COVANTA
Powering Today. Protecting Tomorrow.

Michael E. Van Brunt, P.E.
Director, Sustainability

Covanta
445 South Street
Morristown, NJ 07960
Tel: 862.345.5279
mvanbrunt@covanta.com

March 16, 2015

Dr. Holly Stallworth
US EPA SAB Staff Office
Ronald Reagan Building
1300 Pennsylvania Ave., NW
Suite 31150
Washington, DC 20004

Re: SAB Biogenic Carbon Emissions Panel review of EPA's Framework for Assessing Biogenic CO_2 Emissions from Stationary Sources

Dear Dr. Stallworth:

Thank you for the opportunity to provide comments for consideration for the upcoming meeting of the SAB Biogenic Carbon Emissions Panel on the EPA's revised Framework for Assessing Biogenic CO_2 Emissions from Stationary Sources (the Revised Framework). The work of the SAB and the EPA on this subject is critical: biomass can be an important tool in our efforts to reduce GHG emissions and combat climate change, provided it results in real net reductions in GHG emissions.

We fully support the inclusion in the Revised Framework of an alternative fate approach for waste-derived feedstocks and that both carbon dioxide and methane are explicitly included for forest, agricultural, and waste sector-derived feedstocks. The inclusion of methane is critical, both for the completeness and accuracy of the carbon balance and the significant potency and impact of methane as a greenhouse gas. According to the IPCC's 5th Assessment Report, methane's contribution to climate change is equivalent to over 40% of the total net drivers of climate change.[1] Concurrently, researchers looking at atmospheric concentrations of methane have found that traditional bottom-up GHG inventories in both U.S. and California have significantly underestimated actual methane emissions.[2, 3,4,5]

The President's Climate Action Plan calls reducing emissions of methane "critical to our overall effort to address global climate change" and initiated an interagency methane strategy. This perspective is consistent with a growing recognition of methane and other short-lived climate pollutants ("SLCPs"). Last year, the U.S. State Department, the United Nations Environmental Program, and a group of international partners announced the Climate and Clean Air Coalition

("CCAC") to specifically focus on methane and other SLCPs. Today, the CCAC includes nearly 100 partners, including 39 countries and the European Commission.

While we applaud the alternative fate approach and the inclusion of methane, we believe that there is still some room for improvement in the Revised Framework, and we are pleased that the EPA has decided to reassemble the Biogenic Carbon Emissions Panel to that end. As the Panel begins its assessment, we are pleased to offer the following comments on the Charge Questions outlined in the EPA's February 2015 letter to the SAB Staff Office, as well as other issues we feel are of vital import to the credible calculation of biogenic emissions.

Comments on Charge Questions

1.a. Should the temporal scale for computing biogenic assessment factors vary by policy, feedstocks (e.g., long rotation vs annual/short-rotation feedstocks), landscape conditions, and/or other metrics?

The selection of temporal scale should not be selected based on the individual policy, feedstock, or landscape conditions. Instead, such a selection must be based on the timing of our overall objective in slowing the growth in the atmospheric concentrations of methane, carbon dioxide, and other greenhouse gases in the atmosphere. Current projections of climate response demonstrate that a mix of both short term and long term controls are most effective at limiting future climate change.[6,7,8] As a consequence, both short and long term temporal scales should be considered for biomass assessments.

An appropriate path would be to base the temporal scale for biogenic assessments on the overall policy *objective* with regard to its focus on short-term or longer term impacts. For example, policies aimed at reducing short lived climate pollutants ("SLCPs"), like methane, should be inherently short term focused, since their biggest benefit is reducing short term radiative forcing as a complement to CO_2 reductions.

For years, climate scientists have been calling for separate regulation of climate pollutants like methane owing to their potency and other differences relative to CO_2.[9,10,11] The Climate and Clean Air Coalition states that "actions to reduce emissions of short-lived climate pollutants will quickly lower their atmospheric concentrations, yielding a relatively rapid climate response. Fast action to reduce short-lived climate pollutants, especially methane and black carbon, has the potential to slow down the warming expected by 2050 by as much as 0.5 Celsius degrees."[12] This quick reduction can help buy some time, as we make more substantiative changes in our energy and transportation systems. A failure to address SLCPs, like methane, significantly increases the risk of crossing the 2°C temperature increase threshold widely discussed as most likely to limit severe climate change impacts.[13]

Regardless of the temporal scale selected, the selection of the GWP timescale must be consistent with the overall evaluation timescale. i.e. a 100-year GWP is inconsistent with the selection of shorter timeframes for the temporal evaluation of carbon emissions and regrowth.

