

Bioenergy and Waste-burning Loopholes in the Clean Power Plan, and How to Avoid Them

Mary S. Booth

Partnership for Policy Integrity



Wednesday, November 4, 12:00 PM (Eastern Time)

and

Thursday, November 5, 3:30 PM (Eastern Time)

Dial in: 413-259-8020 (no PIN)

Welcome to the webinar. Lines will be muted during the presentation and unmuted at the end for questions and discussion, which can go beyond the hour if necessary.

Objective

Emissions reductions under the Clean Power Plan are limited.

To be effective, the CPP must exclude biomass and waste burning, which emit more CO₂ per unit energy than fossil fuels. Current science shows treating these fuels as carbon neutral is unjustified.

Citizens and policymakers can use science and the law to ensure state compliance plans exclude polluting renewable energy technologies.

Technologies discussed today

- Wood-burning power plants
- Co-firing wood with coal
- Garbage incineration

But not

- Anaerobic digestion
- Landfill methane capture

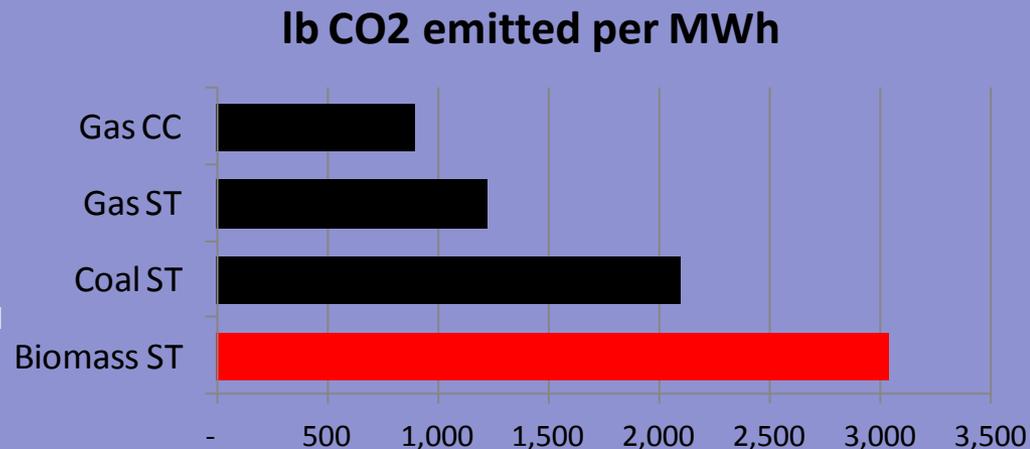
Biomass power plants emit more CO₂ per MWh than coal or gas facilities

	Fuel CO ₂ per heat content (lb/mmBtu)	Facility efficiency	Fuel mmBtu required to generate 1 MWh	Lb CO ₂ /MWh
Gas combined cycle	117.1	0.45	7.54	883
Gas steam turbine	117.1	0.33	10.40	1,218
Coal steam turbine	205.6	0.34	10.15	2,086
Biomass steam turbine	213	0.24	14.22	3,029

A biomass plant emits

- ~150% the CO₂ of a coal plant
- ~250% the CO₂ of a gas plant
- ~340% the CO₂ of a combined cycle plant

Fuel CO₂ per heat content data are from EIA. Efficiency for fossil fuel facilities calculated using EIA heat rate data (<http://www.eia.gov/cneaf/electricity/epa/epat5p4.html>); biomass efficiency value is common value for utility-scale facilities.



So why has biomass energy been treated as “*carbon neutral*”?

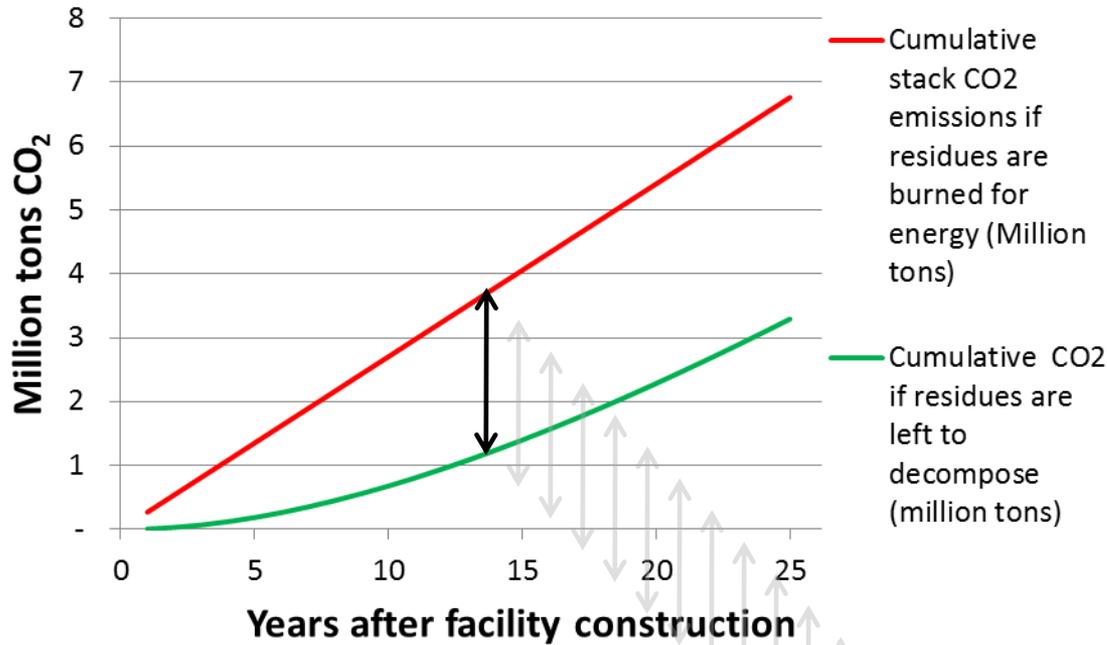
The “waste” argument: Materials burned are “waste” – would decompose and emit CO₂ anyway – e.g. forestry residues.

