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March 15, 2017

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California Energy Commission
Dockets Office, MS-4
Re: Docket No. 16-OIR-05
1516 Ninth Street
Sacramento, CA 95814-5512

**Re: Docket No. 16-OIR-05: Pre-Rulemaking Updates to the Power Source Disclosure Regulations (AB 1110 Implementation)**

Dear Commissioners:

The Center for Biological Diversity (the "Center") respectfully submits the following comments on California Energy Commission staff's pre-rulemaking Scoping Questions regarding updates to the Power Source Disclosure ("PSD") regulations in light of AB 1110. The Center is a non-profit organization with more than one million members and online activists, and offices throughout the United States, including in Oakland, Los Angeles, and Joshua Tree, California. The Center's mission is to ensure the preservation, protection and restoration of biodiversity, native species, ecosystems, public lands and waters and public health. In furtherance of these goals, the Center's Climate Law Institute seeks to reduce U.S. greenhouse gas emissions and other air pollution to protect biological diversity, the environment, and human health and welfare. Specific objectives include securing protections for species threatened by global warming, ensuring compliance with applicable law in order to reduce greenhouse gas emissions and other air pollution, and educating and mobilizing the public on global warming and air quality issues.

The updated PSD regulations must ensure that the greenhouse gas intensity of biomass and waste energy generation is accurately reported to consumers. In terms of actual smokestack emissions, biomass generation is three to four times more carbon-intensive than natural gas-fired generation, and even more carbon-intensive than coal-fired generation. Claims that all biomass emissions should be considered "biogenic" and thus "carbon neutral" lack a reasoned scientific basis. Moreover, although biomass emissions currently do not create compliance obligations under California's cap-and-trade regulation, they must be reported under the state's mandatory greenhouse gas reporting regulations ("MRR"). Accordingly, the Center believes that requiring power producers to report biomass energy greenhouse gas emissions intensity is required by the


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text and consistent with the intent of AB 1110. Reporting those emissions as zero, in contrast, would be both scientifically arbitrary and contrary to statutory text and intent.

Please include this letter and the references discussed herein in the record of proceedings for this docket. Due to file size and copyright limitations, copies of references will be provided on a CD under separate cover, directed to the address above.

## I. Biomass Energy Generation Is Carbon-Intensive, Not Carbon Neutral

Wood contains a great deal of carbon. Combustion of wood for energy instantaneously releases virtually all of that carbon to the atmosphere as $CO_2$. Burning wood for energy is typically less efficient, and thus far more carbon-intensive per unit of energy produced, than burning fossil fuels.

Measured at the stack, biomass combustion produces significantly more $CO_2$ per megawatt-hour than fossil fuel combustion; a biomass-fueled boiler may have an emissions rate far in excess of 3,000 lbs $CO_2$/MWh.[1] Smaller-scale facilities using gasification technology—like the facilities currently being proposed under the SB 1122 feed-in tariff for small-scale bioenergy (see Public Utilities Code section 399.20(f))—are similarly carbon-intensive. For example, the Cabin Creek bioenergy project approved by Placer County would have an emissions rate of more than 3,300 lbs $CO_2$/MWh.[2] As one recent scientific article noted, "[t]he fact that combustion of biomass generally generates more $CO_2$ emissions to produce a unit of energy than the combustion of fossil fuels increases the difficulty of achieving the goal of reducing GHG emissions by using woody biomass in the short term."[3]

By way of comparison, California's 2012 baseline emissions rate from the electric power sector—which includes only large, fossil-fired electric generating units subject to federal greenhouse gas performance standards—was 954 lbs $CO_2$ per MWh.[4] California's actual grid emissions intensity is likely far lower, given the increasing dominance of renewables and storage. Accordingly, replacing California grid electricity with biomass

[1] Representative emissions calculations, prepared by the Partnership for Policy Integrity based on Department of Energy, Energy Information Administration, International Energy Agency, and Oak Ridge National Laboratory data, are attached as Exhibit A.
[2] Ascent Environmental, Cabin Creek Biomass Facility Project Draft Environmental Impact Report, App. D (July 27, 2012) (describing 2 MW gasification plant with estimated combustion emissions of 26,526 tonnes $CO_2$e/yr and generating 17,520 MWh/yr of electricity, resulting in an emissions rate of 3,338 lbs CO2e/MWh).
[3] David Neil Bird, et al., *Zero, one, or in between: evaluation of alternative national and entity-level accounting for bioenergy*, 4 GLOBAL CHANGE BIOLOGY BIOENERGY 576, 584 (2012), doi:10.1111/j.1757-1707.2011.01137.x.
[4] See Energy and Environment Daily, Clean Power Plan Hub, at http://www.eenews.net/interactive/clean_power_plan/states/california (visited May 18, 2016).

electricity likely at least *triples* smokestack emissions rates—and replacing truly low-carbon renewables with biomass is far worse.

