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California Air Resources Board
1001 I Street
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Re: December 21, 2016 Proposed Amendments to the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulation

Thank you for the opportunity to provide comments in response to the California Air Resources Board's (CARB's) December 21st Proposed Amendments to the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulation (the "Proposed Regulation"). We fully support CARB's work to reduce greenhouse gas emissions in the state and the continuation of the Cap and Trade program post 2020. Covanta is a national leader in developing, owning and operating facilities that convert municipal solid waste ("MSW") into renewable energy (waste-to-energy facilities). We operate two such facilities in California, one located in Stanislaus County and the other located in the City of Long Beach.

We support the proposal to retain the limited exemption for waste-to-energy ("WTE") facilities through the end of the 2nd compliance period. The three WTE facilities in California help reduce GHG emissions relative to landfilling and landfills continue to be excluded from the cap. Inclusion of WTE in the cap in the 2nd compliance period would impose a significant economic penalty on WTE relative to landfilling, putting the continued operation of these facilities in jeopardy, despite their benefits.

The GHG benefits of WTE relative to landfilling are well recognized, including by CalRecycle,[1] CARB,[2] the Center for American Progress,[3] Third Way,[4] a 2016 report from the Berkeley Law Center for Law, Energy & the Environment,[5] U.S. EPA,[6] U.S. EPA scientists,[7] the Intergovernmental Panel on Climate Change ("IPCC"),[8] the World Economic Forum,[9] and the European Union,[10,11] WTE facilities are not covered under the EPA's new Clean Power Plan:[12]

WTE facilities are considered zero carbon power under the CPP's accounting structure and new WTE facilities are eligible to generate Emission Rate Credits (ERCs).[13] The conclusions of these organizations and government entities is consistent with the scientific literature, as demonstrated by the conclusion reached by Joint Institute for Strategic Energy Analysis (JISEA)[a] scientists:

> "Life cycle assessment studies published in the literature have generally been consistent in suggesting that MSW combustion is a better alternative to landfill disposal in terms of net energy impacts and CO2-equivalent GHG emissions. The results from this study match that expectation. In this report, WTE leads to a higher reduction in emissions compared to landfill-to-energy disposal per kWh production."[14]

The recognition given to WTE is in large part a result of its ability to avoid emissions of the potent GHG methane. WTE's climate benefits are even more striking in light of methane's role as a short lived climate pollutant ("SLCP"). New data show that the methane emitted by landfills and other sources is even more damaging than previously thought. Methane is the second largest contributor to global climate change.[15] Methane has a much larger climate impact than previously reported and its atmospheric concentrations continue to rise (Figure 5).[16] According to the IPCC's 5th Assessment Report, methane is 34 times stronger than CO_2 over 100 years when all of its effects in the atmosphere are included and 84 times more potent over 20 years.[17]

In response to the growing concern about methane and other SLCPs, CARB has developed a *Proposed Short-Lived Climate Pollutant Reduction Strategy* for California. The use of a the 20-year global warming potential of 72, nearly three times larger than the GWP used in CalRecycle's 2012 analysis, further underscores the benefits of EfW relative to landfilling:

> "The use of GWPs with a time horizon of 20 years better captures the importance of the SLCPs and gives a better perspective on the speed at which SLCP emission controls will impact the atmosphere relative to CO_2 emission controls."[18]

California's WTE facilities provide other important benefits as well. The facilities in Long Beach and Stanislaus are the only two locations in California permitted to destroy narcotics. Since 1988, the Southeast Resource Recovery Facility ("SERRF") in Long Beach has destroyed 11.2 million pounds of confiscated narcotics and drug paraphernalia for over 121 cities, counties, state, and federal law enforcement agencies. Stanislaus has processed over 216 tons of

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[a] The Joint Institute for Strategic Energy Analysis (JISEA) is operated on behalf of the U.S. Department of Energy's National Renewable Energy Laboratory (NREL), the University of Colorado-Boulder, the Colorado School of Mines, the Colorado State University, the Massachusetts Institute of Technology, and Stanford University.

confiscated narcotics, firearms and drug paraphernalia in 2016 for over a 100 cities, counties, state and federal law enforcement agencies.

Path Forward for 3rd Compliance Period

We recognize that the GHG benefits of WTE relative to landfilling may change, especially in light of SB1383 and other steps taken by CARB, CalRecycle, and the Legislature to encourage the diversion of organics from landfills. As more organics are diverted from landfills, landfills will begin to generate, and emit, less methane. This is an outstanding result for the environment, both in terms of more sustainable waste management and lower GHG emissions. We believe WTE will continue to have a valuable role to play as part of an integrated waste management strategy; however, the particular climate benefits achieved by WTE relative to the states' landfills will likely change over time.

