

From: Mary S. Booth, PhD, Partnership for Policy Integrity (mbooth@pfpi.net)
Re: Funding streams to biomass power

June 29, 2011

This memo describes health and environmental impacts of biomass power, and why the Partnership for Policy Integrity, as well as a growing number of groups around the country, believes that biomass power should not receive the subsidies reserved for truly clean and renewable sources of energy. We argue that taxpayers and ratepayers should not have to pay extra for “renewable” energy that accelerates forest cutting, increases greenhouse gas emissions, and pollutes the air, and that biomass power’s ongoing dependency on fuel delivery subsidies also makes it inferior to truly renewable energy sources like wind and solar.

Our analysis of federal subsidies for the biomass energy sector found that

1. Renewable energy production tax credit obligations (PTC) are about \$46 million for a typical 50 MW biomass plant over the duration of the credit; total obligations projected by the Ways and Means Committee for the PTC are around \$1.3 billion for 2009 – 2013. Due to the explosive growth in the biomass industry currently underway, PTC obligations may increase significantly. The federal credit is worth about \$45.8 million to a 50 MW plant for the duration of the credit. Some states also have similar tax credit programs for renewable energy generation.
2. Stimulus grant expenditures of \$102 million for reimbursement of 30% of construction costs have been allocated to 9 biomass energy facilities under the Incentive Tax Credit (ITC) program. Depending on ongoing availability of these funds, it is highly likely that a significant additional number of facilities will receive these grants, which are taken in lieu of the production tax credit.
3. Subsidies and tax credits for fuel collection are significant. In addition to the “collection/harvest/storage/transport” (CHST) component of the BCAP program, which cost about \$243 million for FY 2009/2010, stimulus grants supporting fuel collection and facility development are also available (these are a separate category of support from the ITC). A subset of these projects supporting fuel collection represented \$12.5 million; total program costs are greater. Some states also offer tax credits and grants for fuel collection.
4. Ratepayer renewable energy credits (RECs) also support biomass power. Renewable energy credits are worth around \$8 million - \$12 million per year for a 50 MW biomass plant, depending on the value of RECs.

Background: biomass impacts on health and the environment

Biomass combustion is not a truly “clean” or “green” renewable power source like wind and solar energy¹:

1. Biomass combustion emits about as much particulate matter, nitrogen oxides, and carbon monoxide as coal combustion. Flagship medical organizations like the Massachusetts Medical

¹ For credible science-based information about biomass power, see www.pfpi.net

Society and the American Lung Association have issued statements warning about the health effects of burning biomass to generate power. Biomass power is not a “clean” technology.²

2. Burning biomass for power emits significantly more CO₂ than fossil fuels per unit energy generated. The assertion that biomass is “low carbon” or “carbon neutral” is based on the assumption that where “waste” materials are used as fuel, biomass power plants emit no more CO₂ than would have been emitted had that waste been left to decompose. When new trees are cut for use as fuel, the argument for carbon neutrality assumes forest regrowth will once again take up the carbon released by burning. Both these assertions ignore the fact that burning biomass emits significantly more CO₂ than burning fossil fuels, and does so instantaneously. This has an immediate effect on climate.³
3. Explosive growth in the biomass power industry, fueled by federal, state and ratepayer subsidies, is outstripping potential fuel supplies of “waste” wood. This threatens forests and the industries they already support. For instance in Wisconsin, the Packaging Corporation of America filed testimony with the state’s Public Service Commission, objecting to the approval of a new 50-MW biomass plant being developed by Domtar and We Energies. PCA’s testimony states, “The scale of operations may also result in unforeseen forest management impacts, e.g., clearcutting of northern hardwood stands for whole tree chips”.⁴

As an example of the resource demand and pollutant emissions from utility-scale biomass power facilities, we provide statistics for a typical 50 MW wood-burning biomass plant, the proposed Russell Biomass plant in Massachusetts.

Russell Biomass, MA: 50 MW; actual capacity: 55 – 57 MW (parasitic load at the plant typically represents at least an additional 10% of plant capacity).

- **Fuel consumption** assuming 95% online time: 626,000 tons of green wood/year (this is the equivalent wood that clearcutting 5,700 acres of Massachusetts forest a year would yield)
 - **CO₂ emissions:** 631,000 tons per year
- **Pollutant emissions** (from air permit issued by MA Department of Environmental Protection):

