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GARBAGE, POWER, AND ENVIRONMENTAL JUSTICE: THE CLEAN POWER PLAN RULE

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GARBAGE, POWER, AND ENVIRONMENTAL JUSTICE

The Clean Power Plan Rule

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TABLE OF CONTENTS

1. Introduction: History of Incineration and Environmental Injustice

The environmental justice movement in the United States is intimately tied to the siting of waste disposal facilities like hazardous waste landfills, trash transfer stations, and municipal solid waste incinerators. Since watershed moments like the Warren County landfill protests, where an African American community resisted the waste industry's targeting tactics to the infamous leaked Cerrell memo in California, the concentration and co-location of waste related activities in communities of color and low income communities has largely defined the relationship between waste, class, and race.[1] [2] Garbage incinerator facilities follow a similar trajectory of other waste related proposals in that they are often sited in close proximity to communities of color and low-income communities, thereby contributing to an already disproportionate environmental burden for these communities.[3] [4]

Waste incineration has taken many forms over the last thirty years. In the 1960s and 70s, as federal and state regulations around waste disposal into landfills became more stringent, and landfill space was becoming increasingly limited, incinerators became perceived as a viable alternative for waste disposal. In the 1990s, the deregulation of interstate waste exportation, further fueled the creation of larger regional waste facilities controlled by private companies who sought to rebrand themselves as "Waste to Energy" (WTE) facilities rather than "resource recovery facilities"[5]. Figure 1 illustrates the prevalence of these WTE facilities across the country built largely in the 1980s and early 1990s.[6] These facilities attracted trash from a larger regional waste-shed and aggressively pursued new opportunities for federal and state subsidies related to renewable energy.[7] These facilities have been marketed and sold to municipalities and the public as technologically advanced approaches to handling all manner of solid waste with the added bonus of producing energy from the steam generated by burning garbage.[8] But incinerator facilities in fact produce large amounts of air pollution such as nitrogen oxides (NOx), particulate matter (PM), dioxin, furans, as well as carbon dioxide.[9] Incineration facilities contribute higher levels of greenhouse gas (GHG) emissions than coal

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[1] Bullard, R., Mohai, P., Saha, R., & Wright, B. (2007). *Toxic wastes and race at twenty: 1987 – 2007*. Cleveland, OH: United Church of Christ.

[2] Bullard, R. (1990). *Dumping in Dixie: Race, class, and environmental quality* (Third edition ed.). Boulder, CO: Westview Press.

[3] Pulido, L. (2000). Rethinking Environmental Racism: White privilege and urban development in southern California. *Annals of the Association of American Geographers, 90*(1), 12-40.

[4] Ringquist, E. J. (2005). Assessing evidence of environmental inequities: A meta-analysis. *Journal of Policy Analysis and Management, 24*(2), 223-247.

[5] Engel, K. (1995). Reconsidering the national market in solid waste: Trade-offs in equity, efficiency, environmental protection, and state autonomy. *North Carolina Law Review, 73*(4), 1481.

[6] Michaels, Ted. (2014). The 2014 ERC Directory of Waste to Energy Facilities. Retrieved 11/5/2015, http://energyrecoverycouncil.org/wp-content/uploads/2016/01/ERC_2014_Directory.pdf, p. 6

[7] Wilson, M. (2006). Public funds up in flames: The incineration industry seeks renewable energy subsidies. *Multinational Monitor, 27*(5), 31

[8] Muller, N. Z., Mendelsohn, R., & Nordhaus, W. (2011). Environmental accounting for pollution in the united states economy. *American Economic Review, 101*(5), 1649-1675.

[9] U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. (2009). *Opportunities to reduce greenhouse gas emissions through materials and land management practices,*

plants and consume large amounts of energy when we consider the entire lifecycle of the materials that are burned in incinerators.[10]

The concentration of incinerators in low income and communities of color makes them necessarily an environmental injustice as they negatively impact the host communities where they are located through stack emissions, diesel emissions from sanitation trucks, reduced property values, and the general stigma of becoming a dumping ground for waste. [11] Incinerator facilities are widely rejected by communities for the following reasons:

- Produce harmful air pollution
- Produce toxic ash residue that must be landfilled
- De-incentivize recycling, source reduction and composting efforts that divert trash from incinerator facilities
- Undermine employment opportunities in waste diverting sectors
- Are very costly industries that require large capital investments that can put a financial strain on host communities asked to contribute to their development[12]

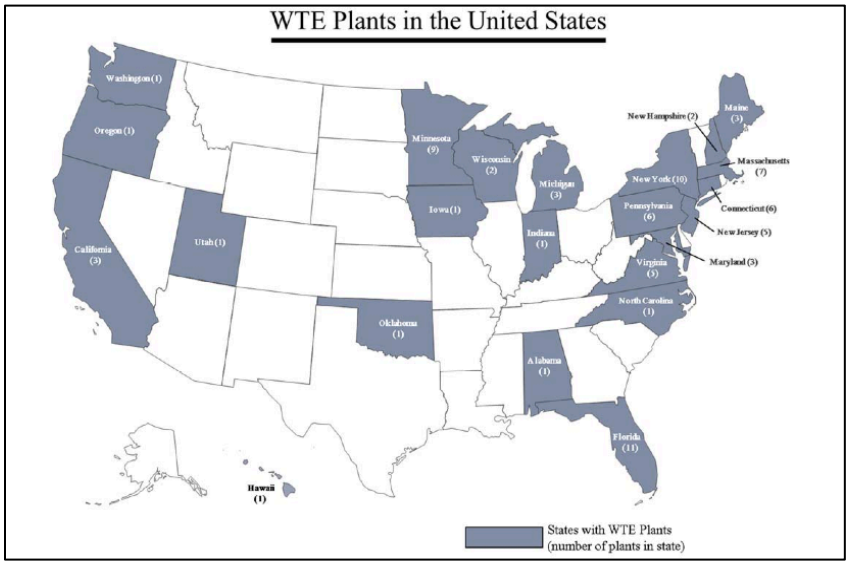

Figure 1. "Waste to Energy" Incinerator Plants in the U.S, Source Energy Recovery Council, Michaels, T. (2014)

Although local opposition to new incinerator proposals in the last twenty years have been largely successful, this industry continues to evolve new mechanisms to capture financial incentives and secure waste contracts that maintain their dominance in local and regional waste management systems. Recent proposals for incinerator facilities in places like Baltimore, Maryland, and Arecibo, Puerto Rico demonstrate the continued targeting of low income and communities of color for new facility siting.[13] The incineration industry continues to seek inclusion into state Renewable Portfolio Standards (RPS) where they can

[10] Vyvyan, H. C. (2009). *Statement of evidence, particulate emissions and health, proposed Ringaskiddy waste-to-energy facility.* GAIA.

