

**Summary Minutes of the
U.S. Environmental Protection Agency
Science Advisory Board
Biogenic Carbon Emissions Panel
Public Meeting
950 New Hampshire Ave., NW, Washington, DC 20052
March 25 – 26, 2015**

Biogenic Carbon Emissions

Panel Members:

Dr. Madhu Khanna, Chair
Dr. Robert Abt
Dr. Morton Barlaz
Dr. Marilyn Buford (by phone)
Dr. Mark Harmon
Dr. Jason Hill
Dr. John Reilly
Dr. Steven Rose
Dr. Daniel Schrag
Dr. Roger Sedjo
Dr. Ken Skog
Dr. Tristram West
Dr. Peter Woodbury

Purpose: The Science Advisory Board (SAB) Biogenic Carbon Emissions Panel discussed responses to charge questions on EPA's draft report *Framework for Assessing Biogenic CO₂ Emissions from Stationary Sources (November 2014)*.

Designated Federal Officer: Dr. Holly Stallworth, Designated Federal Officer

Other EPA Staff: Sara Ohrel, Paul Gunning, Allen Fawcett, Jefferson Cole, Tom Armitage, Stephanie Sanzone, Tom Brennan, Tom Carpenter, Lauren Rafelski, John Steller, Jessica Brooks, Chris Zarba

Attendees who signed in at the meeting: Stan Lancey (American Forest & Paper Association), Bridgette Bobick (Society of American Foresters), Linda Tsaing (American Forest & Paper Association), Justin Baker (RTI), Ryan Callihan (RTI), Kate Shenk (BIO), Carrie Annand (Biomass Power Association), Bill Hohenstein (USDA), Stephanie Batchelor (BIO), David Garman (DGS), Mike Jostrum (Plum Creek), Jen Jenkins (AGS), Scott Deton (AGS), David Williamson (Biogenic CO₂ Coalition), Molly Curmus (Biogenic CO₂ Coalition), Dawn Reeves (Inside EPA), Alejandra Nunez (Sierra Club), William Murray (National Alliance of Forest Owners), Alli Weeler (Clean Air Task Force)

Webcast Attendance (as reported to the DFO): Robert Larson (EPA), Alan Page (Green Diamond Systems), Brent Keith (National Association of State Foresters), Chuck Hersey (Washington State

Department of Natural Resources), Peter Nagelhout (EPA), Chip Murray (National Alliance of Forest Owners)

Meeting Materials and Meeting Webpage:

The materials listed below may be found on the meeting webpage at:

<http://yosemite.epa.gov/sab/sabproduct.nsf/a84bfee16cc358ad85256ccd006b0b4b/ae8b4aa7598f554485257de3006bc2bc!OpenDocument&Date=2015-03-25>

- Agenda
- Federal Register Notice
- Agency Charge
- List of public speakers
- *Framework for Assessing Biogenic CO₂ Emissions from Stationary Sources (November 2014).*
- Office of Air and Radiation's February 2015 *Response to SAB Peer Review Advisory of the Draft Accounting Framework for Biogenic CO₂ Emissions from Stationary Sources, 9/28/2012*
- EPA Presentation to the Biogenic Carbon Emissions Panel, March 25, 2015
- Preliminary Individual Comments from the Panel
- Public Comments (written):
 - Biogenic CO₂ Coalition Statement by Max Williamson, March 25, 2015
 - Dupont Industrial Biosciences presentation by Nancy Clark
 - National Council for Air and Stream Improvement (NCASI) presentation submitted by Caroline Gaudreault and Reid Miner
 - William Moomaw oral comments
 - Biomass Power Association comments submitted by Robert Cleaves and slide for March 25, 2015 presentation
 - Biotechnology Industry Association comments submitted by Kate Shenk
 - Center for Biological Diversity comments submitted by Kevin Bundy
 - Clean Air Task Force (CATF) comments submitted by Jonathan Lewis
 - Composite Panel Association comments submitted by Donald Bisson
 - Covanta comments submitted by Michael E. Van Brunt
 - Environmental Defense Fund comments submitted by Ruben Lubowski
 - Green Power Institute comments submitted by Gregg Morris
 - National Alliance of Forest Owners comments submitted by David Tenny
 - Natural Resources Defense Council (NRDC) comments submitted by Sasha Stashwick and Sami Yassa (also on behalf of the Southern Environmental Law Center and Dogwood Alliance)
 - Partnership for Policy Integrity comments submitted by Mary Booth

Meeting Summary

The discussion followed the plan presented in the meeting agenda.

