

**Summary Minutes of the
U.S. Environmental Protection Agency
Science Advisory Board
Biogenic Carbon Emissions Panel
Public Teleconference
October 12, 2016**

Biogenic Carbon Emissions

Panel Members: Dr. Madhu Khanna, Chair
Dr. Robert Abt
Dr. Marilyn Buford
Dr. Mark Harmon
Dr. Jason Hill
Dr. John Reilly
Dr. Charles Rice
Dr. Steven Rose
Dr. Roger Sedjo
Dr. Ken Skog
Dr. Tristram West
Dr. Peter Woodbury

Chartered SAB Members: Dr. Robert Johnston
Dr. Steven Hamburg
Dr. William Schlesinger
Dr. Peter Thorne

Purpose: The Science Advisory Board (SAB) Biogenic Carbon Emissions Panel discussed chartered SAB comments on its 2-8-16 draft report on EPA's *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, Tom Carpenter, Chris Zarba, Vince Camebreco, Nora Greenglass, Elizabeth Miller, Linda Chappell, Robin Jenkins, Michael Pepenpus, Charmaine Hanson

Public: Sami Yassi (Natural Resources Defense Council); Max Broad (National Wildlife Federation); William Hohenstein (U.S. Department of Agriculture); Mary Sprayregen (Vermont Energy Investment Corporation); Patrick Holmes (U.S. Department of Agriculture); John Upton (Climate Central); David Carr (Southern Environmental Law Center); Josef Spitzer (JS Consulting); Marie-Helene Diodti (Embassy of Canada); Jennifer Jenkins (Enviva); Jonathan Lewis (Clean Air Task Force); Mark Flugge (ICF), Ahmina Maxey (GAIA); Jessica Marcus (U.S. Industrial Pellet Association); Mike Williams (Westervelt Company); Steve Woock (Weyerhaeuser); Clint Woods (Association of Air Pollution Control Agencies); Jeanne VanBriesen (Carnegie Mellon University); Paul Noe (American Forest & Paper Association); Ben Larson (National Wildlife Federation); Kyle Harris (Corn Refiners Association); David

Malkin (Drax Biomass Inc.); Tim Rooney (ANTARES Group); Maureen Walsh (American Biogas Council); Joe James (Agri-Tech Producers); Dylan Meagher (New York City Department of Environmental Protection); Sundara Bhandaram (American Forest & Paper Association); John Norman (ExxonMobil Biomedical Sciences); Marcus Gillette (RNG Coalition); James Easterly (Bloack & Veatch Corporation); Daniel Sanchez (Carnegie Institution for Science); Sarah Amick (Rubber Manufacturers Association); William Strauss (Future Metrics); Patrick Serfass (American Biogas Council); Lew McCreery (U.S. Forest Service); Shelby Livingston (California Air Resources Board); Kate Shenk (Biotechnology Innovation Organization); Ben Paulos (PaulosAnalysis); Brent Bailey (25x25 Alliance); David Beaudreau (D.C. Legislative and Regulatory Services); Adam Macon (Dogwood Alliance); Nick Mazuroski (Biomass Power Association); Tracy Leslie (Forest2Market); Ali Schmidt (ANTARES Group); Jessica Bede (California Air Resources Board); Michael Wang (Argonne National Laboratory); Judy Jarnefeld (New York State Energy Research and Development); Max Broad (National Wildlife Federation); Jared Woollacott (RTI International); Maria Hegstad (Inside EPA); Brittany Bolen (Senate Environment and Public Works Committee); John Norman (ExxonMobil Biomedical Sciences); Margaret Caravelli (Balch and Bingham, LLP)

Meeting Materials and Meeting Webpage:

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

<https://yosemite.epa.gov/sab/sabproduct.nsf/a84bfee16cc358ad85256ccd006b0b4b/bd5980491f4f4fbb85257fef0048cbc4!OpenDocument&Date=2016-10-12>

Dr. Holly Stallworth, Designated Federal Officer for the Biogenic Carbon Emissions Panel, opened the meeting with a statement affirming the compliance of the Panel with the Federal Advisory Committee Act. Dr. Stallworth also noted there were 4 requests for public comment. Dr. Khanna introduced the public speakers.