The WRI Greenhouse Gas Protocol gives the following recommendation in its Policy and Action Standard:

> "Twenty-year GWP values may be used on short-term climate drivers, and should be used if the policy or action assessed is specifically designed to reduce emissions of short-lived greenhouse gases, such as methane."[14]

1.b. Should the consideration of the effects of a policy with a certain end date (policy horizon) only include emissions that occur within that specific temporal scale or should it consider emissions that occur due to changes that were made during the policy horizon but continue on past that end date (emissions horizon)?

Consideration of effects must include emissions that occur due to changes that were made during the policy horizon but that continue on past the end date. The atmosphere does not distinguish between carbon emission changes that occur during, or after, a policy period. In fact, current guidance of accounting for the effects of GHG policies is to include effects that occur after the end of a policy:

> "The ex-ante GHG assessment period (forward-looking) is determined by the longest-term effect included in the GHG assessment boundary. The GHG assessment period may be longer than the policy implementation period … and should be as comprehensive as possible to capture the full range of significant effects based on when they are expected to occur."[15]

1.c. Should calculation of the biogenic assessment factor include all future fluxes into one number applied at time of combustion (cumulative – or apply an emission factor only once), or should there be a default biogenic assessment schedule of emissions to be accounted for in the period in which they occur (marginal – apply emission factor each year reflecting current and past biomass usage)?

All future fluxes should be incorporated into one up-front number to align emissions with the timing of the management decision.[16] Otherwise, the combustion emissions may not receive the proper policy signal. Instead, it may take many years for the cumulative impact of an ongoing combustion or other emissions source to exhibit the full impact of its continued operation.

Reflecting emissions associated with past biomass usage prior to the enactment of a policy obscures the impact of the policy, as there can be a considerable catch-up time with regard the visibility of the emissions associated with the policy.

For example, a primary benefit of MSW diversion mechanisms, like composting, anaerobic digestion, and energy-from-waste, is the avoidance of landfill methane. However, in each case, the reduction in GHG emissions is realized slowly over time, as today's methane emissions from a landfill are largely due to historic biodegradable waste receipts. As a consequence, if emissions

reductions are accrued on a year-by-year basis, policy makers may be less inclined toward landfill diversion projects and more inclined toward other GHG mitigation efforts which have a more immediate payoff with regard to meeting fixed-time GHG goals. Conversely, up-front accounting would temporally align decision making with the full climate impact of the decision.

1.d. What considerations could be useful when evaluating the performance of a future anticipated baseline application on a retrospective basis (e.g., looking at the future anticipated baseline emissions estimates versus actual emissions ex post), particularly if evaluating potential implications for/revisions of the future anticipated baseline and alternative scenarios going forward?

Ex post assessments must use actual measurements and data that cover a statistically representative sample, taking into account differences in policy implementation and geography. Conversely, modeled ex post emissions for updating future anticipated baselines should be viewed with extreme caution, to ensure that revisions to the future anticipated baseline are truly representative. For example, an instantaneous landfill gas collection efficiency of 95% adopted by the U.S. EPA's GHG Mandatory Reporting Rule (40 CFR 98) and then included as a sensitivity analysis in Appendix N of the Revised Framework is not supported by the agency's own research and the consensus default arrived by a group of experts and stakeholders convened by the U.S. EPA at a Landfill Gas Experts Meeting held in October 2014. [17,18] The selection of the instantaneous 95% collection efficiency default therefore could result in conclusions that are not currently supportable by expert consensus and the body of published data on the subject. It is imperative that the final Framework rely on the best, most currently available scientific data and consensus.

2. What is/are the appropriate scale(s) of biogenic feedstock demand changes for evaluation of the extent to which the production, processing, and use of biogenic material at stationary sources results in a net atmospheric contribution of biogenic CO_2 emissions using a future anticipated baseline approach? In the absence of a specific policy to model/emulate, are there general recommendations for what a representative scale of demand shock could be?

As outlined in the Revised Framework, waste feedstocks do not generate a demand on biogenic feedstocks or generate a demand shock. We believe that this recognition should remain in a final Framework.

The EPA came to a similar assessment in its Renewable Fuel Standard ("RFS2"), stating in the preamble to that rule that "renewable fuel produced from feedstocks consisting of wastes that would normally be discarded or put to a secondary use, and which have not been intentionally rendered unfit for productive use, should be assumed to have little or no land use emissions of GHGs."[19] In other words, the use of waste materials does not affect the upstream production of biomass that become waste after its initial intended use.

Comments on Other Critical Issues

The SAB should insist that the EPA use the latest available science with regard to climate science, including the use of the latest global warming potentials for methane from the 5th Assessment Report.