Biomass and fossil $CO_2$ are indistinguishable in terms of their effects on the climate.[5] Claims about the purported climate benefits of biomass energy turn entirely on purported "net" carbon cycle effects, particularly the possibility that new growth will resequester carbon emitted from combustion, and/or the possibility that biomass combustion might "avoid" emissions that would otherwise occur as biological materials decompose. But even if these net carbon cycle effects are taken into account, emissions from biomass power plants tend to increase atmospheric $CO_2$ concentrations for decades to centuries depending on feedstocks, biomass harvest practices, and other factors. Multiple studies have shown that it can take a very long time to discharge the "carbon debt" associated with bioenergy production, even where fossil fuel displacement is assumed, and even where "waste" materials like timber harvest residuals are used for fuel.[6] One study, using realistic assumptions about initially increased and subsequently repeated bioenergy harvests of woody biomass, concluded that the resulting atmospheric emissions increase may even be permanent.[7]

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[5] U.S. EPA Science Advisory Board, *Science Advisory Board Review of EPA's Accounting Framework for Biogenic $CO_2$ Emissions from Stationary Sources* 7 (Sept. 28, 2012) (hereafter "SAB Panel Report"); *see also Center for Biological Diversity, et al. v. EPA*, 722 F.3d 401, 406 (D.C. Cir. 2013) ("In layman's terms, the atmosphere makes no distinction between carbon dioxide emitted by biogenic and fossil-fuel sources").

[6] *See, e.g.*, Stephen R. Mitchell, et al., *Carbon Debt and Carbon Sequestration Parity in Forest Bioenergy Production*, GLOBAL CHANGE BIOLOGY BIOENERGY (2012) ("Mitchell 2012"), doi: 10.1111/j.1757-1707.2012.01173.x; Ernst-Detlef Schulze, et al., *Large-scale Bioenergy from Additional Harvest of Forest Biomass is Neither Sustainable nor Greenhouse Gas Neutral*, GLOBAL CHANGE BIOLOGY BIOENERGY (2012), doi: 10.1111/j.1757-1707.2012.01169.x at 1-2; Jon McKechnie, et al., *Forest Bioenergy or Forest Carbon? Assessing Trade-Offs in Greenhouse Gas Mitigation with Wood-Based Fuels*, 45 ENVIRON. SCI. TECHNOL. 789 (2011); Anna Repo, et al., *Indirect Carbon Dioxide Emissions from Producing Bioenergy from Forest Harvest Residues*, GLOBAL CHANGE BIOLOGY BIOENERGY (2010) ("Repo 2010"), doi: 10.1111/j.1757-1707.2010.01065.x; John Gunn, et al., Manomet Center for Conservation Sciences, Massachusetts Biomass Sustainability and Carbon Policy Study (2010), *available at* https://www.manomet.org/sites/manomet.org/files/Manomet_Biomass_Report_Full_LoRez.pdf (visited May 24, 2016).

[7] Bjart Holtsmark, *The Outcome Is in the Assumptions: Analyzing the Effects on Atmospheric $CO_2$ Levels of Increased Use of Bioenergy From Forest Biomass*, GLOBAL CHANGE BIOLOGY BIOENERGY (2012), doi: 10.1111/gcbb.12015.

Harvesting and processing of wood products also result in substantial $CO_2$ emissions.[8] Several studies have demonstrated that thinning forests and burning the resulting materials for bioenergy can result in a loss of forest carbon stocks and a transfer of carbon to the atmosphere lasting many years. Because it is impossible to know in advance that wildfire will occur in a thinned stand, thinning operations may remove carbon that never would have been released in a wildfire; one recent study concluded, for this and other reasons, that thinning operations tend to remove about three times as much carbon from the forest as would be avoided in wildfire emissions.[9] Another report from Oregon found that thinning operations resulted in a net loss of forest carbon stocks for up to 50 years.[10] Another published study found that even light-touch thinning operations in several Oregon and California forest ecosystems incurred carbon debts lasting longer than 20 years.[11] Other recent studies have shown that intensive harvest of logging residues that otherwise would be left to decompose on site can deplete soil nutrients and retard forest regrowth as well as reduce soil carbon sequestration.[12]

It has been argued that if logging residues otherwise would be burned in the open, using those same materials for bioenergy might result in a very short carbon payback period. However, unlike combustion in a bioenergy facility, broadcast and pile burning of logging slash does not tend to consume all of the material; a significant portion may remain uncombusted on site. According to Forest Service research, fuel consumption in slash piles can range as low as 75%.[13] Combustion factors for broadcast understory burning of coarse woody debris can be as low as 60%.[14] Moreover, open burning of slash

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[8] Mark E. Harmon, et al., *Modeling Carbon Stores in Oregon and Washington Forest Products: 1900-1992*, 33 CLIMATIC CHANGE 521, 546 (1996) (concluding that 40-60% of carbon in harvested wood is "lost to the atmosphere . . . within a few years of harvest" during wood products manufacturing process).