We further recognize that CARB needs a long term approach for the equitable treatment of waste management under the cap and trade program to meet the directives of CARB Board Resolutions passed in October 2011 and September 2012. Over the short-term, these resolutions resulted in the previous exemptions for WTE facilities which are currently proposed to extend through 2017. However, a long term solution that "aligns with statewide waste management goals [and] provides equitable treatment to all sectors involved in waste handling"[19] and represents a "comprehensive approach for the most appropriate treatment under the cap and trade program for all end of life management options for MSW"[20] is still needed. Such a solution needs to consider the regulatory approach of the program, organics diversion and other changes to the waste stream, and the continued exclusion of landfills from the cap & trade program until at least 2025 provided by SB1383.[21]

In response, we are proposing a long-term solution that would include WTE facilities in the cap beginning with the 3rd compliance period in 2018 with a provision for allowances to be granted on the basis of the output-based allocation approach outlined in the regulation. This approach will both include WTE in the cap and trade program and provide a more level and equitable playing field in the waste management sector over the long-term, thereby preventing emissions leakage out of the cap to landfills, without including landfills in the cap (an action that, while equitable when properly implemented, is prohibited by SB 1383 until 2025).

Output-Based Allowance Allocation Proposal

We propose that WTE be allocated allowances consistent with §95891 of the Proposed Regulation through the development of a benchmark (B_a) for the management of MSW remaining after recycling. Based on current practices (over 97% of California's waste remaining after recycling is disposed in landfills),[22] we propose the benchmark be set on the basis of managing MSW in landfills. Unlike other benchmarks, however, we propose the MSW benchmark be subject to change over time to account for the demonstrated decreasing share of

organics in the waste stream as a result of organics diversion efforts. We propose that benchmark be calculated on the basis of the fraction of anaerobically degradable organic carbon (%ANDOC) present in the waste stream as determined through the most recent waste characterization study prepared by CalRecycle, adjusted to represent the waste processed at the WTE facility (Equation 1). For example, WTE facilities in California do not typically take construction & demolition (C&D) or most bulk items. This variability in the benchmark is necessary to ensure that it accurately reflects the decreasing amount of methane generated from landfills as a result of changes to the waste stream. The use of the CalRecycle waste characterization study ensures that the benchmark would be tied to regularly updated and publically available data.

$$B_a = 90\% \times \%ANDOC \times 5.95\ t\ CO_2e/ton\ ANDOC \quad (1)$$

Where:

90%	=	Stringency factor[b]
%ANDOC	=	Anaerobically degradable organic carbon as a mass % of waste (ton carbon / ton waste) (*Variable*, based on latest CalRecycle waste characterization report, adjusted for wastes not taken at specific WTE facility, e.g. C&D, most bulky items)
5.96	=	Metric tonnes of CO_2 equivalents per ton of ANDOC, calculated from CalRecycle (2012) *Review of Waste-to-Energy and Avoided Landfill Methane Emissions* (*Constant*)[c]

Consistent with the allowance allocation equation in §95891(b), we propose the benchmark be used together with the annual waste throughput at the WTE facility and the appropriate cap adjustment and assistance factors from the Proposed Regulation to determine the allowances provided to WTE facilities (Equation 2).

$$Initial\ Allocation_{WTE} = O_{t-2} \times B_a \times AF \times c_t + Metals\ Allowance \quad (2)$$

Where:

O_{t-2}	=	Waste throughput at WTE facility
B_a	=	Benchmark Factor for waste disposal / transformation, based on organics fraction in disposed waste

[b] 90% stringency factor is in accordance with Appendix J to October 28, 2010 Initial Statement of Reasons for the Proposed Regulation to Implement the California Cap-and-Trade Program

[c] CalRecycle reported average total landfill emissions of 0.53 t (metric ton) CO_2e / ton waste, based on a methane global warming potential (GWP) of 25, and an adjusted 8.9% ANDOC. Dividing the total landfill emissions by the adjusted % ANDOC provides a factor that can be applied to wastes with different %ANDOC. The calculation of this factor is as follows: (0.53 t CO_2e / ton MSW) / (0.089 ton ANDOC / ton MSW) = 5.96 t CO_2e / ton ANDOC.