<ul style="list-style-type: none"> ▪ Particulate matter: 84.3 tons/yr ▪ Nitrogen oxides: 194.5 tons/yr ▪ Carbon monoxide: 243.1 tons/yr ▪ Sulfur oxides: 81 tons/yr ▪ Volatile organic compounds: 32.4 tons/yr 	<ul style="list-style-type: none"> ▪ Ammonia: 32.4 tons/yr ▪ Mercury: 8 lb/yr ▪ Lead: 400 lb/yr ▪ Hydrochloric acid: 11.4 tons/yr ▪ Hazardous air pollutants: 49.1 tons/yr
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² See statement from the Massachusetts Medical Society at <http://www.pfpi.net/wp-content/uploads/2011/03/Massachusetts-Medical-Society--Massachusetts-Medical-Society-Adopts-Policy-Opposing-Biomass-Power-Plants1.pdf>. The June 2011 statement from the American Lung Association is at <http://www.pfpi.net/wp-content/uploads/2011/06/ala-energy-policy-position.pdf>

³ The Manomet Study, commissioned by the State of Massachusetts, determined that “net” emissions from biomass power exceed those from coal for a period of 40 years, even taking forest regrowth into account. This is because forests are currently growing and sequestering carbon, and cutting trees for fuel degrades the ability of forests to pull carbon out of the air while simultaneously increasing the amount of carbon emitted per unit energy generated, relative to fossil fuels.

⁴ See our post on this topic at <http://www.pfpi.net/when-industry-gets-worried-about-clearcutting-for-biomass-fuel-it%E2%80%99s-time-for-epa-to-listen>

Financial incentives for biomass power

Biomass power plants are eligible for significant financial support from taxpayers and electricity ratepayers. Ratepayers pay extra on their electricity bill for renewable energy credits (RECs). Taxpayers pay for biomass energy in the form of energy production tax credits and programs that subsidize fuel collection and delivery, at both the state and federal levels.

Federal tax credit programs

The Federal Renewable Electricity Production Tax Credit ⁵(PTC) pays 2.2¢/kWh for closed-loop biomass and 1.1¢/kWh for “open loop” biomass, and generally applies to first 10 years of facility operation. This represents about \$45.8 million to a 50 MW plant over ten years.

Despite the higher rate offered for “closed loop” biomass facilities (which use crops grown exclusively for use as fuel) few if any facilities have taken advantage of the program. The industry recognizes that it is unrealistic and uneconomic to meet emerging biomass fuel needs – which are massive – with purpose-grown crops. Instead, open-loop facilities, which overwhelmingly use forest wood, predominate.

Assuming fulltime operation, a 50 MW open-loop plant can generate about \$3.38 m a year from the open-loop production tax credit. Total production tax credit expenditures for open-loop biomass power are estimated at \$1.3 billion for 2009 to 2013 in a report from the Ways and Means Committee.⁶

Energy Information Administration (EIA) projections of biomass build-out, translated to PTC obligations and assuming that facilities receive the credit for ten years, sum to about \$3.3 billion (“reference” scenario⁷) to \$4.7 billion (“high coal cost” scenario,⁸ used as a proxy for increasing costs of emitting carbon) for the 2012 – 2022 period.⁹ The EIA anticipates that much of future biomass power generation will occur at coal plants co-firing biomass rather than at new, stand-alone facilities, as this represents the least-cost option for ramping up biomass power generation quickly. However, despite EIA’s projections, there are far more stand-alone biomass plants that co-firing projects currently proposed.

Stimulus grants for plant development under Section 1603 of ARRA

Ongoing payments for biomass power production are an attractive incentive, but perhaps more attractive is the Incentive Tax Credit program, which provides a one-time 30% reimbursement of facility development costs under Section 1603 of the American Reinvestment and Recovery Act. The

⁵ http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US13F&re=1&ee=0

⁶ Joint Committee on Taxation, for the House Committee on Ways and Means and Senate Committee on Finance. Estimates of federal tax expenditures for fiscal years 2009 – 2013. January 11, 2010.

⁷ <http://www.eia.gov/oiaf/aeo/tablebrowser/#release=AEO2011&subject=6-AEO2011&table=16-AEO2011®ion=0-0&cases=ref2011-d020911a>

⁸ <http://www.eia.gov/oiaf/aeo/tablebrowser/#release=AEO2011&subject=0-AEO2011&table=16-AEO2011®ion=0-0&cases=hccst11-d020911a>

⁹ The analysis of the PTC obligation assumes that the PTC remains at 1.1¢/kWh and is granted to new electricity generation from biomass for a period of ten years. The irony of this situation is that although burning biomass actually increases CO₂ emissions relative to burning coal, co-firing biomass is treated by EPA guidance as one way to “reduce” CO₂ emissions, based on the assumption that all biomass burned is “waste” wood that would “decompose anyway”, and therefore net emissions do not increase when this material is burned for fuel. In fact, forest harvesting for biomass is increasing.

biomass industry is currently undergoing explosive growth, driven in part by the availability of the ITC reimbursement, but these new facilities must choose between receiving the PTC, or receiving the ITC as a one-time payment. Given that the ITC reimbursement can represent greater value to biomass plants than the 1.1¢/kWh PTC payment over time, it seems likely that most stand-alone biomass facilities will opt for the stimulus payment, if they can demonstrate that they have started construction activities within the eligibility period or have achieved the “safe harbor” provision of expending 5% of facility costs by the deadline. However, for coal plants planning to co-fire biomass, eligibility for the ITC is confined to plants burning closed-loop fuels, only. Given that very few closed-loop projects are underway, most coal plants will likely opt for the PTC.

