The following comments are submitted to assist EPA with development of a scientifically based approach to accounting for climate changing carbon emissions under the Prevention of Significant Deterioration (PSD) and Title V Programs (GHG Tailoring Rule). I'm an economist (Ph.D. – University of California - Berkeley) with Sound Resource Management Group, Inc., an economic and environmental research and consulting firm in Olympia, WA. I've been researching and publishing in the field of life cycle assessment (LCA) on waste/resource management[1], energy[2] and consumption[3] for twenty years.

It is extremely important that EPA require and obtain reporting that will assist the agency in cataloging and tracking carbon emissions from both fossil and biogenic sources. As stated by EPA in its endangerment ruling, "…, for a given amount of CO_2 released today, about half will be taken up by the oceans and terrestrial vegetation over the next 30 years, a further 30 percent will be removed over a few centuries, and the remaining 20 percent will only slowly decay over time such that it will take many thousands of years to remove from the atmosphere."[4] The chemistry and the physics of our climate and atmosphere do not differentiate among carbon dioxide (CO_2) molecules emitted to the atmosphere from coal combustion, wood combustion, municipal solid waste combustion or aerobic decay of dead flora. It is the quantity of carbon emitted to the atmosphere from all sources compared with the quantity sequestered in each year that determine the trajectory of climate change. It is no easier for our oceans and terrestrial vegetation to take up CO_2 emitted from combustion of wood than it is for them to take up CO_2 emitted from coal combustion. Hence ignoring CO_2 emissions from biogenic sources, as many current greenhouse gas accounting methodologies do, can lead to egregious errors in our decisions on methods for combatting climate change.[5]

To be sure the carbon cycles for some biogenic materials such as plant-based foods or lawn grasses are short enough that we may be able to ignore the atmospheric carbon flux from, say, harvesting plants for food or the aerobic decomposition of grass clippings. However, if these releases are not tracked, then the uptake of CO_2 by these plants should also be excluded from the calculation of our planet's annual capacity for CO_2 removal from the atmosphere. In any case carbon releases from the production, transport and use of fertilizers and pesticides to enhance growth of these and all other flora, as well as from the transport, refining and/or manufacturing into product of harvested biogenic materials, need to be counted and in no situation disregarded as "fugitive".

Important sources of biogenic CO_2 emissions that need to be reported include, among others, conversion of municipal solid waste (MSW) to energy, conversion of forest resources and forest products to energy, and conversion of forests to farming or other agricultural use, building sites, and lawns and gardens.

For example, our forestry resources have an especially long carbon cycle – the time between harvest and complete re-sequestration of the carbon released through conversion of harvested forestry resources to energy

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[1] Morris, J., 2010. Bury or burn North American MSW? LCAs provide answers for climate impacts & carbon neutral power potential, *Environmental Science & Technology*, forthcoming 2010.

Morris, J.; Bagby, J., 2008. Measuring environmental value for natural lawn and garden care practices, *International Journal of Life Cycle Assessmen*t, Vol. 13, No. 3, pp. 226-234.

Morris, J., 2005. Comparative LCAs for curbside recycling versus either landfilling or incineration with energy recovery, *International Journal of Life Cycle Assessment*, Vol. 10, No. 4, pp. 273-284.

Morris, J., 1991. Source separation vs. centralized processing: An avoided-cost optimization model provides some intriguing answers**,** *Journal of Resource Management and Technology*, Vol. 19, No. 1, pp. 37-46.

[2] Morris. J., 1996. Recycling versus incineration: An energy conservation analysis, *Journal of Hazardous Materials*, Vol. 47, Issues 1-3 (Special Issue on Energy-from-Waste), pp. 277-293.

[3] Morris, J.; Matthews, H.S., 2010. Development of a consumer environmental index (CEI) & results for Washington State consumers, with co-author H. Scott Matthews, *Journal of Industrial Ecology*, Vol. 14, No. 3, pp. 399-421.

[4] US *Federal Register -- Part III Environmental Protection Agency, 40 CFR Chapter 1 Proposed Endangerment or Cause and Contribute Findings for Greenhouse Gases Under Section 202(A) of the Clean Air Act; Proposed Rule,* Vol. 74, No. 78/Friday April 24, 2009/Proposed Rules, page 18899.

[5] Searchinger, T. D.; Hamburg, S. P.; Melillo, J.; Chameides, W.; Havlik, P.; Kammen, D.M.; Likens, G. E.; Lubowski, R. N.; Obersteiner, M.; Oppenheimer, M.; Robertson, G. P.; Schlesinger, W. H.; Tilman, G. D., 2009. Fixing a Critical Climate Accounting Error. *Science.* Vol. 326, No. 5952, pp. 527-528.

can encompass fifty to hundreds of years. Yet the harvest and energy conversion will take place within a few weeks or months. Hence, there is an inherent annual carbon flux imbalance for forestry resources.

As a second example, my latest LCA research on power generation from MSW indicates that neither waste-to-energy (WTE) nor landfill-gas-to-energy (LFGTE) provide carbon neutral electricity. In fact, both are more carbon intensive per kilowatt hour generated than either natural gas or coal.[6] Conversion of forestry products such as paper and lumber in MSW to energy in WTE facilities instantaneously releases CO_2 that won't be re-sequestered for many decades or even a century or more. Similarly, annual releases of CO_2 at LFGTE facilities also need to be reported, because a portion of these releases are the result of combusting methane captured from the anaerobic degradation of the non-sequestered portion of carbon in long-carbon-cycle forest products that are landfilled.

In the case of forestry resources harvested from just a small portion of a forested area that in total annually re-sequesters the same amount of carbon that is removed by the harvest, there may be a possibility of carbon neutrality. However, systematic measurement and reporting of annual release and annual re-sequestration are necessary to assure that this balance actually is being attained by entities claiming that their forestry harvest practices are carbon neutral. At this point in time we have only the carbon neutrality claims of parties invested in converting biomass to energy or products to rely on. As has been demonstrated by experience with ethanol and other biofuels, this is an insufficient basis for scientific assessment of the climate impact of biomass conversion.

[6] Morris, J., 2010, *op. cit.*