WEDNESDAY, MARCH 25, 2015

Dr. Stallworth convened the meeting and explained that the Science Advisory Board operates under the Federal Advisory Committee Act. She noted that all members of the Panel were in compliance with ethics rules that apply to them. Dr. Madhu Khanna welcomed the public and panel and thanked EPA for hosting the meeting and responding to the Panel's advice from 2012. Mr. Paul Gunning, Division Director in EPA's Climate Change Division also thanked everyone and said that biomass energy was an important issue. Ms. Sara Ohrel and Dr. Allen Fawcett then presented EPA's slides posted at the meeting webpage.

Dr. Khanna noted that the Panel's responses to the charge questions could be better answered if a policy context were provided because answers would differ depending on the policy, e.g. policies that affect scale, targets and the mix of feedstocks. Dr. Fawcett said EPA was not contemplating a particular policy as a potential application of the Framework. Dr. Woodbury commented that the Panel could not evaluate the scientific basis of the Framework without a specific policy context. Dr. Reilly noted the difference between Dr. Fawcett's comments and the November 2014 memo from Acting Assistant Administrator Janet McCabe. In response to a question from a panelist, Dr. Fawcett said EPA was trying to make biogenic carbon accounting parallel to fossil fuel accounting thus the L term did not include emissions from transportation. Dr. Sedjo questioned whether we really needed to focus on stationary source emissions of biogenic carbon given the broad contribution of forests to carbon sequestration. Panelists again voiced discontent with the policy-neutrality of the Framework, saying it was important to know how the Framework would be implemented. Dr. Rose noted, in particular, that implementation would have a bearing on the scientific questions and that the Framework provided too many options as if they were all valid. Dr. Khanna asked about a figure in Appendix K that showed carbon intensity (tCO₂ emissions/t biomass utilized) converging even when biomass demand varied significantly between scenarios. In response, Ms. Ohrel cited the reasons for declining emissions intensity: shifts in feedstock composition, declining market effects of initial demand shocks, etc.

Public Comments

Mr. Paul Noe, on behalf of the American Forest and Paper Association and the American Wood Council, said the forest products industry is the largest producer and user of bioenergy of any industrial sector and that, on average, about 2/3 of the energy used by the industry comes from biomass, primarily residuals that are generated during the manufacturing process. Mr. Noe said a reference point approach would provide a straightforward and transparent way to assess whether there are any atmospheric impacts from the use of bioenergy. Mr. Noe voiced support for using the Forest Inventory and Analysis (FIA) data.

Mr. Robert Cleaves, on behalf of the Biomass Power Association (BPA), said BPA represents grid-based biomass electricity producers across the country. Mr. Cleaves said his industry uses waste materials that would otherwise be landfilled, openly burned or decomposed and that his industry represents "biofuels done right." Mr. Cleaves projected a slide showing that electricity producers only use low-value biomass, priced at \$15 – 35/ton whereas more valuable wood like merchantable pulpwood and sawlogs commanded a higher price and thus would not be economic for electricity production. Mr. Cleaves said use of these materials does not result in land use change or indirect impacts ("leakage"). In response to questions from panelists, Mr. Cleaves

explained that the biomass power industry would not be able to take advantage of declining demand for pulpwood in the future because of the lack of power purchase agreements.

