Bioenergy and waste-burning in the Clean Power Plan: It's hard to reduce emissions by increasing them

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Comments to Pennsylvania DEP on the State's implementation plan

Mary S. Booth
Partnership for Policy Integrity

November 12, 2015

Dear Pennsylvania DEP –

These comments are adapted from a presentation we gave recently on the role of bioenergy in the Clean Power Plan. It also includes a letter sent to OMB during review of the Clean Power Plan, stating opposition to use of bioenergy in the CPP by a number of environmental groups. We are providing comments on the role of natural gas in Pennsylvania's compliance plan under separate cover. Thank you for your consideration.

Mary S. Booth
Director, Partnership for Policy Integrity

Cumulative reductions under CPP are very limited…

Mass-based compliance example from Pennsylvania

Year		No-action (assumes emissions don't grow after 2020)	EPA Interim Step Approach	Reduce yearly, starting in 2021
EPA's 2020 projection		106,682,061	106,682,061	106,682,061
	2021	106,682,061	106,082,757	104,996,086
	2022	106,682,061	106,082,757	103,310,110
Step I	2023	106,682,061	106,082,757	101,624,135
	2024	106,682,061	106,082,757	99,938,160
	2025	106,682,061	97,204,723	98,252,185
Step 2	2026	106,682,061	97,204,723	96,566,209
	2027	106,682,061	97,204,723	94,880,234
Step 3	2028	106,682,061	92,392,088	93,194,259
	2029	106,682,061	92,392,088	91,508,283
	2030	106,682,061	89,822,308	89,822,308
Cumulative Emissions, 2020-2030		**1,173,502,671**	**1,097,233,742**	**1,080,774,030**
Cumulative % reduction over no action scenario			**6%**	**8%**

… So it's important to ensure that emission reductions are *real*.

The preceding table shows cumulative emissions reductions under EPA's CPP goal for Pennsylvania, versus a "steady state" scenario where emissions don't change from 2020 onward. We calculated cumulative emissions because CO_2 is a long-lived pollutant that persists in the atmosphere and continues to warm the climate long after it's emitted. From the atmosphere's point of view, what matters is the total amount of CO_2 we emit by

2030, and that's a function of how quickly we lock in emissions reductions. If we can prevent a ton of carbon from entering the atmosphere next year, that's better than waiting five years.

Looking at cumulative impacts over the full ten-year period from 2020 to 2030, we found that even if Pennsylvania cut emissions in the earliest year of each interim compliance period, the state's cumulative emissions would decline by only 6 percent, compared to the no-action scenario that assumes EPA's projected emissions in 2020 carry through to 2030. If the state started earlier, in 2021, and cut emissions by an equal amount each year, cumulative emissions would fall by 8 percent by 2030, relative to the no-action scenario. This is still a very small number.

To produce real reductions, the state should not include any bioenergy or waste-burning in its compliance plan, because burning biomass and waste emits more CO_2 per megawatt-hour than burning fossil fuels, and future "reductions" in CO_2 from these fuels are hypothetical and unverifiable.

Biomass power plants emit more CO_2 per MWh than coal or gas facilities

CO_2 Emission Rates From Modern Power Plants	Lb CO_2/MMBtu	Facility efficiency	MMBtu /MWh	Lb CO_2/MWh	Biomass v. Tech
New gas combined cycle[a]	117	51%	6.7	**786**	385%
New subcritical coal steam turbine[b]	210	39%	8.7	**1,839**	165%
U.S. coal fleet avg, 2013[c]	210	33%	10.5	**2,198**	138%
New biomass steam turbine[d]	213	24%	14.2	**3,028**	

References:

CO_2 per MMBtu

a, b, c : from EIA at http://www.eia.gov/environment/emissions/co2_vol_mass.cfm. Value for coal is for "all types." Different types of coal emit slightly more or less.

d: Assumes HHV of 8,600 MMBtu/lb for bone dry wood (Biomass Energy Data Book v. 4; Oak Ridge National Laboratory, 2011. http://cta.ornl.gov/bedb.) and that wood is 50% carbon.

Efficiency

a: DOE National Energy Technology Laboratory: Natural Gas Combined Cycle Plant F-Class (http://www.netl.doe.gov/KMD/cds/disk50/NGCC%20Plant%20Case_FClass_051607.pdf)

b: International Energy Agency. Power Generation from Coal: Measuring and Reporting Efficiency Performance and CO_2 Emissions. https://www.iea.org/ciab/papers/power_generation_from_coal.pdf

c. EIA data show the averaged efficiency for the U.S. coal fleet in 2013 was 32.6% (http://www.eia.gov/electricity/annual/html/epa_08_01.html)

d: ORNL's Biomass Energy Data Book (http://cta.ornl.gov/bedb; page 83) states that actual efficiencies for biomass steam turbines are "in the low 20's"; PFPI's review of a number of air permits for recently proposed biopower plants reveals a common assumption of 24% efficiency.

It's a physical fact that wood-burning power plants emit more CO_2 at the stack than coal or gas-fired power plants, so why do people claim biomass energy is "*carbon neutral*"?

The "waste" argument: Materials burned are "waste" – would decompose and emit CO_2 anyway – e.g. forestry residues.

- No *net* increase in CO_2 emissions, but release from combustion is instantaneous while decomposition takes years to decades.

The "resequestration" argument: Future forest growth takes up equivalent carbon as released by burning.

- CO_2 emissions may be offset eventually, but takes decades to centuries.

Claims of bioenergy carbon neutrality: A little bit of magical thinking, a lot of arm waving

Burning biomass and waste emits more CO2 than burning coal and gas. Claiming that the molecules of CO2 coming out a wood-burning power plant's smokestack don't warm the climate, because somewhere, somehow, CO2 is being sequestered, or would be emitted "anyway," is an ineffective approach pollution regulation.

We don't regulate any other pollutant this way. For instance, we don't say, "Let's not regulate NOx emissions from power plants, because eventually, NOx that's emitted is transformed in the atmosphere into other, less harmful nitrogen-containing compounds in the atmosphere." Are we serious about reducing power sector CO_2 emissions, or not?

Virginia provides an example of how wood-burning power plants disproportionately increase emissions from the power sector. Dominion converted three old coal plants to burn wood and built a new "hybrid" energy facility, in addition to their existing Pittsylvania plant. Combined demand from these facilities is millions of tons of wood a year. Since burning a ton of green wood emits just over one ton of CO2, this translates to a significant increase in emissions.

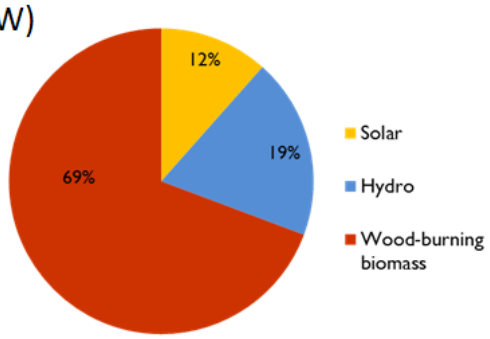
Bioenergy disproportionately increases state-level emissions: Dominion's Virginia wood-burners

- Three coal plants recently converted to burn forest wood (153 MW)
- 600 MW "hybrid" energy center can co-fire ~20% wood (117 MW)
- Existing Pittsylvania wood-burning plant (83 MW)

Combined demand: ~4.5 million green tons/year.

Dominion's wood-burners at full operation provide:

- 4.1% increase in VA electricity generation
- 13.6% increase in day to day power sector CO_2 emissions



Dominion's planned mix of renewable energy generation in 2020. Appendix 6A of Dominion's Integrated Resource Plan, August 29, 2014.

The bioenergy loophole at the heart of the Clean Power Plan: functionally, bioenergy and waste-burning are treated as zero emissions

Rate-based compliance

The Clean Power Plan rate equation* *ignores* biopower emissions:

$$\frac{lb\ CO_2\ (EGU's) + ??}{MWh\ electricity\ (EGU's, renewables\ including\ biopower)}$$

Mass-based compliance

Clean Power Plan "mass-based" compliance caps CO_2 emissions (tons per year), but only counts emissions from fossil-fired plants, thus facilities burning waste or biomass don't count toward total.

EPA may allow bioenergy in some state plans, but states that include it are likely to be locked into the convention of treating it as if it has zero emissions. That's because there's really no place to count those emissions in the carbon accounting metrics used to track progress toward state goals.

