Waste-To-Energy:

Dirtying Maryland's Air by Seeking a Quick Fix on Renewable Energy?

ENVIRONMENTAL INTEGRITY PROJECT

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About the Environmental Integrity Project
The Environmental Integrity Project (EIP) is a nonpartisan, nonprofit organization dedicated to the enforcement of the nation's anti-pollution laws and to the prevention of political interference with those laws. EIP provides objective analysis of how the failure to enforce or implement environmental laws increases pollution and harms public health. We also help local communities obtain the protection of environmental laws.

Acknowledgement
Environmental Integrity Project Research Analyst Robbie Orvis contributed to this report.

Data Limitations
EIP's analysis of incinerator emissions is based on company self-reported data obtained through publicly accessible Energy Information Administration websites and publicly obtainable Maryland Department of the Environment emissions inventories and annual Emission Certification Reports. Occasionally, government data may contain errors, either because information is inaccurately reported by the regulated entities or incorrectly transcribed by government agencies. In addition, this report is based on data retrieved in November 2010, and subsequent data retrievals may differ slightly as some companies correct prior reports.

EIP is committed to ensuring that the data we present are as accurate as possible. We will correct any errors that are verifiable.

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Executive Summary

Maryland has recently seen a surge in proposals to construct or expand Waste-to-Energy (WTE) incinerators which will result in more than doubling Maryland's capacity to incinerate trash for energy use. These facilities combust trash (i.e. municipal solid waste) to generate electricity and produce steam for heating buildings. Although industry reports show that no incinerators were constructed in the entire country between 1996 and 2007, Maryland currently has at least three projects – the new Energy Answers plant in Baltimore City, the proposed expansion of the Harford County Resource Recovery Facility, in Harford County, and the proposed Frederick County Incinerator in Frederick County – under development or already permitted for construction. In light of this recent trend, the Environmental Integrity Project researched the emissions from these facilities, the policies underlying this trend, the impact on renewable energy in Maryland, and steps Maryland can take to minimize emissions or reduce the need for new plants. Our results are summarized below:

- WTE incinerators in Maryland typically emit more pollutants per hour of energy produced than Maryland's largest coal-fired power plants. Emissions include pollutants like mercury and lead that disproportionately harm children, are harmful even in small doses and bioaccumulate over time.
- These facilities produce ash in the combustion process that can be highly toxic and must be carefully tested to determine its toxicity and appropriate management.
- Incinerators are extremely expensive to construct, often costing hundreds of millions of dollars to build and requiring substantial loans and tax credits.
- Maryland has recently reclassified WTE incinerators as Tier 1 renewables under the state's Renewable Portfolio Standard (RPS) despite the fact that incinerators do not harness renewable energy. Rather, they rely on a fixed waste stream, typically consisting of thousands of tons of trash a day. This classification undermines the goal of the RPS and makes Maryland's RPS one of the most lenient in the country with respect to WTE incinerators.
- From a waste management perspective, recycling is better for the environment and amount of energy used than incineration. Furthermore, a report by the Institute for

Local Self Reliance estimates that per ton of waste managed, recycling generates 10 times more jobs than incineration does.

- Although Maryland has one of the highest recycling rates in the country, there is still room to improve its recycling programs, which will lower emissions to the environment, reduce energy use and create more jobs than incineration will.
- Maryland has sufficient funding ($16.2 million out of $25 million) left in its Clean Energy Production Tax Credit program to reconfigure the structure in order to better promote truly clean and renewable energy sources such as solar and wind power.

Given these findings, Maryland should remove WTE incinerators from its RPS, invest further in recycling and source reduction programs, reconfigure its Clean Energy Production Tax Credit Program to better support and promote clean and renewable energy sources like wind, solar, and geothermal energy, and increase its statewide pollution monitoring network to better understand new sources of pollution as well as trends in air quality.

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Introduction

Despite the fact that no Waste-to-Energy (WTE) incinerators were constructed in the U.S. between 1996 and 2007, these facilities have recently seen a surge in interest and development.[1] WTE incinerators combust trash (i.e. municipal solid waste) and other materials such as rubber tires, sewage sludge and wood chips to generate electricity and produce steam for heating buildings. Because these facilities generate power while eliminating some of the trash that would otherwise be landfilled, proponents of incineration have argued that this technology is clean and renewable. However, WTE incinerators are hardly renewable, relying on a continuous waste stream and typically combusting thousands of tons per day of waste in order to generate a minimal (i.e. between 50 and 200 megawatts) amount of electricity. Further, these facilities can release more emissions per hour of energy generated than coal-fired power plants and generate a significant amount of pollution (see table below).