Mr. David Doniger, on behalf of the Natural Resources Defense Council (NRDC), addressed the use of the Framework in the context of the Clean Power Plan (CPP) and the Prevention of Significant Deterioration (PSD) program. Mr. Doniger voiced concern that EPA had not even mentioned the PSD permitting process in the revised Framework, the policy for which the Framework was conceived. Mr. Doniger also noted the revised Framework was descriptive, not directive. Mr. Doniger was particularly concerned about the “sustainability” exemption in the November 2014 McCabe memo, noting that “sustainability” is not a proxy for carbon accounting. Mr. Doniger urged the Panel to recommend a framework that accurately differentiates among forest-derived fuels, incorporates the impact of diameter, assesses additionality and incorporates short time frames.

Dr. Ruben Lubowski, on behalf of the Environmental Defense Fund, suggested a shifting baseline approach to anticipated future modeling. Dr. Lubowski cited the Buchholz study in *Nature Climate Change* (2014) which concluded that timber projections never outperformed a flat baseline. Dr. Lubowski said a shifting historical baseline approach deals with additionality and it can be revisited over time, adjusting the baseline either upwards or downwards. In response to questions from panelists, Dr. Lubowski said a facility would be locked into the BAF determined at the time of application and that revised BAFs would apply only to new applications as they came in. Echoing Dr. Lubowski’s focus on uncertainty, a panelist noted that the impact of climate change on forest was wildly uncertain.

Dr. William Moomaw of Tufts University, on behalf of himself, said that replacing fossil fuels with woody biomass, if not done right, can add substantially to carbon emissions. Dr. Moomaw said net emissions can be 50% greater than coal per Mwh because of efficiency losses. Burning a tree takes a matter of minutes while it takes 30 - 100 years to grow a replacement tree that absorbs carbon dioxide equal to what was released. The woodchips and pellets the US is shipping to the UK are burned in power plants and counted as zero carbon but, according to the accounting of the Intergovernmental Panel on Climate Change (IPCC), they must be reported as emissions from the US as land use changes. They may not be ignored. Dr. Moomaw cited Massachusetts’ consideration of efficiency losses with its stipulation that Renewable Energy Credits are granted only if at least half the heat energy from a woody biomass is utilized.

Mr. Dave Tenny, on behalf of the National Alliance of Forest Owners (NAFO), said he thought it was appropriate for EPA to broaden their approach. Mr. Tenny cautioned against the use of an anticipated future baseline approach because of its uncertainty and noted that just 5 years ago, the outlook for biomass energy was radically different. Mr. Tenny cited the “four science fundamentals” that a group of more than 100 scientists recommended, namely that: the carbon benefits of sustainable forest biomass energy were well established; measuring carbon benefits must consider cumulative carbon emissions over the long run; consistent timeframes must be used to accurately compare forest biomass energy with other energy sources and economic factors will influence the carbon impacts of forest biomass energy. Mr. Tenny advocated a reference point baseline but one panelist noted that the anticipated future baseline approach did not depend upon

an accurate representation of a Business As Usual (BAU) scenario but rather the difference (delta) between the BAU forecast and the projection with perturbations.

Mr. Adam Macon, on behalf of the Dogwood Alliance, described the export of wood pellets from the southeastern U.S. and the effect it was having on forests and nearby homeowners who were concerned about wood dust. Mr. Macon said the southern U.S. was losing forest cover at a rate 4 times that of Brazil. Mr. Macon condemned the outdated notion of “sustainability” implied in the Nov. 2014 McCabe memo because forests are homes to plants and animals, while providing protection from storm surges and purification for drinking water. Mr. Macon urged a shorter time frame to truly address the threat of climate change.

Mr. Dusty Horwitt, on behalf of the Partnership for Policy Integrity, criticized EPA for retaining the reference point baseline approach in the revised Framework. He also criticized the FASOM assumption of anticipatory planting as excessively optimistic and unrealistic. Mr. Horwitt said FASOM underestimates biomass emissions by subtracting “avoided” coal emissions thus utilizing an assumption that all biomass energy will be used at a co-fired coal plant. Panelists challenged Mr. Horwitt’s contention that FASOM does not take into account domestic leakage because of price effects. One panelist also voiced skepticism that FASOM subtracted avoided coal emissions.

