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Comments from the Partnership for Policy Integrity to EPA
on "Deferral for CO2 Emissions from Bioenergy and Other Biogenic Sources under the Prevention of Significant Deterioration (PSD) and Title V Programs," 76 Fed. Reg. 15,249 (March 21, 2011)

DOCKET ID: EPA-HQ-OAR-2011-0083

May 5, 2011

The Partnership for Policy Integrity (PFPI) uses science, policy analysis and strategic communications to promote integrity in public policy. Our work is currently concerned with impacts on forests, air emissions, and global warming emissions from biomass energy. We strongly object to EPA's proposal to defer regulation of biogenic carbon dioxide emissions pending completion of a three-year study. While we do not disagree with EPA's desire to study greenhouse gas emissions from biogenic sources, EPA must not suspend regulation of biogenic greenhouse gas emissions during that time. Such action is not supported by good science. Further, if the agency decides to defer regulation of biogenic carbon for three years, it should not allow air pollution permits to be granted under the Clean Air Act for biomass powered electricity generation plants during that time.

Contents

EPA's three-year deferral for biogenic carbon emissions is not justified

EPA justifies the three-year exemption of biogenic CO2 from regulation as follows:

> 3. Potential for Some Biomass Feedstocks To Have a *de minimis* Impact on Carbon Levels in the Atmosphere
> EPA has sufficient information at this time to conclude that at least some biomass feedstocks that may be utilized to produce energy have a negligible impact on the net carbon cycle, such as residue material (e.g., sawdust from milling operations) that would have decomposed under natural circumstances in a relatively short period of time (e.g., 10–15 years). Given this negligible impact on the carbon cycle, the gain from regulating emissions from combustion of this feedstock for bioenergy could be considered to be trivial.

This justification is not supported by the Agency. EPA has not demonstrated that "residue" materials decompose in a short period of time. It has also not justified treating such emissions, which are assumed to achieve parity with decomposition emissions in 10 – 15 years, are worthy of being treated as instantaneously carbon neutral. Further, the Agency has not demonstrated that such materials constitute the sole or even predominant source of fuel for the current and future biomass industry. EPA thus has not provided the required proofs that regulating biogenic CO_2 would yield a gain of trivial or no value. Not only has EPA not provided the required proofs that its exemption is supportable or justified, but it cannot. The science does not exist to show that burning biomass emits only *de minimis* carbon emissions, and the Agency has admitted as much by stating that different kinds of biomass have different effects on emissions.

One reason that burning biomass emits so much more carbon than burning fossil fuels is because biomass powered electricity generating facilities are generally much less efficient than fossil fuel powered facilities, meaning whatever the source of biomass – whether it be waste, whole trees, or purpose-grown crops – emissions at the stack are much greater than emissions from generating the same amount of energy using coal, oil, or natural gas. For example, the air permit for the proposed 50 MW We Energies/Domtar biomass to energy plant in Rothschild, WI includes an emissions rate of 3,050 lb CO_2/MWH– or a total of 634,553 tons per year operating at 95% capacity, as compared with a gas-fired boiler which would generate around 1,130 lbs of CO_2/ MWH[1] or 235,097 tons of CO_2 per year given the same size, operating and capacity assumptions.

[1] Emissions rate from EIA at http://www.eia.doe.gov/tools/faqs/faq.cfm?id=74&t=11

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B. Boiler B01 – Biomass and natural gas fired boiler with a capacity not to exceed 800 MMBTU/hour. The boiler is subject to NSPS (Part 60, Subparts D and Db).

11. Greenhouse Gases
(a) Limitations: BACT. **(1)** Greenhouse gas emissions may not exceed 3,050 pounds of CO_2 per MWh of gross output, averaged over any consecutive 12-month period. *Gross output* means the gross useful work performed by the steam generated. When the unit is generating only electricity, the gross useful work performed is the gross electrical output from the turbine/generator set. For cogeneration, the gross useful work performed is the gross electrical output plus 75 percent of the useful thermal output measured relative to ISO conditions that is not used to generate additional electrical output (i.e., steam delivered to an industrial process). **. (s. NR 405.08, Wis. Adm. Code)**

FIGURE 1. Greenhouse gas emissions rate from final air permit for We Energies/Domtar biomass plant in Rothschild, WI.

EPA's guidance on BACT for biogenic sources states that biomass can be used as BACT for greenhouse gas emissions. However, comparing the emissions from the Domtar biomass boiler with a natural gas burner shows how that consideration of biomass as BACT is poorly justified. EPA's argument is that burning waste wood emits no more carbon than is emitted in decomposition, and therefore represents no net addition of carbon to the atmosphere. Leaving aside the fact that decomposition takes years to decades, while burning is instantaneous, no one – not the developer of the Domtar plant, not the Wisconsin DEP, not EPA – has demonstrated that the Domtar plant will burn solely "residues" that would "decompose anyway". There is good reason to assume[2] this plant will have to rely on increased whole-tree harvesting to provide fuel.

When a biomass facility does not just burn waste, and instead turns to increased forest harvesting to provide fuel, net emissions are significantly increased. Until the last couple of years when greater scrutiny has been brought to bear on the question, harvesting trees for fuel was widely assumed to be "carbon neutral", based on an uncritical acceptance of the idea that as long as forests were allowed to regrow, carbon released by harvesting would be resequestered. EPA itself sought input on this theory when it issued its Call for Information on approaches to biogenic carbon accounting, soliciting views on "current and projected C sequestration rates in lands used to produce bioenergy feedstocks"[3], or as phrased in the present call for information, "whether some or all of a source's biogenic CO_2 emissions could be discounted based on a determination that they are canceled out by the CO_2 absorption associated with growing the fuel" Proposed Rule at 15257.

[2] Availability of "forest residues" in almost every case turns out to be lower than projected, due to logistical constrains; and as discussed below, other wood-using industries in the woodshed that would serve the Domtar plant allege that competition for fuel could lead to clearcutting of forests.

[3] Federal Register, July 15, 2010. Environmental Protection Agency: Call for information: Information on greenhouse gas emissions associated with bioenergy and other biogenic sources [EPA-HQ-OAR-2010-0560; FRL-9175-0].

But, as even EPA appears to acknowledge in its March 2011 BACT guidance for biogenic carbon dioxide emissions, the assumption of carbon neutrality of biomass based on resequestration of combustion carbon into new growth can break down when the "business-as-usual" (BAU) scenario is taken into account.[4] Recent science has demonstrated that increasing forest harvesting for fuel dramatically increases net CO_2 emissions above the existing baseline. The "Critical Climate Accounting Error" study by Searchinger et al[5] and Johnson's "Goodbye to carbon neutral" paper[6] pointed out the importance of taking ongoing forest carbon sequestration into account when calculating net carbon emissions from biomass energy. The Manomet Study[7] demonstrated using modeling that the combination of greater carbon emissions per unit energy from biomass than fossil fuels, *combined with* the lost forest carbon sequestration associated with additional fuel harvesting, establish a potent "carbon debt" that greatly exceeded that from fossil fuels – a debt that takes decades to more than a century to pay off. Other studies have reached similar conclusions, including the European "bioenergy carbon bomb" study[8] and 2011 work by McKechnie, et al., who conclude that "using standing trees for bioenergy immediately transfers carbon to the atmosphere and provides a relatively smaller GHG benefit from displacing coal or gasoline, increasing overall emissions for several decades."[9]