[11] Lake, R. W. (1993). Planners' alchemy transforming NIMBY to YIMBY: Rethinking NIMBY. *Journal of the American Planning Association, 59*(1), 87-93.
Pulido, L. (2000). Rethinking Environmental Racism: White privilege and urban development in southern California. *Annals of the Association of American Geographers, 90*(1), 12-40

[12] Walsh, M., & Hurdle, J. (2013). Harrisburg sees path to restructuring debts without bankruptcy filing. *The New York Times.*

[13] DuBois, G. (2015, November 9). Curtis Bay Incinerator Progression Disappointing. *Baltimore Sun.* Retrieved 5/5/2016, from http://www.baltimoresun.com/news/opinion/oped/bs-ed-incinerator-construction-20151109-story.html
Earthjustice, 11/12/2015, *Puerto Rico Community Overburdened by Pollution Pushes Back on Incinerator Project*, Retrieved from website 5/5/2016, http://earthjustice.org/news/press/2015/puerto-rico-community-overburdened-by-pollution-pushes-back-on-incinerator-project

capture renewable energy subsidies.[14] There are currently 21 states where incinerators are considered "renewable energy" under state RPS programs.[15] Figure 2 illustrates the states where WTE is defined as renewable as part of their Renewable Portfolio Standard laws or other relevant state laws.[16]

The Clean Power Plan (CPP) has the potential to exacerbate this trend by considering portions of the solid waste stream burned in incinerators as carbon neutral and also allowing biogenic waste and biomass to serve as fuel sources for co-firing in traditional power plants. The CPP rule has the potential to incentivize an industry already known to disproportionately burden environmental justice communities while also diverting resources from truly renewable sources of energy production like solar and wind.

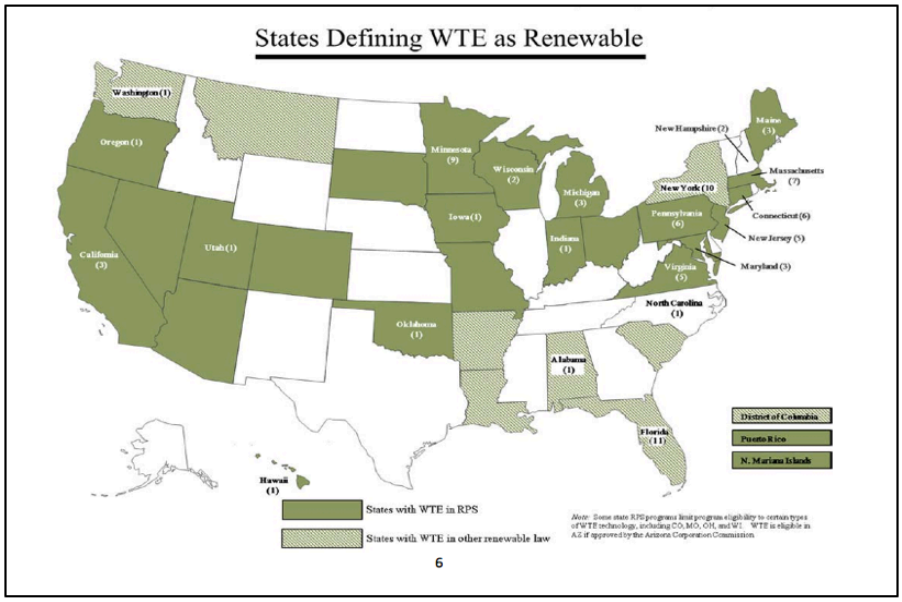

Figure 2: States with WTE as Renewable, Source, Energy Recovery Council, Michaels, T. (2014)

2. Incineration & Clean Power Plan

The Clean Power Plan (CPP), released by the Obama administration on August 3, 2015, signifies an important step towards mitigating climate change by cutting carbon emissions from power plants. The plan outlines standards for states to become compliant with state based carbon reduction mandates through state implementation plans or a federal implementation plan if states opt not to develop their own plans. Among these standards are designations for resources that are classified as 'renewable' and carbon reducing under the CPP framework. The definitions provided in the CPP, particularly those concerning waste and biomass incineration, can be considered contentious, especially from an environmental justice perspective.

[14] Madel, R. (2011). *A burning question: Should waste-to-energy qualify as renewable?* Retrieved 5/5, 2016, from http://www.huffingtonpost.com/robin-madel/a-burning-question-should_b_930837.html

[15] Center for Climate and Energy Solutions, BioPower Atlas, Retrieved 5/ 5/ 15, http://www.c2es.org/us-states-regions/key-legislation/renewable-energy-portfolios/details

[16] Michaels, Ted. (2014). The 2014 ERC Directory of Waste to Energy Facilities. Retrieved 11/5/2015, http://energyrecoverycouncil.org/wp-content/uploads/2016/01/ERC_2014_Directory.pdf, p. 6

2.1 What does the CPP rule say about Incineration?

The Clean Power Plan rule promulgated by the US EPA under the Clean Air Act (Section 111d)[17] mandates a 32% reduction of carbon dioxide emissions below 2005 levels from power plants by the year 2030.[18] Each state has a specific target rate or mass cap on their carbon dioxide (CO2) emissions and they can choose to reduce their emissions by either meeting a state-wide rate (lbs CO2/MWH) or a total mass cap (total tons of CO2) on their carbon dioxide emissions from Energy Generating Units (EGUs) in the power sector. Under this rule, states can designate the "best system of emissions reductions" based on three "Building Block" approaches. The three building blocks to achieve the emissions reductions include: [19]

- Building Block 1. Emissions reductions directly at coal plants
- Building Block 2. Shifting power production to less carbon intense generation (i.e. less coal, more natural gas)
- Building Block 3. Increase deployment of renewables (i.e. wind, solar)

Under Building Block 3, states can delineate CO2 emissions reduction substitutes for power plants under a rate-based plan. These substitutes can take the form of renewable energy that can offset CO2 emissions from affected plants. This section specifically describes such substitutions as: "*CO2 emission reduction measures that provide substitute generation for affected EGUs or avoid the need for generation from affected EGUs in rate-based state plans. These measures may be used to adjust the CO2 emissions rates of an affected EGU under a rate-based state plan."*[20] As part of this approach to achieving carbon dioxide reductions, the US EPA includes the consideration of the "***biogenic portion***" of municipal solid waste (MSW) incineration as carbon neutral and eligible for CO2 generation substitution in state plans.[21] In the specific Section VIII, Part K of the rule, subsection on Renewable Energy measures ***(c) Waste-to-energy***, the rule describes in detail the manner in which waste incineration can be considered carbon neutral:[22]

> When developing their plans, states planning to use waste-to-energy as an option for the adjustment of a CO2 emission rate should assess both their capacity to strengthen existing or implement new waste reduction, reuse, recycling and composting programs, and measures to minimize any potential negative impacts of waste-to-energy operations on

[17] US EPA, (2015). Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units: Final Rule, Federal Register, 40 CFR, Part 60, Volume 80

[18] US EPA, (2015). Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units: Final Rule, Federal Register, 40 CFR, Part 60, Volume 80, No. 205, October 23, 2015, Section VIII.K.1.c, p. 64900

[19] Doniger, D. (2015). *Understanding the EPA's clean power plan.* National Resources Defense Council, 11 Aug. 2015. http://switchboard.nrdc.org/blogs/ddoniger/understanding_the_epas_clean_p.html.