Ms. Nancy Clark, on behalf of Dupont, described a second generation cellulosic ethanol facility in Iowa that is over 90% complete and plans to use corn stover from local farmers. Panelists raised the issue of effects on soil carbon if too much stover is removed from the fields and whether Dupont’s use of corn stover would be kept within those ecological limits.

Dr. Timothy Searchinger of Princeton University, on behalf of himself, said that potential quantities of biomass from forests that may be demanded for bioenergy if it is treated favorably from a regulatory standpoint are very large. Dr. Searchinger cited the practice of the IPCC to immediately count terrestrial carbon losses from trees once they are cut. Dr. Searchinger criticized the anticipatory planting assumption in EPA’s modeling and the purely regional nature of EPA’s analysis which overlooked the possible impact on pulpwood being imported from abroad. Dr. Khanna noted the significant potential to produce biomass from agricultural sources. Dr. Sedjo acknowledged that there was a potential for pulpwood diversion as the demand for biomass increases and that there was already a little bit of that in the southern U.S. right now. Dr. Searchinger suggested the Panel should ask EPA for the ten most important functions and elasticities used in the model and the empirical studies on which they are based.

Mr. Max Williamson, on behalf of the Biogenic CO₂ Coalition, said the following trade associations were represented by the Coalition: American Bakers Association, American Farm Bureau Federation, Corn Refiners Association, National Cotton Council, National Cottonseed Products Association and the National Oilseed Processor Association. Mr. Williamson said the Coalition’s focus was on the combustion, fermentation and wastewater treatment of biomaterials derived from herbaceous crops such as corn, wheat and other grains. Mr. Williams said the carbon flows from the crop-based feedstocks his industries represent meet the carbon neutrality criterion and should be recognized as carbon neutral or de minimis. Mr. Williamson cited a research report from Michigan State University showing that biomass processing by the corn wet milling and dry milling industries, stover combustion and wastewater treatment all slightly reduce atmospheric

carbon dioxide levels as driven by no till or low till agricultural practices. Mr. Williamson said 30 years was an appropriate time scale for the industries he represents because that coincides with the life assumed for a capital investment.

Mr. Michael Van Brunt on behalf of Covanta and the Energy Recovery Council, said waste-to-energy facilities convert 30 million tons of municipal solid waste to energy across the country every year. Mr. Van Brunt supported the alternative fate approach for waste-derived feedstocks and the inclusion of methane alongside CO₂ in EPA's analysis. The inclusion of methane is important, he said, both for the completeness and accuracy of the carbon balance and its significant role in climate change. However, Mr. Van Brunt urged EPA to use the latest available science from the IPCC's 5th Assessment Report with regard to methane's global warming potential (GWP), a 100-year GWP of 34 and a 20-year GWP of 84, inclusive of carbon-climate feedbacks. Mr. Van Brunt also said Appendix N on waste feedstocks should incorporate the agency's recently developed default landfill gas collection efficiencies already incorporated into two of the agency's models, instead of the outdated figures currently referenced.

Dr. Caroline Gaudreault, on behalf of the National Council for Air and Stream Improvement, said that it is important that policies focused on near term emissions of GHGs not result in higher emissions of CO₂ in the long term and that the assessment horizon should extend long enough to capture landowners' investment response. Dr. Gaudreault advocated a time horizon that is consistent with that used to judge the warming impact of GHGs. In addressing charge question 2, Dr. Gaudreault said co-products in the forest industry should be modelled together because they are highly interconnected and policies that affect one part of it are likely to have ripple effects.

After lunch, Dr. Khanna asked the Panel to step back and identify other issues people think should be discussed. Panelists again voiced concern about EPA's policy-neutral Framework and the difficulty of responding to charge questions in the absence of a policy context. Dr. Khanna said when you start putting values in for things like the GROW variables, it depends on the mix of feedstocks and other things that are policy-dependent and many of the answers will depend on policy goals. One panelist challenged Dr. Fawcett by citing the McCabe memo (Nov. 2014) that said the Framework was meant to be interpreted in the context of the Clean Power Plan and the Prevention of Significant Deterioration (PSD) programs but Dr. Fawcett said the Framework would not be ready in time to facilitate CPP implementation.

