the Center for a Competitive Waste Industry
A PROJECT OF NEW FOUND LANDS

April 22, 2009

Hon. Mary Nichols, Chair
California Air Resources Board
1001 "I" Street
Sacramento, California 95814

Re: Low Carbon Fuel Standard – Landfills
Reply to Staff Analysis and Industry Coalition Letter dated April 6, 2009

Dear Chairperson Nichols:

Among the highly controverted issues before the Board and addressed in this letter is how to account for the carbon related to landfill gas that is used to produce compressed natural gas (CNG). Your decision here will determine whether the Board's efforts, intended to reduce greenhouse gas emissions in California's transportation sector, will instead increase overall greenhouse emissions (GHG) when the necessary implications in non-transportation sectors are considered.

Commendably, the Air Board has recognized in the parallel case of corn-based ethanol that the boundary lines for analysis must encompass all affected sectors, and not be encumbered by horse blinders. For, a refusal to contemplate the big picture, as illustrated in that case, results in subsidizing a strategy whose overall impacts actually significantly increase net GHGs. If that insight is permitted to continue to be lost on the landfill question, the result would be exceedingly counterproductive.

Staff analysis ignores major greenhouse gas releases from landfills

Landfills normally release major volumes of methane (CH_4) into the atmosphere, and, equally important, when landfills are modified to optimize energy production, substantial additional volumes of methane are created, of which proportionately more escapes.

Over the prolonged period that gas generation from municipal solid waste (MSW) extends, each ton is anticipated to produce approximately 315 pounds of methane. For California's annual 42.2 million tons of MSW, that normally totals 6.6 million tons of CH_4 associated with each year's discards. When sites are converted to energy production, the near term production of methane concentrations in landfill gas is increased by approximately one-third, and, to an unknown degree, gas collection efficiency is degraded and some future gas generation is shifted to the present.

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Furthermore, methane is an especially potent greenhouse gas with 25 times the warming impacts of carbon dioxide (CO_2), and in the short term that we confront a tipping point, more than 72 times CO_2. Thus, the lifetime generation of methane from just one year's output of wastes has an impact equivalent to 165 million to 475 million tons of carbon dioxide, depending upon whether the long term or short term issues are under consideration.

Because a modern landfill exceeds the volume of 100 to 200 football stadiums sprawled across hundreds of acres, and because most gases are generated before and after functioning gas collection systems are in place, no one actually knows how much of that 165 million to 475 million tons of CO_2E escapes into the atmosphere. The U.S. Environmental Protection Agency (US EPA) assumes 75% is collected, EPA-Region 9 assumes a 30% capture rate, and the International Panel on Climate Change (IPCC) states that capture "may be as low as 20%."

The wide difference in assumptions lies in the use of dramatically different definitions. US EPA defines capture rates based upon what they guess the best systems should achieve during the limited time gas collection is functioning. The IPCC states that if instead performance is defined as the average, not best, and over its entire lifetime, not just best-in-time, the lower value is indicated. Thus, long term landfill uncontrolled GHG emissions from each year's garbage telescoped back to today range from approximately 41 million to 132 million tons, and in the short term, from 119 million to 380 million tons, depending upon the definitions used.

Yet, the staff position is that these hundreds of millions of tons of carbon dioxide-equivalent emissions from the annual burden of trash in California should be ignored – just like corn ethanol proponents contend that its impact on presently untilled lands should not be considered – to wit:

> "[I]t is assumed that no L[and [F]ill] G[as] leaks during the recovery process." (Detailed California-Modified GREET Pathway for Compressed Natural Gas from Landfill Gas, at p. 9).

The GREET model used for analyzing transportation fuel alternatives does not support such an assumption. Rather, staff acknowledges that the "[l]andfill gas to CNG pathway is not available in the original Argonne GREET model but has been coded into the CA-GREET model" with the staff's assumption that "no LFG leaks." (Modified GREET, at pp. 2 and 9.)

That assumption is not in accord with the principles Argonne used to model a life-cycle analysis, i.e. one that encompasses all up and down stream impacts over the relevant time period:

> "Designed to analyze energy and emission effects of new transportation technologies and the use of alternative transportation fuels, GREET evaluates technologies on the basis of what is commonly referred to as the *'total energy cycle*.'" (emphasis added)

The agency's modified model needs to be corrected to analyze the life cycle impacts of landfill gas to CNG, including the pathways accounting for very large methane emissions. Otherwise, major sources of greenhouse gases, whose potency may overwhelm claimed benefits, will be ignored.

Landfill methane emissions are not fixed

The defense for ignoring landfills' lifetime emissions essentially rests upon the unsupported and incorrect claim that the generation and emissions of methane from landfills are fixed. Therefore, the claim continues, adding more subsidies for landfilling through the LCFS program will not methane emissions, but rather would only encourage more of the latent energy value in landfill gas to be utilized as an alternative for transportation fuels.