- No *net* increase in CO₂ emissions, but release from combustion is instantaneous while decomposition takes years to decades.

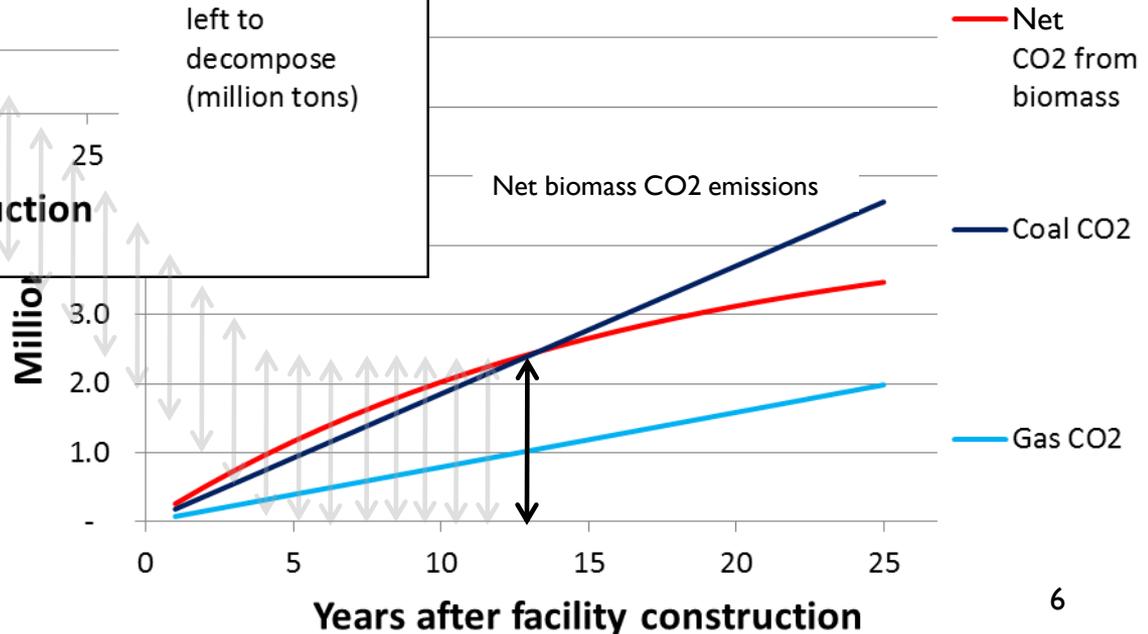
The “resequestration” argument: Future forest growth takes up equivalent carbon as released by burning.

- CO₂ emissions may be offset eventually, but takes decades to centuries.

To determine net emissions from biomass combustion, compare to alternate fate



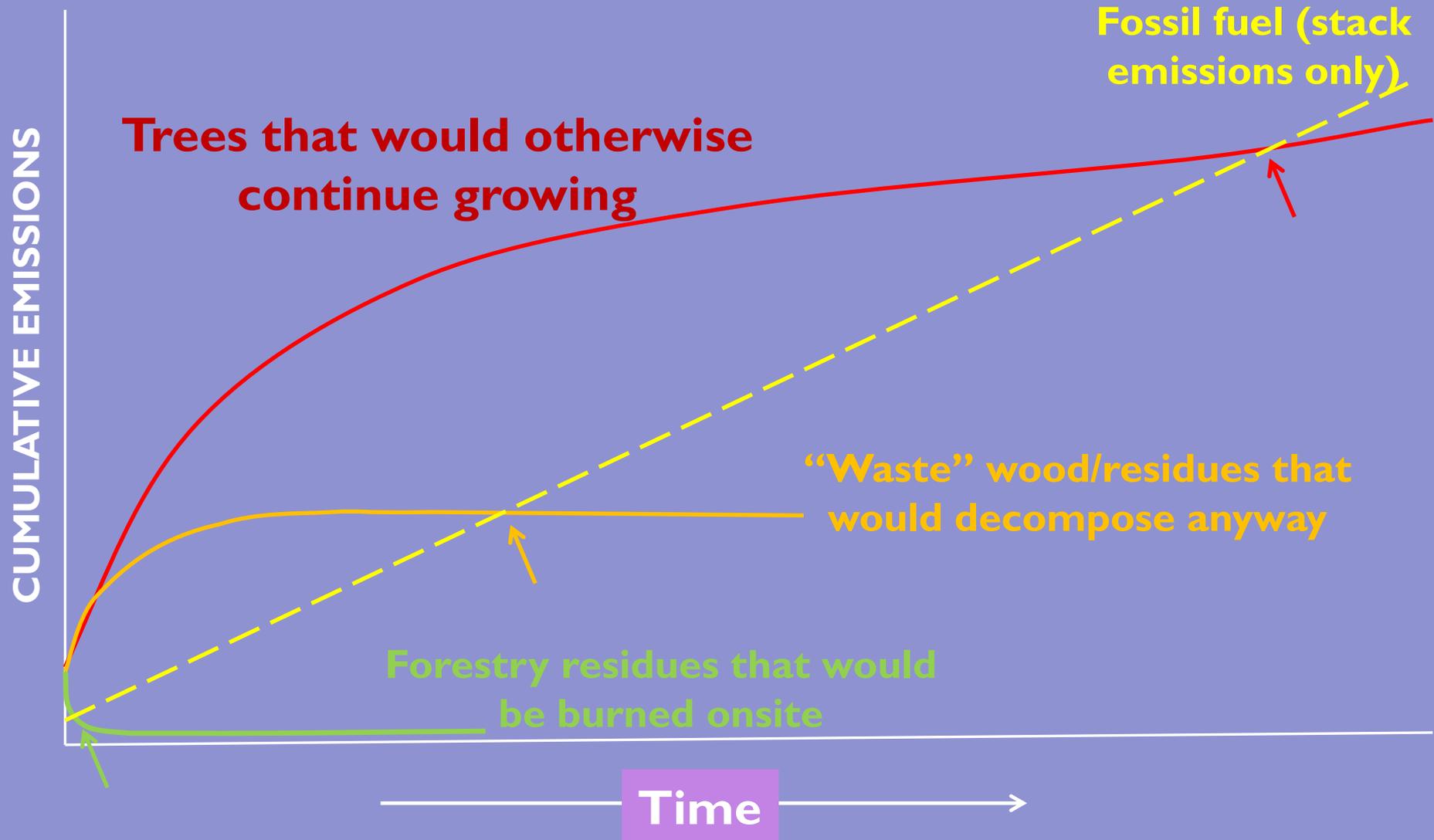
Forestry residues:
Compare emissions from burning in a 20 MW biomass plant to emissions from decomposition