Question 1a

Drs. Schrag and Skog discussed their responses to charge question 1a which asked about different temporal scales and the tradeoffs in choosing between them. Dr. Schrag mentioned the effects of CO₂ fertilization on forest growth rates and the huge uncertainty associated with future forecasting given ecological and economic uncertainty. He said he didn't want people clear cutting forests and planting an energy crop without paying for the carbon debt created. Dr. Schrag suggested that time scales could come out of the land itself, depending on the amount of time needed to replace the carbon that was removed and this could range from 20 years in Georgia to 50 years in New England. "Pay-as-you-go" was discussed as a way to avoid creating large carbon debts that are not paid back. Panelists returned to the issue of time scales and the suggestion was made that the Framework should adopt EPA's 100-year radiative forcing (RF) time scale consistent with EPA's inventory of greenhouse gases and sinks. Dr. Schrag against suggested different landscapes would

have different relevant time scales and the appropriate time scale is until the carbon debt is repaid. Dr. Khanna suggested the “pay-as-you-go” concept could be incorporated into an annual BAF.

Dr. Ken Skog presented an example calculation (posted on the meeting webpage) of net RF over 100 years – in CO₂ equivalent – starting with a 1 ton CO₂ emission from burning logging slash. For a logging residue decay rate of .0347, for example, the net radiative forcing after deducting for the avoided radiative forcing from avoided logging residue decay is 0.30 t CO₂ equivalent – where avoided decay is tracked out 100 years. This result means the net radiative forcing (over 100 years) is the same as if 0.30 t CO₂ had been emitted in the first year. For the case of forest thinnings, Dr. Skog’s calculations take into account the difference in forest regrowth over time between a forest thinning and no thinning cases. Dr. Skog said his RF estimates account for the presence of CO₂ in the atmosphere every year. He indicated this net CO₂ equivalent could be an alternate way to compute BAF. Dr. Skog said his RF calculation explicitly addresses the concern about the time scale for considering the land carbon change by taking CO₂ effects into account every year.

Before moving on to Charge Question 1b, Dr. Stallworth announced that Ms. Ann Weeks of the Clean Air Task Force would be allowed to present her comments since she was unable to attend the meeting earlier that day. Ms. Weeks pointed out the discrepancy between EPA’s instructions to the Panel and its Existing Source Performance Standards (ESPS) which established emissions targets for states to meet by 2030. In the ESPS plan, EPA assumed all biogenic feedstocks were carbon neutral which, according to Ms. Weeks, contradicted EPA’s instructions to the Panel and the Framework itself. Ms. Weeks also expressed a concern about the McCabe memo (Nov. 2014) which spoke, ambiguously, about “sustainably-derived forest feedstocks.”

Question 1b

Charge Question 1b asked whether the emissions horizon and the policy horizon should be the same. Dr. Rose said that one would want to go far enough to capture all net emissions effects with social implications and the horizon should be defined by the feedstock with the longest future effects. One possible way to define the time horizon would be to seek an equilibrium where net carbon fluxes were stabilized. Dr. Khanna noted there had been three different views expressed for how the temporal scale could be set: (1) by the amount of time it takes to pay off the carbon debt; (2) by radiative forcing; and (3) by the amount of time it takes to reach an equilibrium of the flux. In general, she noted, the horizon should be based on physical factors and not by the time horizons of particular policies.

THURSDAY, MARCH 26, 2015

Dr. Woodbury began the discussion by suggesting a general principle for EPA: namely that long term phenomena should not be ignored. Dr. Woodbury thought the Panel could be useful if it focused on general principles.

