UNIVERSITY OF CALIFORNIA, BERKELEY

BERKELEY • DAVIS • IRVINE • LOS ANGELES • MERCED • RIVERSIDE • SAN DIEGO • SAN FRANCISCO • SANTA BARBARA • SANTA CRUZ

Dept of Environmental Science, Policy, and Management
137 Mulford Hall #3114
Berkeley, CA 94720-3114
billstewart@berkeley.edu
(510) 643-3130

September 9, 2010

Environmental Protection Agency
Docket Center (EPA/DC)
Attn. Docket OAR-2010-0560
1200 Pennsylvania Ave., NW
Washington, DC 20460
Re: Call For Information: Information on Greenhouse Gas Emissions Associated with Bioenergy and Other Biogenic Sources; 75 Fed. Reg. 41173 (July 15, 2010);
Docket ID No. EPA-HQ-OAR-2010-0560

"EPA is publishing this Call for Information to solicit information and viewpoints from interested parties on approaches to accounting for greenhouse gas emissions from bioenergy and other biogenic sources."

To Whom It May Concern:

We appreciate the opportunity to provide information regarding approaches to accounting for greenhouse gas emissions from bioenergy and other biogenic sources by the EPA. Since California has decades of experience with bioenergy fueled with forest residues as well as experience with stringent air quality regulations, we think that we can provide some useful insights into the topics. There are three issues relating to biogenic energy generated from forest biomass that seem to underlie the perceived need to shift away from the global accounting system used in the IPCC methodology and by all the signatories of the Kyoto Protocol and towards a partial accounting system. A greater emphasis by the US EPA on small scale and near term time frames has been useful for the protection of public health at the local level within the United States but will push us backwards if applied to the generation of biogenic energy from forest biomass. Our suggestions on the three topics are:

1. Carbon neutrality – US forests meet both tests of carbon neutrality
2. Prevention of significant deterioration (PSD)
   - it must be at a global scale for GHGs
   - it must account for the no action alternative in the West – forest fire risk
3. Hypothetical 'carbon debt' ideas should not be mis-applied to the US – tropical deforestation versus sustainably managed temperate forests in US

Conceptual confusion over carbon neutrality for forest biomass in the US

Unlike the IPCC and the senior authors associated with it (e. g. Canadell, 2008), the EPA is claiming that a new approach for defining carbon neutrality with regard to energy generating plants within the US EPA jurisdiction is needed. The EPA correctly states that carbon neutrality of bioenergy is not a given in all cases. Fundamentally, the carbon neutrality of a biogenic feedstock system requires that the future carbon inventory be equal or larger than the current inventory. Replacing a coffee mug with a teacup – and claiming that you will refill the smaller teacup at some later date – is not carbon neutrality. Fortunately, the US EPA can easily access high quality data from the US Forest Service (e.g. Smith, 2009, various FIA databases) that documents that US forest carbon inventories are on an increasing trajectory. With regard to the forest carbon stocks, the United States is replacing a teacup with a coffee mug.

Conceptual confusion regarding the scale of application of relevant 'Prevention of Significant Deterioration' (PSD) standards for greenhouse gases

Unlike the localized public health issues associated with many of the air pollutants that the US EPA has historically addressed at the local air shed or air district level, the emission of greenhouse gases from energy production needs to be addressed at a national and global scale. As you well know, California has been very successful in pushing

energy-related particulate emissions away from population centers and thereby generating huge improvements in public health. From global GHG perspective, however, importing coal-fired electricity generated in neighboring states (California Energy Commission, 2009) has absolutely no impact on global emissions. From an economic perspective, it probably increases emissions because consumers can purchase more of the cheaper out-of-state generated electricity than the more expensive in-state generated electricity. The suggestion floated by the EPA of the need to consider 'small scale' impacts in addressing the carbon neutrality of bioenergy may be counter-productive with respect to a global pollutant. With regard to PSD, it needs to be applied at a global level rather than at the local level where imports and exports will obviate any initial regulatory intervention. This is why the Europeans have supported the increased use of forest residues to reduce their historic dependence on coal.