Manomet and other studies correctly conclude that the burst in carbon emissions associated with burning biomass occurs both because biomass combustion emits considerably more CO_2 per unit energy generated than fossil fuels, and also because cutting trees retards ongoing forest carbon sequestration. It is worth rebutting biomass industry arguments that have been put forth against this approach, particularly since EPA's BACT guidance for biogenic CO2 appears to repeat and potentially endorse some of them, in direct contradiction to the correct approach, which uses the present-day business-as-usual situation as a benchmark

A biomass industry argument sometimes heard is that as long as forests are growing and sequestering carbon on the landscape as a whole, this compensates for the carbon emitted by cutting and burning trees. Despite appearing to acknowledge the validity of the "business-as-usual" approach employed by the Manomet Study and others, EPA's BACT guidance released

[4] EPA's March 2011 Biogenic CO2 BACT guidance states, "if certain activities, such as logging, are accelerated in a particular region over a certain period of time, and associated emissions are thereby increased, then sequestration on land will decline and net atmospheric carbon stocks will increase over the BAU case. For bioenergy and other biogenic CO2 emissions, where such a wide variety of potential feedstocks exists, the BAU case might be considered the emissions that 'would have happened anyway.'". (US EPA. Guidance for determining best available control technology for reducing carbon dioxide emission from bioenergy production. March, 2011, page 22).

[5] Searchinger, T., et al. 2009. Fixing a critical climate accounting error. Science 326: 527 - 5 28.

[6] Johnson, E. 2008. Goodbye to carbon neutral: Getting biomass footprints right. Environmental Impact Assessment Review, vol. 29, no. 3, pp. 165-168

[7] Manomet Center for Conservation Sciences. 2010. Massachusetts Biomass Sustainability and Carbon Policy Study: Report to the Commonwealth of Massachusetts Department of Energy Resources. Walker, T. (Ed.). Contributors: Cardellichio, P., Colnes, A., Gunn, J., Kittler, B., Perschel, R., Recchia, C., Saah, D., and Walker, T. Natural Capital Initiative Report NCI-2010- 03. Brunswick, Maine.

[8] Birdlife International and European Environmental Bureau. Bioenergy: a carbon accounting time bomb. June 2010. Available at http://www.pfpi.net/wp-content/uploads/2011/05/carbon_bomb_21_06_2010.pdf

[9] McKechnie, J. et al. 2011. Forest bioenergy or forest carbon? Assessing trade-offs in greenhouse gas mitigation with wood-based fuels. Environmental Science and Technology 45:789-795.

contemporaneously with the proposed rule disturbingly also appears to endorse this "landscape level" approach, stating

> "..because sequestration of CO2 emissions in living plant material outside the boundaries of the facility may counteract the emissions from such facilities on a continuous basis, this unique dynamic merits consideration in the BACT analysis. This argument is underlined by the fact that GHGs like CO_2 are well mixed in the atmosphere at large spatial scales: therefore the need to reduce them directly at the facility is of lesser importance so long as their net atmospheric impact is accounted for and is negative or zero."

This approach is fundamentally flawed because it fails to acknowledge that forests are already sequestering carbon, and cutting and burning trees over *here* does nothing to increase carbon sequestration over *there* – an increase that would be required to compensate for the additional carbon emitted by biomass energy generation over fossil fuel generation. The Manomet Study group themselves issued a powerful rebuttal[10] of this carbon accounting approach. It states,

> We agree that the only way to properly evaluate the net carbon impacts of energy from forest biomass is to estimate at the landscape level the net change in atmospheric CO_2 levels over time with and without the harvest of wood biomass for energy. As discussed above this is exactly what the Manomet Study did.
>
> When the problem is framed around analysis of the 'control' and biomass scenarios, the spatial scale of the analysis—a key concern of the O'Laughlin critique and others—becomes irrelevant as long as stands that are not harvested in any time period have the same growth and inventory levels in both the biomass and baseline scenarios… Since there is no difference in carbon accumulation on un-harvested stands between the two scenarios, the un-harvested stands have no net effect on atmospheric carbon levels.

A variation on the "landscape" carbon accounting approach was critiqued in a letter[11] to the Washington State Legislature, pointing out the problems with a Washington State Department of Natural Resources report on biogenic carbon:

> Forests in the northern hemisphere are on balance growing and accumulating carbon for a variety of reasons, and that ongoing growth is helping to hold down the rate of global warming. The DNR report's assumption that as long as forest carbon stocks remain constant, the amount of CO_2 being emitted by bioenergy is balanced by forest carbon uptake[12] disregards this ongoing increase in carbon

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[10] Manomet Center for Conservation Sciences. Manomet response to O'Laughlin's 'Accounting for greenhouse gas emissions from wood bioenergy'. November 11, 2010.
[11] Letter from Mark Harmon, Tim Searchinger, and Bill Moomaw to the Washington State Legislature, February 2, 2011. Available at http://www.pfpi.net/wp-content/uploads/2011/03/Harmon_Searchinger_Moomaw-Letter.pdf
[12] Page 31 of the report

storage. Using wood for power generation that would otherwise be added to forests thus not only increases the rate of CO_2 emissions per kilowatt-hour but also reduces the critical forest carbon "sink". If forests harvested for energy are allowed to re-grow, that re-growth absorbs carbon dioxide and helps to offset the carbon released from the initial burning of the trees for energy. But paying back the carbon released will nearly always take many decades, and in some cases centuries.

For the DNR scenario to work, where constant forest inventory guarantees biopower carbon neutrality, forests would need to somehow "compensate" for the net increase in carbon emissions that occurs when trees are cut and burned for energy. However, taking credit for forest carbon uptake that is happening elsewhere (that is, not on the plot that was cut for fuel, but on other forests) is not legitimate, because cutting and burning trees in one place does not by itself increase forest carbon uptake elsewhere. In fact, applying the carbon gains of other forests within the state to the credit of biomass fuel amounts to double-counting, because these gains in other forests are already accounted for in the carbon balance. DNR's approach is similar to declaring that every business in Washington State is profitable, even a business that loses millions of dollars, so long as the State's businesses are profitable in aggregate. In short, the proposal is an accounting scheme with no accountability.

Another biomass industry argument is put forward in the statement submitted by the National Alliance of Forest Owners (NAFO)[13], which states:

> "emissions from combustion of biomass – which consist primarily of carbon dioxide – should not be treated like other combustion sources, because the carbon generated from the combustion of biomass is part of a natural carbon cycle. The rationale behind this consensus approach is that all plant materials are derived from carbon that is sequestered from the air as plants grow, and this carbon is naturally released back to the air when plants die and decay. Thus, when plant material (biomass) is burned, it merely releases carbon to the atmosphere that was sequestered during plant growth and that would have been emitted to the atmosphere naturally through plant decay."

Again, the Manomet team response to this argument is succinct:[14]

> The choice of an appropriate starting date for carbon impact analyses depends directly on the question that the analysis is intended to address. For the Manomet

[13] Unopposed motion by National Alliance of Forest Owners for Leave to Intervene in Support of Respondent. Center for Biological Diversity, Conservation Law Foundation, and Natural Resources Council of Maine, v. United States Environmental Protection Agency. United States Court of Appeals for the District of Columbia Circuit. No 11-1101.