Decomposition calculation:
(material left at year-x = $e^{-0.1*(year-x - 0.05)}$)

Assumes average decomposition rates for Northeastern forests (FASOM-GHG Regional decomposition constants from page L-28 of Biogenic Carbon Accounting Framework appendices)

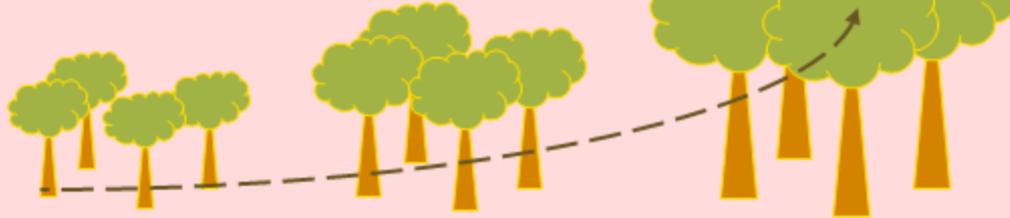
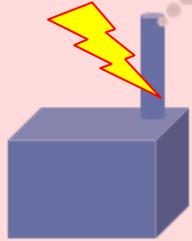
Net bioenergy emissions differ among fuels



Less CO₂

Fossil fuel scenario

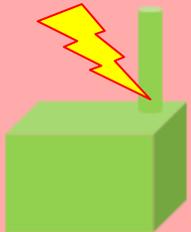
More trees, more carbon uptake



More CO₂

Biopower scenario

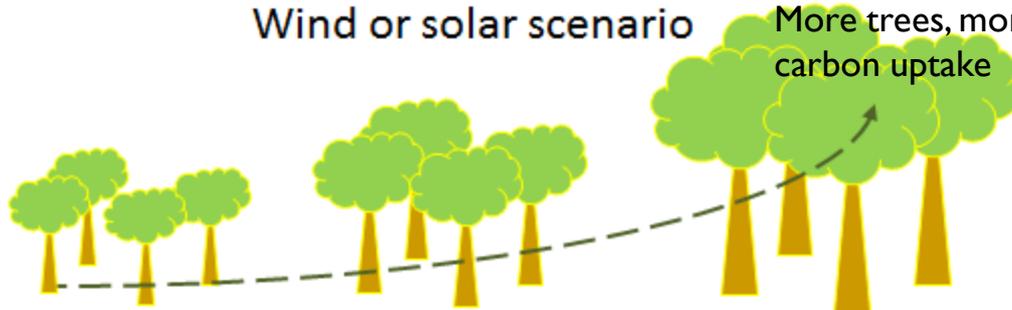
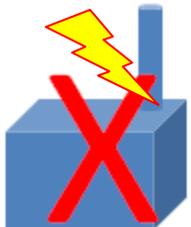
Fewer large trees, less carbon uptake



No CO₂

Wind or solar scenario

More trees, more carbon uptake



Forest harvesting example:

The atmosphere “sees” more CO₂ under a bioenergy scenario

THE CLEAN POWER PLAN

EPA's Clean Power Plan

Goal: Reduce emissions from electric generating units (EGU's) as

State-wide rate (pounds CO₂ emitted per megawatt-hour - lb/MWh),
or,

Total tons of CO₂ from (ie, fossil-fired plants).