EPA's equation for calculating the emissions rate at the state level only counts CO_2 from fossil-fired electric generating units, even while it potentially credits megawatt-hours from biomass and waste-burning in the denominator.

Under a mass-based compliance plan, the CO_2 cap only includes emissions from fossil-fired electric generating units. So if bioenergy is used to generate electricity, emissions will be higher than they would be with coal, but won't be counted – they'll be "off the books."

Biomass and waste in the Clean Power Plan: State Implementation Plans and the draft Federal Implementation Plan

(States may vary in level of detail submitted to EPA)

For states that submit State Implementation Plans (SIPs) to EPA:

- "qualified" biomass discussed as compliance, but not defined
- biogenic portion of waste allowable as compliance

For states that use, or are compelled to use, Federal Implementation Plan (FIP):

- EPA now asking for input on what should constitute "qualified biomass"

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EPA still doesn't have a definition of "qualified" biomass, but they've put some ideas out for comment in the draft Federal Implementation Plan.

Biomass-related questions in the draft FIP

Should EPA include biomass as eligible for rate-based crediting?

Should EPA specify a list of "pre-approved" fuels? (p. 31 FIP)

- "waste-derived" and industrial byproduct feedstocks
- feedstocks from "sustainably managed" forest lands

How would EGUs demonstrate that feedstocks are qualified?

Should biogenic emissions from co-firing biomass with coal be counted?

Decisions made could also apply to mass-based model trading rule set-aside and calculation of covered emissions for affected EGUs that co-fire biomass. (p. 31 FIP)

We're urging EPA to disqualify all burning of solid biomass as an eligible compliance measure in the Clean Power Plan, and similarly, we urge Pennsylvania to exclude these technologies as the state writes its plan.

We're not alone in those sentiments. We've included a letter at the end of this document, which was signed by a number of major environmental groups, calling on OMB to remove biomass as a compliance measure in the CPP as it reviewed EPA's plan.

SIPs: Waste incineration as compliance

Waste incineration is not included in "Best System of Emission Reduction" (BSER), but allowed as compliance.

States must include information on "*efforts to strengthen existing or implement new waste reduction as well as reuse, recycling and composting programs, and measures to minimize any potential negative impacts of waste-to-energy operations on such programs.*" (p. 240 CPP)

EPA's own modeling doesn't support burning even biogenic waste as "carbon neutral" if landfill methane capture is in place.

Pennsylvania's experience with the waste-incineration industry has not been a happy one. Throwing more money at this industry, and allowing it to qualify for benefits under the CPP, would be a mistake.

SIPs: Biomass as compliance

Biomass not included as measure in BSER -

States may notheless consider "qualified" biomass in their plans: *"biomass that can be considered as an approach for controlling increases of CO_2 levels in the atmosphere"* (p. 226 CPP)

State plans must describe:

- types of biomass and how they are ''qualified''
- how the state values biomass CO_2 emissions
  - what proportion of biogenic CO_2 will *not* be counted?

However: EPA hasn't defined "qualified biomass" yet.

Limits on bioenergy as compliance in CPP – vintage of generator

Post-Jan. 1, 2013 construction or expansion is eligible:

- Biomass (industrial burners, stand-alone power plants, co-firing at coal plants, or coal-to-wood conversions)
- Waste incineration (biogenic portion considered carbon free)

Pre-2013 construction is *not* eligible – this capacity is part of the baseline

It's appropriate that the existing bioenergy industry can't serve as compliance…

But plenty of new bioenergy could show up in the CPP

- Stand-alone biomass plants
- Co-firing biomass at coal plants
  - with green wood? with wood pellets?
- Re-firing coal plants completely with wood
- Municipal waste incineration – the industry wants to be legitimized as "clean" energy so it can have a share in the spoils. Legislation being offered in the Pennsylvania statehouse would add waste incinerators to Tier I of the state's APS.

What gets included in the CPP as compliance will drive development via economic incentives (emission reduction credits) and disincentives (allowances)

SIPs: "Waste- derived biogenic feedstocks and certain forest- and agriculture-derived industrial byproduct feedstocks"

EPA "*generally acknowledges*" the "*CO_2 and climate policy benefits*" of these feedstocks (p. 226 CPP)

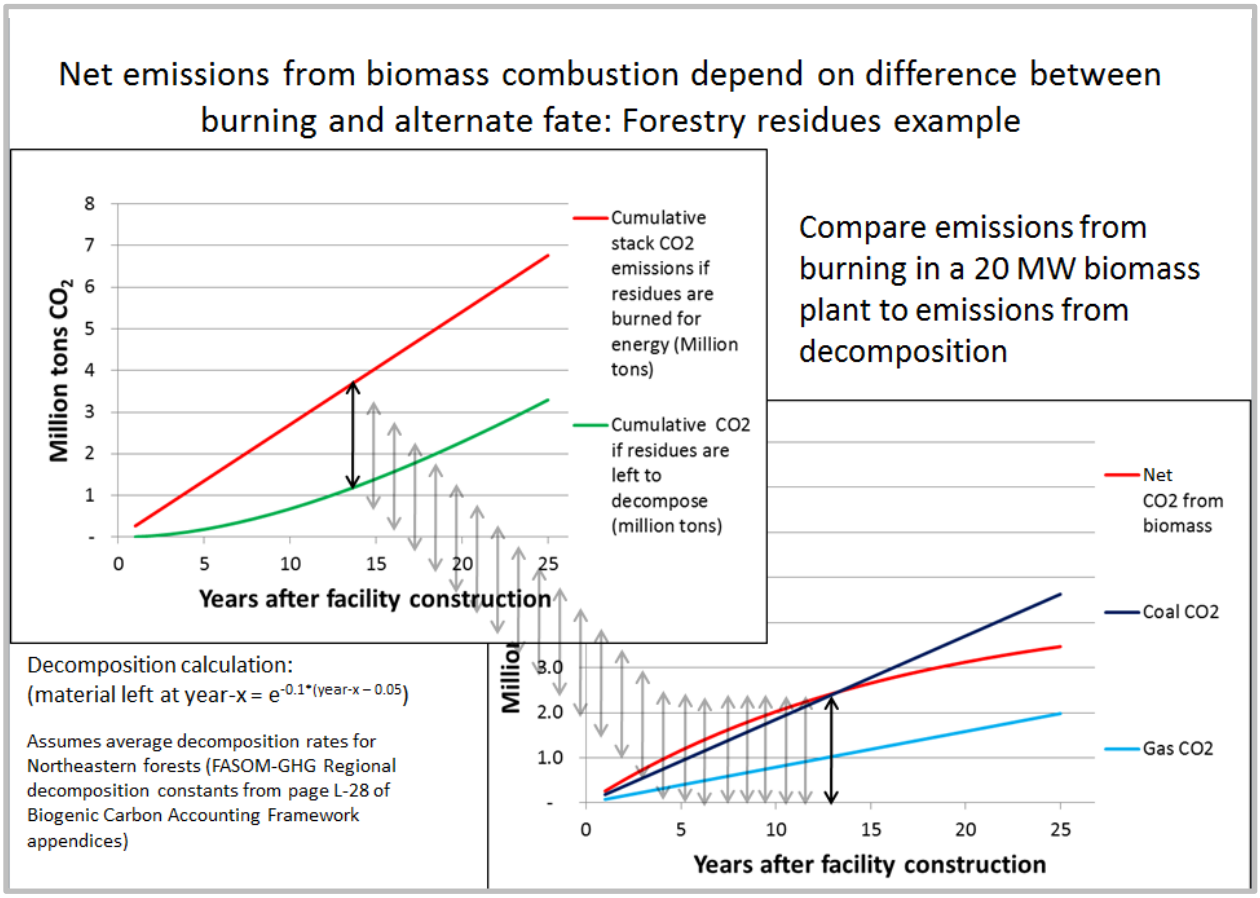
- **However, EPA has not published any modeling results to demonstrate these alleged benefits**
- **And given that burning ANY biomass – no matter what its origin – sends CO2 into the atmosphere, legitimacy of co-firing biomass with coal in electric generating units covered by the rule may be questioned.**

EPA says these fuels are "*likely approvable*" as qualified biomass if state meets monitoring, reporting and verification requirements

Any state wishing to get a plan approved quickly, however, should steer clear.

Burning "waste" wood still produces a significant carbon debt.

The example on the next page demonstrates the calculation of net bioenergy emissions over time by subtracting "anyway" emissions from combustion emissions. It models forestry residues and assumes a decomposition rate typical of Northeastern forests.