[14] Manomet Center for Conservation Sciences. Manomet response to O'Laughlin's 'Accounting for greenhouse gas emissions from wood bioenergy'. November 11, 2010.

> study, the question posed is 'what is the impact on atmospheric greenhouse gases if, beginning today, we increase the share of our energy supplies generated from wood relative to fossil fuels?' To answer the question, we consider the future GHG impacts of two scenarios. The first is a 'control' in which we estimate forest carbon stocks over time assuming continued fossil fuel burning and no increase in bioenergy production from wood. In the second scenario, we model the impacts on total forest carbon of using wood to produce an amount of energy equivalent to that produced using fossil fuels in the control scenario. Comparing the differences in total forest carbon stocks between the two scenarios at various points in time provides an indicator of the net change in GHGs attributable to switching from fossil energy sources to biomass.
>
> When the focus is on how today's decisions to generate more energy from biomass will affect future GHGs, past forest growth is irrelevant. The two primary drivers of future GHG impacts are (1) the relative levels of GHG emissions per unit of energy production for biomass and fossil fuels and (2) the future rates of carbon change in the forest in the control and biomass scenarios.

Nothing in this "eternal carbon cycle" argument acknowledges the considerable acceleration in carbon emissions that occurs when biomass is harvested and burned rather than allowing it to complete its lifecycle and decay naturally (a process that takes years, if not decades, and also contributes to long-lasting soil carbon pools where carbon is locked up for decades to centuries). For EPA to include any variation on the argument that forests other than those used for fuel will somehow increase carbon sequestration to compensate for biogenic emissions, or that "previous" carbon sequestration by forests compensates for increased biogenic emissions occurring now, is contrary not only to good science, but to common sense.

Biogenic carbon dioxide emissions are not *de minimis*

Carbon emissions from the biomass industry if left unregulated will demonstrably not be *de minimis*. The reasons for this are several-fold and are developed below in more detail, but in essence include demonstrations that the existing industry is currently a large source of CO_2 emissions; that assumptions that the industry uses "waste" wood are unfounded; and that using waste wood as fuel can in fact represent a significant source of CO_2 over the timeframe when it is most important to mitigate climate change by reducing emissions.

The existing biomass power industry is already a significant source of CO_2

Energy Information Administration data for biomass fuel consumption in 2009 demonstrates that the industry is already a large source of CO_2. Making standard assumptions[15] about the carbon content and moisture content of wood pulping liquors and wood solids used as fuel, it can be

[15] Fuel and heat input data are as reported by EIA; CO2 emissions are calculated assuming for carbon and moisture content, respectively: pulping liquors (35%, 55%); wood (50%, 45%); agricultural materials (45%, 20%). "Other" biomass solids were modeled as wood, but since this category is quite small, any error is also small.

seen that CO_2 emissions from the existing industry are significant (table does not include emissions from the portion of municipal waste defined as "biomass"):[16]

TABLE 1. Fuel use, heat input, and CO2 emissions from bioenergy production reported to the Energy Information Administration, 2009. (Source: Energy Information Administration. 2009 EIA-923 Monthly Time Series File, Revised April 2011)

Fuel type	**fuel (tons)**	**heat input (mmbtu)**	**CO2 emissions (tons)**
Agricultural fuels	4,252,601	32,312,178	5,613,433
Wood solids	48,165,174	489,243,148	48,566,550
Pulping liquors	57,011,003	645,150,689	32,923,854
"other" biomass solids	1,981,226	20,853,306	1,997,736
Total	**111,410,004**	**1,187,559,321**	**89,101,573**

Total CO_2 emissions from the current biomass industry as it operated in 2009 were equivalent to the combined reported power sector emissions of CO_2 from RI, SD, DE, AK, ME, NH, CT, HI, OR, WA, and NJ[17] (data reported by EIA do not include emissions from biomass). The significance of these emissions to particular regions is illustrated in Maine. Total power sector emissions in Maine are reported at 5,196,592 tons by EIA, a figure that counts all biomass burning as zero emissions. However, emissions from biomass burning[18] in Maine added approximately another 6,207,336 tons of CO_2, more than doubling the total that was reported. [19] It is unknown what portion of the biomass fuel burned in Maine comes from logging residues that would decompose eventually, versus whole-tree harvesting. However, Maine's forest cutting practices allow clear cuts of up to 250 acres for "forest products," the definition of which includes biomass fuel,[20] suggesting that limits on whole-tree harvesting and its associated impacts on carbon emissions do not exist.

A growing biomass industry will require more than just "residues" as fuel

EPA assumes that new facilities that would be regulated under the tailoring rule will be fueled by residues, and thus the impact on carbon emissions will be *de minimis*. However, this is not the case – for a variety of reasons, new biomass facilities will demonstrably require increased forest harvesting, which has been shown by the best and most current science to represent a significant increase in carbon emissions above fossil fuels.

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[16] Energy Information Administration. 2009 EIA 923 Monthly Time Series File. Sources: EIA-923 and EIA-860
[17] Energy Information Administration. State Historical Tables for 2009: emission_state_2009.xls. Revised Jan 4, 2011.
[18] Wood and wood-derived fuels, only; excludes municipal waste combustion
[19] Emissions from biomass burning calculated using same assumptions as above
[20] Maine Department of Conservation. 1999. Forest regeneration and clearcutting standards. Available at http://www.maine.gov/doc/mfs/pubs/htm/fpafnl.htm#SECTION 5.

Growth in the industry is projected to be significant – although ironically this growth is largely dependent on the very assumption that EPA is making, that CO_2 emissions will be negligible. EIA data indicate that the existing biomass industry generated 37,656,499 MWh in 2009, not including power generated by municipal waste combustion (but does include pulping liquor fuels and agricultural fuels). This generation is the equivalent of 4,525 MW, operating at 95% availability. Industry data[21] show that now in the planning and permitting stages are about 117 new direct-fired biomass facilities representing a further 4,479 MW of capacity, all of which plan to use wood as fuel and most of which are to be operational by 2013. Projected wood use by this group of plants is over 57 million green tons a year. This figure does not include co-firing projects; we are aware of more than 20 such projects, although the total amount of generation from biomass than these will represent is still undetermined. The Public Utilities Commission of Ohio alone has approved several large co-firing and re-firing projects in the State, totaling close to 2,000 MW in capacity.