[20] US EPA, (2015). Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units: Final Rule, Federal Register, 40 CFR, Part 60, Volume 80, No. 205, October 23, 2015, Section VIII.K.1.c, *Additional considerations and requirements for rate-based state plans.* p. 64885

[21] *Materials typically considered biomass for pelletization include municipal solid waste (trash), construction/demolition wood waste, crop and animal wastes, energy crops, trees, gas from digestion of sewage sludge or animal wastes, and landfill gas. As such, biomass can include any non-fossil fuel that is arguably "organic" or biogenic*. Retrieved from the US EPA website 10/7/15, https://www3.epa.gov/climatechange/ghgemissions/biogenic-emissions.html

[22] US EPA, (2015). Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units: Final Rule, Federal Register, 40 CFR, Part 60, Volume 80, No. 205, October 23, 2015, Section VIII.K.1.c, p. 64899-64900

> such programs. States must include that information in their plan submissions. The EPA will reject as qualified biomass any proposed waste-to-energy component of state plans if states do not include information on their efforts to strengthen existing or implement new waste reduction as well as reuse, recycling and composting programs, and measures to minimize any potential negative impacts of waste-to-energy operations on such programs. **Only electric generation at a waste-to-energy facility that is related to the biogenic fraction of MSW and that is added after 2012 is eligible for use in adjusting a CO2 emission rate.**[23]

The final rule carves out only the "biogenic" portion of the waste stream burned in the generation of power at incinerators after 2012 as eligible for consideration in state plans.[24] This carve out reflects a significant modification from the proposed rule in which all waste feedstocks burned in incinerators for power generation were considered "carbon neutral". This provision was critiqued by a variety of stakeholders including more than a dozen organizations that signed a letter petitioning the Office of Budget and Management to review this section of the CPP due to the potential for incentivizing the burning of all waste streams, including fossil fuel derived plastics and other materials which do not have the same life cycle logic as biogenic waste that is sometimes deemed "carbon neutral".[25] Biogenic is defined as biologically-based material and biogenic CO2 is defined by the US EPA in the rule as carbon dioxide emissions from bioenergy and other biogenic sources that are generated during the combustion or decomposition of biologically-based material.[26]

2.2 What Are Key Concerns Related to Biogenic Waste in the CPP?

Biogenic Waste is Not Carbon Neutral

The inclusion of "biogenic" portions of energy generation from Municipal Solid Waste (MSW) streams for inclusion in State Implementation Plans means that these emissions are considered carbon neutral. This assertion that biogenic waste incineration is carbon neutral is problematic for several reasons. But first what is the rationale for this designation of carbon neutrality? The US EPA suggests that biomass and biogenic derived CO2 should be considered carbon neutral because it is a part of the existing carbon cycle that releases CO2 naturally. This rationale is countered by various stakeholders that point to the problem of time scale related to the carbon cycle.

> Some argue that the combustion of biomass releases no more CO2 than what would have been released naturally, and therefore, organizations using this form of energy should not be accountable for the resulting emissions. For example, utilizing logging residue to generate energy, rather than leaving the residue to decompose on the forest

[23] US EPA (2014). *Framework for assessing biogenic CO2 emissions from stationary sources*, Office of Air and Radiation Office of Atmospheric Programs, Climate Change Division.
[24] U.S. EPA (2013). Biogenic Waste definition, Retrieved 2/13/2016, https://www3.epa.gov/climatechange/downloads/Framework-for-Assessing-Biogenic-CO2-Emissions.pdf
[25] Partnership for Policy Integrity. (2015). *Municipal waste burning: More polluting than coal, but treated as zero-emissions in the clean power plan.* Retrieved 5/5, 2016, f http://www.pfpi.net/municipal-waste-burning-more-polluting-than-coal-but-treated-as-zero-emissions-in-the-clean-power-plan
[26] Ibid.

> floor following harvesting, likely would not cause emissions over and above that which would have taken place if the energy use did not occur. **The difference is that the length of time required for the residue to decompose is 10 to 15 years while combustion would likely release the CO2 in a shorter time frame.**[27]

The problem with qualifying biomass and biogenic waste as carbon neutral is that it does not consider the importance of the timeframe in relation to the re-sequestration potential and net increase of carbon into the atmosphere. The warming effect of the carbon released instantaneously via combustion rather than released and sequestered slowly over decades or more means that the 2030 carbon reduction goals of the CPP and the ability to mitigate climate change is undermined. The United Nations Environment Programme (UNEP) diverges from the USEPA in their analysis of the lifecycle logic of biogenic CO2:

> Climate change is time-critical – it is widely accepted that immediate reductions in global GHG emissions are essential to reduce the impact of climate change. The atmosphere does not differentiate between a molecule of biogenic CO2 and a molecule of fossil-derived CO2, therefore it appears logical that immediate efforts should be made to minimize emissions of all CO2 regardless of source. [28]

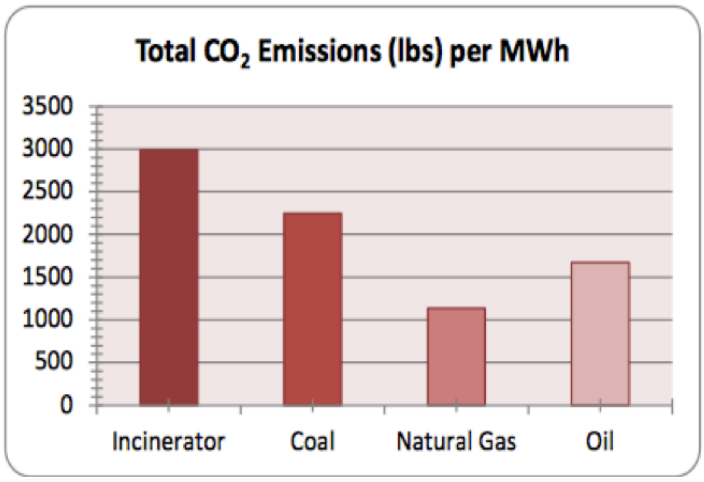

Figure 3: Total CO2 Emissions (lbs/MWH), Source Eco-Cycle Report (2011), p.12

Additionally, combustion of municipal solid waste (MSW) and biomass releases more carbon dioxide than coal and natural gas on a per kilowatt-hour basis. The US EPA estimates incinerators emit more CO2 per unit of electricity (2,988lbs/MWH) than coal-fired power plants (2,249 lbs./MWH)[29] as illustrated in Figure 3.[30] This makes waste a very poor fuel source for power generation. A report by Eco-Cycle points to the Intergovernmental Panel of Climate Change's (IPCC) CO2 reporting requirements that include both biogenic and non-biogenic greenhouse gas emissions when comparing electricity generation sources.[31] [32]

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[27] E3 Solutions. (2013). *Biogenic CO2 what is it, and what does it mean for your business?* Retrieved 5/5, 2016, from http://e3solutionsinc.com/home/index.php/top-resources/articles/171-biogenic-co2#edn2

[28] United Nations Environment Programme (2010). "Waste and Climate Change: Global Trends and Strategy Framework", p. 13

[29] US EPA "How Does Electricity Affect the Environment." Web. http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html.

[30] Eco-Cycle. (2011) Waste-of- Energy: Why Incineration is Bad for our Economy, Environment, and Community. p.12.

[31] Ibid.

[32] Platt, B., Ciplet, D., Bailey, K. M., & Lombardi, E. (2008). *Stop Trashing the Climate* Institute for Local Reliance, Available at www.stoptrashingtheclimate.org.

In addition to being more carbon intensive than coal, waste incineration is also more polluting than coal plants. According to the Energy Justice Network, "To make the same amount of energy as a coal power plant, trash incinerators release 28 times as much dioxin than coal, 2.5 times as much carbon dioxide (CO2), twice as much carbon monoxide (CO), three times as much nitrogen oxides (NOx), 6-14 times as much mercury, nearly six times as much lead and 70% more sulfur dioxides."[33]

Unlike carbon dioxide, pollutants such as particulate matter, dioxin, and nitrogen oxides have regional and local air quality impacts. If we consider that the majority of incinerator facilities are located in communities of color and low-income communities, and that air pollutants associated with these facilities play a role in contributing to the cumulative air pollution load in already burdened areas, the impacts of incentivizing this form of energy production may exacerbate air pollution in these communities.