Conceptual confusion of applying the 'carbon debt ' concept to the US

The docket puts considerable weight on a consulting report, the Manomet study, that ties its analysis of hypothetical energy plantations in New England to a concern that a huge carbon debt, quoting Fargione, Hill et al. (2008), will be created in the short term. However, the 2009 GHG Inventory (U.S. Environmental Protection Agency, 2009) provides the details and descriptions of the actual use where forest residues, rather than tropical forests in Indonesia or Brazil (the focus of the Fargione paper), are the feedstock for the current US system. As a careful reading of the abstract or the full 4 page article will quickly show, the Manomet consultants seemed to have applied exactly the opposite point that the authors made in their article in Science. A more detailed explanation, excerpts from the abstract, and the full abstract follow.

Additional details and data on the three themes.

Global accounting of temperate forest and forest products

It has been well documented in the scientific literature that the carbon neutrality of biomass-based energy is not assured without a basic condition being met – the base terrestrial carbon inventories must be stable or increasing. While this condition is rarely measured in the tropical countries that are the common topic of cautionary tales (Fargione et al., 2008), forest inventories are accurately measured in the United States as well as our major source of wood imports – Canada (Natural Resources Canada, 2008). The US data is well summarized by the USFS in the GHG Inventory (U.S. Environmental Protection Agency, 2009) and should be the basis of any EPA discussion on this topic. The United States, like Europe, has a net growth to harvest and mortality ratio of around 1.6 (Smith, 2009). While reducing US harvests may produce local increases in inventories, the long-term evidence is that US consumer demand will simply be met with greater imports – resulting in no change in global terrestrial forest carbon inventories. It is quite easy to check international trade data on wood products to confirm the fact that the international trade among developed countries with temperate forests is active and efficient (Food and Agriculture Organization, 2010). However, it appears that under this information seeking effort, the US EPA is considering dropping the international standards used to define carbon neutrality and considering a host of partial accounting methods that have more to do with local land use issues than with global concentrations of long lasting greenhouse gases.

Nearly all of the renewable energy currently produced from forest biomass in the United States is a complementary product of the sustainable management of forestlands to produce higher value products that also have significant climate benefits via substitution for alternative energy-intensive products (Ryan, 2010; Skog, 2008). Most of the forest residue based bioenergy generated in the US is used for industrial heat but an increasing percentage is used for electricity generation. The same situation is true in Europe where the increased utilization of forest residues is a main pillar of their strategy to reduce the coal-intensive nature of their historic energy supply system (Commission of the European Communities, 2007; European Environment Agency (EEA), 2006; Luxmore, 2008). The US EPA could gain insights into this issue by referring to the wealth of official documents listed above as well as from many of the scientific articles that have been produced by researchers from countries that have ratified the Kyoto Protocol (Canadell, 2008; Janssens et al., 2003; Lindner, 2008; Nabuurs et al., 2010).

PSD requires considering what often happens to forest biomass waste if it is not used to generate energy to replace some of the coal-fired electricity of the national grid

In California we have many wood fired energy plants that have produced energy to replace coal and natural gas based energy sources. The two primary sources of feedstock have been low-grade chips (sometimes referred to as hogfuel) produced in sawmills and logging or fuels treatment residues brought in from the forests. The US EPA could try to regulate every kilogram of biomass that may release greenhouse gases by burning or decomposing, but it is very unclear how that would be accomplished across the vast areas of public and private forests in the United States. Here in

California, we have a situation where federal forest lands have higher forest inventories and considerably higher risks of catastrophic crown fires than private forestlands (Christensen, 2008). When those forests do burn, they produce huge quantities of greenhouse gas emissions – carbon dioxide and methane. When fire risk reduction actions are undertaken, the removed fuels is often purchased by energy plants and used to generate electricity that can replace some of California's prodigious import of coal-fired electricity from neighboring states.

Improvements could clearly be made in terms of capturing some of the forest biomass and using it for renewable energy – rather than having it release GHG in the forest, but the current proposal has no references to the extensive information that exists on these topics. A review of relevant US Forest Service publications and research reports (Ince et al., 2008; Skog, 2008) would provide a firmer basis for future decision making by the EPA.

Across the Western United States, there is also considerable concern about the high risks of well stocked forests being consumed in wildfires given that the current array of surface fuels and ladder fuels is well suited to propagate large fires. It has been demonstrated that these risks, and the resulting avoidable emissions of greenhouse gases, could be substantially reduced with well planned and implemented fuels reduction projects that would produce large volumes of biomass unsuitable for lumber but well suited for renewable energy generation (Barbour, 2008; Becker, 2009; Daugherty and Fried, 2007). The application of new EPA information requirements and regulatory hurdles based on the clear misinterpretation of a scientific paper (Fargione, Hill et al. 2008) in a consulting report would seem to be moving away from solutions rather than towards them.