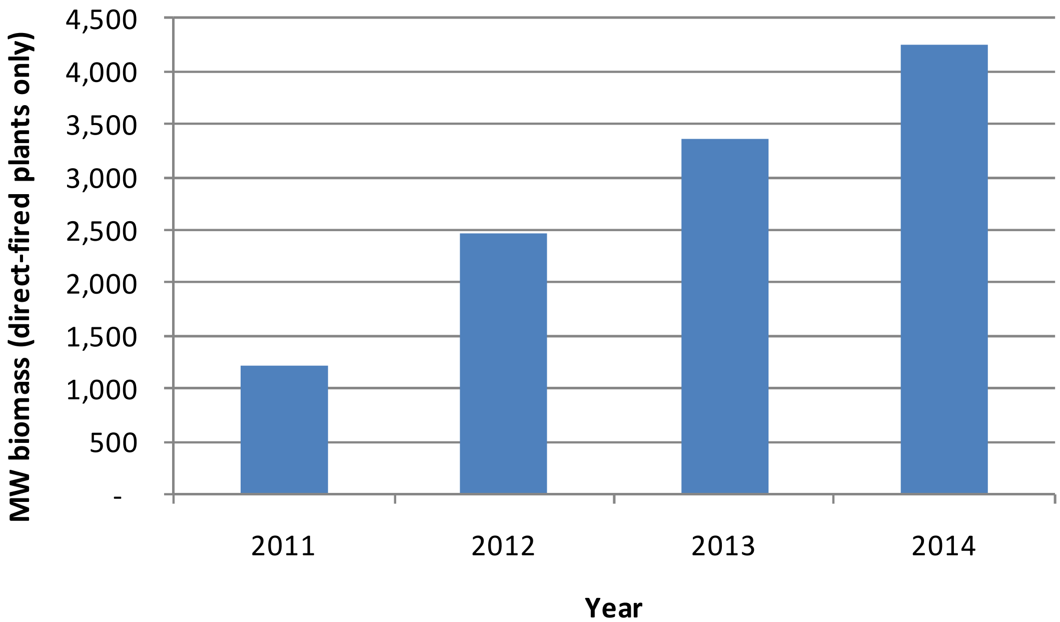

FIGURE 2 -- Cumulative MW biomass generation capacity brought online by year (Source: RISI, Inc. North American Wood Biomass Projects Database, updated February, 2011.)

It is thus fair to say that the direct fired and co-firing projects now in the pipeline could at least double the size of the industry in the next few years; there are also an unknown number of smaller facilities being built. Potential fuel demand is massive.

[21] RISI, Inc. North American Wood Biomass Projects Database, updated February, 2011

Mill and forest residues are already allocated

According to US Forest Service data, only about 1.5% mill wastes remained unutilized nationally[22] as of 2006. Since that time, growth in the pellet industry, which also utilizes mill waste, may have reduced the supply available for use at direct-fired biomass plants even further.

The existing biomass power industry is also putting demands on forestry residues, but even assuming that existing demands were zero, wood demand at new and proposed facilities would exceed the amount of forest residues currently available in the U.S. According to the Forest Service,[23] approximately 100 million green tons of forest residues are generated each year, of which at most 50% are considered to be available and collectable. According to industry data, [24] however, new wood demand for wood pellet manufacture (22,381,200 green tons), biofuels feedstock (9,690,000 green tons) and direct-fired biomass facilities (57,462,183 green tons) significantly exceeds the availability of logging residues.

These figures do not include wood demand by co-firing at coal plants; however, according to EIA, because co-firing represents the least-cost approach for generating biomass power, a significant ramp-up can be expected, particularly when the only regulatory cost incurred results from emitting fossil fuel CO_2. The "high coal cost" scenario is treated as a proxy for mitigating CO_2 emissions; under this scenario, co-firing of biomass increases significantly relative to the reference case.

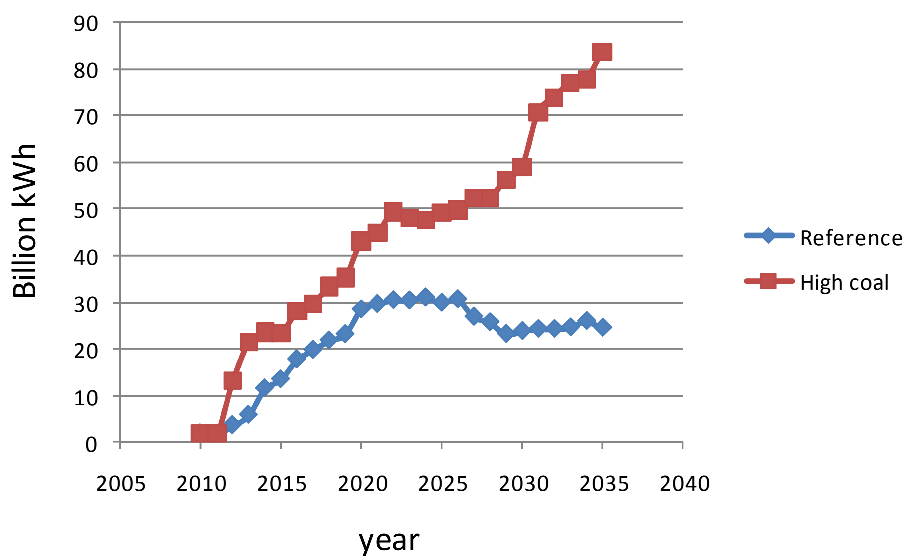

FIGURE 3. EIA's projected build-out of biomass power generation under the reference and "high coal cost" scenarios. (EIA National Energy Modeling System, AEO2011, renewable energy generation).

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[22] Smith, W.B., et al. 2007. Forest Resources of the United States, 2007. United States Forest Service, Gen.Tech Report WO-78. December, 2008.
[23] Smith et al, 2007
[24] RISI, Inc. North American Wood Biomass Projects Database, updated February, 2011

As an example of the amounts of wood required by co-firing, providing 5% of the heat input with wood at the 660 MW Killen Station coal plant in Adams County, Ohio, is estimated to require 185,000 tons of biomass per year,[25] an amount of wood equivalent to that provided by clearcutting 2,050 acres of Ohio forests per year.[26]

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Estimates of logging waste availability are over-inflated

While Forest Service data indicate that there are only about 100,000 million green tons of logging residues generated annually,[27] various other sources overestimate availability. For instance, the amount of "forestry residues" considered available by the Energy Information Administration (EIA) and used to support their energy build-out modeling is a large overestimate. EIA's estimate of available "logging residues" includes those materials as defined by the Forest Service,[28] which includes branches and tops and "cull" (unmarketable) trees cut in the course of harvesting.

However, EIA's dataset[29] also includes part of the massive national inventory of *standing* cull trees, as well as standing inventories of "excess small pole trees."[30] Because the Forest Service inventory includes standing cull trees on potentially harvestable forest land, whether or not this land is likely to be logged, the estimated supply of potentially harvestable cull and pole trees vastly exceeds the amount of true logging residues that are actually generated each year.[31] This overestimate has caused EIA to make overly optimistic conclusions about residue availability; the assumptions are particularly troubling in that EIA's projection of decreasing CO_2 emissions

[25] Ohio Environmental Protection Agency: Final air pollution permit-to-install for Dayton Power and Light Killen Generating Station, 12/29.2010.

[26] Assumes about 88 green tons per acre standing biomass in Ohio's forests; data from Smith et al, 2007.

[27] Smith et al 2007

[28] The category of logging residues as defined by the Forest Service data includes virtually anything "sound enough to chip" other than the commercial roundwood removed by harvesting. It includes "Growing–stock volume cut or knocked down during harvest but left at the harvest site" and "wood volume other than growing stock cut or knocked down during harvest but left on the ground. This volume is net of wet rot or advanced dry rot and excludes old punky logs; consists of material sound enough to chip; includes downed dead and cull trees, tops above the 4–inch growing–stock top, and smaller than 5 inches d.b.h. (diameter at breast height); excludes stumps and limbs." Cull trees are unmarketable because of rot, roughness, or species (Smith et al, 2007).