Public Comments

Seth Ginther of the Industrial Pellet Association said a long time scale is most appropriate because global temperatures are driven by cumulative emissions. He also cited a recent Intergovernmental Panel on Climate Change (IPCC) report that said there is no evidence for global scale tipping points. On the accounting framework, Mr. Ginther said both biological and economic impacts should be incorporated. Mr. Ginther voiced support for a reference point baseline because it is more easily implemented.

Max Williamson, on behalf of the Biogenic CO₂ Coalition representing the crop agriculture community, cited figures for the contribution of the bioeconomy to the U.S. economy. He expressed concern that EPA had taken the position in the Clean Power Plan (CPP) that there is no distinction between biogenic and non-biogenic CO₂. Stipulating that crop-based feedstocks met the criterion for carbon neutrality, Mr. Williamson implored the Panel to create a separate track for crop-based feedstocks that don't have the temporal issues associated with forest-based feedstocks.

Stephen Prisley, on behalf of the National Council for Air and Stream Improvement (NCASI), spoke about temporal scales, modelling approaches and baselines. On temporal scales, he emphasized that peak global temperatures will be driven by cumulative emissions. A failure to consider long-term implications could result in forest carbon policies that result in a higher atmospheric levels of carbon. On modelling, he stressed the response of forest owners to market signals. Dr. Prisley said reference point baselines were best suited to EPA's policy objectives and implementation realities.

Mary Booth of the Partnership for Policy Integrity said there were two pieces of legislation that would force EPA to treat all biomass as carbon neutral. Dr. Booth cited statistics showing the relative inefficiency of biomass compared to fossil fuels in generating electricity. Dr. Booth encouraged the Panel to consider the target date of the CPP (2030) as an appropriate time scale. She noted the biomass industry has aggressively advocated burning wood pellets as a replacement for coal under the CPP. Dr. Booth cited an Energy Information Agency prediction that treating biomass as carbon neutral would quadruple electricity generation from biomass.

Panel Discussion of Chartered SAB Comments on Draft Report

Turning to the SAB's feedback on the Panel's 2-8-16 draft report, Dr. Khanna summarized three main areas of concern:

1. The appropriate time scale for calculating a Biogenic Assessment Factor (BAF) is the time period over which all terrestrial effects on carbon stocks occur.
2. It is cumulative emissions over 100 years that directly affect the climate.
3. The use of economic models to determine the BAF.

Dr. Khanna directed the Panel's attention to the SAB's margin comments on the 2-8-16 draft report posted on the meeting webpage. With respect to the SAB comment on the Panel's discussion of the policy context in the Executive Summary, panelists agreed that language could be added recognizing international policies (e.g. European Union), regional policies and other exogenous drivers that will affect emissions. Dr. Rose suggested this could go in the section on modelling since it relates to assumptions about drivers.

With respect to the SAB's comments on p. 4 of the Executive Summary, Dr. Hamburg said the SAB would like the report to be revamped so that the Panel points out the implications for different time horizons rather than prescribing a long time horizon. Dr. Schrag acknowledged that the choice of time horizon was a policy matter but that science did have some useful insights. He noted that high sulfur coal is actually good for the climate over the next 10 years. He pointed out that forest conservationists wanted a short time scale and industry wanted a long time scale. Dr. West said the Panel's job is merely to point out how BAF changes over time. Dr. West also stressed that the Panel's charge was to look at net emissions and not how net emissions would impact climate. Dr. Khanna pointed out the Panel's language on time scale merely advocates incorporating all effects over time. Dr. Sedjo said the Panel's input could be framed as "if/then" propositions. Dr. Harmon voiced supported for the SAB's comment that lines 12 – 20 on p. 4 of the Executive Summary needed to be revised. Dr. Reilly said the problem with the paragraph was that it assumes the world moves from one equilibrium to the next. Dr.