How? Use “Best System of Emission Reduction” (BSER) measures:

1. Increase efficiency at coal plants
2. Increase deployment at existing natural gas plants
3. **Increase deployment of renewables**

And/or, use other, non-BSER measures – to be determined

EPA sets target rates/caps for each state to be achieved in compliance periods leading up to 2030

The bioenergy loophole at the heart of the Clean Power Plan

Rate-based compliance

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

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

No biopower emissions term

Mass-based compliance

Clean Power Plan “**mass-based**” compliance caps CO₂ emissions (tons per year), but only counts emissions from fossil-fired plants, thus facilities burning waste or biomass don't count toward total.

* Equation has been simplified for purposes of this discussion

Cumulative reductions under CPP are 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 1 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*.

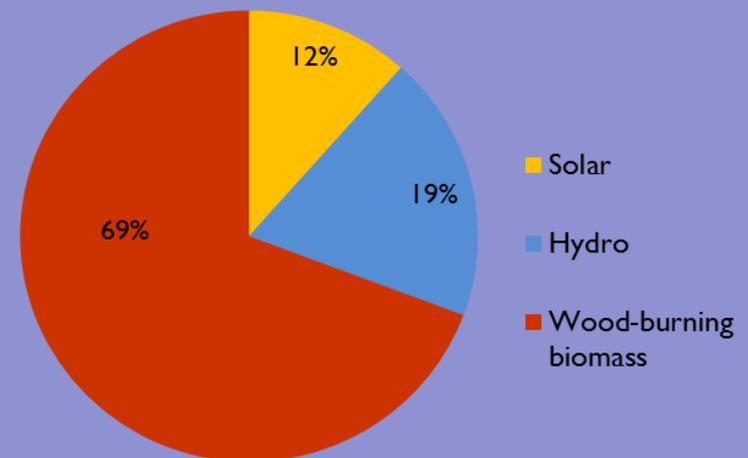
Bioenergy disproportionately increases state-level emissions: Dominion's Virginia wood-burners

- 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 CO₂ emissions



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

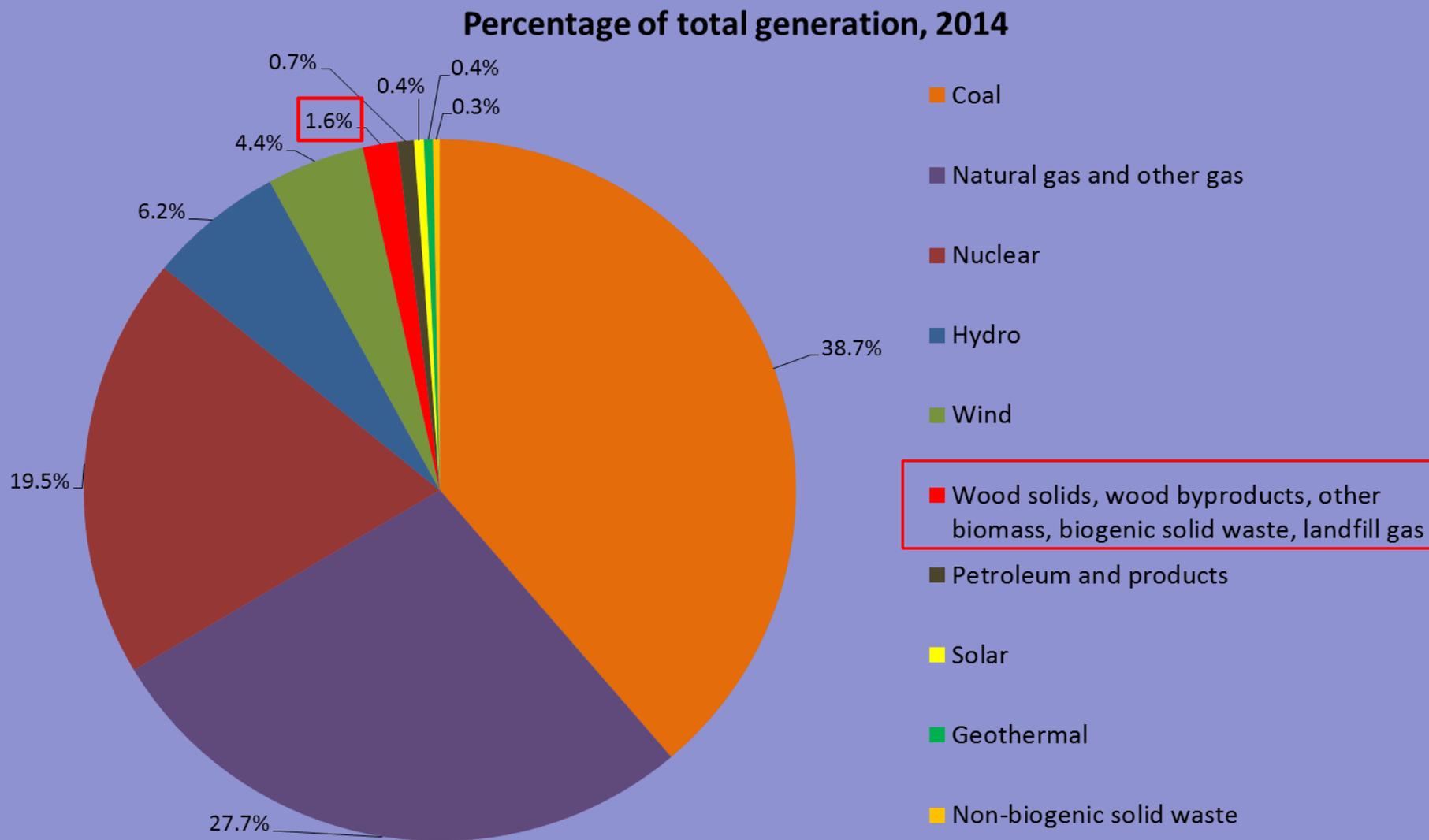
Limits on bioenergy as compliance in CPP