In reporting, inventories, and its Revised Framework [ref], the EPA continues to use outdated GWPs, citing the need for consistency with other regulations or international agreements. However, for assessing different pathways for the management of biomass waste materials, which involve both methane and carbon dioxide, reporting conventions are completely immaterial: the GHG effect induced by a gas either directly or indirectly is completely indiscriminate of regulatory distinctions or international protocol.

Consequently, the SAB should insist that the EPA update its Revised Framework to use the 100 year global warming potential ("GWP") for methane to 34 CO_2 and the 20 year GWP of 84.[20] This is 36% greater than the now outdated 100-year GWP of 25 currently referenced in the Revised Framework. The U.S. EPA itself has recognized that the 100-year GWP figure of 25 is outdated. In its 2014 Report Climate Change Indicators in the United States, the agency uses a 100-year GWP of 28 from the 5th Assessment Report.[21] While a step in the right direction, the 100-year GWP of 28 is also flawed, as it does not include carbon-climate feedbacks. The IPCC concluded that "it is likely that including the climate-carbon feedback for non-CO_2 gases as well as for CO_2 provides a better estimate of the metric value than including it only for CO_2."[22]

Incorporating the latest science is important, given that the Revised Framework will help drive decision making on waste management. These decisions should be based on our understanding of how methane behaves in the environment, not current agreements and regulations, and the climate impact of methane is much larger than previously reported. According to the IPCC's 5th Assessment Report, methane's contribution to climate change is over 40% of the total net drivers of climate change.[23] Methane's radiative forcing (RF), a measure of the uptake of energy relative to a reference year and hence a measure of overall global warming drivers, is 0.97 W/m^2, over 75% higher than previously reported in the 4th Assessment Report.[24,25] Methane's RF exceeds that of halocarbons, nitrous oxide, carbon monoxide, non-methane VOCs, and changes in solar irradiance *combined*. There is no justifiable reason why we shouldn't be relying on the latest data.

In its review and report to the USEPA, the SAB should stress the importance of using the latest available science for data, factors, and other inputs used in the analysis of alternate fates for waste-derived feedstocks.

Accurate data is critical for the analysis of alternate fates for waste-derived feedstocks. The SAB should insist that the EPA use such data wherever available for its final Framework. In particular, Appendix N on Assessing Emissions from Waste-Derived Biogenic Feedstocks, should incorporate the latest science on time-integrated collection efficiencies developed through an expert driven effort spearheaded by the agency itself.

The EPA initiated the multi-year effort at a Landfill Gas Experts Meeting held in October 2012, and included academics, landfill operators, industry engineers and experts, and its own office of research and development. The effort helped inform appropriate defaults for the modeling of GHG emissions from landfills and included a detailed analysis performed by Drs. James Levis and Morton Barlaz on appropriate time-integrated landfill gas collection efficiencies. For mixed MSW, the range of time-integrated collection efficiencies was 34 – 62%.[26] The defaults developed have been incorporated into the U.S. EPA's Waste Reduction Model (WARM) and its MSW Decision Support Tool (MSW-DST), as well as North Carolina State's Solid Waste Optimization Life-cycle Framework (SWOLF).

Most importantly, the analysis reflects a refined understanding of the temporal variation of gas collection efficiency after waste is placed in a landfill. Once waste is placed in a landfill, it degrades anaerobically over years. The percentage of the gas generated that is captured also changes over time, dependent on the cover materials, the design of the collection system and other factors. By presenting time-integrated collection efficiencies, Drs. Levis and Barlaz account for this variation. It is this time-integrated collection efficiency that accurately describes the climate impact of placing biodegradable wastes in landfills. In contrast, the 75% default presented in the Revised Framework Appendix N, is an instantaneous average collection efficiency. While very useful in estimating point-in-time emissions, as is the reason for its reference and inclusion in EPA's Emission Factor database, AP-42, it is not particularly useful for assessing relative carbon impacts, as is the goal with the Revised Framework. As a result, we strongly recommend that the SAB direct the EPA to use the estimates for time-integrated collection efficiency developed by Drs. Levis and Barlaz and reviewed by the EPA-convened Landfill Gas Experts Group.

Building on the success of this effort, we have requested similar attention be paid to the issue of Soil Oxidation also referenced in Appendix N.[27] When the results of that analysis have been completed, they too should be incorporated into the Revised Framework.

The use of waste sources of biomass for energy is widely recognized by policymakers and the scientific community as a tool to help reduce net GHG emissions.