AF	=	Assistance Factor, 100% based on high risk for leakage
c_t	=	Cap adjustment factor from Table 9-2, for sectors with process emissions greater than 50%

WTE facilities have little ability to control the amount of stack GHG emissions subject to the cap and trade program. The emissions from the transformation of MSW are dependent on the waste composition, most notably the overall carbon content, and the fraction of carbon that is from biologically derived materials, neither of which can be readily controlled by the WTE owner or operator.

Therefore, in order to provide an opportunity for WTE facilities to reduce their regulated GHG emissions while achieving a tangible and quantifiable environmental benefit, we propose that allowances be granted for the recovery of metals. Such an approach would incentivize the installation of advanced metals recovery technologies at WTE facilities, which, by recovering additional metals from the waste stream that would have otherwise been lost in landfills, result in net GHG benefits from the avoidance of GHG emissions that would have occurred during the manufacture of metals from raw materials. Although these GHG reductions do not occur at the WTE facility, they are a direct result of the recovery equipment installed, and the actions taken, at the WTE facility.

The metals allowance should be calculated on the basis of the actual metals recovery at a WTE facility multiplied by U.S. EPA GHG savings factors for metals recycling (Equation 3). Consistent with the cap and trade program, the allowances would be subject to a stringency factor and the cap adjustment factors.

$$Metals\ Allowance = 90\% \times c_t \times AF \times (R_{Fe} \times f_{Fe} + R_{Non-Fe} \times f_{Non-Fe}) \quad (3)$$

Where:

90%	=	CARB stringency factor
c_t	=	Cap adjustment factor from Table 9-2,[d] for sectors with process emissions greater than 50%
R_{fe}	=	Recovery of ferrous metals (tons)
$R_{Non\text{-}Fe}$	=	Recovery of non-ferrous metals (tons)
f_{Fe}	=	GHG Benefit factor for ferrous metals recycling, 1.81 t CO_2e / ton Fe metal[23]
$f_{Non\text{-}Fe}$	=	GHG Benefit factor for non-ferrous metals recycling, reflecting 80% aluminum and 20% copper, 8.2 t CO_2e / ton non-Fe metal[24]

[d] The Proposed Regulation no longer specifically identifies "Sectors with Process Emissions Greater Than 50%" within the headings to table 9-2, but specifies NAICS codes which include "activities with over 50 percent of total emissions from process emissions and a high leakage risk classification in Table 8-1." We are proposing that the NAICS code for municipal waste combustion, 562213, be added to the heading of Table 9-2.

Selection of Appropriate Assistance and Cap Adjustment Factors

WTE facilities face a high leakage risk. The three WTE facilities in California operate in a highly competitive environment with landfilling. Landfills have a near monopolistic market share of 97% of the post-recycled waste management services provided in California. As a result, landfill operators exercise significant control over tip fees, or the price charged to dispose of a ton of waste. WTE facilities already charge higher tip fees than local landfill options,[25] and, as discussed earlier, landfills are not currently regulated under the cap and trade program and are explicitly protected from inclusion in cap and trade until 2025. Consequently, WTE facilities owners and operators have little ability to pass through costs from the cap and trade program to customers.

When looking strictly at stack GHG emissions without consideration of the net benefits of WTE, WTE facilities have a high emissions intensity. Using tip fees as a conservative and absolute upper bound for the "value-added" from post recycled waste management, the weighted average emissions intensity of the three WTE facilities in California is above the 5,000 t CO_2e / $M value added threshold for a "high emission intensity." In other words, the financial exposure to WTE operators is significant relative to the cost of service. The three WTE facilities face a potential 3rd period compliance cost collectively of over $14 million without allowances. If WTE received no allowances in recognition of their GHG mitigation or to mitigate leakage risk, municipalities using WTE facilities would face a significant compliance cost that would need to be met through raising fees (already demonstrated to be difficult in a marketplace dominated by landfills), cutting services, or sending MSW to landfills. Given the high leakage risk and the calculated high emissions intensity, we propose that the assistance factor associated with the high leakage risk classification from Table 8-1 of the Proposed Regulation be applied to the three WTE facilities in the 3rd compliance period.

Process emissions associated with the anaerobic decomposition of organics in landfills dominates the emissions from the waste management sector. As described above, landfills dominate the sector, managing 97% of the annual post-recycled MSW generated in the state. As a result, we propose that the cap adjustment factor for those activities with a high leakage risk classification and greater than 50% of total emissions from process emissions be applied to WTE facilities.