Carbon Neutrality Leads to False Accounting of CO2

The carbon neutrality of biomass and biogenic waste leads to misleading calculations of the rate and mass based carbon goals for each state. The Partnership for Policy Integrity (PFPI), an organization with expertise in the field of biomass incineration, highlights that this accounting error can lead to a watering down of efforts to drive effective renewable energy options in states and potentially exacerbates climate change. PFPI details this accounting problem:

> EPA's equation for calculating the emissions rate at the state level only counts CO2 from fossil-fired electric generating units, even while it potentially credits megawatt-hours from biomass and waste-burning in the denominator. Under a mass-based compliance plan, the CO2 cap only includes emissions from fossil-fired electric generating units. So if bioenergy is used to generate electricity, emissions will be higher than they would be with coal, but won't be counted – they'll be "off the books."[34]

This CO2 accounting error risks not only exacerbating climate change but also de-incentivizing the shift to renewable energy sources that actually reduce net CO2 emissions.

2.3 Zero Waste is Key to Combating Climate Change

The climate mitigation potential of waste diversion through composting, recycling, anaerobic digestion, and source reduction is much greater than burning waste. The US EPA reaffirms this in the CPP by referring states that include WTE in their state plans to the waste hierarchy that promotes waste prevention over incineration. A 2008 report suggests that Zero Waste strategies have the potential to reduce the United State's greenhouse gas emissions by 7%.[37]

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[33] Energy Justice Network. *Trash incineration more polluting than coal.* Retrieved 5/5, 2016, from http://www.energyjustice.net/incineration/worsethancoal

[34] Ibid

[37] Platt, B., Ciplet, D., Bailey, K. M., & Lombardi, E. (2008). *Stop trashing the climate.* Institute for Local Reliance. Available online at www.stoptrashingtheclimate.org

> By reducing waste creation and disposal, the US can conservatively decrease greenhouse gas emissions by 406 megatons CO2 eq. per year by 2030. This zero waste approach would reduce greenhouse gas emissions the equivalent of closing one-fifth of the existing 417 coal-fired power plants in the US. This would achieve 7% of the cuts in the U.S. greenhouse gas emissions needed to put us on the path to achieving what many leading scientists say is necessary to stabilize climate by 2050.

The high carbon intensity of material extraction, production, and transport of consumer goods coupled with the specific carbon intensity of landfilling and incineration suggests that zero waste strategies would result in much greater carbon reductions than incineration. While the CPP targets the power producing industry, it undermines the greater goal of climate mitigation by incentivizing an industry that is carbon and energy intensive.

2.4 How Will the Waste Hierarchy Be Upheld by the Rule?

The CPP articulates some key concerns related to waste incineration and its impact on the US EPA's recommended waste hierarchy, which prioritizes reduction and recycling.[38]

> Increasing demand for electricity generated from waste-to-energy facilities could increase competition for and generation of waste stream materials - including discarded organic waste materials – which could work against programs promoting waste reduction or cause diversion of these materials from existing or future efforts promoting composting and recycling. The EPA and many states have recognized the importance of integrated waste materials management strategies that emphasize a hierarchy of waste prevention, starting with waste reduction programs as the highest priority and then focusing on all other productive uses of waste materials to reduce the volume of disposed waste materials[39]

In this section of the CPP rule, the US EPA clearly articulates one of the most serious potential pitfalls of including biogenic waste as carbon neutral under Building Block 3. Theoretically, existing incinerator facilities or new proposed facilities could be incentivized to increase their capture of the biogenic portion of the waste stream because of its carbon neutrality designation under the rule. While the CPP mandates that states including biogenic waste in their State Implementation Plans adhere to the waste hierarchy, they do not stipulate the type, scope, and content of the information required to demonstrate compliance with this provision.

> The EPA will reject as qualified biomass any proposed waste-to-energy component of state plans if states do not include information on their efforts to strengthen existing or implement

[38] US EPA, Sustainable Materials Management, Waste Hierarchy, Retrieved on 5/5/2016 from https://www.epa.gov/smm/sustainable-materials-management-non-hazardous-materials-and-waste-management-hierarchy

[39] US EPA, (2015). Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units: Final Rule, Federal Register, 40 CFR, Part 60, Volume 80, No. 205, October 23, 2015, Section VIII.K.1.c, p. 64900

> new waste reduction as well as reuse, recycling and composting programs, and measures to minimize any potential negative impacts of waste-to-energy operations on such programs.[40]

This raises several substantive questions about how states can meet the requirement to "*minimize any potential negative impacts of waste-to-energy operations*", including:

- What efforts would qualify as "strengthening existing efforts"? Would the inclusion of outreach materials and campaigns qualify? And if so how would such efforts demonstrate substantive "strengthening" of waste reduction outcomes?
- What efforts will qualify as measures to "minimize potential negative impacts" from these facilities?
- Will environmental justice concerns, including the contribution to cumulative, air pollution impacts in EJ areas be considered as *potential negative impacts*?
- What metrics will be used to quantify the effectiveness of new waste reduction measures?

The CPP leaves a great deal of ambiguity around how exactly states will comply with adherence to the waste hierarchy. States could submit plans that include soft strategies such as awareness campaigns that do little to divert waste from incineration yet capture the incentives under the rule to expand waste incineration. In states with already low waste diversion rates and weak strategies (i.e. lack of funding) for supporting composting and recycling, the CPP may create a market for biogenic waste incineration. Additionally, there are no requirements stipulating target diversion rates for different sectors of the waste stream (i.e. organic, non organic) that a state must demonstrate to show compliance with the recommended waste hierarchy. There is no maximum amount of biogenic material incinerators can burn as a percentage of total waste processed making it theoretically possible for waste incinerators to "cream" waste streams for biogenic waste content to generate the maximum carbon credit from their operations. Without clear and concrete metrics for how states can substantiate their adherence to the waste hierarchy, the final rule risks de-incentivizing organic waste diversion activities that produce better results for the climate and the environment.

2.5 How Will States Account for Biogenic MSW Energy Generation?

The CPP requires States to include a method for determining the biogenic portion of energy generation from waste incineration. [41]

> A state plan must include a method for determining the proportion of total MWh generation from a waste-to-energy facility that is eligible for use in adjusting a CO2 emission rate. The EPA will evaluate the method as part of its evaluation of the approvability of the state plan. Measuring the proportion of biogenic to fossil CO2 emissions can be performed through sampling and testing of the biogenic fraction of the MSW used as fuel at a waste-to-energy facility (e.g., via ASTM D–6866–12 testing or other methods—ASTM, 2012; Bohar, et al. 2010), or based on the proportion of biogenic CO2 emissions to total CO2 emissions from the facility. For an example of the former method, if the biogenic fraction of MSW is 50

[40] US EPA, (2015). Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units: Final Rule, Federal Register, 40 CFR, Part 60, Volume 80, No. 205, October 23, 2015, Section VIII.K.1.c, p. 64900

[41] Ibid

> percent by input weight, only the proportion of MWh output attributable to the biogenic portion of MSW at the waste-to-energy facility may be used to adjust an affected EGU CO2 emission rate. Alternatively, as an example of the latter method, if biogenic CO2 emissions represent 50 percent of total reported CO2 emissions, a facility would need to estimate the fraction of biogenic to fossil MSW utilized and the net energy output of each component (based on relative higher heating values) to determine the percent of the MWh output from the waste-to-energy facility that may be used to adjust an affected EGU's CO2 emission rate.

