGI program has failed to follow the science with regard to regulating biomass emissions. The program allows "eligible" biomass to be treated as having zero emissions when co-fired with fossil fuels, *and does not cover emissions from stand-alone biomass power plants at all*. The Model Rule allows "eligible biomass" to include "sustainably harvested" trees, when it has been well documented that sustainable harvesting programs are not a proxy for carbon neutrality.[10] Consequently, the program significantly understates current CO_2 emissions from the power sector and lacks a mechanism to reduce these emissions in the future.

This concern is not insignificant. In 2020, wood-burning biomass power facilities accounted for 2,315 GWh of electricity in the New England power grid alone.[11] According to the most recent RGGI CO_2 monitoring data, non-fossil fuel-fired EGUs in the nine-state RGGI region emitted 18,005,228 tons of CO_2 in 2018 – representing 19.4% of total CO_2 emissions from in-region electricity generation. Furthermore, total CO_2 emissions from non-fossil fuel-fired EGUs *more than doubled* from 2005 to 2018.[12]

Large standalone biomass electric plants in the RGGI states typically burn wood chips, most of which are sourced directly from forests. A single facility has the potential to reduce forest biomass on a wide area of the landscape. For instance, the 70 MW Laidlaw Berlin BioPower plant in New Hampshire is permitted to burn 113 tons of wood per hour, including from whole logs chipped on site. This is the equivalent of clearcutting more than an acre of forest per hour.[13] Whether burning wood sourced from whole trees or residues, the net carbon

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[9] *Center for Biological Diversity v. EPA*, 772 F.3d 401, at 406-412 (D.C. Cir. 2013).

[10] It is incorrect to assume that materials produced under federal, state, or private "sustainable forestry" programs will result in atmospheric CO_2 reductions within relevant time frames. For example, state-level sustained yield forestry regulations and private certification programs may ensure that overall growth exceeds harvest, but they do not ensure the carbon neutrality of bioenergy or otherwise guarantee against net transfers of forest carbon to the atmosphere compared to what would occur in the absence of biomass generation. For more, *see* Michael T. Ter-Mikaelian, et al., *The Burning Question: Does Forest Bioenergy Reduce Carbon Emissions? A Review of Common Misconceptions about Forest Carbon Accounting*, 113 J. Forestry 57 (2015).

[11] 2020 ISO New England Resource Mix. Available at: https://www.iso-ne.com/about/key-stats/resource-mix/

[12] RGGI, Inc. CO2 Emissions from Electricity Generation and Imports in the Regional Greenhouse Gas Initiative: 2018 Monitoring Report (March 11, 2021), Table 1 at pp. 16-17). Available at https://www.rggi.org/sites/default/files/Uploads/Electricity-Monitoring-Reports/2018_Elec_Monitoring_Report.pdf

[13] Joint ENGO Comments on the 2016 RGGI Program Review at 5-6, (citing New Hampshire Department of Environmental Services, PSD and NSR Permit, page 6 of 37. Available at https://www.pfpi.net/wp-content/uploads/2011/06/100726air_permit.pdf).

emissions from biomass combustion will impact the atmosphere on a timescale from decades to over a century – long past the time when steep emissions reductions must be achieved.[14]

As has been shown in the European Union, where the Renewable Energy Directive has driven a steep increase in combustion of wood fuels for electricity and heat, counting bioenergy generation, but not emissions, increases bioenergy buildout and carbon pollution while undermining deployment of clean renewable energy.[15] In order to avoid such an outcome here, the RGGI program must include all carbon emissions from the electricity sector under the cap, not just fossil fuel emissions.

(2) Recommendations for modeling CO_2 emissions from bioenergy production

In order to accurately model carbon emissions from the electricity sector under various policy scenarios, the IPM must incorporate and model emissions from biomass energy.