We believe that a long-term strategy and solution is necessary. Conceptually, landfills and WTE should be treated consistently with regard to GHG emissions, so that the cost of carbon for both process that manage post-recycled MSW can be accurately reflected, thereby providing the appropriate market signal. In an idealized market, this market signal would incentivize waste management options with the lower carbon intensity. Today, as is recognized internationally and by California, this more efficiency process is WTE.

However, landfills do not receive a market signal, nor will they be exposed to one until at least 2025. This significantly complicates creating a level playing field in the waste management sector, especially given that CARB plans to include WTE in the cap beginning in 2018. However, we believe the allowance mechanism outlined above can help approach a level playing field. While the approach subjects WTE to a compliance obligation in conflict with the understanding that WTE is preferable to landfills, allowances will help alleviate the financial burden on those communities who use and/or own WTE facilities, and, most importantly, help prevent leakage of emissions out of the cap to landfills. The approach operates within a system already established by the regulation and will expose WTE to a carbon price while providing some options for reducing financial exposure and reducing GHG emissions through metals recovery projects.

The approach is conservative: it relies on a long-term methane GWP which is less reflective of methane's short term impacts that are a key focus of the states' SLCP plan, it relies on an older methane GWP which underestimates even the long term impact of CH_4, and its recognition of WTE's benefits diminishes over time, not in consideration of a science-based reality, but in an effort to fit within the cap adjustment and assistance factor regulatory constructs. It also recognizes that the waste stream will change over time, as a result of the laudable efforts on the part of CARB, CalRecycle, and the state legislature to divert organics from landfills. Perhaps most importantly, the approach is performance-based: the calculation of allowances is based on actual emissions, waste processed, and demonstrated changes in the waste stream as revealed by CalRecycle's period waste characterization reports.

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, P.E.

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

[2] 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*

[3] 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

[4] Third Way (2014) *Power Book*: *Energy from Waste*, http://powerbook.thirdway.org/filter-web-app/energy-from-waste, accessed November 26, 2014.

[5] Berkeley Law Center for Law, Energy & the Environment (2016) *Wasting Opportunities: How to Secure Environmental & Clean Energy Benefits from Municipal Solid Waste Energy Recovery*. https://www.law.berkeley.edu/research/clee/research/climate/waste-to-energy/

[6] U.S. EPA Office of Solid Waste, Energy Recovery from the Combustion of Municipal Solid Waste (MSW), https://www.epa.gov/smm/energy-recovery-combustion-municipal-solid-waste-msw#EnergyRecovery, accessed January 20, 2017.

[7] 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. http://pubs.acs.org/doi/abs/10.1021/es802395e

[8] 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. http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm

[9] 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

[10] 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*

[11] 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

[12] 40 CFR 60.5845

[13] 40 CFR 60.5800

[14] Joint Institute for Strategic Energy Analysis (2013) *Waste Not, Want Not: Analyzing the Economic and Environmental Viability of Waste-to-Energy (WTE) Technology for Site-Specific Optimization of Renewable Energy Options*. http://www.nrel.gov/docs/fy13osti/52829.pdf

[15] 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., *et al.* (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_SPM_FINAL.pdf

[16] World Meteorological Organization (2014), *WMO Greenhouse Gas Bulletin: The State of Greenhouse Gases in the Atmosphere Based on Global Observations through 2013*, 10, September 9, 2014. Available at: https://drive.google.com/file/d/0BwdvoC9AeWjUd0lPWXBMU1VmNGc/view

[17] 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." See p714 & Table 8-7 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., *et al.* (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf

[18] CARB (2016) *Proposed Short-Lived Climate Pollutant Reduction Strategy* https://www.arb.ca.gov/cc/shortlived/meetings/04112016/proposedstrategy.pdf

[19] Board Resolution 11-32

[20] Board Resolution 12-33

[21] See Section 3(b) of SB 1383

[22] CalRecycle (2016) *State of Disposal in California, Updated 2016* http://www.calrecycle.ca.gov/Publications/Documents/1556/201601556.pdf

[23] See Exhibit 2-2 of U.S. EPA (February 2016) *Documentation for Greenhouse Gas Emission and Energy Factors Used in the Waste Reduction Model (WARM): Management Practices Chapters* https://www.epa.gov/sites/production/files/2016-03/documents/warm_v14_management_practices.pdf

[24] *Ibid.*

[25] See Figure 2 of CalRecycle (2015) *Landfill Tipping Fees in California*, http://www.calrecycle.ca.gov/publications/Documents/1520%5C20151520.pdf