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)

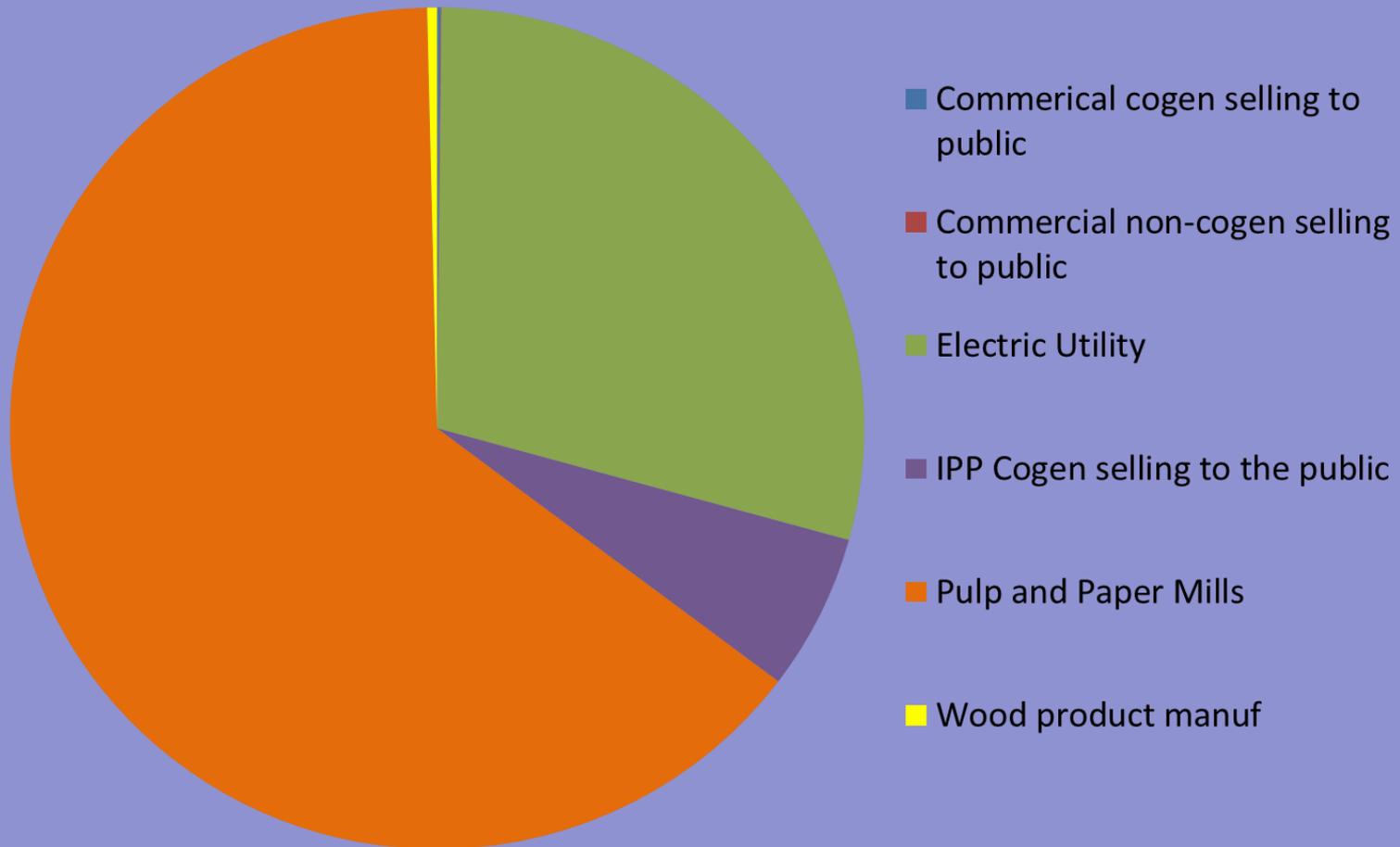
Pre-2013 construction is *not* eligible – this capacity is part of the baseline

The existing bioenergy sector provides a small percentage of total generation (EIA data)