This section of the CPP requires "*sampling and testing of the biogenic fraction of the MSW used as fuel*" and also assumes a method for determining the percent by input weight of biogenic waste in WTE facilities. The rule does not stipulate how exactly this sampling should be conducted and verified across MSW facilities. MSW waste streams can vary significantly across facilities and time. The biogenic content of different plants and at different times of the year can be very heterogeneous. If a calculated average is used it may over represent the proportion of biogenic waste present in the waste stream at any one time.

While estimates vary on the exact proportion of MSW waste that is considered biogenic, generally non-biogenic waste, particularly plastics, have increased as a proportion of total waste over the last two decades in the US.[42] The EIA suggests that overall biogenic waste content in MSW has decreased in the last decade, "*The biogenic percentage of MSW continues to decrease, because of an increase in the consumption (and discarding) of non-biogenic materials, concurrent with the increased recovery of biogenic materials before they enter the waste stream as discards (more recycling). As a result, renewable energy generated by municipal solid waste continues to decrease as the consumption of plastics continues to go up, and biogenic waste is increasingly recovered and/or recycled.*"[43] [44]

Biogenic	Heat content (MMBtu/ton)
Newsprint	16
Paper	6.7
Containers and packaging	16.5
Textiles	13.8
Wood	10
Food waste	5.2
Yard trimmings	6
Leather	14.4
Average	**11.1**

Table 1: Heat Content of Biogenic Waste, Source, EIA website, US EPA MSW Fact Sheets

Estimates from the U.S. Energy Information Administration (EIA) suggest that 50-60% of municipal solid waste is biogenic and that, "*The biogenic material in MSW contributed about 52% of the energy from MSW that was burned in electricity-generating waste-to-energy facilities.*"[45] But the heat content of the many types of biogenic waste varies widely

[42] Gourmelon, G. (2015). Global plastic production rises, recycling lags. In L. Starke (Ed.), *The Worldwatch Institute Vital signs volume 22: The trends that are shaping our future,* Washington, D.C.: Island Press. pp. 91-95

[43] US Energy Information Administration (EIA). (2012). *More recycling raises average energy content of waste used to generate electricity.* Retrieved 5/5, 2016 from http://www.eia.gov/todayinenergy/detail.cfm?id=8010

[44] US Energy Information Administration. (2007). Methodology for Allocating Municipal Solid Waste to Biogenic and Non-Biogenic Energy. Washington, DC.

[45] U.S. Energy Information Administration, (2015) "Waste-to-Energy (Municipal Solid Waste)." *Energy Explained, Your Guide To Understanding Energy*. N. 14 Dec. 2015. Web. *http://www.eia.gov/Energyexplained/?page=biomass_waste_to_energy*

as does the overall biogenic proportion of the waste stream. For example, increased packaging in materials discarded during periods of high consumption (i.e. Christmas) and the uneven diversion rates of organics across regions can significantly diverge from averages reported annually or statewide. The EIA also breaks down the heat content of MSW materials and demonstrates the wide variation within the biogenic portion of the waste stream (see Table 1).[46] Changes in the composition of MSW can have significant effects in both the heat content and air pollution emissions related to the waste stream. Under the CPP, these variations in heat and waste stream content may mask the large fluctuations in the amount of bioenergy MSW facilities are actually producing at any one time, thus the method of sampling, calculating, and verifying the biogenic content of waste incineration facilities is an important consideration.

2.6 What Are the Environmental Justice Implications Of Waste in the CPP?

The CPP has significant qualifications for states that include waste incineration in their plans. Importantly, the electricity capacity related to the biogenic portion of energy generation at MSW plants must be from 2012 or later, which excludes most of the incinerators currently in operation. While the rule only applies to new or expanded generation after 2012, the rule may incentivize future expansions and new facility construction. One facility in West Palm Beach expanded their facility significantly in 2013 and would likely benefit from this provision. The Solid Waste Authority of Palm Beach in West Palm Beach, Florida, is currently building a second waste-to-energy facility that will increase its capacity by an additional 3,000 tons per day and generate an estimated 97 megawatts of electricity.[47]

[46] U.S. Energy Information Administration. (2012). *More recycling raises average energy content of waste used to generate electricity.* Retrieved 5/5, 2016 from http://www.eia.gov/todayinenergy/detail.cfm?id=8010

[47] The Solid Waste Association of North America (SWANA). (2011). *Waste-to-energy facilities provide significant economic benefits.* SWANA

While the potential for increased proposals for expansion or new construction of WTE facilities is uncertain, the allowance of biogenic waste incineration in State Implementation Plans means that environmental justice advocates must remain vigilant about proposals that try to capitalize on this incentive. Figure 4 illustrates the current stock of WTE facilities that generate electricity and can expand generation. There are currently 84 WTE facilities in the US across 21 states. Some of the recent battles over new incinerator development proposals are located in low income and communities of color in Puerto Rico and Maryland where they have been opposed by local communities invoking environmental injustice.[48] [49] Meanwhile, the incinerator industry see its inclusion in the CPP as an economic opportunity to incentivize the construction of new facilities. Regarding the CPP, Stephen J. Jones, President and CEO of Covanta, one of the world's largest owners and operators of WTE incinerator facilities states:

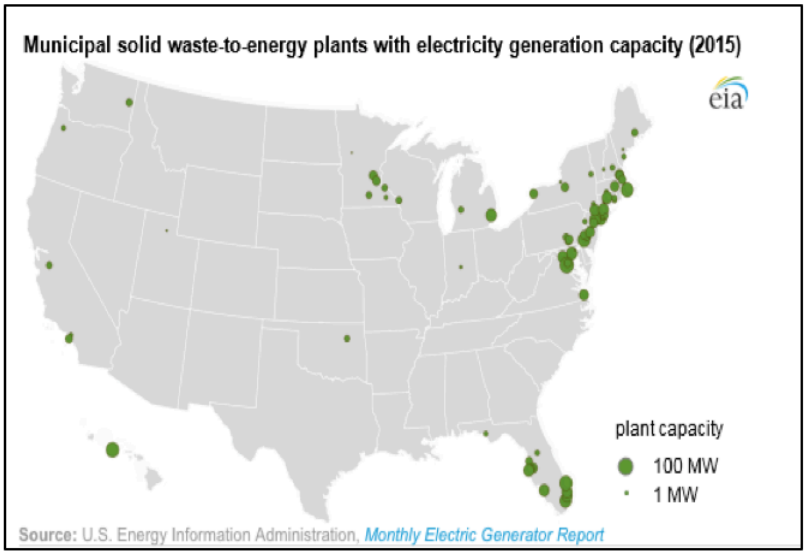

Figure 4: Municipal Solid Waste-to-Energy Plants with Electricity Generation Capacity (2015), from the US EIA.

> The Clean Power Plan is a significant step forward in addressing the urgent challenge of climate change and allows states to use flexible, affordable and reliable technologies like Energy-from-Waste to achieve carbon reduction goals.[50]

The biomass industry is already experiencing expansion trends with biomass generation currently increasing by an average of 3.1% per year, and after 2030, new dedicated biomass plants could account for most of the growth in generation from bioenergy sources.[51]

The CPP's treatment of biogenic waste incineration as carbon neutral may adversely impact climate change mitigation goals and further exacerbate pollution in overburdened environmental justice communities especially in those states where incinerators are already part of the Renewable Portfolio Standard (RPS). Renewable portfolio standards are "*policies designed to increase generation of electricity from renewable resources. These policies*

[48] Earth Justice. (2015). *Puerto Rico community overburdened by pollution pushes back on incinerator project.* Retrieved 5/5, 2016, from http://earthjustice.org/news/press/2015/puerto-rico-community-overburdened-by-pollution-pushes-back-on-incinerator-project#

[49] Williams, T. (2015). Garbage Incinerators Make Comeback, Kindling Both Garbage And Debate. *The New York Times.*

[50] Business Council for Sustainable Energy. (2015). *Business & energy leaders' statement on release of final EPA clean power plan*/. Retrieved 5/5/2016, from http://www.bcse.org/bcse-business-energy-leaders-statement-on-release-of-final-epa-clean-power-plan/.