Since 2007, there has been renewed interest in waste burning plants particularly in the state of Maryland, which already has at least three of these facilities -– the Energy Answers plant in Baltimore City, the Frederick County Incinerator in Frederick County, and the Harford County Resource Recovery Facility in Harford County – under development or already permitted for construction or expansion.[2,3,4] This renewed interest in WTE incinerators is being driven by several national and state policies. Within Maryland, the state's Renewable Portfolio Standard (RPS) classifies these facilities as "Tier 1" renewables[a] and creates a Renewable Energy Credit (REC) market that allows generators to sell excess credits for profit.[5] Additionally, the state offers the Clean Energy Production Tax Credit, which provides additional incentive to invest in these facilities.[6] On a national level, the relatively recent listing (2004) of WTE incinerators as renewable energy sources under the Federal Renewable Electricity Production Tax Credit (PTC) program allows these facilities to receive federal tax credits for electricity generation.[7] Finally, the American Recovery and Reinvestment Act (2009) authorizes these plants to receive a substantial amount of money (i.e. 30% of the construction cost) up front in lieu of the Federal PTCs.[8]

[a] Effective October 1, 2011.

The combination of these policies has truly encouraged the construction of these facilities. One example is the Energy Answers Fairfield Renewable Energy Facility, which is currently permitted to begin construction in 2011.[9] This plant is sited in a neighborhood in south Baltimore that is already overburdened with toxic air pollution. Further, it is authorized to emit up to 240 pounds per year of mercury (to which children are extremely vulnerable) and has been sited in close proximity to at least three different elementary and middle schools: Curtis Bay Elementary School, Benjamin Franklin Middle School and Brooklyn Park Elementary School.[10]

By incorporating WTE incinerators as Tier 1 renewables and offering these facilities the same benefits as other *truly* renewable and clean sources of energy (e.g. wind, solar, hydro), Maryland has effectively watered down its RPS and undermined its efforts to improve the environment. Given their very high emissions rates (at or above that of coal-fired power plants), their dependency on a continued waste stream and their potential to displace other much cleaner and truly renewable sources of energy, Maryland should carefully re-evaluate its policy on WTE incinerators.

Incinerator Emissions and Their Potential Health Impacts

Incinerators emit many different pollutants, including conventional greenhouse gases, criteria air pollutants and toxic compounds. These emissions can include particulate matter, organic pollutants such as dioxins, phthalates and PCBs, heavy metals such as lead, cadmium, and mercury, as well as many others.[11] Additionally, many of these compounds are known to have significant health impacts (see Appendix A for a list of the toxic pollutants emitted by incinerators and their health impacts).[12]

While we know that air toxics can be harmful, EPA has not set National Ambient Air Quality Standards (NAAQS), which prescribe emissions limits necessary to protect the public health, for most toxic compounds, so it is difficult to predict how emissions from proposed new incinerators will affect public health. Therefore, this report relies on a comparison of emissions and emissions rates from WTE incinerators against emissions from plants fired by coal, widely known to be the dirtiest of the fossil fuels. As noted above, data submitted to the Maryland

Department of the Environment (MDE) by industry indicates that WTE incinerators are capable of emitting several pollutants at a rate exceeding that of conventional coal-fired power plants.

While many coal power plants are sited in rural areas, incinerators "generally operate in or near metropolitan areas," where the majority of trash is typically generated and a greater number of people are exposed to emissions from these facilities.[13] Additionally, the National Research Council has noted that some of these emissions are not localized to the geographic area in which they are generated, but rather that some "persistent air pollutants, such as dioxins, furans, and mercury, can be dispersed over large regions – well beyond the local areas and even the countries from which the sources first emanate."[14] A closer examination of the emissions data shows just how dirty WTE incinerators are.