[9] John L. Campbell, et al., *Can fuel-reduction treatments really increase forest carbon storage in the western US by reducing future fire emissions?* FRONT. ECOL. ENV'T (2011), doi:10.1890/110057.

[10] Joshua Clark, et al., *Impacts of Thinning on Carbon Stores in the PNW: A Plot Level Analysis*, Final Report (Ore. State Univ. College of Forestry May 25, 2011).

[11] Tara Hudiburg, et al., *Regional carbon dioxide implications of forest bioenergy production*, 1 NATURE CLIMATE CHANGE 419 (2011), doi:10.1038/NCLIMATE1264.

[12] David L. Achat, et al., *Forest soil carbon is threatened by intensive biomass harvesting*, SCIENTIFIC REPORTS 5:15991 (2015), doi:10.1038/srep15991; D.L. Achat, et al., *Quantifying consequences of removing harvesting residues on forest soils and tree growth – A meta-analysis*, 348 FOREST ECOLOGY & MGMT. 124 (2015).

[13] Colin C. Hardy, *Guidelines for Estimating Volume, Biomass, and Smoke Production for Piled Slash*, U.S. Dept. of Agriculture, Forest Service, Pacific Northwest Research Station, Gen. Tech. Rep. PNW-GTR-364 (1996).

[14] *See* Eric E. Knapp et al., *Fuel Reduction and Coarse Woody Debris Dynamics with Early Season and Late Season Prescribed Fire in a Sierra Nevada Mixed Conifer Forest*, 208 FOREST ECOLOGY & MGMT. 383 (2005).

is not a universal practice, nor is it universally permissible; rather, it depends on local conditions, including weather and relevant air quality regulations.[15]

As EPA's Science Advisory Board panel on biogenic $CO_2$ emissions concluded, biomass cannot be considered a priori "carbon neutral."[16] Rather, biomass emissions must be compared with emissions that would otherwise occur if specific feedstocks were not used for bioenergy.[17] Such a comparison requires careful attention not only to the quantity of emissions, but also to the particular alternative fates of feedstock materials and the timeframe on which emissions occur; bioenergy emissions occur almost instantaneously, while future resequestration or avoided decomposition may take years, decades, or even centuries to achieve atmospheric parity. This long period of increased atmospheric $CO_2$ concentrations resulting from bioenergy—combined with profound uncertainty as to the relative permanence of any land-based carbon stock recovery or sequestration[18]—could seriously impede achievement of California's mid- and long-term climate goals.

## II. The Text and Intent of AB 1110 Require Calculating Biomass Emissions Intensity Based on Smokestack and Other Facility-Reported Emissions

The Commission's task in developing updated PSD regulations begins with the text of AB 1110. The statute defines "greenhouse gas emissions intensity" as "the sum of all annual emissions of greenhouse gases associated with a generation source divided by the annual production of electricity from the generation source." (Pub. Util. Code § 398.2(a).) This definition is best read as establishing a simple equation—annual source emissions divided by annual electricity production—for determining emissions intensity.

The Commission also must "[a]dopt a methodology, in consultation with the State Air Resources Board, for the calculation of greenhouse gas emissions intensity for each

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[15] *See, e.g.*, North Coast Unified Air Quality Management District (California), Regulation II , *available at* http://www.ncuaqmd.org/index.php?page=rules.regulations; Placer County (California) Air Pollution Control District, Regulation 3, *available at* http://www.placer.ca.gov/departments/air/rules.

[16] SAB Panel Report, *supra* note 5 at 18.