Open loop biomass combustion power plants that have taken the ITC so far represent about \$102 million in expenditures (does not include biogas, liquid biofuels projects or bio-products plants):

Business	Property Location	Amount Approved
Blue Lake Power, LLC	California	\$5,378,717.00
San Juan Bioenergy, LLC	Colorado	\$296,977.00
Multitrade Telogia LLC	Florida	\$2,962,718.00
Multitrade Rabun Gap LLC	Georgia	\$8,503,434.00
L'Anse Warden Electric Company LLC	Michigan	\$11,690,566.00
Thompson River Power, LLC	Montana	\$6,465,081.00
Evergreen Community Power LLC	Pennsylvania	\$39,226,475.00
Rio Grande Valley Sugar Growers, Inc.	Texas	\$10,232,261.00
Simpson Tacoma Kraft Company, LLC	Washington	\$17,368,882.00

To project the future cost of these stimulus grants to the biomass industry, we evaluated development costs for 82 representative facilities and determined that each MW of capacity is *projected* to cost around \$3.25 million, meaning a typical 50 MW plant would be projected to cost around \$163 million (actual development costs are likely greater). One industry database¹⁰ estimates there are about 4,593 MW of new biomass power capacity currently in planning and permitting as free-standing plants (this does not include co-firing at coal plants). If all these power plants were built within the eligibility window, and all opted for the ITC at 30% of development costs, the projected obligation would be around \$4.48 billion (these are obviously not realistic assumptions, but they serve to put an outside bound on the cost estimate.)

¹⁰ RISI Wood bioenergy facilities database, accessed February, 2011.

Subsidies and tax credits for fuel collection and delivery

Unlike true renewable energy facilities where the “fuel” (sunlight, wind, and geothermal, hydro, and tidal energy) is free, biomass power requires intensive and costly fuel collection and transport. Indeed, the biomass industry appears to require ongoing support and subsidies for fuel collection and delivery. The main program supporting this has been the Biomass Crop Assistance Program (BCAP), which was defunded in the recent House version of the agricultural appropriations bill, and will next be scrutinized by the Senate.¹¹ One component of BCAP, which provides matching payments for biomass fuel delivery, costs millions of dollars per year. The following are some of the categories of expense:

A subset of BCAP expenditures FY 2009 and FY 2010¹²

Agriculture resources: \$251,788
 Herbaceous resources: \$215,038
 Federal woody resources: \$12,435,269
 Non-federal woody: \$190,530,908
 Orchard wood waste: \$15,015,889
 Pellets: \$5,367,939
 Sawdust: \$12,842,021
 Shavings: \$2,860,136

The program’s reimbursement rate of \$45/dry ton translates to about \$25/green ton at average moisture content for wood. This means that the total for the program of \$242,985,210 translates to delivery of about 9.7 million tons of material, which would fuel about 5.9 million MWh of electricity generation. The program cost thus works out to about 4.1¢/kWh.

Besides the federal BCAP program, there are also state programs that promote collection and transport of biomass fuel. For instance, Oregon provides a tax credit¹³ for biomass collection of \$10/ton for delivered woody biomass. The website explaining the Oregon program¹⁴ explains the dependency of biomass facilities on such support, a surprising conclusion for a state so rich in woody resources that supposedly has abundant sources of logging “waste” (emphasis added):

Using conventional combustion technology without cogeneration, the estimated cost to generate electricity from biomass ranges from 5.2 to 6.7 cents per kilowatt-hour in Oregon and the Pacific Northwest. Actual costs would vary depending on financing, location, system design and fuel cost. In contrast, the estimated cost of generating electricity from a new natural gas-fired, combined-cycle power plant is 2.8 cents per kilowatt-hour.

For biomass-fueled power plants, reliance on variable supplies of forest and agricultural residues means that **a continuous supply of fuel may be uncertain**. Generation of electric power requires large quantities of biomass. **Fuel transportation, storage and handling costs are a significant part of the costs of**

¹¹ The BCAP program was characterized as “worthless” by Collin Peterson (D-Minn), the former chair of the House Agricultural committee and an early supporter of BCAP (<http://biomassmagazine.com/articles/5576/bcap-reap-still-on-chopping-block-but-some-hope-remains>)

¹² https://www.fsa.usda.gov/Internet/FSA_File/bcap_chst_component_report.pdf

¹³ http://www.oregon.gov/DOR/PERTAX/2009_piti/credits_biomass.shtml

¹⁴ <http://www.oregon.gov/ENERGY/RENEW/Biomass/Cost.shtml>

biomass energy production. One strategy to deal with fuel supply uncertainty is to design the facility to handle multiple biomass fuel types. Future expansion of the biomass power market may require the development of a feedstock supply system based on large-scale production of biomass fuel from energy crops.