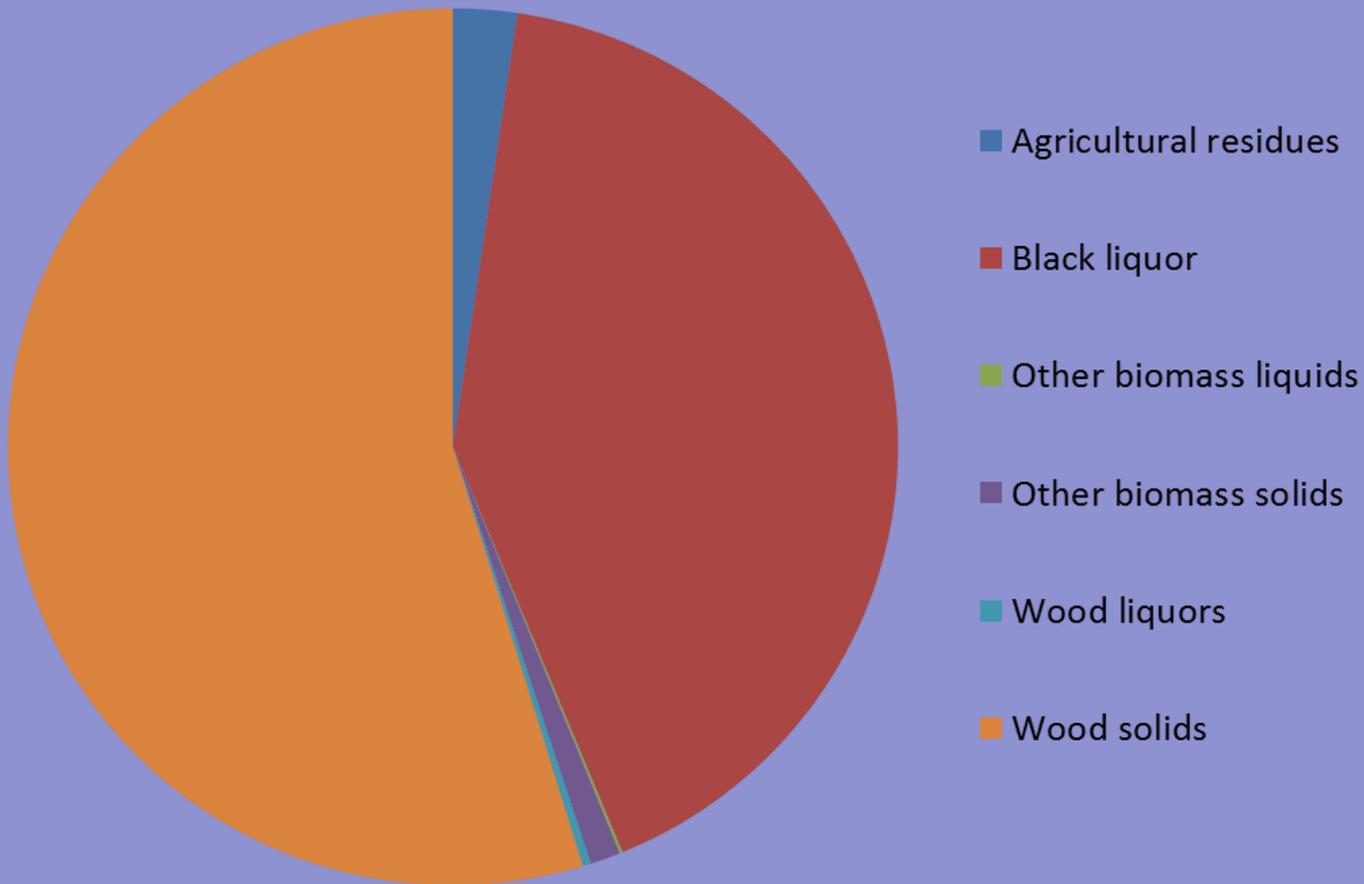
Industrial facilities dominate bioenergy sector

Megawatthours in 2014



Black liquor is still an important fuel

Megawatthours in 2014 by fuel type



It's appropriate that the existing 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
 - Pennsylvania's proposal to add waste incinerators to Tier I

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

Domestic biopower



50 MW McNeil plant, Burlington Vermont. ~625,000 green tons/year

Refiring projects (Dominion Altavista 2007)





Enviva wood pellet facility, Ahoskie, North Carolina



850,000 green tons/year

4th INDUSTRIAL WOOD PELLETS for COAL PLANT CO-FIRING/CONVERSIONS

**A Renewable/Dispatchable Pathway to
Compliance for Utilities & IPPs**

JUNE 16-18, 2015 | MINNEAPOLIS MARRIOTT WEST | MINNEAPOLIS, MN

THE NEW NORTH AMERICAN WOOD PELLET MARKET: THE EASY SOLUTION FOR UTILITIES & IPPS WITH AGING COAL PLANT ASSETS

- Get the Latest on the EPA's Clean Power Plan (CPP), 38+ State Renewable Portfolio Standards (RPS)/RPS variants, and other regulations impacting Coal Plant owners
- Learn how modifying pulverized coal power plants to utilizing industrial wood pellets can provide the lowest cost renewable and dispatchable power for CPP and RPS compliance
- Leading pellet producers discuss the prospects of the emerging North American market and outline benefits of the different types of pellets used following conversion
- U.S. and Canadian forest landowners provide perspectives and their projections for sustainable supplying a North American market
- Hear case studies from Utilities and Independent Power Producers (IPPs) who have successfully converted or are considering converting to wood pellets for power generation or co-firing

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



Joby Warrick, Washington Post 6/2/2015

[“How Europe’s climate policies led to more U.S. trees being cut down”](#)