This recitation in no way conforms with the facts. For one thing, of all the alternatives for managing our organic discards, only landfilling generates significant uncontrolled methane as a byproduct of their decomposition. Over 100 programs in North America, including 42 in California, have demonstrated the practicality of diverting as much as 70% of the organic stream away from landfills. Burying garbage is the only management option that generates substantial volumes of uncontrolled methane, a significant part of which escapes.

With methane's 25× to 72× potency, there is no conceivable set of assumptions which avoided carbon dioxide emissions from LFG to CNG would exceed the warming impact from the methane that escapes. Since none of the organics processing alternatives produce significant uncontrolled volumes of methane in the first instance, diversion is always a substantially more effective strategy to reduce net GHGs than recovering energy from landfill gas.

Yet the effect of undercounting LFG to CNGs carbon intensivity will be to subsidize disposal and, thereby, increase the hurdle for those same non-methane generating alternatives to be economically justified. A few cities may chose to divert their organics for environmental purposes even when landfilling is cheap. But, most will be guided by the comparative economics. Staff's factually unsupported position will lead to more net GHG emissions than would occur absent the LCFS program.

Moreover, for another, making matters worse, landfills operated for energy recovery are not managed the same as traditional sites, because the latter are too dry to produce gas with enough high Btu methane to be economically useful. By delaying installation of the final cover and other strategies, moisture is increased, boosting methane concentrations and overall gas production, but at the expense of degraded collection efficiency. This generally unknown fact among the public is widely acknowledged by the industry:

> "Furthermore, a site with a collection system that is used solely for energy recovery is usually not capable of achieving as high a collection efficiency as compared to one that is compliant with NSPS regulations." (Solid Waste Industry for Climate Solutions, *Current MSW Industry Position and State-of-the-Practice on LFG Collection Efficiency, Methane Oxidation, and Carbon Sequestration in Landfills* (Jul 2007), at 10.)

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> "[Overpulling] and other related strategies can lessen surface emission (to extents somewhat difficult to measure and quantify) and achieve better gas recovery and quality (more easily quantified). However they can reach points of diminishing returns. In the case of increasing extraction or "overpull" relative to generation, air entrainment inhibits methane generation. And with overpull, dilution of landfill gas with air can limit certain energy uses." (Don Augenstein et. al., Improving Landfill Methane Recovery – Recent Evaluations and Large Scale Tests, Presentation to Methane to Markets Partnership Expos (2007), at p. 3.)

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> "Gas recovery efficiency is maximized [when] header pipeline methane [concentration is] at 40 to 50% (rather than 50 to 60 percent, suggesting tuning wells for maximum recovery." (SWANA, *Comparison of Models for Predicting Landfill Methane Recovery* (1998), at p. 2-3.)

This is why further claims in defense of the staff report in connection to existing wastes are also not valid. They argue that for waste-in-place, the non-methane producing alternatives do not exist, and for that reason, the comparison here is between energy recovery and flaring the gas. Of course, the proposed rule does not restrict LFG to CNG's carbon footprint to gas only from new wastes, and therefore the defense is irrelevant to this case. But, even if the had restricted its reach to gas from previously buried trash, the comparison must also include the foregoing changes in operations that increase uncontrolled releases of methane.

While the options are constrained for waste-in-place, as noted, those who operate energy producing landfills' modify their practices in order to optimize revenues by creating substantially more methane, proportionately more of which escapes. In the case of new wastes, there are no realistic set of assumptions in which the warming influences from the potent methane that escapes would not overwhelm the benefits in avoided CO_2 emissions. Here there may be some assumptions within the zone of reasonableness that might alter the answer.

But, the point being is that, like demand for oil, the amount of methane released from landfills is a variable as a function of, among other things, landfill pricing, which will be affected by the staff's proposed carbon accounting.

The remedy does not lie in fixing inadequate landfill gas abatement

Others argue that if fugitive methane releases are a problem, that should be addressed directly by strengthening the emissions rules for landfills instead of "wasting" the energy value in captured landfill gas.

This claim is dubious in that those raising it are the same one's fiercely opposing efforts to do something elsewhere.

But, in any event, the larger point is that the same landfill geometry described earlier has defied efforts to reliable measure emission levels, without which strict regulation is impossible, as does the fact that much of the emissions occur when the owner is long gone.

There are some modest salutary prescriptive measures that could be adopted, such as closer well spacing and quicker installation of final covers. However, in addition to the fact that the staff has peremptorily refused to consider prescriptive standards, their imposition, which would keep the site dry for the foreseeable future, will also retard methane generation and make energy recovery impractical.

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For the foregoing reasons, we ask that the landfill section be removed from these standards. After the staff properly accounts for fugitive landfill gas impacts, landfills can be brought back on the table with the several other items slated to be treated outside the rule.

Sincerely,

CENTER FOR A COMPETITIVE WASTE INDUSTRY

Peter Anderson

by:_____
Peter Anderson
Executive Director

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