Even after subtracting out the CO_2 that would be emitted "anyway" if the wood were left in the forest to decompose, net emissions from a wood-burning power plant exceed emissions from coal for 10 – 15 years, and continue to exceed emissions from a gas plant for multiple decades. Given that the Clean Power Plan calls for genuine reductions in emissions by 2030 – fifteen years from now – it's clear that burning even waste wood isn't going to produce genuine reductions.

<u>Also potentially approvable in SIPs:</u>
<u>"Sustainably-derived" agricultural and forest biomass feedstocks</u>

May also be acceptable as qualified biomass in a state plan -

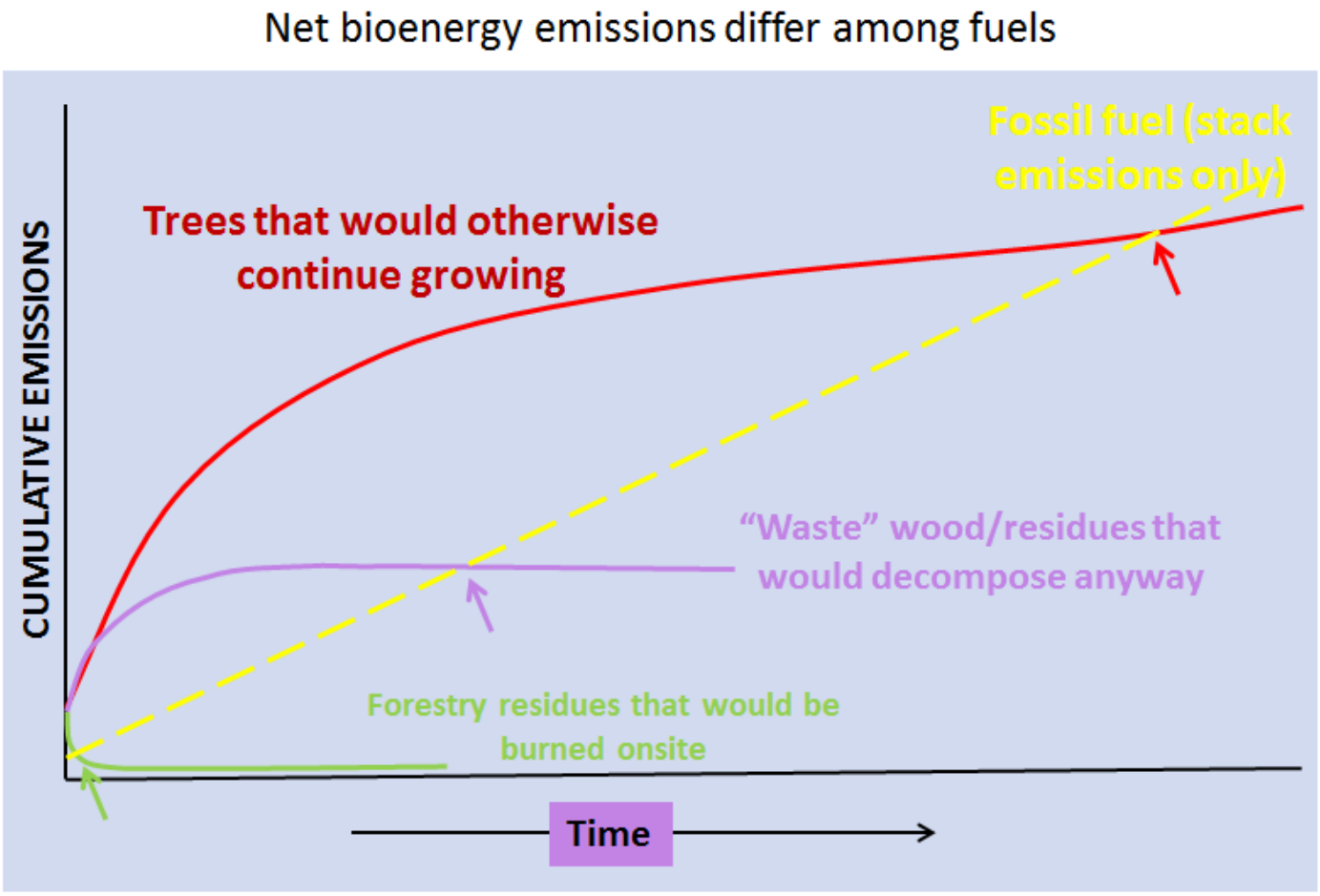
If state can:

- show such feedstocks *"appropriately control increases of CO_2 levels in the atmosphere"* (p. 226 CPP)

And,

- *"adequately monitor and verify feedstock sources and related sustainability practices."*

However, "Sustainability" has little to do with carbon neutrality – and in any case, EPA has not defined "sustainably-derived."



The preceding graph is a generalization of the net emissions estimates for bioenergy derived by comparing emissions from combustion of fuels with emissions from their alternative fates. Modeling demonstrates that different types of materials have varying carbon debt payoff times (carbon debt is the period of time over which net biomass emissions exceed those from fossil fuels, or alternatively, the period of time over which net carbon emissions are greater than zero).

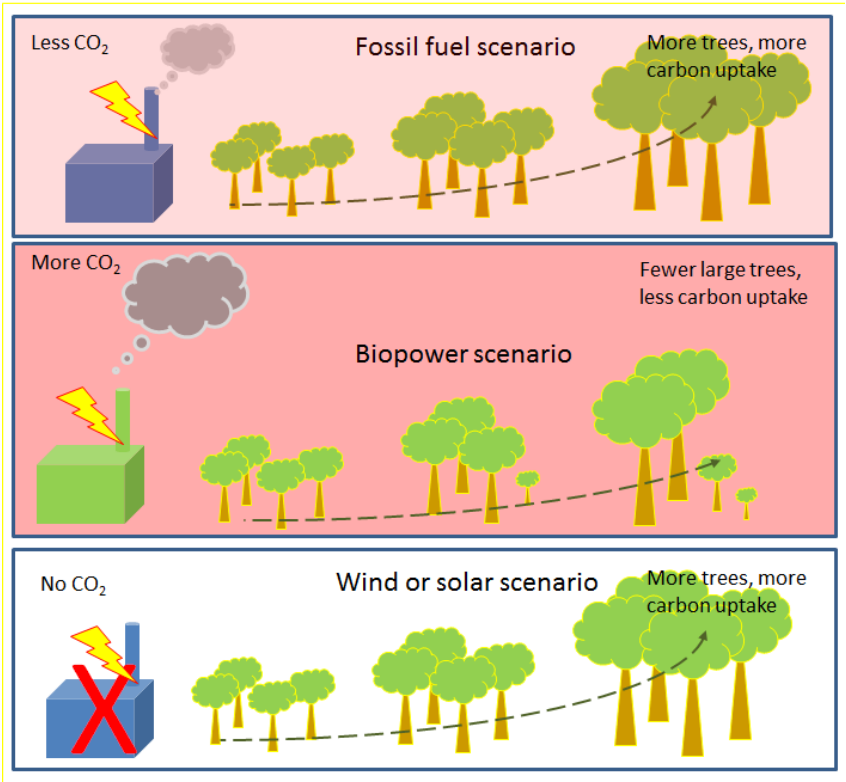
Burning forestry residues that would otherwise be burned in the field creates the least carbon debt, since emissions from burning in a power plant are the same as emissions from burning in the field, in any given year.

Burning forestry residues that would otherwise decompose in the forest creates a carbon debt that persists for more than a decade, relative to coal, and more than three decades, compared to natural gas, because burning is instantaneous, and decomposition takes years to decades.

Burning trees that would otherwise continue growing and sequestering carbon from the atmosphere creates a carbon debt that persists several decades to more than a century. This is true even if the trees are "low value" wood. The atmosphere doesn't care – CO_2 is CO_2.

Pennsylvania's "Blue Ribbon Task Force" claimed over 6 million tons of "low-use wood" is available for biomass fuel. The group's report stated: "*Wood consumed for energy is clearly accepted as a carbon neutral concept when based on harvesting from well-managed forests*" However, this isn't true (neither part is true – it's not carbon neutral, and it's not clearly accepted).

Scientists dismiss the idea that "Sustainability" equates with carbon neutrality. Forests are growing and taking carbon out of the atmosphere. Cutting and burning trees sends the carbon that's locked up in wood into the atmosphere; unless there's a way to *simultaneously* replace that wood, burning wood for energy will increase the concentration of CO_2.