Federal stimulus money is also being used to support provision of biomass fuels. The summed project total from the first 12 pages of the website documenting biomass harvest projects¹⁵ is over \$12 million. Some are necessary projects for hazardous fuels reduction, but many appear to have collection of biomass fuels as the chief priority. Some projects highlight the need for ongoing financial support for the biomass industry. For instance, the documentation page¹⁶ for a \$800,000 Stimulus grant to the Oregon Department of Forestry states

To advance biomass utilization in Western Oregon it is apparent that new technology is needed to drive down the cost of collecting, grinding and delivering biomass hog fuel to generate electricity. **Currently biomass extraction costs exceed the value of the material for a variety of reasons.** For power producers such as Roseburg Forest Products to expand their power generating capacity, and thus expand biomass utilization, they need a long term cost effective supply of biomass fuel. The desired outcome for this project is to test new technology that **may help drive down the cost of recovering biomass fuel and make it economically viable to utilize biomass as a fuel for power generation in the future.** This will ultimately lead to the creation of long term sustainable jobs for rural counties in Western Oregon. Seventeen biomass units have been completed on a total of 1,746 acres (175% of target acres) collecting 27,165 green tons of biomass (91% of target).

From the figures provided, we can conclude that

- Average cost per ton of the material removed was about \$29/ton.
- The project goal is about 30,000 tons of biomass. At average plant efficiency, this wood would provide about 2 MW of electricity continuously for a year. It required logging almost 2,000 acres to do acquire this material.
- The project had to log more acres than anticipated to acquire the intended amount of biomass.

Some State Tax Credit Programs

There are several state tax credit programs that support biomass electricity production and fuel collection and processing. Some examples include:

- Arizona: Renewable Energy Production Tax Credit 1¢/kWh for 10 years; \$20m maximum¹⁷
- Iowa: Renewable Energy Production Tax Credit 1.5¢/kWh for ten years¹⁸
- Kansas: Renewable Energy Facility Tax Credit 10% of system's cost for the first \$50m invested; 5% of cost over \$50m¹⁹

¹⁵ <http://www.recovery.gov/espsearch/Pages/default.aspx?k=biomass>

¹⁶

<http://www.recovery.gov/Transparency/RecipientReportedData/Pages/RecipientProjectSummary508.aspx?AwardID SUR=67591&qtr=2011Q1>

¹⁷ http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=AZ48F&re=1&ee=0

¹⁸ http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=IA13F&re=1&ee=0

¹⁹ http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=KS21F&re=1&ee=0

- Oregon: Business Energy Tax Credit: 50% of certified project costs²⁰; an Oregon tax credit²¹ for biomass collection gives \$10/ton for woody biomass
- Maryland: Clean Energy Production Tax Credit²²: 0.85¢/kWh (0.5¢/kWh for co-fired electricity)
- Missouri: Wood Energy Tax Credit:²³ Grants individuals or businesses processing Missouri forestry industry residues into fuels an income tax credit of \$5.00 per ton of processed material (e.g., wood pellets). A multiplier of 4 applies to charcoal, based on the amount of Missouri forest industry residue required to produce one ton of charcoal

Renewable Energy Credits (RECs)

The final main category of financial support for biomass power is renewable energy credits (RECs), which are funded by ratepayers through their electric bills. A noted lack of transparency in the market makes REC prices difficult to determine. Prices for the compliance market are certainly higher than for the voluntary market, but some voluntary market prices for the Mid-Atlantic region are posted at <http://www.cleanyourair.org/costs.html>. Representative examples include:

DC's choices:

100% Pennsylvania Wind: 2.5¢/kWh
 100% Farm methane: 0.86¢/kWh
 100% “renewables” including biomass: 13.12¢/kWh

Pennsylvania's choices:

89% biomass, 10% wind, 1% solar: 15.4¢/kWh
 100% wind: 2.54¢/kWh

Assuming conservatively that a 50 MW plant were eligible for a relatively low REC rate of 2¢/kWh, this would represent about \$8.3 million in revenue per year. The new biomass generation capacity now in development, taking into account stand-alone plants and biomass co-firing at coal plants, will represent over a \$1 billion a year in renewable energy credits.

²⁰ http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=OR03F&re=1&ee=0

²¹ http://www.oregon.gov/DOR/PERTAX/2009_piti/credits_biomass.shtml

²² http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MD16F&re=1&ee=0

²³ http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MO02F&re=1&ee=0