<u>More details on the problems with applying a tropical deforestation 'carbon debt' problem to sustainably managed temperate forests in the United States</u>

A fundamental source of confusion behind the current request for additional information by the US EPA appears to trace back to the consulting report done in Massachusetts – the Manomet 2010 consultants report. It translates arguments over protecting what is perceived to be local open space (albeit temporary given the rates of residential conversion) in residential areas into global suggestions for applying partial accounting methods (short term, local) rather than unbiased national accounting methods.

In particular, the Manomet consultants report makes a great deal over the 'carbon debt' concept of Fargione, Hill et al. (2008). Unfortunately, they chose to apply the potential situation of an energy plantation replacing a tropical forest rather than what actually happens in US forests as the basis for a new set of US EPA regulations. However, the final sentence in the Fargione abstract, "In contrast, biofuels made from waste biomass or from biomass grown on degraded and abandoned agricultural lands planted with perennials incur little or no carbon debt and can offer immediate and sustained GHG advantages." (Fargione et al., 2008) is a far better description of the current status of energy produced from forest residues than implied by the EPA information request.

In Massachusetts, the only deforestation occurring is where forest management <u>does not</u> occur, where new homes and estates permanently replace the forests. A 2006 article published by researchers from Harvard Forest and the University of Massachusetts found that "there is a strong negative correlation ($r = -0.89$) between the proportion of forest lost to land-use conversion and the proportion of forest harvested." (McDonald, 2006). In plain English, they found that around 1% of forest area is altered per year in most regions of Massachusetts, but that while the sustainably managed and harvested forests regrow with trees, the converted areas regrow with buildings.

The US EPA should not try to tailor national policy to address a land use dispute in Massachusetts where they want to keep bucolic forest areas free of harvesting and processing so that future subdivisions can occur. The accounting methodologies floated by the US EPA (e.g. special 'small scale' and 'payback time' analyses) for comment are essentially <u>partial accounting methods</u> guaranteed to produce results that will be incorrect when applied to global pollutants with effective lifespans that are measured in centuries rather than years. Such approaches may have been useful when dealing with the location of coal fired power plant near cities with a lifespan that can be measured in decades – but not for greenhouse gases.

<u>Conclusion</u>

In summary, the US EPA utilized the data and science necessary to address the issue of carbon neutrality of woody biomass in the 2009 GHG inventory that they published after coordinating with many other federal agencies and researchers. The suggestions that the US EPA should now switch to partial accounting methodologies utilizing arbitrarily short time frames and localized spatial regions of analysis for long-lived greenhouse gas concentrations that are spread globally would appear flawed. It is an approach that had large public health benefits when it was used by the

US EPA and other agencies to move smokestacks away from large population centers, but is fundamentally flawed when applied to the well-documented status of the sustainability and carbon neutrality of forest based woody biomass utilization in the United States.

References

Barbour RJ, Jeremy S. Fried, Peter J. Daugherty, Glenn Christensen, Roger Fight. Potential biomass and logs from fire-hazard-reduction treatments in Southwest Oregon and Northern California. Forest Policy and Economics (2008) 10:400-407.

Becker DR, Debra Larson, Eini C. Lowell. Financial considerations of policy options to enhance biomass utilization for reducing wildfire hazards. Forest Policy & Economics (2009).

California Energy Commission. 2009 Integrated Energy Policy Report, Final Commission Report, December 2009, CEC -100-2009-003-CMF. (2009).

Canadell JG, and Michael R. Raupach. Managing Forests for Climate Change Mitigation. Science (2008) 320:1456-1457.

Christensen G, J. Fried, J. and S. Campbell (tech. eds.) California's Forest Resources, 2001-2005: five-year Forest Inventory and Analysis report. (2008) Portland, OR: U.S. Forest Service, Pacific Northwest Research Station.

Commission of the European Communities. Renewable Energy Road Map - Renewable energies in the 21st century: building a more sustainable future. (2007).

Daugherty PJ, Fried JS. Jointly Optimizing Selection of Fuel Treatments and Siting of Forest Biomass-Based Energy Production Facilities for Landscape-Scale Fire Hazard Reduction. INFOR (2007) 45:17-30.