The atmosphere "sees" more CO_2 under a bioenergy scenario

Combining the greater emissions from wood-burning power plants (compared to coal) with the reduction in forest carbon uptake following harvesting for fuel, the net emissions impact of bioenergy is significantly increased when trees are cut for fuel.

Further, since bioenergy is competing with and displacing other renewable energy that has no emissions – like wind and solar – the impact is even greater.

CPP doesn't allow offsets… so why consider "sustainably-derived" biomass?

No Emission Reduction Credits for *"Measures that reduce CO_2 emissions outside the electric power sector, including GHG offset projects representing emission reductions that occur in the forestry and agriculture sectors"* (p. 290 CPP)

But, rationale of offsets hardly differs from rationale of "sustainably derived" biomass, where

- *"state plan must adequately demonstrate that biomass feedstocks appropriately control increases of CO_2 levels in the atmosphere."* (p. 226 CPP)

If bioenergy emissions are offset at all, it will happen in some other place, at some future time. Verifiable? Enforceable?

CPP verification and enforceability requirements for bioenergy

Biomass-related biogenic CO_2 benefits must be **"quantifiable, verifiable, non-duplicative, permanent and enforceable."** (p. 226 CPP)

To date, EPA has not produced a framework for evaluating biomass emissions, and is still asking for comment on how verify what fuels are burned.

Documentation disclosure requirements

EPA wants:

- *robust, independent third party verification* ***and measures to maintain transparency****, including* ***disclosure of relevant documentation and reports****. (p. 226 CPP)*
- *measures for tracking and auditing performance to ensure that biomass used meets the state plan requirements for qualified biomass and associated biogenic CO_2 benefits.*

Transparency requirements might come as bad news to some. Massachusetts has regulations in place that eliminated renewable energy subsidies for low-efficiency biomass plants and requires facilities to meet fuel sourcing standards. We FOIA'd documents from Massachusetts to see what plants qualified for the MA RPS are reporting for their fuel sourcing. This is what we got back.

Verification matters – but even where fuel sourcing is tracked, transparency may be lacking (example from Massachusetts)

Fuel Mix Information (Identify all woody biomass fuels, certified or non-certified, delivered to the unit and allocated for the purpose of this Report during the quarterly reporting period.)

Fuel Type	Tons Delivered to Unit in Quarter	Tons of Certified Fuel Allocated for this Quarterly Report (include both tons delivered and allocated in this quarter and any allocated from banked Certificates from previous quarters within this calendar year)	Tons of Certified Fuel Delivered this Quarter Banked for Future Quarters within this Calendar Year
(A) Total tons of biomass delivered to the Unit that were Certified Residues	[redacted]	[redacted]	[redacted]
(B) Total tons of biomass delivered to the Unit that were Certified Thinnings	[redacted]	[redacted]	[redacted]
(C) Total tons of biomass delivered to the Unit	[redacted]	[redacted]	

Verification? Enforceability?

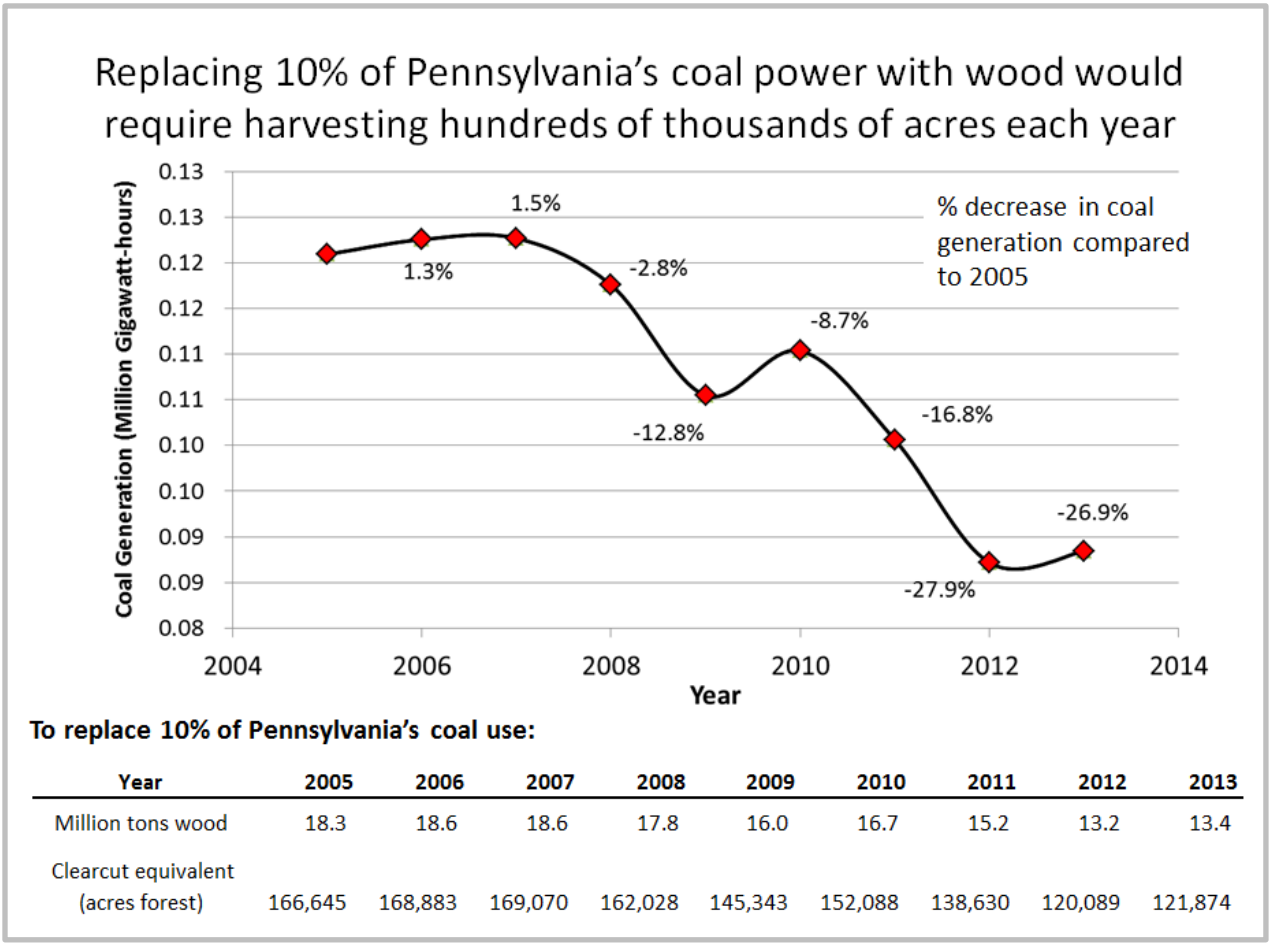
50 MW McNeil plant, Burlington Vermont. ~625,000 green tons/year – much of it from whole trees

Biomass power plants burn trees, chips, "waste" wood – but most of it arrives in a chip van. The Covanta plant, shown below, is just 50 MW in capacity, but burns vast amounts of wood. Who can verify the source of fuels?

(Of note, regarding the Covanta Delanor facility, from https://ccejn.wordpress.com/2015/10/21/community-complaints-lead-to-over-30000-in-violation-penalties/:

"The San Joaquin Valley Air District recently found the Covanta biomass incinerator in Delano liable for seven air quality infractions, leading to over $30,000 in penalties. The latest in the series of violations was settled on September 10th, resulting in a $20,000 fine for Covanta's "failure to comply with visible emissions limits." The air district's action is responding to a resident-led effort to monitor and report suspected violations from the Covanta facility.

According to reports from residents, the facility consistently fails to control smoke emitted from a pair of smoke stacks just two miles south of Delano. Over the last year, concerned residents living nearby the facility have filed over 20 complaints to the San Joaquin Valley Air Pollution Control District, through the community-based Kern Environmental Enforcement Network (KEEN) reporting platform. The air district used these complaints to investigate, ultimately finding the company liable for seven separate violations of its air permits.")



To replace 10% of Pennsylvania's coal use:

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
Million tons wood	18.3	18.6	18.6	17.8	16.0	16.7	15.2	13.2	13.4
Clearcut equivalent (acres forest)	166,645	168,883	169,070	162,028	145,343	152,088	138,630	120,089	121,874

Even if burning biomass didn't emit CO_2, replacing just 10% of Pennsylvania's coal use in every year since 2005 would require the equivalent wood yielded by clear-cutting over a hundred thousand acres of forest annually. Meanwhile, coal use has fallen relative to 2005 (percentages) due to economic factors and the availability of natural gas.