Rose said he still supports the Panel's science-based rationale for setting the time horizon as the time when effects stabilize. Dr. Skog reminded the Panel that the science tells us that climate benefits would be ignored with a shorter time frame. Dr. Khanna suggested the Panel bring in Figure C-6 and discuss the trade-offs between various time periods.

Dr. Woodbury offered 4 statements that are supported by the science and suggested these could be used and propagated throughout the draft report.

1. The accounting framework should cover the time period over which terrestrial effects occur.
2. Because there is variation in climate forcing over time, the accounting framework should include such variation; thus, a BAF will differ depending on the time.
3. It is important to recognize that there are cumulative long-term impacts on peak global temperature over time.
4. It is a policy choice to select a policy period. However, the accounting of biogenic CO₂ should include the 3 points above, which differs from the policy horizon.

Some panelists voiced resistant to using the word "should." Dr. Johnston suggested re-wording to say something like "If the policy maker desires to capture all effects over time, then the time period for calculating a BAF should cover the time period over which all effects on terrestrial carbon occur." Dr. Schrag said the science isn't completely neutral on the time scale, adding that you will miss certain climate benefits with shorter time scales.

Dr. Woodbury said he would like to preserve the word "should" as used in his sentence above because it referred to the accounting period for calculating a BAF which was a separate matter from a policymaker's goals. Dr. Rose echoed Dr. Schrag's point that science does provide useful information on the appropriate time scale.

Dr. Hamburg said there are multiple climate objectives, not just minimizing effects on peak temperatures. Dr. Rose countered that climate objectives are more relevant to the stringency of the policy, not the calculation of a BAF. Dr. Woodbury noted that EPA did not specify climate forcing as the issue but it's hard to come up with any other motivation for this accounting. Dr. Sedjo said the "if/then" propositions could be used to point out the relevant space for policymakers.

Dr. Khanna agreed with Dr. Sedjo's suggestion that the discussion could be reframed as a series of "if/then" statements pointing out the consequences of various horizons. Dr. Schlesinger suggested one of the "if/then" statements could be "if you want low carbon impacts, short-term herbaceous crops are preferred." Dr. Rose voiced a desire to produce a report that does not allow one administration to pick their BAF followed by the next administration picking another BAF.

Dr. Harmon suggested adding two figures: (1) an illustration of how the BAF reacts over hundreds of years in both the carbon gain and carbon loss cases and (2) a figure that shows multiple feedstocks with different time signatures. Other panelists voiced support for these figures. Dr. Woodbury said a large caveat would be needed for other greenhouse gasses that pertain to management practices.

Dr. West said he thought the report needed a section on spatial scale. Dr. Sedjo pointed out problems with trying to build more precision with respect to the land area associated with the carbon stock.

With respect to the SAB comments on p. 5 of the Executive Summary in which the SAB reviewers requested that the Panel explain why they did not use the Social Cost of Carbon. Dr. Khanna explained the Panel needed to stick to biophysical terms, not the monetary values associated with climate change. She further explained that a discount rate would not be appropriate when applied to biophysical phenomena like tons of carbon. Dr. Johnston supported Dr. Khanna's explanation and asked that it merely be incorporated in the report.

With respect to the SAB comments on p. 12 on the modelling approach, Dr. Hamburg said the SAB reviewers asked for a discussion of the advantages and disadvantages of different approaches. Dr. Skog said language could be added that recommends a modeling approach that takes all the drivers into account in determining a BAF while acknowledging the uncertainty associated with more complex models. He said a simpler model would be more precise but less accurate. Dr. Rice offered the idea of a simple diagram table that goes from simple models to more complex models that depicts the trade-offs. Dr. Khanna asked him to produce such a table.