[29] Walsh, M., et al. 2000. Biomass feedstock availability in the United States: 1999 state level analysis. Prepared for EIA; available at http://bioenergy.ornl.gov/resourcedata/index.html

[30] The term "excess small pole trees" does not occur in the glossary of terms included with the Forest Service forest inventory dataset but presumably refers to some portion of the standing stock of poletimber, which is defined as "Live trees at least 5.0 inches in d.b.h but smaller than sawtimber trees".

[31] EIA documentation for National Energy Modeling System reference case scenarios, available at http://www.eia.doe.gov/oiaf/aeo/assumption/renewable.html, makes it clear that new logging will be required to provide biomass fuel: "Fuel supply schedules are a composite of four fuel types: forestry materials, wood residues, agricultural residues and energy crops. Energy crop data are presented in yearly schedules from 2010 to 2030 in combination with the other material types for each region. The forestry materials component is made up of logging residues, rough rotten salvageable dead wood, and excess small pole trees. The wood residue component consists of primary mill residues, silvicultural trimmings and urban wood such as pallets, construction waste, and demolition debris that are not otherwise used. Agricultural residues are wheat straw, corn stover and a number of other major agricultural crops. Energy crop data are for hybrid poplar, willow, and switchgrass grown on crop land, pasture land, or on Conservation Reserve Program lands."

under a federal renewable electricity standard are largely based on replacing some portion of coal with wood and not counting CO_2 emissions from biomass.

Not counting emissions from biomass that is sourced from increased forest harvesting, as EIA has done, means that the projections ignore significant emissions and are not an accurate forecast of power sector emissions under a renewable electricity standard.

A further issue with calculating availability of logging residues is the problem of the "sliding baseline": the way in which the fast-growing wood pellet industry may significantly change the dynamics of forest harvesting and increase "residue" availability considerably. Wood pellet production largely depends on harvesting whole trees, because the industry needs clean, debarked trunkwood to make higher quality pellets. A massive overseas market for wood pellets as well as U.S. incentives for pellet use is being driven by the very assumptions of carbon neutrality that EPA is now considering. Yet the pellet industry makes no pretense of using "residues", because low-diameter wood with a high bark content cannot be used to make the "clean burning" pellets that command the highest prices. A massive increase in the pellet industry is underway, featuring plants like Green Circle Energy in Cottondale, FL, which harvests over 1.2 million tons of wood a year to produce 560,000 tons of pellets, all of which are shipped overseas (pictures of whole trees lined up for chipping at http://www.greencirclebio.com/gallery.php).

The dramatic increase in harvesting that will accompany increased wood pellet production thus is likely to also generate a new flush of "residues" - the tops and branches (and bark) not used in pellet manufacture. This raises a question of how the baseline for residues should be defined. If EPA considers logging residues to be carbon neutral because "they would be generated and then decompose anyway", does this argument still hold true if an explosion in pellet production is increasing residue production, fueled by the same myth of carbon neutrality?

The industry has acknowledged that residues will not meet fuel needs

The coal industry and biomass power developers sometimes claim that they will only use forestry residues for fuel, but industry makes it clear when it comes down to establishing a right to burn whole trees for power that residues will not be sufficient to meet fuel needs. Testimony submitted to the North Carolina Utilities Commission by Duke Energy makes it clear that the company requires large amounts of whole tree harvesting to meet its renewable energy generation goals, and that logging residues are clearly insufficient and otherwise undesirable as fuel. They state[32]

> "Biomass currently plays an extremely important role in Duke Energy Carolinas' plants to meet its general REPS compliance obligations in both the near and long term. Biomass generation resources, in its various forms, represent cost-effective renewable energy options for REPS compliance purposes as well as carbon

[32] Testimony of Owen A. Smith, Duke Energy Corporation, before the North Carolina Utilities Commission, In the Matter of the Registration Statements of Buck and Lee Steam Stations as Renewable Energy Facilities Pursuant to RuleR8-66. Docket No. E-7, SUB 939 and SUB 940 at page 4.

> neutral generation options in the impending federally-regulated carbon-constrained generation environment. Additionally North Carolina is blessed with abundant forest resources… The Company's strategy for using wood biomass to comply with its REPS obligations includes efforts to co-fire wood fuel with fossil fuel at existing Company facilities and to repower units at certain Company facilities to burn only wood fuel to generate electricity".

Asked, "How would a limiting interpretation of the definition of 'biomass resource' impact the company's REPS compliance strategy and resource investment plans?" They answer,[33]

> "Duke Energy Carolinas would be forced to significantly alter its REPs compliance strategy if the definition of "biomass resource" was interpreted as a matter of law to exclude all other wood fuel sources except "wood waste". As illustrated by the testimony of Company Witness Steward, there is already limited "wood waste" supply in the marketplace, and such a limiting interpretation would create an artificial premium for that supply. Also as the supply of "wood waste" will be geographically dispersed, risks and limitation related to economical transport of fuel will further constrain actual supply. Depending upon the transport distances in relation to the generation facility sites, there may simply not be enough "wood waste" fuel available to support the relative needs at Company-owned or third party sites".

Existing industries that use wood, including some that burn biomass for energy themselves, also acknowledge the reality of whole-tree harvesting for fuel, and have expressed concerns that the new, large biomass-burning facilities will drive up wood demand and increase forest harvesting. For instance, testimony[34] offered by the Packaging Corporation of America to the Public Service Commission of Wisconsin on the proposed 50 MW We Energies/Domtar plant in Rothschild, WI, states,

> To make a complete shift from a near non-existent to a smooth-running industry will likely take a minimum of 5-8 years, and perhaps longer, to reach stability. In the absence of such change, or during the transition, it would seem that the simplest and perhaps only alternative for WE is to procure pulpwood to be chipped as fuel. This obviously will raise the cost not only of pulpwood but also of biomass across the region. The scale of operations may also result in unforeseen forest management impacts, e.g., clearcutting of northern hardwood stands for whole tree chips.

In New Hampshire, six smaller biomass burning companies intervened in the power purchase agreement for the 70 MW Laidlaw plant proposed in Berlin, NH, which will burn more than

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[33] Testimony of Owen A. Smith, Duke Energy Corporation. before the North Carolina Utilities Commission, In the Matter of the Registration Statements of Buck and Lee Steam Stations as Renewable Energy Facilities Pursuant to RuleR8-66. Docket No. E-7, SUB 939 and SUB 940 at page 9.

[34] Initial post-hearing brief of Packaging Corporation of America, before the Public Service Commission of Wisconsin, Docket No. 6630-CE-305. December 23, 2010.