In previous RGGI program reviews, PFPI and our colleagues have recommended the modeling include the following assumptions for woody biomass combustion:

(1) A CO_2 emission rate for biomass of at least 3,000 lb/MWh (reflecting direct "stack" emissions) and,

(2) A CO_2 emission rate for biomass that is between 0 lb/MWh and 3,000 lb/MWh (reflecting a partial discounting of CO_2 emissions)

Counting stack emissions more closely approximates net atmospheric impact than assuming that emissions are zero, which is the functional outcome of not regulating wood-burning power plants under the cap. Stack emissions are further an underestimate of the actual net carbon impact of cutting and burning whole trees that would have otherwise continued growing and removing CO_2 from the atmosphere.[16]

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[14] Joint Environmental NGO Comments on the Treatment of Biomass-Based Power Generation in EPA's Proposed Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units, at 4 (August 31, 2018) (citing to EIA data and a Report conducted by the Manomet Center for Conservation Sciences). *Available at* https://www.nrdc.org/sites/default/files/joint-engo-ace-biomass-comments-20181031.pdf

[15] Mary S. Booth and Ben Mitchell, *Paper Tiger: Why the RED II biomass sustainability criteria fail forests and the climate*, (PFPI), July 2020 at http://eubiomasscase.org/wp-content/uploads/2020/07/RED-II-biomass-Paper-Tiger-July-6-2020.pdf.

[16] Domke, G. M., et al. (2012). "Carbon emissions associated with the procurement and utilization of forest harvest residues for energy, northern Minnesota, USA." Biomass and Bioenergy **36**: 141-150; Stephenson, A. L. and D. J. C. MacKay (2014). Life Cycle Impacts of Biomass Electricity in 2020 London, UK, UK Department of Energy and Climate Change**:** 154; Walker, T., et al. (2013). "Carbon Accounting for Woody Biomass from Massachusetts

Since the last RGGI program review, new tools have become available for modeling "net" bioenergy emissions, such as the Bioenergy GHG Calculator developed by Natural Resources Canada.[17] This online tool makes it easy to quickly evaluate the timing of GHG emission reductions of various deployment scenarios when forest bioenergy is used as a substitute for fossil energy.

PFPI has developed a relatively simple, science-based methodology for calculating net emissions, published in the peer-reviewed journal *Environmental Research Letters* (attached).[18] The model calculates cumulative net emissions by estimating "direct" emissions as cumulative combustion emissions plus CO_2 from harvesting, producing, and transporting biomass. It subtracts cumulative emissions under an alternative fate scenario (either burning biomass without energy recovery, if there are no other uses for the material, or leaving it to decompose). The "net emissions impact" (NEI) is the ratio of cumulative net emissions to cumulative direct emissions, and provides an answer to the question, "what percentage of the CO_2 released by burning biomass is attributable to its use for energy, and how does this change over time?" The accompanying emissions accounting tool is a simple Microsoft Excel spreadsheet model that estimates alternative fate emissions through time.

Using the NEI to weight biogenic CO_2 for inclusion in the RGGI carbon trading program would reduce emissions more effectively than the current assumption of zero emissions. It would also provide an "intelligent" exemption for industrial facilities that burn waste materials, such as black liquor, where the alternative fate is genuinely incineration without energy recovery.

One of the advantages of the NEI model is that it can be easily tailored to the different RGGI states by factoring in different decomposition rates for woody biomass, based on geographical differences in species composition and temperature. For instance, southeastern hardwoods have an average decay rate ("*k*-constant") of approximately 0.082 and southeastern softwoods have a decay rate of 0.057. This translates to values of 67% and 75% on the ten-year

(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; Laganière, J., et al. (2017). "Range and uncertainties in estimating delays in greenhouse gas mitigation potential of forest bioenergy sourced from Canadian forests." GCB Bioenergy **9**(2): 358-369.