Futher, if the 10% replacement were done by co-firing wood at coal plants, it would actually *interfere* with achieving the first "building block" of the Clean Power Plan, increasing coal plant efficiency - the one part of the Clean Power Plan that everyone can agree on.

Biomass co-firing degrades coal plant performance

- Building Block 1 for BSER is reducing heat rate at coal plants (amount of energy required to generate a kWh)
- Co-firing biomass with coal *increases* heat rate and increases CO_2 emissions at coal plants

It's hard to reduce emissions when you're actually increasing them. So although EPA says they'll consider biomass co-firing as a compliance option…

… PA can be smarter than EPA.

Replacing any meaningful amount of coal would require astronomical amounts of wood. The people who are actually charged with caring for Pennsylvania's forests aren't enthused:

Forest impacts of Bioenergy: Pennsylvania DNR warns about harvesting trees for fuel

*"Whole-tree harvesting … should be done with **extreme care** to avoid damage to the remaining forest during harvesting. Whole-tree harvesting can present **ecological and practical problems for forest management**. Much of the nutrients in a tree are stored in the small twigs and leaves. Removal of the whole tree removes these important resources and may negatively affect nutrient cycling. **Whole-tree harvesting is often mechanized using large equipment and can cause significant damage to young seedlings**. In partial harvests, shelterwoods, and thinnings, regeneration is not as important, but harvesting and skidding whole trees with broad tops is difficult without damaging residual trees."**

* Draft 2015 State Forest Resource Management Plan
http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr_20031287.pdf; p. 75

Pennsylvania's forests are in trouble – and accelerating harvesting for biomass could impact them further

*"The capacity of the forest to renew itself through natural regeneration is a key indicator of forest health and a necessary component of a sustainably managed forest. Ensuring desirable regeneration throughout Pennsylvania's forest is a significant management challenge. **Across the state, only 49 percent of sampled stands have adequate regeneration to develop into high-canopy forests** (FIA, 2014). When only considering commercially desirable species, the number drops to 36 percent. The extent and quality of forest regeneration has far-reaching impacts on forest health and the suite of values the forest provides to society. The natural replacement of forests helps maintain and enhance Pennsylvania's forest land base of nearly 60 percent that recharges water within watersheds, stores carbon, and provides incalculable ecological services."*

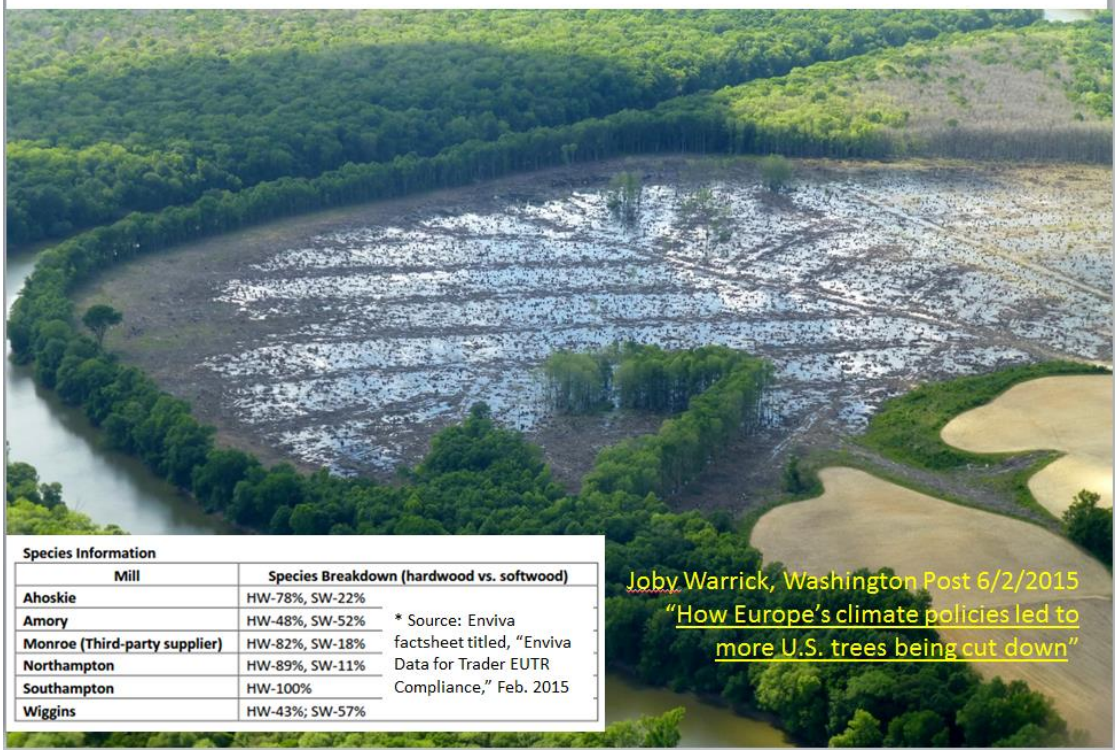
Draft 2015 State Forest Resource Management Plan
http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr_20031287.pdf; p. 160

Meanwhile, in the Southeast:

Enviva wood pellet facility, Ahoskie, North Carolina

850,000 green tons/year

Pellet industry harvesting in North Carolina: *"Little remains but stumps and puddles in what was once a bottomland hardwood forest"*



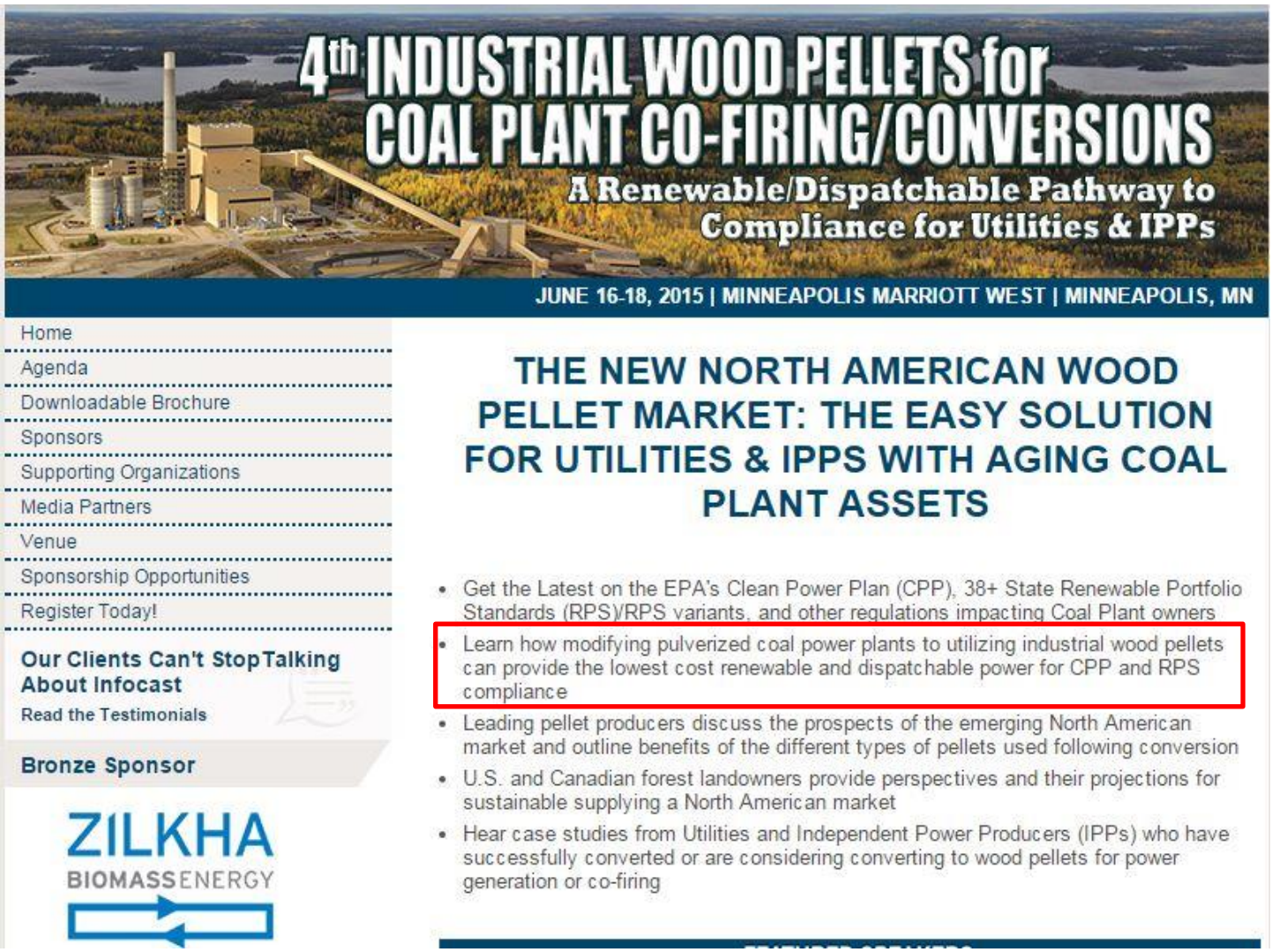
Species Information

Mill	Species Breakdown (hardwood vs. softwood)
Ahoskie	HW-78%, SW-22%
Amory	HW-48%, SW-52%
Monroe (Third-party supplier)	HW-82%, SW-18%
Northampton	HW-89%, SW-11%
Southampton	HW-100%
Wiggins	HW-43%; SW-57%

