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May 26, 2016

California Air Resources Board
1001 I Street
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Re: Proposed Short-Lived Climate Pollutant Reduction Strategy

Thank you for the opportunity to provide comments on the April 2016 *Proposed Short-Lived Climate Pollutant Reduction Strategy* (the Strategy). We fully support CARB's work to achieve deep reductions in the emissions of Short Lived Climate Pollutants (SLCPs). Covanta is a national leader in developing, owning and operating facilities that convert municipal solid waste ("MSW") into energy (energy-from-waste or "EfW" facilities). These facilities are internationally recognized as a source of greenhouse gas mitigation, including by the U.S. EPA,[1] U.S. EPA scientists,[2] the Intergovernmental Panel on Climate Change ("IPCC"),[3] the World Economic Forum,[4] the European Union,[5,6] CalRecycle,[7] and the Center for American Progress.[8] This GHG mitigation is achieved by displacing grid connected fossil-fuel fired electricity, recovering metals from the waste stream for recycling, and most importantly, by avoiding landfill emissions of methane, a key SLCP.

We support the diversion of organics from landfills to reduce emissions of methane, a potent SLCP. As identified in the recent Berkeley Law Center for Law, Energy & the Environment report (the "Berkeley Report"), diverting waste from landfills, particularly organics, can avoid the potent GHG methane, contribute to nutrient recycling and soil carbon, complement intermittent renewable energy sources, and support the development of renewable transportation fuels.[9]

Recent research underscores the need for proactive steps to reduce California's methane emissions, which may be greater than previously thought. According to a 2013 report prepared for CARB and CalEPA, "California's CH_4 emissions are estimated to be 1.30 – 1.74 times larger

than the current State total CH_4 emissions."[10] Two recently published manuscripts came to a similar conclusion for the L.A. area.[11,12] Despite the tremendous advancements made by CARB in regulating landfills, resulting in the most arduous standards in the nation, landfill emissions, at 20% of the state's inventory, are still significant.

The only sure way of reducing landfill methane emissions is to prevent their generation in the first place through landfill diversion. In fact, this approach has been followed with great success by the European Union, primarily through the Landfill Waste Directive, which calls for the reduction in landfilling of biodegradable wastes.[13] In fact, the proactive waste policies of the EU have been an overwhelming success in Europe's efforts to reduce GHG emissions: the waste sector achieved the largest relative reduction (34%) of any sector in the EU.[14] Both composting and AD have shown steady growth in the EU as a result of policies. Here in the U.S., President Obama's 2014 methane strategy includes diversion of food waste from landfills and its ability to reduce GHG emissions is well recognized by the U.S. EPA.[15,16]

Effective organics diversion will take support. When market conditions make it economical to landfill, waste naturally flows to landfills, which is the lowest cost option and the predominant market actor, taking 25 million tons of waste each year in California. As observed in the Berkeley Report, "cheap landfilling encourages waste management stakeholders not to explore other options." However, price is not the only barrier to organics diversion. We encourage CARB to address infrastructure needs, permitting, and appropriate policy design to facilitate organics diversion.

Accurate performance and evaluation metrics also play an important role in facilitating diversion. Therefore, we support CARB's continued efforts to better quantify fugitive methane emissions from major sources, including landfills. Proper measurement of landfill emissions, instantaneous gas collection efficiencies, and development of corresponding realistic and science based estimates on the lifetime efficacy of landfill gas collection is critical: it informs the lifetime benefits of landfill organics diversion. Conversely, inaccurate estimates of landfill emissions can have a chilling effect on the development of organics diversion projects.

For example, the recently proposed Greenhouse Gas Quantification Methodology for the CalRecycle Waste Diversion Grant and Loan Program (the "Methodology") overestimates the performance of landfills thereby underestimating the benefits of landfill diversion. The Methodology references a range of total lifetime landfill gas (LFG) *collection* efficiency of 70.0% - 78.5%, significantly higher than the *control* efficiency range, inclusive of the effects of soil oxidation, determined by CalRecycle of 57-70%.[17] CARB previously incorporated CalRecycle's results in its own analysis of avoided landfill methane emissions. [18]

The Methodology's systemic underestimation of the benefits of organics diversion is driven by high defaults for landfill gas collection and soil oxidation that are not supported by a diligent review of peer reviewed research. For example, the Methodology assumes that landfills on

average maintain a 95% collection efficiency for 90 years beginning in year eleven (11). However, in stark contrast, CARB itself concluded that landfill methane emissions, after implementation of the early action measure, could be reasonably expected to achieve an instantaneous collection efficiency of 85%.[19] A 2013 peer-reviewed paper authored by NOAA, UC-Davis, UC-Irvine, and Harvard scientists focused on methane sources in the L.A. basin, confirmed CARB's inventory approach for estimating landfill emissions, predicated on a 75% collection efficiency.[20] More background and supporting information on how the Methodology overestimates the efficacy of landfills can be found in Covanta's April 22nd comments on the Methodology.