[51] U.S. Energy Information Administration, Office of Energy Analysis. (2015). *Annual Energy Outlook 2015.* US Department of Energy. Retrieved 5/5/2016 from https://www.eia.gov/forecasts/aeo/executive_summary.cfm

require or encourage electricity producers within a given jurisdiction to supply a certain minimum share of their electricity from designated renewable resources. Generally, these resources include wind, solar, geothermal, biomass, and some types of hydroelectricity, but may include other resources such as landfill gas, municipal solid waste, and tidal energy."[52]

There are currently 30 states with mandatory RPS rules and eight states with voluntary RPS rules that help set targets and incentivize certain renewable energy sources. Each state can define what it considers "renewable" energy sources and often organizes the incentives for renewable sources around two tiers, "*How much capital is allocated to each of these sources depends on what "tier" within the RPS it is placed. Tier 1 generates more revenue than tier 2, allowing WTE technologies in this higher category to compete with solar and wind, which are the energy-producing forerunners right now."*[53]

Figure 5 illustrates the location of MSW incinerators and states where waste incineration is included in state RPS rules.[54] There is a clear clustering of incinerator facilities in the northeast where incinerators are part of the RPS in several of those states. Among these states, only Maryland classifies WTE as a Tier 1 renewable source of energy. Maryland's RPS classification allows electric ratepayer funding to subsidize WTE generation and this incentive is one of the main drivers fueling a recent proposal to build a new incinerator facility in Baltimore.

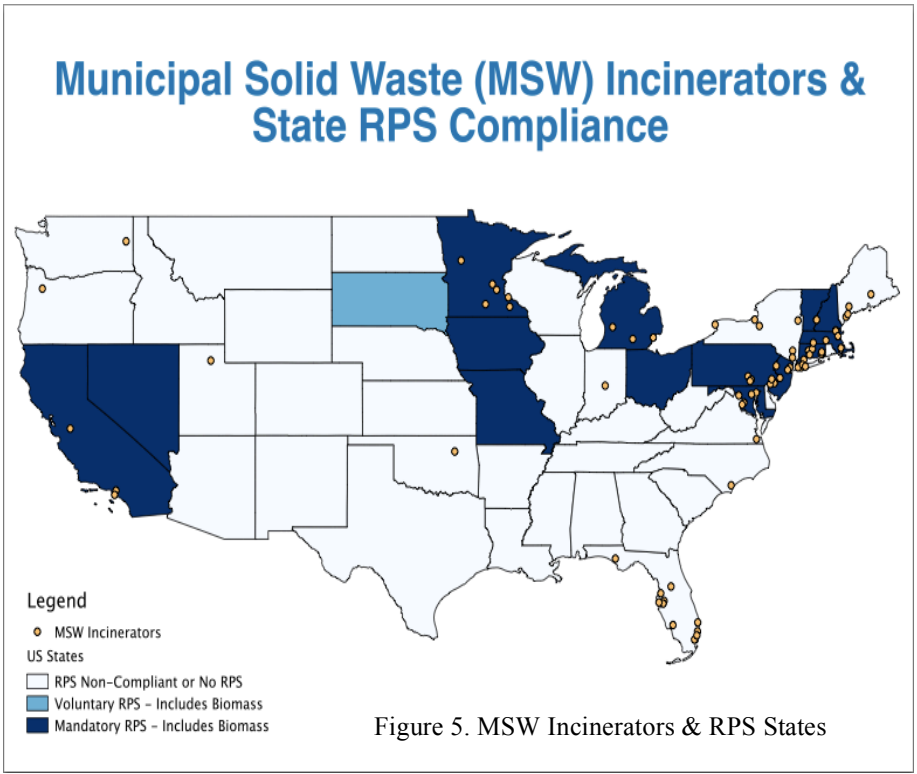

Figure 5. MSW Incinerators & RPS States

[52] US Energy Information Administration. (2012). *Most States have Renewable Portfolio Standards.* Retrieved 5/5, 2016, from http://www.eia.gov/todayinenergy/detail.cfm?id=4850

[53] Karidis, Arlene. (2016). *The 50 states of Waste: How Waste to Energy Definitions Vary Across the Nation.* Waste Dive. Web. http://www.wastedive.com/news/the-50-states-of-waste-how-waste-to-energy-definitions-vary-across-the-nat/416197/

[54] MSW Incinerators – EPA eGRID 2010 data via NREL Biopower Atlas, retrieved from https://maps.nrel.gov/biopower-atlas/
RPS Compliance – Center for Climate & Energy Solutions, data retrieved from http://www.c2es.org/docUploads/State%20rps%20eligible%20resources.pdf)

In states like New York that have successfully fought several industry attempts to include WTE in their state's RPS,[55] the CPP inclusion of bioenergy may trigger increased pressure to approve WTE as part of the RPS or incentivize new or expanded incinerator developments like the one in Maryland.

The CPP rule suggests that states examine potential impacts to EJ communities, "*The EPA strongly encourages states to evaluate the effects of their plans on vulnerable communities and to take the steps necessary to ensure that all communities benefit from the implementation of this rule*."[56] The final rule goes on to stipulate that EPA will, *"...EPA intends to perform an assessment of the implementation of this rule to determine whether it and other air quality rules are leading to improved air quality in all areas or whether there are localized impacts that need to be addressed."*[57] Based on the potential inclusion of incineration in state plans and the evidence of existing environmental justice concerns related to these facilities, it would be critical to include a consideration of WTE impacts as part of the EPA's EJ assessment and guidance to States.

2.7 Dangers of Co-Firing Waste Pellets

Another way that the CPP can encourage the incineration of waste and the exacerbation of environmental injustice is through the allowance of co-firing of biomass or biogenic waste based fuels in coal plants where they can offset affected EGU emissions. Under Building Block 1 where direct modifications at existing coal-fired power plants can be made to reduce CO2 emissions, these waste related feedstocks can be counted as carbon neutral, thereby bringing down the CO2 calculations of individual plants without actually reducing CO2.[58] In fact, such methods could actually increase the amount of CO2 emitted from coal plants as waste is twice as carbon intensive than coal. While the CPP does not include biomass or waste derived fuel as a "Best System of Emission Reduction" for coal plants it leaves open the option to use co-firing of waste derived fuels based on the economic feasibility of fuel switching. "*...the EPA expects that use of biomass may be economically attractive for certain individual sources even though on a broader scale it would likely be more expensive or less achievable than the measures determined to be part of the BSER.*"[59]

This provision may make biomass and waste derived fuel (WDF) pellets a viable feedstock for a variety of power plants seeking to capitalize on the potential CO2 credits associated with CPP compliance. WDF industry involves taking non-recyclable wastes and processing it into high caloric density material in the form of briquettes or pellets for incineration at power

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[55] Pyper, Julia. (2011). *Does Burning Garbage to Produce Electricity Make Sense?* Scientific American. Retrieved 5/5/2016 from http://www.scientificamerican.com/article/does-burning-garbage-to-produce-energy-make-sense/

[56] US EPA. (2015). *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units*; Final Rule. Federal Register. U.S.C. p. 64671

[57] Ibid.