* Source: Enviva factsheet titled, "Enviva Data for Trader EUTR Compliance," Feb. 2015

Joby Warrick, Washington Post 6/2/2015
"How Europe's climate policies led to more U.S. trees being cut down"

Enviva's pellet harvesting operations rely primarily on native hardwood forests for fuel. Clearcutting sends some high-value wood to sawmills, but the majority goes for pellets.



The biomass and pellet industry is offering to keep "aging coal plant assets" operating under the Clean Power Plan. They'd like nothing more than to develop a market in the U.S., because currently, all their utility-scale customers are located overseas.

This market for wood pellets – which is responsible for millions of tons of trees being cut and pelletized each year – is driven by the fact that in EU and UK, carbon accounting conventions only count the CO_2 from manufacturing and transporting wood fuels, and not the stack emissions. This is just what the CPP will do, if biomass is accepted and promoted as a compliance measure.

The pellet and biomass industry are ripping through the forests that the pulp and paper industry considered theirs. "Sustainable" harvesting, if it ever existed, is an impossibility when wood demand abruptly increases.

The US pulp and paper sector is not amused

Export Pellets from the USA

- Without the foreign (EU) subsidy, the entire industry fails
- European sustainability and certification specifications are being developed. There is no auditing mechanism available to verify even claims made today. This creates tremendous uncertainty.
- Pellet plant sites are being selected to minimize transportation costs to a port. The wood baskets won't sustain the harvesting pressure.
- The vast majority of the fiber is coming from whole trees, not residuals. This is the pellet model going forward.
- The perspective is that a bubble (demand in the resource) is being created that won't be sustainable. The damage created during its existence will create a lot of dislocation in the USA domestic wood markets.
- Once the coastal areas have been depleted the pellet plant sites will move more inland and pellets will be trucked or railed to ports.

MWV How brands take shape™

(Slide from presentation given by Irene Kowalkczyk, **MeadWestvaco,** March 2014 Kentucky Industrial Utility Customers annual meeting)

Threats to air quality and health from contaminated wood burned as biomass

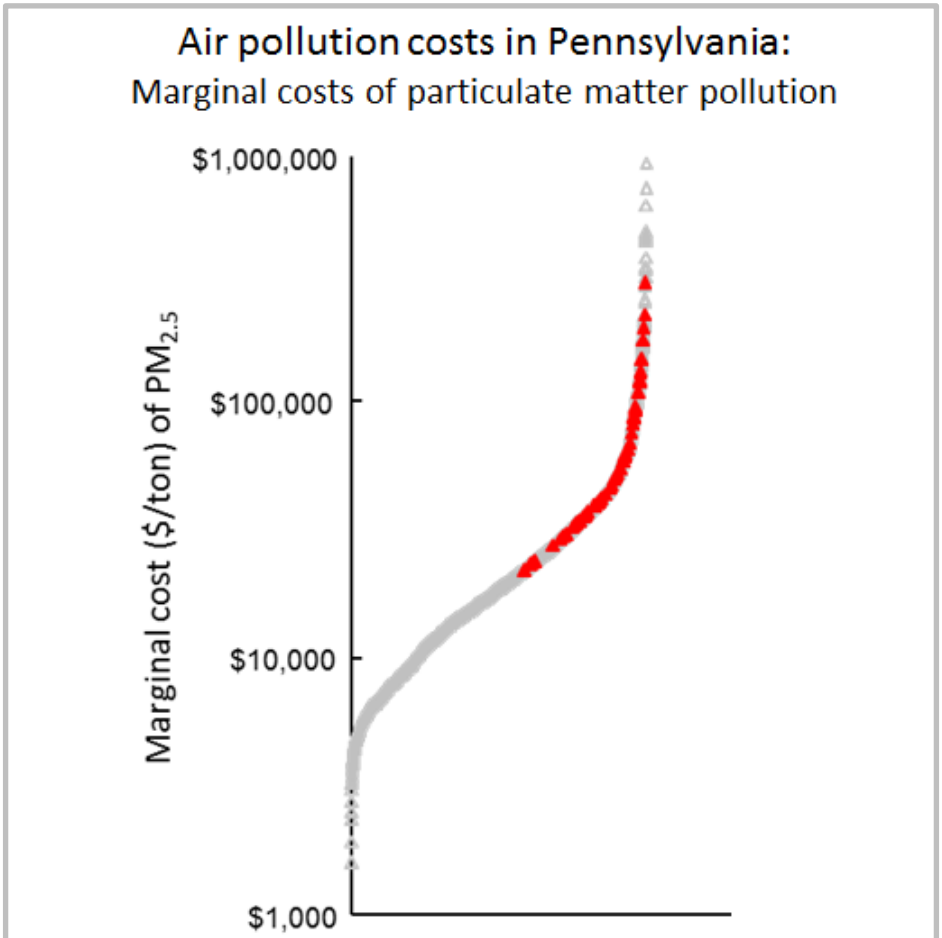
Evergreen Community Power, Reading, Pennsylvania
Burns contaminated wood in non- attainment area for EPA health standards for PM, ozone, and airborne lead. See, http://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf

L'Anse Warden plant, MI:
Coal-to-biomass conversion is most polluting plant in Michigan, per MWh. Burns tires and creosote- and pentachlorophenol-treated railroad ties. See, http://www.pfpi.net/groups-say-u-p-biomass-power-plant-blankets-community-in-toxic-soot

Covanta plant in CA:
Dioxin-loaded wood ash ploughed into farmland as "soil amendment." See, http://www.newsreview.com/chico/settlement-reached-in-popi-case/content?oid=15836324

EPA is regulating contaminated materials as "biomass," not waste. See, http://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf

The marginal costs of an additional ton of pollution in Pennsylvania are among the highest in the nation.



Distribution of marginal cost estimates for all counties in the United States as calculated using the APPEP model. Counties in Pennsylvania are shown in red.

(From PFPI's 2014 report on bioenergy in Pennsylvania, at http://www.pfpi.net/wp-content/uploads/2014/10/PFPI-Pennsylvania-bioenergy-rpt-Oct-2014.pdf)

Pollution has a cost, in terms of environmental effects (crops and forests nationwide sustain billions of dollars in damage from ground-level ozone each year) and human health, where multiple impacts ranging from low birth weight to cancer have been linked to poor air quality.

Such impacts can be expressed in financial terms. It is well-established that the effects of additional air pollution loading are worst in areas that are already suffering from degraded air quality. One analytic tool for determining financial impacts of pollution, developed with EPA support, is the Air Pollution Emission Experiments and Policy Analysis (APEEP) model. This model assesses the marginal cost of each additional ton of pollution emitted, calculating separate county level cost estimates that weight marginal costs by existing emission sources, and thus by extension background air pollution.

Of the pollutants modeled by the APEEP model, the greatest marginal costs are associated with $PM_{2.5}$, the size fraction of particulate matter that is emitted in the greatest quantities by wood-burning. Employing the

standard assumption that the "value of a statistical life" is $6 million, the APEEP model finds that Pennsylvania, as a state with existing air quality problems, has counties with some of the highest marginal costs of pollution in the nation.