Question 1c

Charge Question 1c asked whether the biogenic assessment factor (BAF) should include all future fluxes into one number (cumulative) or whether it should be set year-to-year based on current and past biomass usage. Dr. West said a one-time cumulative BAF would coincide with the general

purpose of comparing biogenic to fossil fuel emissions. Dr. West voiced concern about the implementation difficulties of a pay-as-you-go marginal BAF accounting because of the need to track parcels of land in a geospatial manner, possibly with remote sensing. In trying to clarify the difference between “marginal” and “cumulative”, Dr. Rose pointed out that the Framework conflates “annual” with “marginal” when, in fact, the term “marginal” should really refer to the incremental demand for biomass compared to an Annual Energy Outlook (AEO) reference case. Dr. Rice voiced support for regional BAFs calculated on an annual basis or in short time blocks (such as 5 year increments to promote stability and certainty). He thought periodic revisions based on regional analyses of net emissions would encourage sustainable resource management. Dr. Rice said a 5-year rolling average BAF would be consistent with the 5-year contracts in Iowa and Kansas for removal of residue from annual cropland. Panelists discussed the possibility of an insurance reserve to account for biophysical uncertainty and economic uncertainty. Dr. Abt distinguished between a stand-level BAF and a regional BAF. Dr. Woodbury said he was hearing some agreement that BAFs, in general, cannot be calculated on a facility basis and wondered whether that should be offered as a general principle.

Question 1d

Charge Question 1d asked what considerations would be useful when evaluating a future anticipated baseline application on a retrospective basis. Dr. Skog said he would first recast the BAF values in Appendix L tables as equivalent in RF. To evaluate an anticipated baseline retrospectively, you would have historical data on macroeconomic drivers and actual trajectories of feedstocks. You would be able to correct the baseline for the alternative feedstocks as well rather than just perturbing one feedstock going forward into the future. Dr. Skog said the best possible BAF would be one that could be made after 50 years had passed. Dr. Khanna suggested the Panel could agree that it is important to evaluate performance every 5 years but the implications of new data for the next 5 years might not be straightforward. Dr. Khanna said the 5 year update related to EDF’s recommendation to have a moving baseline.

Dr. Harmon expressed concerns that the AVOIDEMIT term was violating conservation of mass. He said a simpler approach would be to account for the net change in live stores, net change in dead stores, net change in soil stores, net change in product stores and net change in waste stores. Dr. Reilly suggested recasting the Framework to use an integral that sums the net change in various carbon stocks as listed by Dr. Harmon. Dr. Fawcett explained that the BAF equation does not need a substitution term to represent avoided fossil fuel emissions and that a BAF equal to 1 means biogenic fuels are treated the same as fossil fuels. A BAF > 1 means biogenic emissions are worse than fossil fuels. In response to Dr. Harmon’s concern that the BAF equation was violating the conservation of mass, Dr. Fawcett said to look at a detailed explanation in Appendix F of how mass balances are tracked in the LOSS and PROD terms. Ms. Ohrel said the live feedstock pool and all the pools were identified in the Framework. Dr. Rose said the question was whether the overall aggregate representation in FASOM was valid for thinking about carbon effects and Dr. Khanna pointed out the GROW term includes domestic leakage in FASOM. With respect to system boundaries, Dr. Rose pointed out the regional approach should capture most market effects. Dr. Rose pointed out that the Framework is targeting the difference between the increased demand future and the baseline.

Questions 2a-c

Questions 2a – c asked about the appropriate scales of biogenic feedstock demand changes: specifically whether the “shock” should reflect a small incremental increase or a large increase; what the general increment of the shock should be; and whether the shock should be evaluated in comparison to a BAU projection or should it reflect the marginal impact of the last ton.

Following on the previous discussion on system boundaries, Dr. Abt said the questions of temporal and spatial scale are not independent and that spatial scale could be defined with a statistical or data-drive approach in which the appropriate scale is one in which the signal can be detected. Dr. Abt also suggested the definition of a feedstock (e.g. whether to lump together hardwoods and pines) could also be data-driven, i.e. defined by whether the data allows them to be distinguished from other feedstocks. Dr. Abt also suggested if the BAF was not robust across scales, then some reconsideration was needed.

