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Sent: Friday, October 24, 2008 9:31 AM
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Subject: Detailed California-Modified GREET Pathway for CNG from LFG

All --

I am most interested in the subject report that was apparently placed recently on the ARB LCFS website and is attached to this note. We hope to have our consultants review it soon in more detail. Was its release ever noticed publicly?

My most immediate question pertains to the manner in which CO2 emissions from the landfill flare and CNG combustion in vehicles is characterized in this assessment. On one hand, the report counts the CO2 *emissions* from the LFG CNG combusted in the vehicles as a *positive* CO2 emission source and the CO2 *emission reductions* from the LF flare as *negative*. The result is that the decreased flare emissions roughly balance out the increased vehicle CNG emissions -- making for a very low carbon fuel. That is all well and good -- and we certainly support the very low carbon intensity that is calculated as a result. My question has to do with the biogenic nature of the CO2 -- shouldn't the CO2 emissions derived the combustion of a totally biogenic waste-derived fuels be considered totally carbon neutral? That is, neither the LF flare emissions, nor the vehicle CO2 emissions should be counted due to the totally biogenic source of the fuel that is combusted to produce the CO2 emissions in both cases -- biogenically produced landfill gas. It is my understanding that the GHG accounting practices of the IPCC due not consider biogenic sources of CO2 emissions to count in GHG inventories and accounting protocols.

By biogenic, I'm referring to fuels and energy that are produced as part of the "near-term" carbon cycle (i.e., plants) as opposed to anthropogenic fossil fuel emissions. Under international greenhouse gas accounting methods developed by the Intergovernmental Panel on Climate Change (IPCC), biogenic carbon is part of the natural carbon balance and it will not add to atmosphere concentrations of CO2. Most international protocols use an emission factor of zero for wood, landfill gas, wood waste, and other biomass fuels in which the carbon is *entirely* biogenic.

That being said, we agree that fossil fuel sources of energy used to *produce* or *transport* the fuel, as well as *landuse carbon intensity* implications of energy crops, need to be included in calculating the overall carbon intensity of the fuel -- as you have done and are doing. But the molecule of CH4 that is burned -- either by the flare or by the vehicle -- is totally of biogenic waste material origin. I really need your help to shed some light on this issue.

To do otherwise has significant ramifications for other sources of bio-fuels and energy -- particularly those derived from biogenic waste materials. Does this mean that the CO2 emitted in the combustion of fuels that are totally derived from biogenic waste sources must be counted as a source of CO2 emissions? Does this mean that in order to calculate the carbon intensity of a biogenically derived fuel we must *speculatively* track the derivation of the fuel back to the point that the original biogenic waste material would have otherwise produced CO2 had it not been used as fuel -- in order to use these CO2 emissions to offset the biogenic fuel CO2 emissions?

How would you handle the calculation of carbon intensity of CNG produced from an in-vessel anaerobic digester that handles urban green waste and food wastes that would otherwise be sent to landfills or composting facilities? Would you still count the CO2 emissions from the burning of the AD produced CNG in the vehicles? Would you have to perform a comprehensive lifecycle assessment to *speculatively etimate* where the green wastes and food wastes would have gone had they not been sent to the anaerobic digester. What assumptions would you have to make about the fraction of carbon that would otherwise be converted to CO2 or methane at a composting or landfilling operation? How could you ever be certain how the waste would have otherwise been managed had it not gone to the anaerobic digestion unit?

Why is all this necessary if we can just agree that the source of the CNG (or LNG) fuel *molecule* is totally biogenic and "carbon neutral". The fossil fuel emissions associated with the production and transport of the fuel, as well as land use carbon intensity implications of energy crops, would be added in separately to determine the overall carbon intensity of the biogenically produced fuel.

In a related matter, WM and Linde-BOC have partnered and are working with the Gas Technology Institute to construct a landfill gas to LNG plant at our Altamont landfill in Alameda County which will be up and running in 2009. Attached is a fact sheet on this project. Will a similar lifecycle analysis be performed by CEC/ARB for LFG to LNG? We believe that this project will have even a lower carbon footprint due to the fact that most, if not all, of the electricity required to run the LFG to LNG project will be derived from landfill gas to energy engines. Some of the vehicles using the LNG may be fueled directly at the Altamont landfill. Others may be fueled in East SF Bay cities, but the LNG could be trucked there using LFG to LNG transport vehicles. What does WM and Linde BOC need to do to make sure the carbon intensity of the fuel produced by this project will be properly recognized?

Please advise me if there is a time that we can call or meet to further discuss these matters further. Thanks.

<<100808lcfs_lfg.pdf>> <<Fact Sheet 09_26_08.doc>>

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