Enviva pellet feedstock is mostly hardwoods*

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%

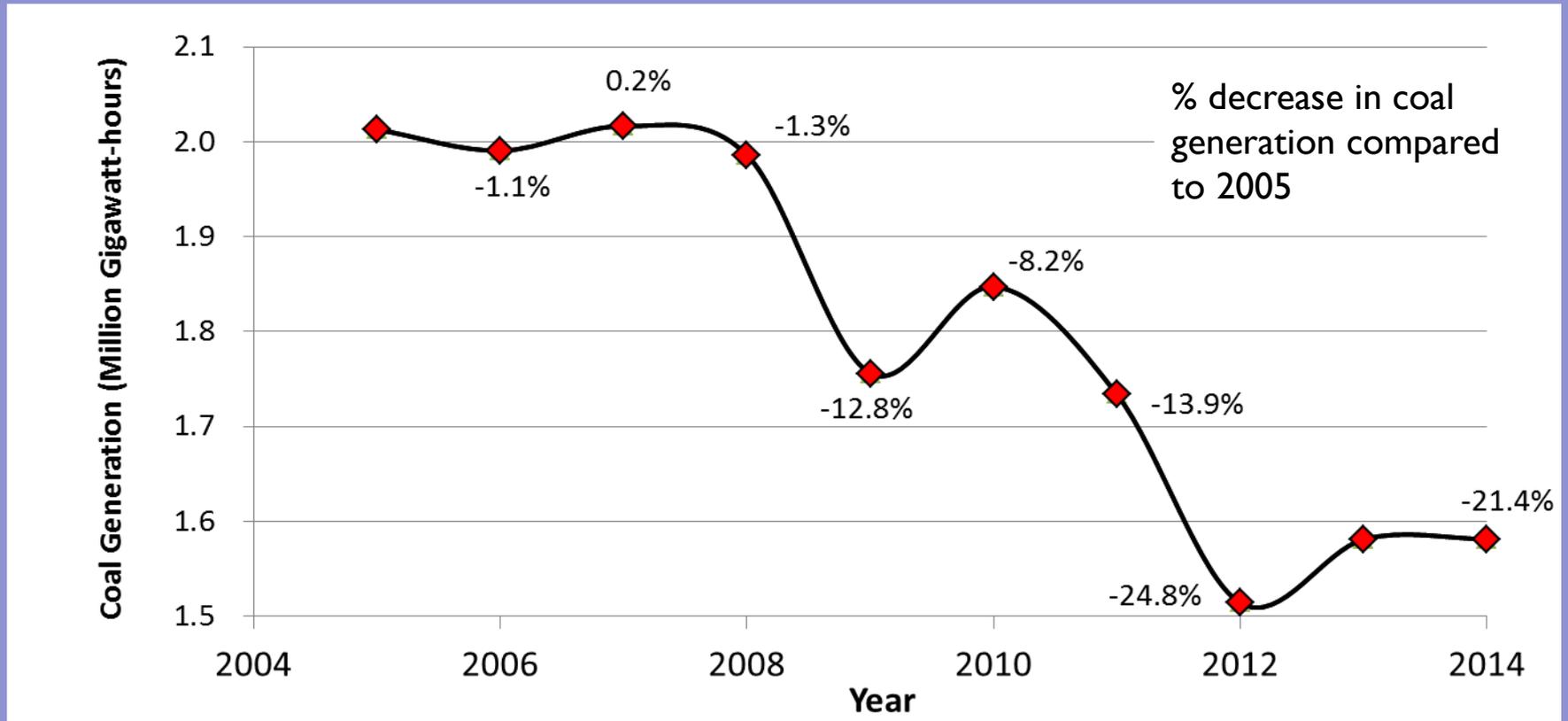
* Source: Enviva factsheet titled, “Enviva Data for Trader EUTR Compliance,” Feb. 2015

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.

Replacing 10% of US coal power with wood would require cutting millions of acres of forest each year



To replace 10% of coal use:

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Million tons wood	305	302	306	301	266	280	263	229	240	240
Million acres forest	4.69	4.64	4.70	4.63	4.09	4.31	4.04	3.53	3.69	3.69

Biomass co-firing degrades coal plant performance

- Building Block I 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 CO₂ emissions at coal plants

Nonetheless, EPA says they'll consider biomass co-firing as a compliance option



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

L'Anse Warden plant, MI:

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>

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			% of MD Tier I in 2012
			NOx (tons)	SOx (tons)	CO2 (tons)	
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%

CPP LOOPHOLES AND HOW TO AVOID THEM

Two ways to help ensure the CPP is actually “clean”:

COMMENT TO EPA:

EPA is accepting comments on the draft Federal Implementation Plan

- opportunities for oral and written comments

GET INVOLVED WITH CPP IMPLEMENTATION IN YOUR STATE

- EPA-mandated state hearings; written testimony

States submitting “state measures” plans must have public participation

All state plans must include:

Public participation and certification of hearing on state plan

*“the EPA is **requiring** states to demonstrate how they are **meaningfully engaging all stakeholders**, including workers and low-income communities, communities of color, and indigenous populations living near power plants and otherwise potentially affected by the state’s plan” (p. 8 CPP)*

Watch for state announcements

Biomass and waste in SIPs and FIP

(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”
- Important that the FIP be strong – don’t reward states for their failure to submit a state plan.

SIPs: Waste incineration as compliance

Waste incineration 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 seems willing to accept biogenic fraction of waste as having net zero carbon emissions (appears to be contrary to their own modeling).

SIPs: Biomass as compliance

Biomass not included as measure in BSER -

However,

States may consider “qualified” biomass in their plans: “*biomass that can be considered as an approach for controlling increases of CO₂ levels in the atmosphere*” (p. 226 CPP)

State plans must describe:

- types of biomass and how they are “qualified”
- how the state values biomass CO₂ emissions
 - what proportion of biogenic CO₂ will *not* be counted?