750,000 tons of wood a year. The smaller power plants have intervened, as a biomass industry publication notes, "alleging fierce competition for the biomass fuel".[35]

Forest Service data show residues are too scarce to meet emerging demand

Detailed data on wood resources and harvests from the Southern Research Station of the U.S. Forest Service demonstrate that recoverable residues are indeed spread thinly across the landscape, as Duke Energy complains. In North Carolina, the average density of harvestable[36] residues is 12.27 tons per acre, and is 4.76 tons/acre in South Carolina. Duke Carolinas' combined coal plant capacity in North Carolina and South Carolina is 7,573 MW (nameplate).[37] Repowering 10% of Duke's coal capacity with biomass would require 7,334,645 tons of wood, which would require collecting residues from over 861,000 acres per year, or slightly less than the approximately 869,000 acres cut per year in the two states combined.[38]

In Florida, new demand for biomass fuel from six proposed plants will be about 4,847,625 tons per year, on top of the 1.2 million tons a year harvested by the Cottondale pellet plant.[39] Forest Service data indicate a logging residue density of about 4.46 tons per acre, thus meeting the need for biomass fuel would require collecting residues on 1,086,911 acres per year. However, all types of forest cutting in Florida, including final harvest, partial harvest, shelterwood, commercial thinning and timber stand improvement, constitute about 331,000 acres per year.[40]

The biomass industry states EPA's deferral will accelerate fuel use

Testimony[41] from David Tenny, President of NAFO, states that EPA's proposed deferral for biogenic CO2 regulation will spur greater use of biomass for fuel, stating

> "The deferral would spur the market for biomass energy and increase the biomass sales of NAFO's members by removing the regulatory uncertainty and compliance costs that has inhibited capital investment in biomass energy facilities…. Wood to electricity facilities are expected to be a central component of renewable fuel portfolios across the country and total capacity is expected to increase four-fold during the next decade."

NAFO's position is clear – the deferral will allow the industry to grow dramatically, and legal uncertainty may cause the industry to "stagnate"

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35 Gibson, L. NH plants petition for intervention in Laidlaw PPA. Biomass Power and Thermal, October 7, 2010.
36 Conner, R. and Johnson, T. Estimates of biomass in logging residue and standing residual inventory following tree-harvest activity on timberland acres in the Southern Region. USDA Forest Service Southern Research Station, Resource Bulletin SRS-169. January, 2011. The review attempts to quantify wood that is recoverable for use as fuel and thus caps recovery at 60% of residues, which is higher than Duke Energy estimated was available.
37 EIA. Existing generating units in the United States by State, Company and Plant, 2008.
38 Conner and Johnson, 2011.
39 RISI, Inc. North American Wood Biomass Projects Database, updated February, 2011
40 Conner and Johnson, 2011.
41 Declaration of David P. Tenny, National Alliance of Forest Owners ¶ 11.a., Center for Biological Diversity v. EPA, D.C. Cir. No. 11-1101(filed April 28, 2011).

> "Regardless of the eventual outcome, the interim effect of the legal uncertainty will be to stall the continued growth and development of the biomass energy sector and reduce the demand for biomass products supplied by NAFO's members. This legal uncertainty will be exacerbated by the fact that the Tailoring Rule will apply to CO2 emissions from biomass combustion until the legal uncertainty is resolved. Given the high cost of complying with PSD and Title V permitting requirements, there are strong reasons to believe that the biomass energy sector could stagnate until the legal uncertainty is resolved."

Yet the biomass industry has in fact been stagnating for years. According to EIA's "existing generating units" database from 2008, the median in-service date of the current fleet of plants is 1981; some facilities date from the 1930's. More than half the 111.4 million tons of fuel burned in these plants was wood pulping liquor residues, indicating that the purpose of the existing fleet is nearly as much about waste disposal as it is about energy generation.

Given the biomass industry's long static phase, there is no need to suddenly ramp up capacity prior to EPA doing due diligence on carbon impacts. EPA's goal of regulating CO_2 is to reduce greenhouse gas emissions, or at least ensure they do not increase. In this context, EPA's statement that regulating biogenic CO_2 might be "counterproductive because it could discourage utilization of biomass feedstock as fuel" is particularly inappropriate, given the Agency's failure to determine net carbon impacts. The only reason to promote the use of biomass as a renewable fuel is if it offers significant GHG reductions relative to fossil fuels. Until this question is resolved, there is little point in promoting new development of the industry, as NAFO indicates the deferral will do. NAFO's complaint that EPA regulation of carbon emissions from biomass is analogous to developers of a nuclear plant stating that regulations restricting radiation releases are holding back their industry.

In fact the biomass industry's stated intent to expand biomass consumption in response to the deferral, and the embrace of carbon accounting approach not dissimilar to a Ponzi scheme, indicates no reason to anticipate any industry restraint with regard to increasing forest harvesting for biomass fuel. EPA's acknowledgement that carbon accounting is complex, and that time is needed to study the question, does not justify leaving carbon emissions from the industry unregulated for three years. Far from representing a *de minimis* impact, the action will itself "spur" industry development, as NAFO's Dave Tenny states, and will increase the likelihood that large and essentially permanently unregulated facilities will be built in a rush to become grandfathered out of regulation in the three-year period.

EPA has not shown that using forestry waste is truly carbon neutral

Burning biomass, even residues, instantly transfers more carbon to the air than burning fossil fuels; this is particularly true when biomass burned in a standalone plant, due to generally lower efficiencies of biomass burners than fossil fuel burners. Thus, given EPA's apparent assumption that forest and mill residues are carbon neutral, it begs the question: over what time period is EPA interested in reducing CO_2 emissions from the power sector? And even assuming that the

Agency were correct that net emissions from either burning or decomposing waste wood are the same after 10 – 15 years (itself likely an underestimate), what gives the Agency the ability to defer the actual emissions reduction from CO_2, as opposed to criteria pollutants regulated under the Clean Air Act? The Agency regulates NOx at the point and time of emission – it does not ask the question of what the "net balance" of NOx will be at some point 10 – 30 years into the future. Why then does the agency have the ability to defer the actual reduction in CO_2 emissions under this rule, particularly given the extreme urgency of reducing emissions now to address climate change? Further, is it fair to fossil fuel burning industries that the biomass industry is given several years to reduce its net emissions, and they are not?

In fact, decomposition takes time – therefore it is not legitimate for EPA to treat CO_2 emissions from burning waste wood as if they achieve instant parity with the emissions that would occur if decomposition were occurring instead. For instance, Repo et al 2011[42] found carbon "payback" periods for forestry residues that varied by the type of wood (stumps versus branches). The Manomet Study team concluded that even when just forestry residues are used as fuel, it still takes 30 years for net emissions from a utility-scale biomass facility to achieve parity with net emissions from electricity generation using natural gas. More than 90 years are required when "mixed" wood (which includes whole trees) is used.[43]

Decomposition is a complex process that varies with different wood types, climate, nutrient availability and the decomposer community. But from the following chart, which describes the percent mass remaining of decomposing wood through time and which models a range of reasonable values for decomposition rate constants (k) representing these factors, it is evident that 10 to 30 years after harvest, significant amounts of decomposing material remain. The assumption that decomposition happens swiftly and that net emissions from burning and decomposition quickly achieve parity is not borne out by the science.

[42] Repo, A., Tuomi, M. and Liski, J. 2011. Indirect carbon dioxide emissions from producing bioenergy from forest harvest residues. GCB Bioenergy, 3: 107–115. doi: 10.1111/j.1757-1707.2010.01065.x
[43] Walker, T. "Manomet & biomass: moving beyond the soundbite". Presentation to USDA Bioelectricity and GHG Workshop, 15 November 2010.