We support the recognition of waste sources of biomass in both the EPA's Revised Framework and the SAB's comments on the initial Framework document. The carbon benefits associated with the use of waste sources of biomass are widely recognized, including by prominent academics and NGOs. In the *Science* article "Beneficial Biofuels – The Food, Energy, and Environment Trilemma," the authors succinctly observed that:

> "the search for beneficial biofuels should focus on sustainable biomass feedstocks that neither complete with food crops nor directly or indirectly cause land-clearing and that offer advantages in reducing greenhouse-gas emissions." [28]

The authors identify five feedstocks, including municipal and industrial wastes and sustainably harvested wood and forestry residues that meet this definition. In the influential article "Fixing a

Critical Climate Accounting Error," the authors specifically distinguish between residues or biowastes and other sources of biomass.[29]

A statement coauthored by a diverse set of environmental NGOs including Earthjustice, Environment Northeast, National Audubon Society, the Natural Resources Defense Council, the Sierra Club, The Wilderness Society, and the Union of Concerned Scientists states "renewable biomass resources, such as agricultural, forestry, and urban residues, as well as some dedicated energy crops, can be used to produce transportation fuels, electricity, and heat. These types of bioenergy can create jobs in rural communities, cut carbon pollution, and reduce our dependence on imported oil."[30] A recent paper co-authored by researchers from The Nature Conservancy and the University of Minnesota found that the use of waste biomass, including slash and thinning from sustainable forestry and crop residues "incur[s] little or no carbon debt and can offer immediate and sustained GHG advantages."[31] The World Wildlife Federation (WWF) recommends that the use of waste and by-products be promoted to reduce emissions associated with food crop displacement.[32]

Thank you for the opportunity to comment as part of your process in reviewing and offering feedback on the Revised Framework. Please do not hesitate to contact me should you have any questions on the comments provided.

Best regards,

Michael E. Van Brunt, P.E.

Cc: Paul Gilman, PhD
SVP & Chief Sustainability Officer, Covanta
Morristown, NJ

Nathan Rich, P.E.
Executive Director, Wasatch Integrated Waste Management District
Ogden, UT

Kelsi Oswald
Director, Pinellas County Department of Solid Waste
St. Petersburg, FL

Lindsey J. Sampson
Director, Lee County Solid Waste Division
Ft. Myers, FL

Kevin Roche
CEO, ecomaine
Portland, ME

Mark Wilfalk
Director, Solid Waste & Environmental Program Management, City of Tampa
Tampa, FL

Dan Pellowitz
Managing Director, Solid Waste Authority of Palm Beach County
West Palm Beach, FL

Matthew Eaton
Project Manager, Commerce Refuse-to-Energy Authority
Sanitation Districts of Los Angeles County
Whittier, CA

James D. Warner
CEO, Lancaster County Solid Waste Management Authority
Lancaster, PA

---

[1] Methane's contribution to the increase in radiative forcing relative to 1750 is 0.97 W / m^2, 42% of the total net increase in radiative forcing of 2.29 W / m^2. See Figure SPM.5 of IPCC WGI. 2013. *Working Group I Contribution to the IPCC Fifth Assessment Report Climate Change 2013: The Physical Science Basis Summary for Policymakers*.

[2] Wong *et al.* (2015) Mapping CH_4: CO_2 ratios in Los Angeles with CLARS-FTS from Mount Wilson, California, *Atmos. Chem. Phys.,* 15, 241-252, 2015.

[3] Peischl *et al.* (2013) Quantifying sources of methane using light alkanes in the Los Angeles basin, California, *Journal of Geophysical Research: Atmospheres,* **118**: 4974-4990.

[4] Wunch, D., *et al.* (2009) Emissions of greenhouse gases form a North American megacity, *Geophysical Research Letters*, **36**, L15810.

[5] Hsu, Y., *et al.* (2010) Methane emissions inventory verification in southern California, *Atmospheric Environment* **44** (2010) 1-7.

[6] Shindell, D. *et al.* (2012) Simultaneously Mitigating Near-Term Climate Change and Improving Human Health and Food Security, *Science*, **335:** 183-189.

[7] UNEP & WHO (2011) *Integrated Assessment of Black Carbon and Tropospheric Ozone: Summary for Decision Makers*. http://www.unep.org/dewa/Portals/67/pdf/Black_Carbon.pdf

[8] Rogelj, J. *et al.* (2014) Disentangling the effects of CO2 and short-lived climate forcer mitigation, *PNAS*, **111**, 46, 16325-16330.