[17] *See* SAB Panel Report, *supra* note 5 at 18; *see also* Michael T. Ter-Mikaelian, et al., *The Burning Question: Does Forest Bioenergy Reduce Carbon Emissions? A Review of Common Misconceptions about Forest Carbon Accounting*, 113 J. FORESTRY 57 (2015); Timothy D. Searchinger, et al., *Fixing a Critical Climate Accounting Error*, 326 SCIENCE 527 (2009); see also Mitchell 2012, *supra* note 6 at 9 (concluding that management of forests for maximum carbon sequestration provides straightforward and predictable benefits, while managing forests for bioenergy production requires careful consideration to avoid a net release of carbon to the atmosphere)

[18] *See* Brendan Mackey et al., *Untangling the confusion around land carbon science and climate change mitigation policy*, 3 NATURE CLIMATE CHANGE 552 (2013), doi:10.1038/NCLIMATE1804.

purchase of electricity by a retail supplier to serve its retail customers." (Pub. Util. Code § 398.4(k)(2)(A).) In developing this methodology, the Commission must "[r]ely on the most recent verified greenhouse gas emissions data." (Pub. Util. Code § 398.4(k)(2)(C).) The methodology as a whole, moreover, should be based on an adequate scientific record, developed in a transparent manner, and subjected to public notice and comment prior to inclusion in or enactment of the revised PSD regulations.

The Commission's workshop notice seeking comment on scoping questions states that "Legislative intent compels the methodology to be consistent with the Cap and Trade Program and the Mandatory Reporting Requirement Regulation (MRR)."[19] Nothing in the text of AB 1110 expressly "compels" consistency with either regulation. No version of the bill ever directly referred to the Cap and Trade program. Moreover, an express requirement that MRR data be used was removed from the bill in amendments dated August 19, 2016, and replaced with the requirement that the Commission "adopt a methodology, in consultation with the State Air Resources Board." (AB 1110, as amended in Senate Aug. 19, 2016.) That said, the MRR program may provide a source of "recent verified greenhouse gas emissions data" (Public Utilities Code section 398.4(k)(2)(C)) that could be useful in developing the methodology.

The methodology must consider greenhouse gas emissions "associated with a generation source." To the extent this phrase is read in light of MRR requirements, it encompasses only "associated" emissions that sources are required to report. (See, e.g., 17 Cal. Code Regs. §§ 95112, 95115.) Under MRR, therefore, emissions "associated with a generation source" consist almost exclusively of stack emissions, and would not include any reductions from, for example, anticipated future regrowth of biomass or purportedly avoided decomposition of biological materials.

Accordingly, any methodology for calculating biomass greenhouse gas emissions intensity that attempted to offset stack emissions by considering resequestration, avoided decomposition, or other purported reductions would require a significant deviation from an interpretation of legislative intent that "compels" consistency with the MRR. Any such methodology, moreover, would need to be based not only on "the most recent verified greenhouse gas emissions data" (Public Utilities Code section 398.4(k)(2)(C)), but also on data reflecting accurate, feedstock-specific calculations that reflect both the quantity and timescale of relevant emissions. Unless and until the Commission and the Air Resources Board develop a robust methodology that satisfies these statutory and scientific requirements, emissions intensity must be based on reported emissions data.

In sum, therefore, in order to give effect to what the Commission believes was the intent of the Legislature, biomass emissions intensity calculations should reflect only annual stack emissions (and any other facility emissions that must be reported under

[19] Staff Pre-Rulemaking Workshop on Updates to the Power Source Disclosure Regulations at 3 (Feb. 21, 2017).

MRR) divided by annual electricity production. The Commission cannot lawfully treat bioenergy generation as effectively having zero emissions for purposes of AB 1110.

## III. Responses to Specific Scoping Questions

These responses address specific questions listed under the heading "GHG Intensity Factor Data and Calculations."

*1. AB 1110 defines "greenhouse gas emissions intensity" as the "sum of all annual emissions of greenhouse gases associated with a generation source divided by the annual production of electricity from the generation source." Are there any reasons to consider calculating GHG emissions intensities using greenhouse gases other than those accounted for in both MRR and the EPA's Greenhouse Gas Reporting Program?*

The answer to this question must be consistent with statutory and regulatory definitions and requirements. Although AB 1110 itself does not define "greenhouse gases," the Legislature was almost certainly guided by existing definitions in California law and regulation. Health and Safety Code section 38505(g) defines "greenhouse gases" as including $CO_2$, $CH_4$, $N_2O$, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride. The MRR regulation similarly defines "greenhouse gas" as including $CO_2$, $CH_4$, $N_2O$, "sulfur hexafluoride ($SF_6$), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and other fluorinated greenhouse gases as defined in this section." (17 Cal. Code Regs. § 95102(a)(227); see also *id.*, § 95102(a)(194) [further defining "fluorinated greenhouse gases"].)

It is not clear what "other" greenhouse gases the question might be referring to. It is also not clear that any "other" greenhouse gases beyond those typically emitted in fuel handling and combustion ($CO_2$, $CH_4$, and $N_2O$) play any significant role in the overall greenhouse gas intensity of electricity generation.[20] Accordingly, there does not seem to be any authority to depart from the definition of "greenhouse gases" in California statutes and regulations for purposes of AB 1110, nor any clear reason to do so.