Biomass as "Clean" Energy?
EPA emissions data from biomass facilities receiving subsidies under the Maryland RPS – black liquor and waste wood

Facility	State	Type of biomass	E-GRID Emissions in 2012 NOx (tons)	SOx (tons)	CO2 (tons)	% of MD Tier I in 2012
Luke Mill	MD	Black liquor	444	2,304	763,123	2.68%
P H Glatfelter Co -Chillicothe Facility	OH	Black liquor, wood	500	2,322	919,275	1.34%
Stone Container Coshocton Mill	OH	Wood	527	125	284,967	0.88%
P H Glatfelter Spring Grove	PA	Black liquor	444	1,934	767,389	1.33%
Viking Energy of Northumberland	PA	Wood	40	6	40,938	0.72%
Covington Facility	VA	Black liquor	955	4,448	1,471,468	5.65%
International Paper Franklin Mill	VA	Black liquor	326	765	256,585	2.09%
Multitrade of Pittsylvania LP	VA	Wood	209	78	552,902	9.91%
Stone Container Hopewell Mill	VA	Black liquor, wood	1,277	2,725	1,009,669	6.61%
West Point Mill	VA	Black liquor, wood	1,046	3,078	1,429,122	4.82%
International Paper Kaukauna Mill	WI	Black liquor, wood	174	862	366,756	0.29%
			5,942	**18,647**	**7,862,194**	**36.32%**

These EPA data on emissions from biomass facilities receiving renewable energy credits in Maryland should disabuse anyone of the notion that bioenergy is "clean." The wood wastes and black liquor being burned at these facilities might be classified as waste fuels and therefore count as "qualified" fuels under the Clean Power Plan. However, CO_2 emissions at some of these plants are over a million tons a year, and some of the facilities emit as much or more NOx and SOx as highly polluting coal plants. If Pennsylvania engages in multi-state emissions trading with Maryland and other states that have qualified facilities like this under their own CPP compliance plans, Pennsylvania will own this problem , too.

Pennsylvania has its own highly polluting bioenergy facilities

Fuel at the Evergreen Community Biomass facility, Reading PA

Pennsylvania's biomass plants and waste incinerators (and biomass plants that are incinerating waste, like the Evergreen facility) are not well-regulated. The Evergreen plant, located in Reading, was built just recently, yet has had a number of problems with emissions. We discussed this in two of our reports, which we quote here. We're providing this level of detail because we think it's important to illustrate the large gap between happy talk about "clean" bioenergy, and the reality of how these plants operate.

From **"Trees, Trash, and Toxics: How Bioenergy Has Become the New Coal"**
(at http://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf)

"This combined heat and power plant associated with United Corrstack, a paper product manufacturing company, cost $140 million to build. It received a $39 million "clean" energy grant from the federal government at startup.[1] An evaluation by the Department of Energy states that the fuel burned at the plant includes mostly wood, but that there are *"significant amounts of paper, plastic and other foreign debris*"[2] (Figure 10[3]). This fuel mix suggests that the facility is actually an incinerator, although for reasons that are unclear, it was not permitted as one. The DOE reported that the facility receives 41 – 55 tractor trailer loads a day of fuel and burns 300,000 – 350,000 tons per year. It generates ~70,000 tons of toxic ash a year, which costs $2.45 million a year for disposal.

The Evergreen plant is located in the Ozone Transport Region, and federal air permitting applicability thresholds were 100 tons when it was permitted, not 250 tons, but the plant projected emitting no more than 98.7 tons of any pollutant, and thus avoided nonattainment New Source Review permitting. [4] Evergreen was also permitted as an area source for HAPs, even though it was permitted to burn municipal waste, demolition debris, railroad ties, and tire-derived fuel. Projected emissions of HAPs included 9.6 tons of HCl per year (just below the 10 tons per year major source threshold) and a variety of heavy metals, including cadmium, cobalt, chromium, nickel, lead (over a ton per year), manganese, mercury (almost seven pounds per year), arsenic, and selenium. Total HAPs emissions were projected to be 23.9 tons per year, perilously close to the 25-ton triggering threshold that facilities so wish to avoid. [5] The facility started operations in 2009, and by 2010 had seen failure of its ash handling system, its sorbent injection system for controlling HCl, which had to be fully replaced, and its SCR system for controlling NOx. [6] An inspection in 2010 found that the facility had failed to record continuous emissions data for some pollutants, and that the 30-day rolling average emissions rate for HCl, which was supposed to be 0.005 lb/MMBtu to ensure the plant didn't emit more than 10 tons, was actually 30 times higher, at 0.149 lb/MMBtu. [7] This rate, maintained over a year, would lead to emissions of over 300 tons of HCl annually. As of 2010 and 2011, the facility was losing $15 million per year, even though the plant does not pay for fuel, but just its transportation. [8]

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[1] The guidance for the Department of Treasury's 1603(b) program, which converts the Incentive Tax Credit worth 30% of construction costs to a cash grant, states that the program provides a long-term benefit of expanding the use of clean and renewable energy and decreasing our dependency on non-renewable energy sources."
http://www.treasury.gov/initiatives/recovery/Documents/GUIDANCE.pdf

[2] U.S. Department of Energy, Mid-Atlantic Clean Energy Application Center. Evergreen Community Power Plant Case Study: 33 MW Facility Using Biomass. November 16, 2011.

[3] U.S. Department of Energy, Mid-Atlantic Clean Energy Application Center. Evergreen Community Power Plant Case Study: 33 MW Facility Using Biomass. November 16, 2011.

[4] Plan approval application for the United Corrstack LLC Evergreen Community Power Project. Submitted to the Pennsylvania Department of Environmental Protection, October, 2006.

[5] Ibid.

[6] Letter from Art McLaughlin, Site Manager for Evergreen Community Power, to Kenneth Hartzler, Pennsylvania Department of Environmental Protection, December 28, 2010.

[7] Annual inspection verification report for minor facilities – United Corrstack, LLC. Date of inspection September 29, 2010. Submitted by William Borst, AQDS, to Pennsylvania Department of Environmental Protection.

[8] The facility anticipated receiving $500,000 in tipping fees in its first year of operation, but only collected $10,000.

Needless to say, this was not how the company had represented its future operations. A write-up about the plant from 2009 looks to the future, quoting David Stauffer, a vice-president of United Corrstack. "*Thanks to reduced emissions, the new plant will improve air quality. 'For every megawatt of electricity we make, that electricity will be displacing a fossil fuel unit somewhere,' Stauffer says. 'When we fire up our 25 megawatts, 25 megawatts of coal fire goes down, which helps clean up the air*.'"[9]

From **"Pollution from Pennsylvania's Biomass Energy Sector: Resources for Citizen Involvement"** (at http://www.pfpi.net/wp-content/uploads/2014/10/PFPI-Pennsylvania-bioenergy-rpt-Oct-2014.pdf)

The facility is located in a densely populated area of Reading, in Berks County, which is in non-attainment for EPA's 8-hr ozone standard. Berks County had a student asthma prevalence in 2012/2013 of 13.5% (9,621 children). Despite the heavily polluted nature of its surroundings, the company received a cash grant of $39 million in Federal funds to install the biomass boiler. The facility was permitted as a synthetic minor for both criteria pollutants and hazardous air pollutants to avoid Title V permitting, but has had a variety of problems meeting its emissions limits. A Department of Energy evaluation determined that the project was losing around $15 million per year in 2010 and 2011 (for more details on the Evergreen facility, see our report "Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal[10]).

Evergreen Community Power's state-only operating permit allows 96 tons of particulate matter emissions per year. While the facility does use an electrostatic precipitator for PM control, emissions could be reduced if the facility used a high-efficiency baghouse, which would serve the additional purpose of reducing emissions of heavy metals from the treated wood that is burned at the facility (Berks County, along with Beaver County, is also partially in non-attainment for the EPA inhalable lead health standard[11]). As the APEEP model values the marginal cost of $PM_{2.5}$ at $ 95,231/ton in Berks County, reducing PM emissions by ten tons could avoid almost $1 m in pollution costs per year.

[9] Ben Franklin Technology Partners website: "United Corrstack: Developing a co-generation plant to provide steam and electricity to its manufacturing facility." May 10, 2009. Accessed January 2014 at http://nep.benfranklin.org/united-corrstack-developing-a-co-generation-plant-to-provide-steam-and-electricity-to-its-manufacturing-facility/

[10] At http://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf.

[11] http://www.epa.gov/airquality/greenbook/mncs.html#PENNSYLVANIA.