[17] Available at https://apps-scf-cfs.rncan.gc.ca/calc/en/bioenergy-calculator. Based on model developed by Laganière, J.; Paré, D.; Thiffault, E.; Bernier, P. Y. 2017. Range and uncertainties in estimating delays in greenhouse gas mitigation potential of forest bioenergy sourced from Canadian forests. GCB Bioenergy, 9: 358–369. doi:10.1111/gcbb.12327.

[18] Mary Booth, *Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy*, Environ. Res. Lett. 13 (2018). Available at https://iopscience.iop.org/article/10.1088/1748-9326/aaac88.

NEI curve.[19] A state in the Northeast would have a higher percentage of net emissions at year 10 because the climate is cooler and the decay rate is slower.

As a concrete example of how the NEI can be utilized in the RGGI program, NRDC ran the NEI model for Virginia's cap and trade program in 2018 and recommended the following biomass emissions factors for three categories of forest-derived biomass:

> (i) CO_2 emissions from onsite waste that would otherwise be burned in an industrial setting without energy recovery would require approximately zero allowances for each ton of carbon emitted;
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> (ii) CO_2 emissions from forest harvest residues that would otherwise decay would require approximately 0.69 allowances for each ton of carbon emitted;
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> (iii) CO_2 emissions from whole trees, boles, and large diameter materials that would have a merchantable end-use, including pulp, paper, fiberboard, engineered wood or lumber would require approximately 1.0 allowances for each ton of carbon emitted.[20]

(3) Excluding bioenergy emissions is inconsistent with RGGI's purpose

The historical exclusion of carbon emissions from bioenergy production is not consistent with the purpose of the RGGI compact. RGGI was created "to reduce anthropogenic emissions of CO_2."[21] There is nothing limiting the term "anthropogenic emissions" to mean only fossil fuel emissions. The current language of the RGGI Model Rule can be reasonably construed to require the regulation of emissions from bioenergy facilities. The RGGI model rule clearly indicates that "*any*" unit that "serves an electricity generator with a nameplate capacity equal to or greater than 25 MWe *shall* be a CO_2 budget unit …" (emphasis added).[22] Likewise, combustion turbines are defined by the model rule as fossil *"or other fuel-fired device[s]*."[23] (emphasis added). It is illogical for a regulatory program focused on reducing carbon emissions from the electricity sector to include some, but not all, carbon polluting combustion sources. A reasonable

[19] Booth, *Not Carbon Neutral* at 6.

[20] NRDC Comments on VA DEQ's Proposed Regulation for Emissions Trading (9VAC5 Chapter 140, Rev. C17), April 9, 2018.

[21] 2017 RGGI Model Rule, Section XX-1.1, Purpose

[22] RGGI Model Rule, Section XX-1.4, Applicability

[23] RGGI Model Rule, Section XX-1.2, Definitions, "Combustion Turbine"

interpretation of the relevant language suggests that *all* combustion EGUs, including bioenergy facilities, *shall* be regulated under RGGI.

Conclusion

Biomass energy is neither "clean" nor "carbon neutral." Previous RGGI program reviews have failed to analyze the significant contribution of bioenergy emissions to the overall CO_2 emissions from the electricity sector. As the most recent monitoring data show, these emissions are now approaching 20% of the CO_2 emissions from in-region electricity generation.[24] It makes no sense to continue to allow almost all bioenergy emissions to go unregulated when those emissions are clearly net additive to atmospheric carbon levels. As such, PFPI recommends that RGGI, Inc. take the necessary step and model those emissions and to include an analysis of these findings and necessary program reforms in the Third Program Review.

Thank you for your consideration of these comments.

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[24] RGGI, Inc. CO2 Emissions from Electricity Generation and Imports in the Regional Greenhouse Gas Initiative: 2018 Monitoring Report (March 11, 2021), Table 1 at pp. 16-17). Available at https://www.rggi.org/sites/default/files/Uploads/Electricity-Monitoring-Reports/2018_Elec_Monitoring_Report.pdf