[58] US EPA, (2015). Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units: Final Rule, Federal Register, 40 CFR, Part 60, Volume 80, No. 205, October 23, 2015, Section (4) *Fuel switching to biomass at affected EGUs.* p. 64756

[59] Ibid.

plants, cement kilns or boilers. The five general categories of pellets, also known as Refuse Derived Fuels (RDF) or Process Engineered Fuel (PEF), are industrial waste and co-products, municipal solid waste, food waste, agricultural residues, energy crops, and virgin lumber. The common method of converting waste into combustible material for incineration is known as pelletization. Waste is sorted, crushed, and mixed into high-density pellets that can be combusted in existing boiler and coal plants, for the generation of electricity, industrial boilers, pyrolysis, and gasification.

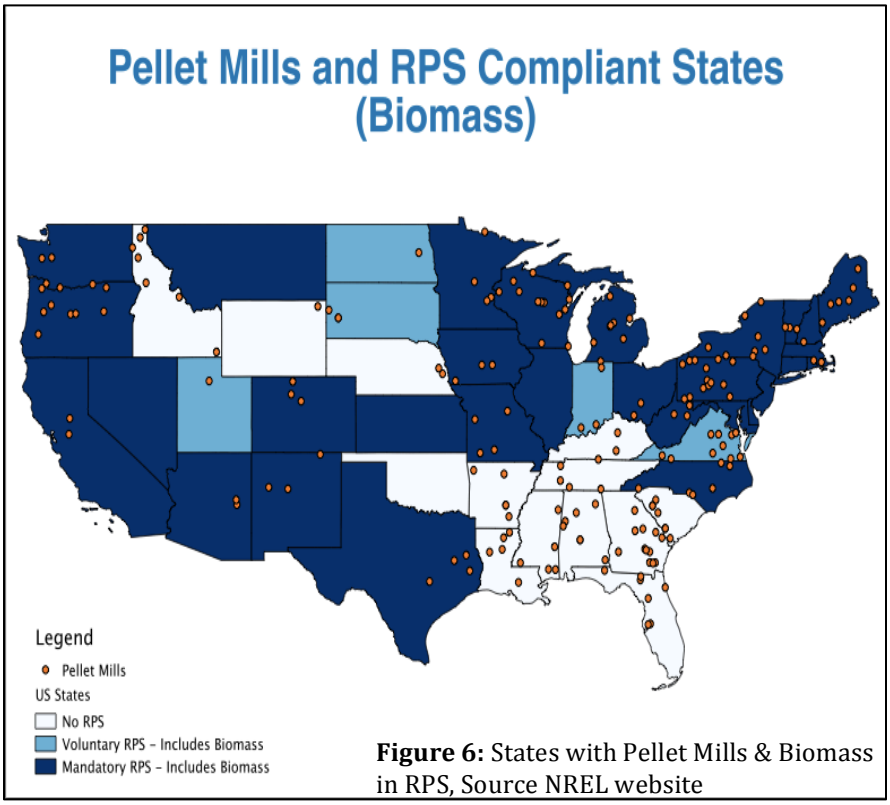

Figure 6: States with Pellet Mills & Biomass in RPS, Source NREL website

Given that "environmental benefits" of co-firing feedstocks are highly contested, it is important for environmental justice communities to be prepared to critically engage with co-firing proposals as State Implementation Plans (SIPs) are developed in the coming years. Conversely, the industry response to the CPP rule, has been to aggressively advocate recognizing biomass and WDF as carbon neutral in SIPs and the FIP. Figure 6 illustrates the prevalence of pellet mills and the large number of states where biomass is already included in state RPS standards.[62] As Seth Ginther, Executive Director of the U.S. Industrial Pellet Association states, "*U.S. coal-fired power plants could use biomass for co-firing to meet the objectives of the Clean Power Plan—and do so while preserving jobs, infrastructure and capital investment—biomass can provide an affordable way for the U.S. to decarbonize as well."*[63]

Processing and Chemical Composition of Waste Pellets

Another key concern related to using waste pellets as a means to co-fire coal plants is the mechanism by which waste feedstocks are processed to transform them into fuel. Mechanical

[62] Pellet Mills, Biomass Magazine, May, 2015 data via NREL Biopower Atlas, retrieved from https://maps.nrel.gov/biopower-atlas/
RPS Compliance – Center for Climate & Energy Solutions, data retrieved from http://www.c2es.org/docUploads/State%20rps%20eligible%20resources.pdf

[63] Ginther, S., & Biomass Magazine. (2015). *Pellets still the affordable, available, renewable one.* Retrieved 5/5, 2016, from http://biomassmagazine.com/articles/12387/pellets-still-the-affordable-available-renewable-one.

sorting is a common method of isolating waste feedstock that is combustible according to regulatory standards. Waste pellet facilities that sort inputs for energy use typically use a form of mechanical processing to separate desirable materials to then be conditioned to uniform size and density. After mechanical separation occurs, size reduction is the primary goal of most mechanical processing techniques. Input wastes are usually shredded and densified to a uniform size output for incineration or co-firing. This output could also then be further processed through a biological treatment to reduce moisture and gas content before the incineration process. It is important to note that when specifically handling the organic fraction of municipal solid wastes (OFMSW), most incineration facilities also follow this trend and rely on mechanical separation techniques.[65] However, mechanical processing has been shown to be an unreliable method of removing hazardous components of feedstock. As Velis et al. point out, "*Our analysis, among else, (1) verifies the difficulty of chemical separation solely by mechanical means; (2) illustrates the trade-off between achieving a high quality of recoverable outputs and the quantity/properties of reject material."*[66]

The problem with mechanical processing is that it relies on the physical properties of input waste, with little concern for chemical composition and distribution. Thus, mechanical processing provides an inefficient method of isolating biogenic material from MSW inputs with assurance that potentially hazardous material has also been removed.[67] With high trade-offs between energy cost and quality/quantity of RDF outputs in mechanical processing, we can expect any innovation in chemical processing or separation to be highly cost and energy intensive. Furthermore, if biogenic material were to be properly isolated and processed to produce an energy efficient fuel source, biogenic feedstocks can still be high in material rendered hazardous through incineration given the overwhelming reliance on ineffective mechanical separation techniques for OFMSW.[68]

As discussed earlier, while the CPP allows biogenic waste to be considered carbon neutral or a "renewable energy" under Building Block 3, the heat content of this portion of the waste stream can vary significantly and can be difficult to ascertain. While many biogenic feedstocks are assumed to be chemically consistent, such as wood chips, the biogenic content of municipal solid waste can be highly varied because of the diversity of what enters waste streams. For example, high incidences of chlorine-based pollutants could be found in biogenic portions of MSW on certain days or weeks due to high levels of particular kinds of food waste (i.e. dairy products) that happen to enter the waste stream. As such, biogenic portions of MSW, even if effectively isolated from other materials, would not produce consistent quantities of non-hazardous outputs for incineration. Furthermore, given the unpredictable chemical composition of MSW, waste pellet fuels would require increased investments in either the processing and/or incineration phase to ensure hazardous materials are filtered and controlled. Even if biogenic fuel is considered carbon neutral it can be very heterogeneous in terms of its chemical content and thus emit a range of pollutants that can complicate the CPP's mandate to mitigate "negative" impacts related to waste incineration.