European Environment Agency (EEA). How much bioenergy can Europe produce without harming the environment? (2006).

Fargione J, Hill J, Tilman D, Polasky S, Hawthorne P. Land clearing and the biofuel carbon debt. Science (Washington) (2008) 319:1235-1238.

Food and Agriculture Organization. FAOSTAT, Forestry Trade Flows (2010) http://faostat.fao.org/site/630/default.aspx 2010) (Type of Medium).

Ince PJ, Spelter H, Skog KE, Kramp A, Dykstra DP. Market impacts of hypothetical fuel treatment thinning programs on federal lands in the western United States. Forest Policy and Economics (2008) 10:363-372.

Janssens IA, et al. Europe's terrestrial biosphere absorbs 7 to 12% of European anthropogenic CO2 emissions. Science (2003) 300:1538-1542.

Lindner M, Tim Green, C. W.Woodall, C. H. Perry, G. J. Nabuurs, M. J. Sanz Impacts of forest ecosystem management on greenhouse gas budgets. Forest Ecology and Management (2008) 256:191-193.

Luxmore C. Bioenergy in Europe Implementation of EU Directives and Policies relating to Bioenergy in Europe and RD&D Priorities for the Future. In: VTT Tiedotteita Research Notes 2441 (2008) Finland: Espoo. 59

McDonald RI, Glenn, Motzkin, Michael S. Bank, David B. Kittredge, John Burk, David R. Foster. Forest harvesting and land-use conversion over two decades in Massachusetts. Forest Ecology and Management (2006) 117:31-41.

Nabuurs GJ, Hengeveld GM, van der Werf DC, Heidema AH. European forest carbon balance assessed with inventory based methods--An introduction to a special section. Forest Ecology and Management (2010) In Press, Corrected Proof.

Natural Resources Canada. The State of Canada's Forests: Annual Report 2008 (2008).

Ryan MGH, Mark E.; Birdsey, Richard A.; Giardina, Christian P.; Heath, Linda S.; Houghton, Richard A.; Jackson, Robert B.; McKinley, Duncan C.; Morrison, James F.; Murray, Brian C.; Pataki, Diane E.; Skog, Kenneth E. A synthesis of the science on forests and carbon for U.S. Forests. Issues In Ecology (2010) 13:1-16.

Skog KE. Sequestration of carbon in harvested wood products for the United States. Forest Products Journal (2008) 58:56-72.

Skog KEI, Peter J.; Spelter, Henry; Kramp, Andi; Barbour, R. James. Woody biomass supply from thinnings to reduce fire hazard in the U.S. West and its potential impact on regional wood markets. Presented at the Woody biomass utilization : challenges and opportunities, June 26, 2006 (2008) Madison, WI.

Smith WB, tech. coord; Miles, Patrick D., data coord.; Perry Charles H., map coord,; Pugh, Scott A. Data CD coord. Forest Resources of the United States, 2007 (2009) Washington, DC: U.S. Department of Agriculture, Forest Service, Washington Office. 336.

U.S. Environmental Protection Agency. Inventory of U. S. Greenhouse Gas Emissions and Sinks: 1990 – 2007. In: Catalogue No. EPA 430-R-09-004 (2009).

Sincerely,

William Stewart
UC Forestry Specialist

Gary Nakamura
UC Forestry Specialist

Abstract from Fargione, Hill et al (2008) article

Land Clearing and the Biofuel Carbon Debt

Joseph Fargione,[1] Jason Hill,[2,3] David Tilman,[2]* Stephen Polasky,[2,3] Peter Hawthorne[2]

Increasing energy use, climate change, and carbon dioxide (CO_2) emissions from fossil fuels make switching to low-carbon fuels a high priority. Biofuels are a potential low-carbon energy source, but whether biofuels offer carbon savings depends on how they are produced. Converting rainforests, peatlands, savannas, or grasslands to produce food crop–based biofuels in Brazil, Southeast Asia, and the United States creates a "biofuel carbon debt" by releasing 17 to 420 times more CO_2 than the annual greenhouse gas (GHG) reductions that these biofuels would provide by displacing fossil fuels. In contrast, biofuels made from waste biomass or from biomass grown on degraded and abandoned agricultural lands planted with perennials incur little or no carbon debt and can offer immediate and sustained GHG advantages.