Overestimating landfill performance will impede the success or organics diversion from landfills. While California has made great strides in managing landfills, they remain a major source of emissions that will continue long into the future. Landfills don't measure their emissions, they model them and these models are very sensitive to assumptions. One study found the typical landfill emissions model used underestimated emissions.[21] Given the uncertainty around the magnitude of landfill emissions, the long term nature of landfill emissions and the increasing cost of carbon over time, and the uncertainty regarding long term landfill maintenance, a strong case can be made for discounting the default efficacy of landfill gas control, to better assure that policies are protective of the environment.

Lastly, we also support the judicious and sustainable use to biomass to energy facilities as a tool to help mitigate forest and agriculturally related sources of black carbon emissions. Biomass to energy facilities can help sustain a market for low value thinnings, slash, and other forestry residues that can help minimize fuel loads in managed forests and thereby reduce the risk of severe and catastrophic forest fires.

Thank you very much for the opportunity to comment. Please let us know if you have any additional questions and thank you for your work on this important issue.

Sincerely,

Michael E. Van Brunt

[1] U.S. EPA Office of Solid Waste, Air Emissions from MSW Combustion Facilities, http://www.epa.gov/osw/nonhaz/municipal/wte/airem.htm#7

[2] Kaplan, P.O, J. DeCarolis, and S. Thorneloe, 2009, Is it better to burn or bury waste for clean electricity generation? *Environ. Sci. Technology* 43 (6) pp1711-1717. Available at: http://pubs.acs.org/doi/abs/10.1021/es802395e

[3] EfW identified as a "key mitigation measure" in IPCC, "Climate Change 2007: Synthesis Report. Contribution of Work Groups I, II, and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change" [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp. Available at: http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm

[4] EfW identified as a key technology for a future low carbon energy system in World Economic Forum. *Green Investing: Towards a Clean Energy Infrastructure.* January 2009. Available at: http://www.weforum.org/pdf/climate/Green.pdf

[5] EU policies promoting EfW as part of an integrated waste management strategy have been an overwhelming success, reducing GHG emissions over 72 million metric tonnes per year, see European Environment Agency, *Greenhouse gas emission trends and projections in Europe 2009: Tracking progress towards Kyoto targets* *http://www.eea.europa.eu/publications/eea_report_2009_9*

[6] European Environmental Agency (2008) Better management of municipal waste will reduce greenhouse gas emissions. Available at: http://www.eea.europa.eu/publications/briefing_2008_1/EN_Briefing_01-2008.pdf

[7] CalRecycle. 2012. CalRecycle Review of Waste-to-Energy and Avoided Landfill Methane Emissions. Available at: http://www.calrecycle.ca.gov/Actions/PublicNoticeDetail.aspx?id=735&aiid=689

[8] Center for American Progress (2013) Energy from Waste Can Help Curb Greenhouse Gas Emissions http://www.americanprogress.org/wp-content/uploads/2013/04/EnergyFromWaste-PDF1.pdf.

[9] Berkeley Law Center for Law, Energy & Environment (2016) *Wasting Opportunities: How to Secure Environmental & Clean Energy Benefits from Municipal Solid Waste Energy Recovery* https://www.law.berkeley.edu/wp-content/uploads/2016/05/Wasting-Opportunities.pdf

[10] Fischer & Jeong (2013) *Inverse Modeling to Verify California's Greenhouse Gas Emission Inventory*, prepared for CARB and CalEPA.

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

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

[13] EU (European Union) (1999) Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste. *Official Journal of the European Communities*. L182, 42, 1–19.

[14] European Environment Agency, *Greenhouse gas emission trends and projections in Europe 2009: Tracking progress towards Kyoto targets* *http://www.eea.europa.eu/publications/eea_report_2009_9*

[15] White House (2014) *Climate Action Plan Strategy to Reduce Methane Emissions* https://www.whitehouse.gov/sites/default/files/strategy_to_reduce_methane_emissions_2014-03-28_final.pdf

[16] See p52116 of U.S. EPA (2015) Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills, *Federal Register*, **80**, 166 (August 27, 2015), 52100 – 52162.

[17] CalRecycle. 2012. CalRecycle Review of Waste-to-Energy and Avoided Landfill Methane Emissions. Available at: http://www.calrecycle.ca.gov/Actions/PublicNoticeDetail.aspx?id=735&aiid=689

[18] See Table 5 of *California Air Resources Board (2014) Proposed First Update to the Climate Change Scoping Plan: Building on the Framework, Appendix C – Focus Group Working Papers, Municipal Solid Waste Thermal Technologies*

[19] California Air Resources Board (CARB 2009b), *Staff Report: Initial Statement of Reasons for the Proposed Regulation to Reduce Methane Emissions from Municipal Solid Waste Landfills, Appendix D: Evaluation of Landfill Gas Collection Efficiency,* May 2009. Available at: http://www.arb.ca.gov/regact/2009/landfills09/isor.pdf

[20] 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.

[21] Amini, H.R., D. Reinhart, A. Niskanen (2013) Comparison of first-order-decay modeled and actual field measured municipal solid waste landfill methane data, *Waste Management* **33:** 12 (December 2013), 2720 – 2728.