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[65] Ariunbaatar, J., Panico, A., Esposito, G., Pirozzi, F., & Lens, P. N. (2014). Pretreatment methods to enhance anaerobic digestion of organic solid waste. *Applied Energy, 123*, 143-156

[66] Velis, C., Longhurst, P. J., Drew, G. H., Smith, R., & Pollard, S. J. (2010). Production and quality assurance of solid recovered fuels using mechanical—biological treatment (MBT) of waste: A comprehensive assessment. *Critical Reviews in Environmental Science and Technology, 40*(12), 979-1105

[67] Ibid.

[68] Ibid.

2.8 Other Policies Related to the CPP and Waste

In combination with the CPP rule, other policies have the potential to further incentivize the burning of waste and the burdening of environmental justice communities. The waste industry is set to take advantage of recent revisions to the US EPA's definition of Non-Hazardous Secondary Waste (NHSW) Rule that treats some waste streams as non-hazardous and together with the CPP, opens the door to co firing waste without being regulated in the same way that incinerators and power plants are.[69] According to GAIA, the confluence of the NHSW rule and changes to the Clean Air Act's emissions standards for large and small boilers that burn solid waste - combine to create new incentives for the waste industry to produce energy from waste feedstocks.[70] [71]

> Previous to February 2013, if wastes were burned, the facility burning the waste would be classified as an "incinerator" and would be subject to stricter emissions limits than other combustion facilities. In February 2013, via obscure rule changes, the EPA approved a policy to allow processing facilities to take mixed waste, as well as used plastics, tires, chemically-treated wood, paper sludge, coal byproducts – you name it, and turn it into pellets or other fuel stuff that can be reclassified as "**non-hazardous secondary materials**" or NHSM.... under the **industrial boiler and heater rule**, coal plants and other facilities can avoid regulation as coal plants and qualify biomass by only getting only 15% or more of their energy from biomass. This means that a facility could burn 15% biomass and 85% coal and avoid measuring nearly all pollutants. Since the waste-derived fuel pellets will include a mix of plastics, paper, wood, and other materials, the use of mixed waste pellets alongside coal might allow an industrial facility to avail itself of this significant regulatory bypass.

Under the NHSW rule, companies can submit a petition to the US EPA to get permission to make pellets or otherwise process waste, and then sell it as "non-hazardous secondary material," which means it can be sold as a fuel. In order to qualify for this reclassification, companies must show that they have processed the waste (through sorting, shredding, etc.), and that it is being treated as a product to be bought and sold on the market – thus supporting an expanded waste trade. Although relatively small at this point, the new EPA petition process means that the industry making pelletized waste is poised to grow. The May 2013 issue of the industry magazine *Renewable Energy from Waste* included an article titled "Coal Swap", which concludes with the following claim*, "By capturing valuable commodities and marketing EF [engineered fuel] to the existing infrastructure of utility boilers and cement kilns... mixed waste processing facilities will likely become more prevalent in the United States."*[72]

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[69] McCabe, Janet G. US EPA. (November 19, 2014). *Memorandum: addressing biogenic carbon dioxide emissions from stationary sources to air divisions directors, region 1-10.* Unpublished manuscript.

[70] GAIA. (2013). *Out Of The Frying Pan, Into The Fire*. Report for Global Alliance for Incineration Alternatives.

[71] U.S. EPA. (2015). *Emissions Standards for Boilers and Process Heaters and Commercial / Industrial Solid Waste Incinerators.* Retrieved 5/5, 2016, from https://www.epa.gov/energy

[72] Viny, S. M., & Renewable Energy From Waste. (2013). *Coal Swap.* Retrieved 5/5, 2016, from https://www.rewmag.com/article/rew0613-operations-mixed-waste-processing/

3. Recommendations

There are serious concerns that the CPP raises with respect to waste incineration and environmental justice. The final CPP rule leaves open the possibility of including waste incineration as a means for achieving carbon emissions reductions in State Implementation Plans. Under both Building Blocks 1 and 3, the CPP can be a mechanism for incentivizing an industry long critiqued for it's potential to target and burden environmental justice communities. States can propose strategies to meet their carbon emissions goals without including an assessment of the disproportionate impacts in communities of color and low income communities from existing EGUs, biomass and WTE facilities implicated in their plans.

It is therefore critical that stakeholders and environmental justice communities carefully consider the implications of the CPP in their respective states. In states that already have WTE facilities designated as "renewable" energy under state Renewable Portfolio Standards, the CPP may well be an incentive to include WTE in SIPs. In states where incinerator proposals are currently proposed, the CPP may give further financial incentives to those facilities seeking renewable energy credits. Nevertheless, the CPP does affirmatively outline some concerns and requirements related to the inclusion of waste incineration in state plans, which may be an opportunity to limit or block its inclusion. The recommendations below focus on the opportunities for stakeholders to weigh in on State Implementation Plans with respect to waste incineration and environmental justice.

- **Prohibit the inclusion of biomass and biogenic waste incineration from State Implementation Plans.** Already more than 40 organizations signed on to public comments to discourage the inclusion of any form of incineration in state plans. There is still an opportunity to advocate that states effectively prohibit or omit incineration from their plans on a state by state basis since states have the flexibility to determine what mix of strategies they will use to meet their rate or mass based goals.

- **Require EJ Analysis for any State Plans that do include biogenic waste**
  - Conduct an environmental justice analysis of emissions and proximity from expanded or new emissions related to waste derived electricity generation
  - If low income and communities of color are found to be impacted, this can serve as evidence of "negative impact" under the CPP WTE provision

- **Require strict adherence to the waste hierarchy through enforceable waste reduction and diversion targets**
  - Require mandatory waste reduction and diversion targets as part of SIPs to demonstrate compliance with the US EPA's waste hierarchy
  - Require independent auditing and verification of waste diversion and waste hierarchy implementation strategies included in the SIP.
  - Require independent auditing and verification of the biogenic content of waste streams through waste stream analysis rather than mass balance calculations
  - Set maximum limit on the biogenic energy generation allowed from WTE facilities to no more than 50% of the total waste stream to assure new facilities or expansions are not creaming waste streams for biogenic waste.

- **Petition states with WTE in their RPS to remove waste incinerators from their qualified renewables list due to the limitations of its inclusion in the SIP.**
  - If States include biogenic waste in their state implementation plan and they also include waste in their RPS portfolios, then they should require their RPS portfolios to adhere to the same provisions of the CPP for biogenic fraction of WTE power generation (limit to only post 2012 and waste hierarchy requirements).

- **Prohibit the inclusion of co-firing with refuse derived fuels and biomass feedstocks in EGUs to count as carbon neutral**
  - The associated costs, chemical and mechanical processing difficulties of waste derived fuels, and their potential to emit carbon and other air pollutants should be emphasized in states proposing co-firing of waste in their SIPs.
  - Require cost, emissions and EJ analyses for any states that propose to include waste pellets as co-firing fuels for EGUs

Resources

For stakeholders interested in learning more about the Clean Power Plan and waste related issues, the following links may be useful resources that provide additional information:

- Global Alliance for Incinerator Alternatives, www.no-burn.org
- Partnership for Policy Integrity, www.pfpi.net
- Center for Climate and Energy Solutions, www.c2es.org
- National Renewable Energy Laboratory, maps.nrel.gov/biopower-atlas
- Grassroots Recycling Network, www.grrn.org
- Institute for Local Self Reliance, ilsr.org
- Energy Justice Network, www.energyjustice.net/cleanpowerplan
- Waste and Climate Change: Global Trends and Strategy Framework Report (2010), UNEP
- Clean Power Plan Toolbox for States, https://www.epa.gov/cleanpowerplantoolbox
- Clean Power Plan Rule, https://www.epa.gov/cleanpowerplan

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