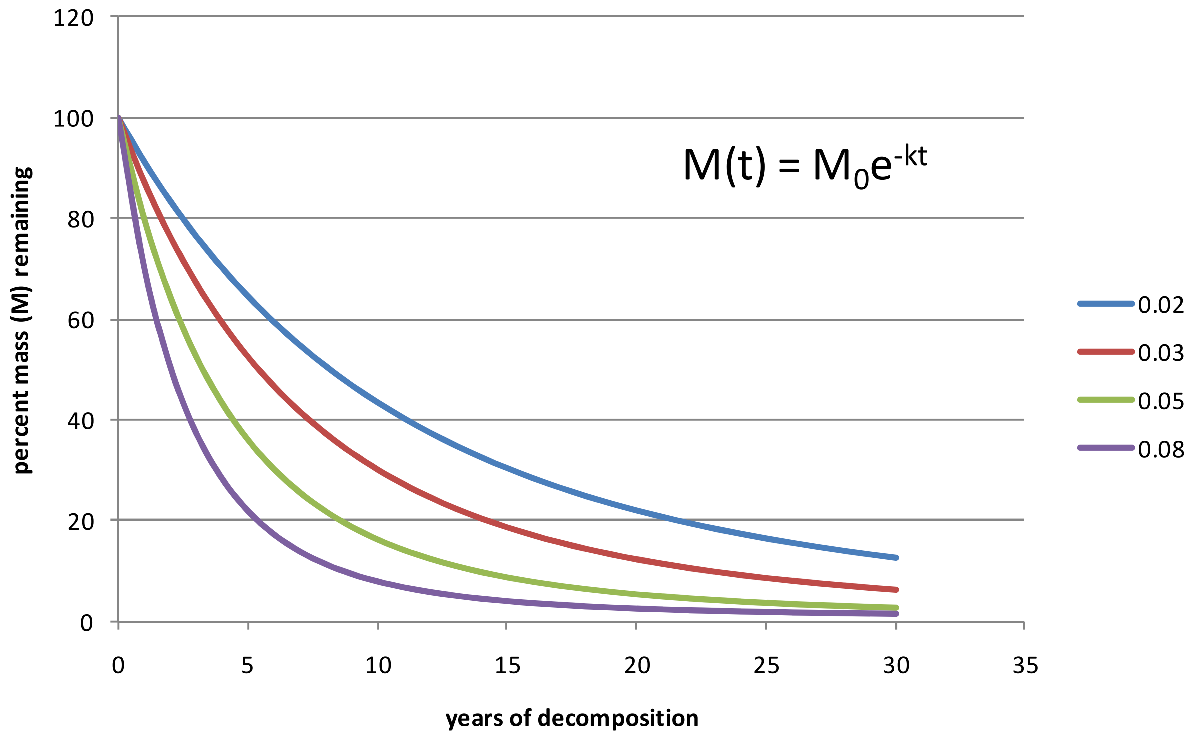

Figure 4. Decomposition curves showing percent of initial material remaining for a range of "k" factors representative of wood in North America.

Even the Finns, who use biomass energy intensively, are recognizing that harvesting residues for fuel has consequences for overall forest carbon balance. A press release from a study recently issued by the Finnish Environment Institute states,

> "Forest energy is not as low in emissions as is generally assumed. Harvesting of wood from forests reduces the quantity of atmospheric carbon accumulated in forests, even though growing forests do take up carbon from the atmosphere. Logging residue, such as branches, wood from first thinnings and tree stumps, would store carbon for a long time if left to rot in the forest. The climate benefit achieved by carbon storage is similar to that of, for instance, long lasting products made of wood"[44]

Net carbon emissions over time can be lower when energy crops or agricultural residues are used as fuel, provided this does not involve land-use change with substantial net emissions of carbon (such as replacing native forests to grow energy crops). However, EPA has not provided a single example of combustion of biomass that actually reduces greenhouse gas emissions. The example that EPA provides of a beneficial type of biomass is not supported by current science. EPA states:

[44] Finnish Environment Institute. "Weaker carbon sink capacity of forests undermines the majority of benefits from forest energy". February 1, 2011. http://www.ymparisto.fi/default.asp?contentid=375136&lan=en&clan=en

> "requiring permitting for facilities seeking to generate energy from the combustion of dead trees, especially those killed due to a widespread event like the mountain pine beetle epidemic, is likely to discourage the utilization of a readily available resource that would *clearly* reduce CO_2 emissions (e.g., by removing and utilizing biomass material that would otherwise be susceptible to fire or decompose in the forest, leading to CO_2 and CH_4 emissions from decomposition). [45]

The example provided, that of harvesting beetle-killed wood for fuel, is not supported by recent studies, which indicate that the severity of crown fires may be reduced in beetle-killed stands relative to undisturbed stands[46] which that net carbon emissions from beetle-killed stands are lower than has been assumed.

Further support is offered by a NASA study[47] which found that

> "Preliminary analysis indicates that large fires do not appear to occur more often or with greater severity in forest tracts with beetle damage. In fact, in some cases, beetle-killed forest swaths may actually be less likely to burn. What they're discovering is in line with previous research on the subject.
>
> The results may seem at first counterintuitive, but make sense when considered more carefully. First, while green needles on trees appear to be more lush and harder to burn, they contain high levels very flammable volatile oils. When the needles die, those flammable oils begin to break down. As a result, depending on the weather conditions, dead needles may not be more likely to catch and sustain a fire than live needles.
>
> Second, when beetles kill a lodgepole pine tree, the needles begin to fall off and decompose on the forest floor relatively quickly. In a sense, the beetles are thinning the forest, and the naked trees left behind are essentially akin to large fire logs. However, just as you can't start a fire in a fireplace with just large logs and no kindling, wildfires are less likely to ignite and carry in a forest of dead tree trunks and low needle litter.

EPA's statement that collection of beetle-killed wood for fuel results in equivalent emissions to it staying in the field and burning also assumes that theses stands burn with 100% probability, which is not the case.

The deferral of applicability of the tailoring rule to emissions from tire-derived fuel can surely not be based on the argument that tires would "decompose" in 10 – 15 years, thus rendering net

[45] Proposed Rule at 15,262

[46] Martin Simard, et al., 2011, Do Mountain Pine Beetle Outbreaks Change the Probability of Active Crown Fire in Lodgepole Pine Forests? Ecological Monographs 81(1) 3 – 24. .

[47] Shoemaker, Jennifer. NASA satellites reveal surprising connection between beetle attacks, wildfire. September 8, 2010. Available at http://www.nasa.gov/topics/earth/features/beetles-fire.html#

emissions from combustion and decomposition equivalent. The inclusion of tire-derived fuels in the list of excluded materials thus shows that the Agency's rationale for not counting emissions is not based on a true assessment that emissions from burning waste are negligible, but instead that the decision was based on precedent and driven by industry pressure.

Biomass energy has consequences for forests and carbon emissions

David Tenny of NAFO projects that biomass power generation will quadruple in the next ten years.[48] If this occurs – and it is most likely to occur if EPA fails to regulate biomass carbon pollution – it will have dramatic consequences for forests and carbon emissions. Despite claims that a variety of feedstocks, including annual crops, can be used as fuel, industry data demonstrate that the overwhelming majority of existing plants use wood as fuel, and the overwhelming majority of new plants being planned and built will use wood as fuel. Plants co-firing biomass have a particular need for wood, rather than agricultural crops, since their boilers and emissions control equipment are not equipped to deal with the slagging and fouling that can accompany combustion of agricultural materials. Wood – especially debarked and pelletized or torrefied wood – is the fuel of choice for coal plants wanting to co-fire biomass.