Dr. Harmon pointed out that comparing two simulations (a policy scenarios versus a business-as-usual trend) often involves cancellation of some kinds of uncertainties. Dr. Khanna added that the anticipated baseline approach involved comparing two simulations and that some scenarios aren't going to affect the delta or the difference between the two scenarios.

After cautioning the Panel not to turn the report into a college course, Dr. Woodbury thought the modelling discussion only needed a few clear sentences to the effect that: assumptions are important, data is needed, economic impacts are needed, all models have uncertainty, etc.

With respect to the draft report discussion on time scale on p. 14, Dr. Khanna pointed out that this discussion is different from the topic of how to determine the optimal T for calculating a BAF. Dr. Khanna distinguished between the time scale used to calculate a BAF for carbon emissions versus the time scale used to evaluate how these emissions affect climate. Dr. Schlesinger suggested just eliminating the entire section (Section 3.5). Dr. Harmon suggested replacing Section 3.5 with the new language discussing trade-offs over time, but Dr. Khanna said it would fit better in the main body of the report. Dr. Rose voiced some resistance to eliminating Section 3.5 as did Dr. Buford. Dr. Skog suggested replacing Section 3.5 with the findings from the IPCC Fifth Assessment Report Working Group 1 about the relationship between cumulative emissions and peak global temperature. Dr. Khanna said the Panel's recommendation #3 on p. 6 alluded to climate impacts and pondered whether there should be a section in the report supporting that recommendation. Dr. Khanna pointed out this recommendation (which refers to the difference between BAF_T and $BAF_{\Sigma T}$) may need some justification if we're going to keep the $BAF_{\Sigma T}$. Dr. Woodbury called the Panel's attention to his earlier statements. He stressed the need to distinguish between the analysis of carbon accounting for net emissions from the selection of a policy time frame. Dr. Khanna said she would take Section 3.5 out and fold it into the discussion of the two BAFs and explain why it's relevant to that discussion and how to think about the

choices between alternative methods of calculating the BAF. This would provide the supporting text for recommendation #3.

Dr. Khanna asked Drs. Hamburg and Schlesinger whether they had any comments on the draft report's content on peak warming and cumulative emissions and the impossibility of avoiding tipping points. She clarified that this content would be moved to another section that discusses the differences between BAF_T and $BAF_{\Sigma T}$. Dr. Schlesinger said he would have to wait and see the revised text. Dr. Buford said she didn't want the "baby thrown out with the bathwater" and Dr. Sedjo agreed with that recommendation. Dr. Khanna said she would attempt a "delicate balancing act." Panelists pondered whether the draft report should connect its discussion of time scales with other EPA choices about climate policy. Dr. Buford cautioned against that approach, and Dr. Rose agreed with her caution. Dr. Harmon said there are three ways to think about time: t (a continuous variable), T (the time at which uptake is completed) and the policy assessment period. Dr. Khanna added a fourth dimension: the time at which we think cumulative emissions affect temperature.

Dr. Woodbury said the Panel needed to improve the balance for how longer versus shorter time scales are discussed. The BAF will vary over time, and it will vary by calculation method. Dr. Rose pointedly asked the SAB reviewers whether the Panel had to change the "should" language about capital T . Dr. Hamburg said the SAB was only reacting to the draft report's favorable reference to 100 years in multiple places. Dr. Rose harkened back to Dr. Harmon's suggestion that we clearly distinguish between different time scales.

Dr. Khanna said she and Dr. Stallworth would work on revisions and draw upon individual panelists for particular sections. Before adjourning, panelists discussed whether the SAB reviewers should be included in emails on the revisions. At Dr. Khanna's suggestion, the Panel decided to make the first round of revisions without the SAB reviewer's involvement but would then submit their revisions to the SAB reviewers.

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

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