Dr. Sedjo said the long-run was preferred to the short-run and wider is preferred to narrower and these principles might be some of the guidance the Panel could provide to EPA. Dr. Sedjo said the questions were very hard to answer in the abstract because the answer is always “it depends ...”

In reference to question 2c, Dr. Khanna explained the case studies in Appendix K took three alternative baseline scenarios: Zero Biomass, Constant Biomass and AEO Reference. Dr. Rose pointed to Table M-2 where the BAF was shown as changing with increasing feedstock shocks.

Questions 2d - e

Questions 2d – e asked whether shocks for different feedstocks should be implemented in isolation or in aggregate and how a joint production function should be implemented. Dr. Woodbury offered some general comments up front that went beyond the charge questions, stating, first of all, the Framework should acknowledge explicitly that EPA’s purpose is to address climate change. Dr. Woodbury warned of perverse effects that could happen with increased nitrogen (N₂O) fertilizer use. Dr. Woodbury said the overall GHG picture helps to put things in context and that the shocks for different feedstocks should be analyzed together to account for interactions but that he would defer to the economists on this. He said the choice would depend upon policy context and whether the purpose was to incentivize a particular feedstock or activity. Dr. Woodbury voiced concern that the Panel was too focused on long rotation roundwood and more time should be spent on short rotation and agricultural feedstocks and the need to ensure that carbon credits were actually occurring.

Dr. Khanna said that modeling the feedstocks jointly may lead to confounding problems and that it made sense to start with a No Biomass case and model a 1 million ton increase in a particular feedstock. On Question 2e, Dr. Khanna said she thought just the shock for bioenergy should be modeled because she found it hard to understand how demand for logging residues could drive demand for other forest products, e.g. sawtimber. Dr. Khanna said the shocks should not be policy-specific but should instead be quantity-specific. She further suggested the demand shocks be limited by the realism of particular scenarios. Apropos to this point, Dr. Hill thought it was plausible that the demand for corn stover could actually drive the demand for corn.

Questions 2f – g

Questions 2 f-g asked whether the scale of the policy be considered for default factors and whether considerations would change when developing policy-neutral default factors versus developing policy-specific default factors.

Dr. Hill said the scale of the policy should definitely be considered and no single set of default factors should be applied to policies that lead to substantially different increases in feedstock usage. Dr. Hill pointed to the importance of context and noted that the first ton of feedstock collected may have a different impact than the *n*th ton. Dr. Hill noted how the *n*th user of corner stover could do more damage to soil carbon than the first user. Dr. Khanna noted this really gets to the question of marginal versus average. Dr. Hill said the BAF really has to be tied to policy and noted that, for example, the Renewable Fuel Standard (RFS2) required that feedstocks come from land that wasn't already in agricultural production.

Dr. Barlaz said his comments were in the context of municipal solid waste (MSW). Noting that MSW is already regulated, he said he would not be comfortable with a single set of default factors. Dr. Barlaz noted that with reference to landfills, EPA has defined a narrow system that encompasses landfill gas as well as fugitive emissions. Dr. Barlaz expressed concern about the disincentive to collect landfill gas when CO₂ isn't emitted from the flare. Dr. Barlaz also expressed a worry that Table N-2 would lead to comparisons of BAF across waste feedstocks that did not account for all effects in a lifecycle approach. Dr. Kelley said feedstock-switching was more often infeasible from an engineering standpoint.

Question 2h

Question 2h asked what considerations could be useful when evaluating the performance of the demand shock choice *ex post*. Dr. Reilly said this question was really asking about how to compare a shock in the real world to a shock in the model. Panelists discussed what to do with something like the oil price shock given that FASOM is run on a 5-year time scale and whether the BAF should be revised based on short term demand shocks.

Next Steps

After the discussion of charge questions concluded, Dr. Stallworth asked panelists to revise their responses to charge questions by April 6. She said she would try to post a draft report by April 20 and that, based on the written submissions, she would work with Dr. Khanna to decide whether consensus opinion was far enough along to draft an Executive Summary and letter to the Administrator. She said if the Panel's written submissions were not far enough along, the draft report to be posted (prior to the May 29, 2015 teleconference) might not have an Executive Summary and letter to the Administrator.