Leaving aside co-firing proposals, the approximate doubling in the size of the biomass power industry now underway in the next few years will require over 57 million tons of wood annually, which, when assumed to be at around an industry standard assumption of 45% moisture content, translates to almost 58 million tons of CO_2 emitted per year.[49] The quadrupling in consumption envisioned by NAFO will represent well over another 100 million tons of CO2 emissions, bringing the projected industry total to around 200 million tons of CO_2 emitted annually and unregulated by EPA. If these numbers are concerning to the Agency, then there is no reason to delay regulation, for the very act of deferral will itself incentivize the continuing explosion of the biomass industry – a fact endorsed by NAFO.

Accepting the unjustified myth of biomass carbon neutrality leads to bad public policy. For instance, an examination of EIA's projected reductions in carbon emissions that would occur if a federal renewable electricity standard were passed reveals that the majority of the "reductions" are the result of replacing coal with biomass and simply not counting the emissions. Given EIA's assumptions about fuel availability, which lump trees from increased forest harvesting into the "forest residues" category, there is good reason to assume that net emissions from the ramp-up in biomass energy that EIA envisions would be substantial. How should the public feel when it turns out that the very core objective of the climate bill, to reduce greenhouse gas emissions, is based on a an outdated and unverified assumption that is demonstrably wrong?

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[48] Declaration of David P. Tenny, National Alliance of Forest Owners ¶ 11.a., Center for Biological Diversity v. EPA, D.C. Cir. No. 11-1101(filed April 28, 2011).
[49] One ton of green wood at 45% moisture content emits about 1.008 tons of CO_2 when burned.

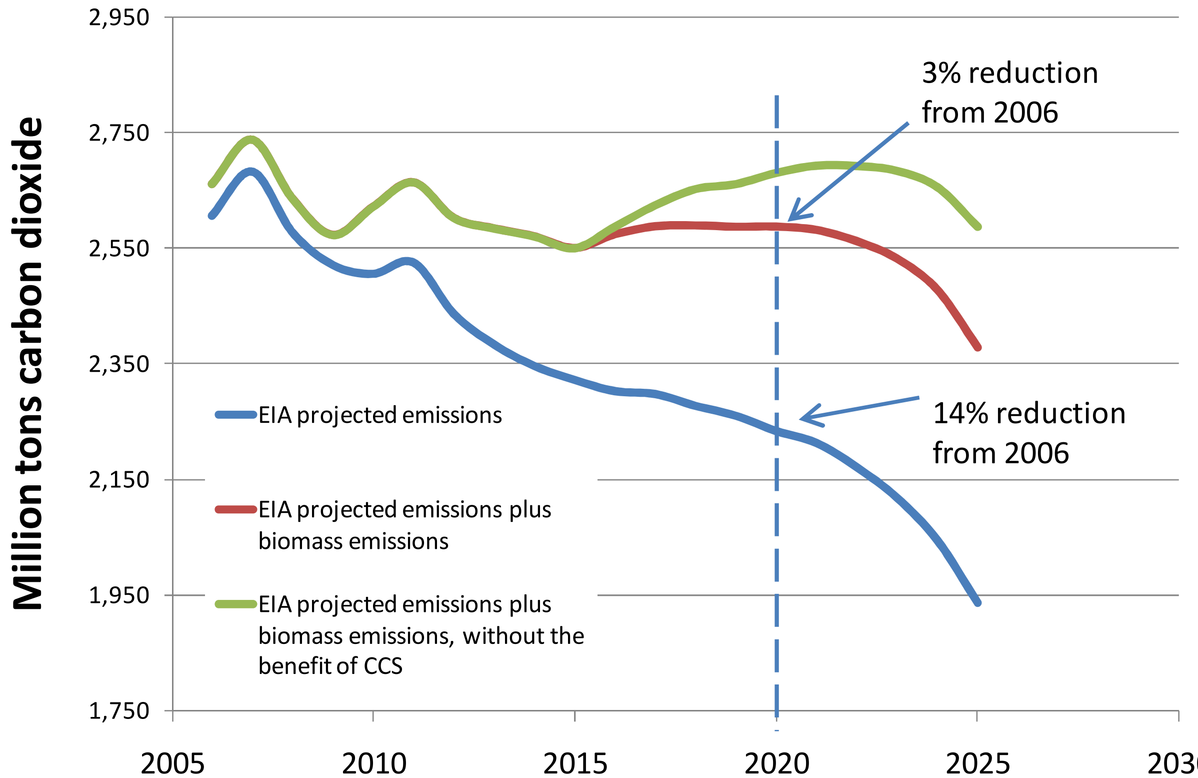

FIGURE 5. EIA's assumptions about residues availability and carbon neutrality contribute the projection that replacing some portion of coal with biomass will lead to large reductions in greenhouse gases under a renewable electricity standard. The other reductions in power sector emissions come from deployment of nuclear power and carbon capture and sequestration. Adding biomass emissions back in to EIA-projected emissions shows the degree to which EIA's projections depend on the assumption of biomass carbon neutrality. (Source: Booth, M.S. and Wiles, R. 2010. Clearcut Disaster. Environmental Working Group, Washington DC).

Considering biomass carbon neutral also incentivizes forest cutting and turns forests from carbon sinks into carbon sources. Take for example Vermont, which is distinguished by being noted as one of the states identified in the national inventory of greenhouse gas emissions where forests are a net source of carbon – that is, they are being cut and/or dying faster than they are growing.[50] Forest Service data indicate Vermont generated 522,044 tons of forest residues in 2006.[51] Wood reported burned in 2009 (in plants large enough to report to EIA) was 603,763 tons. Currently, more energy wood facilities are planned in the state, including pellet plants; projects in the pipeline have a total wood demand of 1,722,330 tons to supply new pellet and biomass facilities.[52] Liquidation of these carbon stocks will drive Vermont's forests further into the red – they will be even greater sources of greenhouse gases than they are now.

Or consider Michigan, another state identified in the national greenhouse gas inventory as having forests that are a net source of carbon. EIA data indicate that in 2009, wood solids consumption

[50] EPA, 2011. Inventory of U.S. greenhouse gas emissions and sinks: 1990 – 2009. Annex 3.12, Table A-210.
[51] Smith et al, 2007
[52] RISI, Inc. North American Wood Biomass Projects Database, updated February, 2011

for existing biomass combustion in the state was 2,434,090 tons. Projected consumption by new pellet and biomass power facilities currently in the pipeline[53] will be around 3,157,160 tons – more than doubling current "energy wood" consumption in the state and further increasing the rate of forest loss.

EPA must not defer regulation because the path forward is clear

EPA is adequate to the task of estimating the true carbon impact of biomass fuels and facilities, and does not need three years to do so. Further, the harm done from not regulating CO2 in this period will be significantly greater than the potential unnecessary trouble caused to the few new facilities that come under regulation during that period that actually might have de minimis emissions. Only a tiny minority of the facilities now proposed intend to use agricultural residues or purpose-grown crops for fuel. The rest will use wood, and the industry has spoken loudly that this wood will not come from residues, but will come from intensified forest harvesting. EPA has all the evidence the Agency needs to conclude that regulating greenhouse gas emissions is justified on the science.

Thank you for the opportunity to comment.

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Partnership for Policy Integrity

[53] Includes one large biofuel plant that will use 950,000 tons of wood a year as feedstock