Groups letter to Office of Management and Budget, when OMB was reviewing the Clean Power Plan.
Message: Bioenergy doesn't belong in the Clean Power Plan as compliance.

Center for Biological Diversity | Chesapeake Climate Action Network
Clean Air Task Force | Dogwood Alliance | Earthjustice
Environmental Working Group | Friends of the Earth
Global Alliance for Incinerator Alternatives | Greenpeace
Partnership for Policy Integrity | Rainforest Action Network | Sierra Club
Southern Environmental Law Center | 350.org

The Honorable Shaun Donovan, Director
Office of Management and Budget
725 17th Street, NW
Washington, DC 20503

June 23, 2015

Dear Mr. Donovan —

The public interest environmental organizations listed above write to register our strong objections to the use of biomass combustion for power generation as a compliance measure in the Clean Power Plan (CPP). In the preamble to the proposed CPP, the Environmental Protection Agency anticipates that states will likely consider biomass as a compliance option, and asserts the importance of defining a clear path for states to do so.[12] This letter outlines several of the concerns our organizations have about the environmental impacts and the legal viability of the approach suggested by EPA in its proposed rule.

First, biomass-based power generation should not be included in the final CPP as a compliance measure because, at least in its proposal, EPA has not identified a rational basis for considering biomass combustion as part of the "best system of emission reduction" (BSER). Power plants burning wood and other forms of biomass emit about 3,000 pounds of CO_2 per megawatt-hour, an emissions rate that is approximately fifty percent higher than that of a coal-fired power plant. Co-firing biomass in a coal plant can increase emissions relative to burning coal alone, and, as EPA has acknowledged, can decrease facility efficiency[13] (thus working in opposition to Building Block 1 of the CPP, which calls for increasing coal plant efficiency).

The Clean Air Act requires EPA to promulgate a standard of performance for limiting the air pollutants emitted from each listed category of stationary sources. This performance standard must

[12] Carbon pollution emission guidelines for existing stationary sources: electric generating units; proposed rule, 79 Fed. Reg. 34,830, 34,924 (June 18, 2014).
[13] U.S. Environmental Protection Agency. Documentation for EPA Base Case v.5.13: Using the Integrated Planning Model. Page 5-9. http://www.epa.gov/airmarkets/documents/ipm/Documentation.pdf

"reflect[] the degree of emission limitation achievable through the application of the best system of emission reduction … the Administrator determines has been adequately demonstrated."[14] Section 111(d) of the Act is source-focused, requiring states to submit plans for implementing standards of performance at particular existing sources.[15] As biomass combustion does not produce contemporaneous reductions in CO_2 emissions, with any reductions in net lifecycle emissions depending on carbon offsetting that occurs offsite and in the future, it cannot be considered part of the BSER envisioned in the Clean Power Plan and required under Section 111 of Act.

EPA and other agencies have often treated CO_2 from bioenergy differently from CO_2 from fossil fuel combustion, even though CO_2 from both sources has the same effect on the climate. This different treatment is based on the theory that burning biomass to generate energy either results in emissions that will be recaptured as trees grow back, or avoids emissions that otherwise would have occurred if the biomass were to decompose. However, even if emissions are reduced by regrowth later in time, or if emissions that would have occurred later in time are avoided, the offsetting reductions are significantly delayed – on the order of years, decades, or more than a century, depending on the material used as fuel. The emission reductions typically attributed to power plants that burn biomass are therefore uncertain, speculative, and dislocated, and cannot be relied upon for the purpose of CPP compliance.

Second, if EPA decides to shift the development of biomass carbon accounting to individual states, with no guidance or standards for evaluating biomass-dependent compliance proposals, this would invite arbitrary results and would have no rational basis. EPA's proposed CPP would not require biomass-burning facilities to ensure that emission reductions are contemporaneous, or even that such reductions will occur within a specified time period. Nor did the proposal describe how states are to assess the connection between facilities that burn biomass and nominally related CO_2 reductions that occur elsewhere (due to either subsequent plant growth or avoided decomposition).

EPA points states and other stakeholders to the Agency's ongoing effort to develop a scientific carbon accounting framework to track the lifecycle CO_2 emissions associated with biomass-based energy production. According to EPA, states that want to incorporate biomass combustion into their CPP implementation plans should refer to the draft *Framework for Assessing Biogenic CO_2 Emissions from Stationary Sources*. The draft Framework, however, is currently under review by an EPA Science Advisory Board (SAB) panel that roundly criticized the Agency's previous draft;[16] it states explicitly that EPA has not yet determined how to apply the Framework to any particular policy context, such as the CPP;[17] and it does not deliberate on the legal limitations and obligations that are particular to Section 111 of the Act or how the details of that provision apply to biomass combustion. Given the lack of guidance provided by EPA, there is a significant risk that some states will develop

[14] 42 U.S.C. § 7411(b)(1)(B), (a)(1).
[15] *Id.* § 7411(d)(1)(A).
[16] SAB review of EPA's Accounting Framework for Biogenic CO_2 Emissions From Stationary Sources. EPA-SAB-12-011 (Washington, D,C., Sept. 28, 2012), *available at* http://yosemite.epa.gov/sab/SABPRODUCT.NSF/57B7A4F1987D7F7385257A87007977F6/$File/EPA-SAB-12-011-unsigned.pdf. EPA recently extended the SAB's current review of the Framework through at least early September. *See* Notification of Three Teleconferences of the Science Advisory Board Biogenic Carbon Emissions Panel, 80 Fed. Reg. 32,113 (June 5, 2015).
[17] United States Environmental Protection Agency, Office of Air and Radiation. Framework for Assessing Biogenic CO_2 Emissions from Stationary Sources (Nov. 2014).

implementation plans that incorporate a diversity of biomass combustion measures that are arbitrary or otherwise legally baseless.[18]

Third, the concept of "sustainability" that EPA has said it will use to distinguish CPP-compliant biomass is not a proxy for carbon accounting. In a memorandum issued in late 2014, EPA signaled that it might bypass the scientific effort being conducted by the SAB by making two determinations: first, that the "use of waste-derived feedstocks and certain forest-derived industrial byproducts are likely to have minimal or no net atmospheric contributions of biogenic CO_2 emissions, or even reduce such impacts, when compared with an alternate fate of disposal;" and second, "that states' reliance specifically on sustainably-derived agricultural- and forest-derived feedstocks may also be an approvable element of their [CPP] compliance plans."[19] Sustainability standards in the forestry context, however, generally do not consider carbon dynamics at all, and thus cannot serve as an accurate proxy for carbon accounting.

The organizations represented on this letter have a range of perspectives about bioenergy. However, we all agree that the molecules of CO_2 emitted by biomass-burning facilities warm the atmosphere and acidify the oceans just as effectively as CO_2 from fossil fuels. Even if bioenergy emissions are eventually offset, the process of reaching net emissions parity with coal- and natural gas-fired power plants takes decades to more than a century, depending on the feedstocks used and the combustion efficiency of the facility. As such, biomass combustion is contrary to both the policy goals and legal requirements that underpin the Clean Power Plan, and cannot qualify as BSER.

For the reasons described above, we believe that the inclusion of biomass combustion as a compliance option would deeply compromise the final CPP, and we respectfully urge the Office of Management and Budget to recommend its exclusion.

Respectfully submitted,

Center for Biological Diversity
Kevin Bundy, Climate Legal Director and Senior Attorney

Chesapeake Climate Action Network
Mike Tidwell, Executive Director

Clean Air Task Force
Jonathan Lewis, Senior Counsel, Climate Policy

Dogwood Alliance
Danna Smith, Executive Director

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[18] The forestry industry, emboldened by the possibility that EPA will discount the CO_2 emitted by biomass-burning power plants, anticipates a "new North American wood pellet market" under the CPP. *See* http://www.informationforecastnet.com/events/pellets-coal-plant-conversions/?utm_source=Pellets-J1-0526-1&utm_medium=Banner&utm_campaign=2015Events. A new market would exacerbate the rapidly growing demand for US-harvested trees from power companies in Europe, where bioenergy is wrongly assumed to be "carbon neutral." *See* Joby Warrick, How Europe's climate policies led to more U.S. trees being cut down, Washington Post, June 2, 2015, *available at* http://t.co/anLq0JuA6c.

[19] Memorandum from Janet McCabe, Acting Assistance Administrator, Office of Air and Radiation, EPA, to Air Division Directors, Regions 1 – 10, "Addressing Biogenic Carbon Dioxide Emissions from Stationary Sources," Nov. 19, 2015.

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