[9] Jackson, S., (2009), Parallel Pursuit of Near-Term and Long-Term Climate Mitigation, *Science,* **326:** 526-527

[10] Weaver, A., (2011), Toward the Second Commitment Period of the Kyoto Protocol, *Science,* **332**: 795-796

[11] See p2 of UNEP, WMO, (2011), *Integrated Assessment of Black Carbon and Tropospheric Ozone: Summary for Decision Makers*. http://www.unep.org/dewa/Portals/67/pdf/Black_Carbon.pdf

[12] Climate and Clean Air Coalition website, accessed 9/2/2014. http://www.unep.org/ccac/Short-LivedClimatePollutants/BenefitsofMitigation/tabid/130286/Default.aspx

---

[13] Shindell, D. *et al.*, (2012) Simultaneously Mitigating Near-Term Climate Change and Improving Human Health and Food Security, *Science*, **335**, 183-189.

[14] See p. 64 of World Resources Institute Greenhouse Gas Protocol (2014) *Policy and Action Standard: An accounting and reporting standard for estimating the greenhouse gas effects of policies and actions.* http://www.wri.org/sites/default/files/Policy_and_Action_Standard.pdf

[15] See p. 70 of World Resources Institute Greenhouse Gas Protocol (2014)

[16] ICLEI – Local Governments for Sustainability USA (2013) *U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Appendix E: Solid Waste Emission Activities and Sources*. http://www.icleiusa.org/tools/ghg-protocol/community-protocol/download-the-community-protocol

[17] U.S. EPA (2012) *Quantifying Methane Abatement Efficiency at Three Municipal Solid Waste Landfills*. http://www.epa.gov/nrmrl/pubs/600r12003.html

[18] See p.5 of Levis, J. & Barlaz, M.A. (2014) *Landfill Gas Monte Carol Model Documentation and Results.* http://epa.gov/epawaste/conserve/tools/warm/pdfs/lanfl_gas_mont_carlo_modl.pdf.

[19] "Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program; Final Rule." *Fed. Reg.* **75**, 58 (Mar 26, 2010): 14670-904.

[20] The IPCC concluded that "it is likely that including the climate-carbon feedback for non-CO2 gases as well as for CO2 provides a better estimate of the metric value than including it only for CO_2." See Table 8-7 of *IPCC WGI Fifth Assessment Report, Chapter 8: Anthropogenic and Natural Radiative Forcing*.

[21] See p7 of U.S. EPA (2014) *Climate Change Indicators in the United States, 2014 Third Edition.* http://www.epa.gov/climatechange/pdfs/climateindicators-full-2014.pdf

[22] See p714 of Myhre, G. *et al.* (2013) Anthropogenic and Natural Radiative Forcing. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. http://www.climatechange2013.org/images/report/WG1AR5_Chapter08_FINAL.pdf

[23] Methane's contribution to the increase in radiative forcing relative to 1750 is 0.97 W / m^2, 42% of the total net increase in radiative forcing of 2.29 W / m^2. See Figure SPM.5 of IPCC (2013) Summary for Policymakers. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S. K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. http://www.ipcc.ch/report/ar5/wg1/docs/WG1AR5_SPM_FINAL.pdf

[24] *Ibid.*

[25] See Figure SPM.2 of IPCC (2007) Summary for Policymakers. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. http://www.ipcc.ch/publications_and_data/ar4/wg1/en/spm.html

[26] Levis, J. & Barlaz, M.A. (2014) *Landfill Gas Monte Carol Model Documentation and Results.* http://epa.gov/epawaste/conserve/tools/warm/pdfs/lanfl_gas_mont_carlo_modl.pdf.

[27] Van Brunt, M. E. (2014) Letter to Tiffany Kollar, Office of Resource Conservation and Recovery, U.S. EPA, "Proposed Waste Reduction Model (WARM) soil oxidation and methane global warming potential defaults" dated February 19, 2014.

[28] Tilman *et al.* Beneficial Biofuels – "The Food, Energy, and Environment Trilemma" *Science* 325: 270-271

[29] Searchinger *et al.* "Fixing a Critical Climate Accounting Error" *Science* 326: 527-528.

[30] "Establishing a Sound Framework for Bioenergy in Clean Energy and Climate Protection Legislation" http://docs.nrdc.org/energy/files/ene_10042101a.pdf

[31] Fargione, J., J. Hill, D. Tillman, S. Polasky, P. Hawthorne. "Land Clearing and the Biofuel Carbon Debt" *Science* Published online February 7, 2008; 10.1126/science.1152747.

[32] WWF. "WWF Position Paper on Bioenergy – June 2008." http://assets.panda.org/downloads/wwf_position_paper_on_bioenergy_291107.pdf