[20] Electricity grid losses of sulfur hexafluoride, for example, are relatively small (about 0.13 $MTCO_2e$ in 2014). California Air Resources Board, Greenhouse Gas Emission Inventory - Query Tool for years 2000 to 2014 (9th Edition) at https://www.arb.ca.gov/app/ghg/2000_2014/ghg_sector.php (visited March 15, 2017) (querying $SF_6$ emissions from both in-state and imported electricity generation). And short-lived climate pollutants like black carbon are not "greenhouse gases," are not subject to reporting under the MRR regulation, and are governed by their own statutes and programs; the Commission thus likely lacks statutory authority to address such pollutants under AB 1110.

*2. What are the concerns, limitations, and benefits of relying on GHG emissions reported to the MRR program for the development of GHG emissions intensities for in-state and out-of-state facilities?*

Relying on emissions reported to the MRR program has several benefits, particularly with respect to the emissions intensity of biomass generation. The MRR program requires reporting of biomass greenhouse gas emissions. (17 Cal. Code Regs., §§ 95101(b)(4), 95103(a)(2), (j).) Moreover, as discussed above, the MRR program provides a good source of "verified greenhouse gas emissions data" regarding emissions "associated with" generation sources; "associated" emissions should thus include only the emissions required to be reported under MRR. (See, e.g., 17 Cal. Code Regs. §§ 95112, 95115.) Any emissions intensity methodology that discounts stack and other facility emissions based on claimed future reductions from biomass regrowth or avoided decomposition, in contrast, by definition cannot be grounded in "*verified* greenhouse gas emissions *data*" and would not be consistent with either the statute or the MRR program. Reliance on reported stack and other emissions under MRR in calculating the emissions intensity of biomass generation, in contrast, is not only consistent with the Commission's understanding of legislative intent, but also consistent with the plain text of the statute.

One potential drawback of relying exclusively on the MRR program—albeit unrelated to bioenergy generation—is that it does not necessarily capture all fugitive and vented methane emissions at gas-fired power plants. Recent studies indicate such emissions may be far higher than EPA data previously suggested.[21] Such emissions are arguably relevant to the intensity factor for gas-fired generation.

*3. Should GHG emissions classified as non-covered or exempt under the Cap and Trade Program be included in PSD greenhouse gas intensity calculations?*

At least with respect to biomass facilities, greenhouse gas emissions must be included in PSD greenhouse gas intensity calculations regardless of whether they give rise to compliance obligations under the Cap and Trade regulation. The fact that the Cap and Trade program does not impose compliance obligations on certain emissions does not mean that those emissions are zero. It means only that those emissions are outside the "cap" and must be reduced in other ways in keeping with California's overall greenhouse gas reduction goals. Excluding these emissions from intensity calculations under AB 1110 would be inconsistent with the statutory requirement that the Commission rely on "the most recent verified greenhouse gas emissions data" in calculating intensity factors. (Pub. Util. Code § 382.4(k)(2)(C).) The extent of Cap and Trade coverage and the exclusion of certain categories of emissions from the Cap and Trade program are *policy*

[21] Tegan N. LaVoie, et al., *Assessing the Methane Emissions from Natural Gas-Fired Power Plants and Oil Refineries*, __ ENVIRON. SCI. TECHNOL. __ (published online Feb. 21, 2017), DOI: 10.1021/acs.est.6b05531.

choices made within the context of California's overall effort to meet greenhouse gas reduction targets, not "verified greenhouse gas emissions data."

## IV. Conclusion

In order to maintain consistency with the plain text of AB 1110, as well as the Commission's understanding of legislative intent, the PSD regulations must calculate the greenhouse gas emissions intensity of biomass energy generation using the simple equation provided in AB 1110 itself: annual stack emissions (plus any other emissions that must be reported under the MRR program) divided by annual electricity production.

Thank you very much for your consideration of these comments.

Sincerely,

Kevin P. Bundy
Senior Attorney

Encl.: List of References Cited
Exhibit A (CO2 Emission Rates from Modern Power Plants)

**References Cited**
**Center for Biological Diversity Comments**
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**(Copies of references to be provided on CD under separate cover)**


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U.S. EPA Science Advisory Board, *Science Advisory Board Review of EPA's Accounting Framework for Biogenic $CO_2$ Emissions from Stationary Sources* 7 (Sept. 28, 2012).

EXHIBIT A

| $CO_2$ 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.