General Issues Outside the Charge Questions

Dr. Khanna then turned the Panel's attention to issues outside the scope of the charge questions, specifically the issue of choosing a reference point baseline or an anticipated baseline, the type of model to use (whether rational expectations, recursive-dynamic, etc.) and the lack of policy context.

With respect to the issue of choosing a reference point baseline or an anticipated baseline, panelists reiterated the failure of a reference point baseline to incorporate additionality, i.e. the carbon

changes wrought by increased biomass use by a stationary source. Some panelists said that naïve assumptions could be made about the BAU baseline. Dr. Khanna pondered whether the Panel should recommend deleting the reference point baseline entirely from the revised Framework.

On the choice of model, Dr. Khanna asked whether there were some large issues that should be raised in the Panel's report. Dr. Fawcett said the Agency was not locked into using FASOM. Dr. Skog pondered whether it made more sense to ask whether we could build a body of evidence that would support various BAF ranges. He said biophysical models should be used to estimate biophysical (direct) effects while economic models are needed for indirect effects. Dr. Reilly asked the Panel to step away from the charge questions and ask themselves whether the method could be successful. He said there was uncertainty about direct effects and even more uncertainty about indirect effects. He further pondered whether the Panel should just say calculating a BAF is a waste of time because it involves using an incredibly complex model that depends upon incredibly complex conditions all the while introducing bureaucratic hassles. Dr. Reilly said he was worried about international leakage effects, i.e. the scenario of imported biomass not being charged for its carbon content. Dr. Khanna noted that after a great deal of analysis and modelling, EPA generally came to the conclusion that GROW was greater than EMISSIONS.

Dr. Rose suggested the Panel stick to the topic of whether the BAF calculation could lead to some useful insights. Dr. Khanna asked whether the Panel wanted to allow for the possibility of a facility-specific BAF (contrary to its previous advice). She also asked the Panel to think about whether an anticipated baseline approach might not be needed for agricultural feedstocks. Dr. Khanna suggested the leakage effects and the GROW term for roundwood would have to depend on an anticipated baseline model.

Dr. Skog returned the Panel's attention to the advantages of calculating RF instead of tons of CO₂ emitted. He said the reason to calculate RF is that you take into account the effects of carbon in the atmosphere over time and that it was inappropriate to truncate RF that occurs far into the future. Dr. Reilly expressed worry about the lack of a legal requirement to grow the carbon back after it has been used and the lack of incentives to plant and grow the stock again. Dr. Khanna said a rolling average and/or 5-year increments for revising the BAF would remove the need to know the ultimate time scale or big T. Ms. Ohrel reminded the Panel that temporal issues were discussed in Appendix B.

Mr. Michael Van Brundt of Covanta offered another public comment, expressing support for Dr. Skog's proposal for RF. He said the RF approach addressed one of his industry's key concerns, which is the potential temporal mismatch between the emissions evaluation period and the averaging timeframe inherent in the global warming potential. Since waste management methods were invariably compared against landfilling, a ton of waste placed in a landfill today, methane will be emitted over time, for up to 100 years or more.

Dr. Khanna thanked everyone and Dr. Stallworth adjourned the meeting.

Holly Stallworth, Ph.D. /s/
Designated Federal Officer

Certified as Accurate:

Madhu Khanna, Ph.D. /s/
Chair, SAB Biogenic Carbon Emissions Panel

NOTE AND DISCLAIMER: The minutes of this public meeting reflect diverse ideas and suggestions offered by committee members during the course of deliberations within the meeting. Such ideas, suggestions, and deliberations do not necessarily reflect definitive consensus advice from the panel members. The reader is cautioned to not rely on the minutes to represent final, approved, consensus advice and recommendations offered to the Agency. Such advice and recommendations may be found in the final advisories, commentaries, letters, or reports prepared and transmitted to the EPA Administrator following the public meetings