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

EPA generally acknowledges the “*CO₂ and climate policy benefits*” of these feedstocks (p. 226 CPP)

- (However, EPA has not published any modeling results to demonstrate these alleged benefits)

“*Likely approvable*” as qualified biomass if state meets monitoring, reporting and verification requirements

SIPs: “Sustainably-derived” agricultural and forest biomass feedstocks

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

If state can:

- show such feedstocks “*appropriately control increases of CO₂ levels in the atmosphere*” (p. 226 CPP)

And,

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

CPP doesn't allow offsets... so why consider “sustainably-derived” biomass?

No Emission Reduction Credits for “*Measures that reduce CO₂ 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 CO₂ 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?

What the draft FIP does

Proposes (p.4 FIP)

1. A rate-based federal plan for each state with affected EGUs;
2. a mass-based federal plan for each state with affected EGUs;
3. a rate-based model trading rule for potential use by any state;
4. a mass-based model trading rule for potential use by any state.

Biomass-related questions in the draft FIP

EPA is taking comment now

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)

Verification and enforceability are key

Biomass-related biogenic CO₂ 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.

Monitoring and verification 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 CO₂ benefits.*

Massachusetts: Tracks biomass sourcing, but fuel sourcing records redacted by state

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 <u>Delivered</u> to Unit in Quarter	Tons of Certified Fuel <u>Allocated</u> 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 <u>Delivered</u> this Quarter <u>Banked</u> 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]	[REDACTED]

Verification? Enforceability?

Covanta Delano plant, CA



485' x 60' x ??



35.719049, -119.23414

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Google Skyline Dr

Summary points: Bioenergy and the Clean Power Plan

- CPP goals are not aggressive, so only zero-emissions renewable energy should be eligible.
- Bioenergy emits more CO₂ at the stack than fossil fuels.
- Co-firing biomass with coal degrades facility efficiency and increases stack CO₂ emissions.
- If bioenergy CO₂ emissions are offset at all, it's in some other place, at some future time – not “verifiable,” “enforceable,” or “permanent.”
- Net combustion emissions from even “waste” wood (assuming decomposition would happen anyway) exceed emissions from fossil fuels for years to decades.
- Verification of the fuels facilities *actually* burn is functionally impossible
- Biomass and trash incineration aren't “clean energy,” emitting SO_x, carbon monoxide, and smog precursors NO_x and VOCs.
- Some fuels are highly contaminated, emitting hazardous air pollutants that include heavy metals and dioxins.

Download the CPP and the draft FIP

<http://www2.epa.gov/cleanpowerplan/clean-power-plan-existing-power-plants>

How to comment on the FIP: Oral Testimony at Public Hearings in November

Pittsburgh, PA

Nov. 12th 9:00 a.m. – 8:00 p.m. (ET)

Nov. 13th 9:00 a.m. – 5:00 p.m. (ET)

William S. Moorhead Federal Building, Room
1310

1000 Liberty Avenue

Pittsburgh, PA 15222

[Register](#)

Washington, DC

Nov. 18th 9:00 a.m. - 8:00 p.m. (ET)

Nov. 19th 9:00 a.m. - 5:00 p.m. (ET)

William Jefferson Clinton East Building,
Room 1153

1201 Constitution Avenue, NW

Washington, DC 20004

[Register](#)

Denver, CO

Nov. 16th 9:00 a.m. - 8:00 p.m. (MT)

Nov. 17th 9:00 a.m. - 5:00 p.m. (MT)

EPA Region 8 Building

1595 Wynkoop Street

Denver, CO 80202

[Register](#)

Atlanta, GA

Nov. 19th 9:00 a.m. - 8:00 p.m. (ET)

Nov. 20th 9:00 a.m. - 5:00 p.m. (ET)

Sam Nunn Atlanta Federal Center

61 Forsyth St SW

Atlanta, GA 30303

[Register](#)

EPA's registration page

<http://www2.epa.gov/cleanpowerplan/forms/public-hearings-proposed-federal-plan-clean-power-plan>

How to comment on the FIP – Written Comments due January 21

Comments on the proposed Federal Plan and Model Rules for the Clean Power Plan must be received by **January 21, 2016**. Be sure to reference Docket ID: **EPA-HQ-OAR-2015-0199**

Comments may be submitted by one of the following methods:

[Federal eRulemaking portal](#): Follow the online instructions for submitting comments

Internet Explorer 8 and above users: If you are experiencing issues linking directly to the docket in the eRulemaking portal, try one of these methods:

Right click on [Federal eRulemaking portal](#) and a menu will appear. To open the docket page in a new window, select "Open" or "Open in new window." To open the docket in a new tab, select "Open in new tab."

Copy and paste the link into the browser's address bar:

<http://www.regulations.gov/#!submitComment;D=EPA-HQ-OAR-2015-0199-0001>

Try another browser - the link should work without issue using Google Chrome or Mozilla Firefox web browsers.

A-and-R-Docket@epa.gov: Include docket ID No. EPA-HQ-OAR-2015-0199 in the subject line of the message

Fax: Fax your comments to: 202-566-9744.

Mail: Environmental Protection Agency, EPA Docket Center (EPA/DC), Mailcode 2822 IT, Attention Docket ID No. OAR–2015-0199, 1200 Pennsylvania Avenue, NW., Washington, DC 20460.

Hand Delivery or Courier: Deliver your comments to: EPA Docket Center, Room 3334, 1301 Constitution Ave., NW, Washington, DC, 20460. Such deliveries are only accepted during the Docket's normal hours of operation, and special arrangements should be made for deliveries of boxed information.

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mbooth@pfpi.net