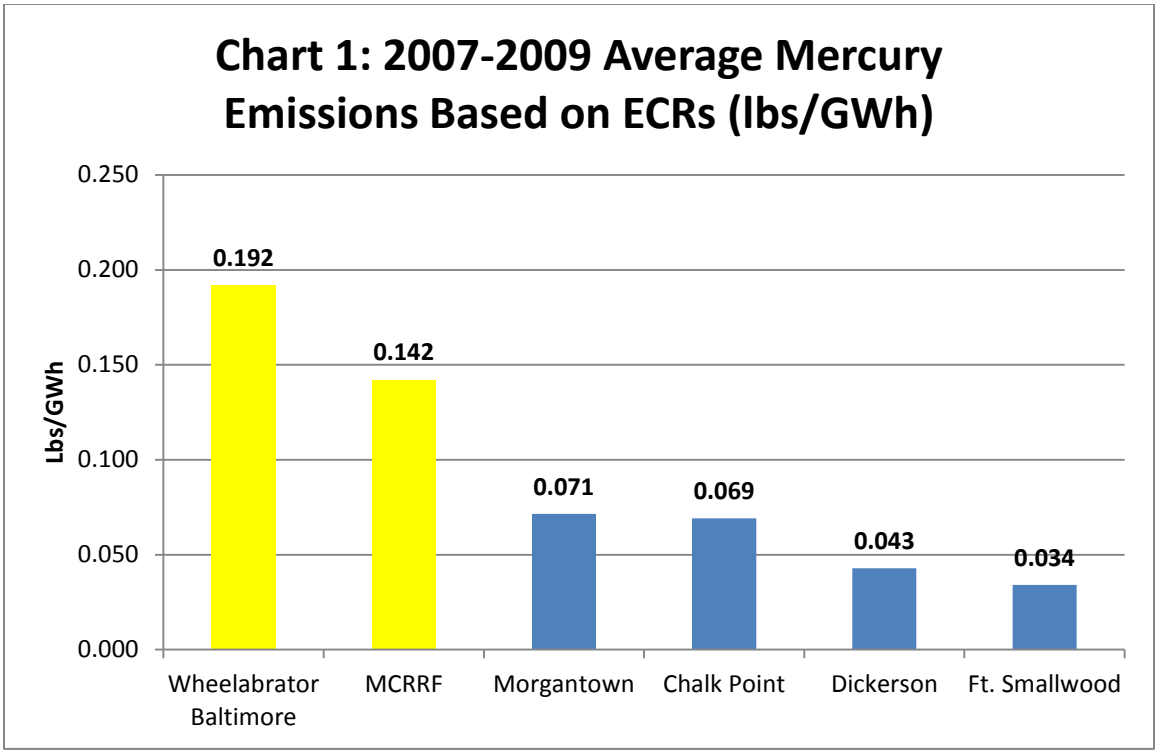
Mercury

Annual Emissions Certification Reports (ECRs) submitted by Maryland's two major WTE incinerators and the four largest coal power plants[b] in the state show that the incinerators consistently emit several dangerous pollutants at a greater rate than each of the four power plants. For example, both the Montgomery County Resource Recovery Facility (MCRRF) and the Wheelabrator Baltimore Incinerator (WBI), the state's two main WTE incinerators, produce significantly more mercury per hour of energy generated than coal-fired power plants. On average between 2007 and 2009, the amount of mercury produced per hour of energy at MCRRF was 2-4 times and at WBI 2.5-5.6 times that of the coal power plants (see Chart 1). Because these rates are so much higher, the total amount of mercury released by incinerators can be substantial, and in some cases greater than that of coal burning power plants (See Table 1).

Mercury is a potent neurotoxin capable of causing harm in small amounts, particularly with children, where it can cause permanent neurological damage to those who are overexposed.[15] Additionally, mercury is capable of damaging the kidneys and nervous system, and can damage fetuses in pregnant mothers.[16] Mercury can also persist in the environment for long periods of time as it changes forms, and can become a public health concern over time even while being emitted at low levels.[17] One of the ways in which this occurs is

[b] Coal power plants include: GenOn Chalk Point, Constellation Ft. Smallwood Complex, GenOn Morgantown, and GenOn Dickerson.

bioaccumulation, in which small amounts of mercury build up over time in predatory species.[18] Consuming large amounts of these animals with high levels of mercury can lead to fretal methylmercury poisoning, which has a variety of symptoms (see Appendix A for full list).[19,20] Other forms of exposure include inhalation of mercury vapor, dermal contact and ingestion of contaminated breast milk for infants (mercury is passed through the milk).[21,22]



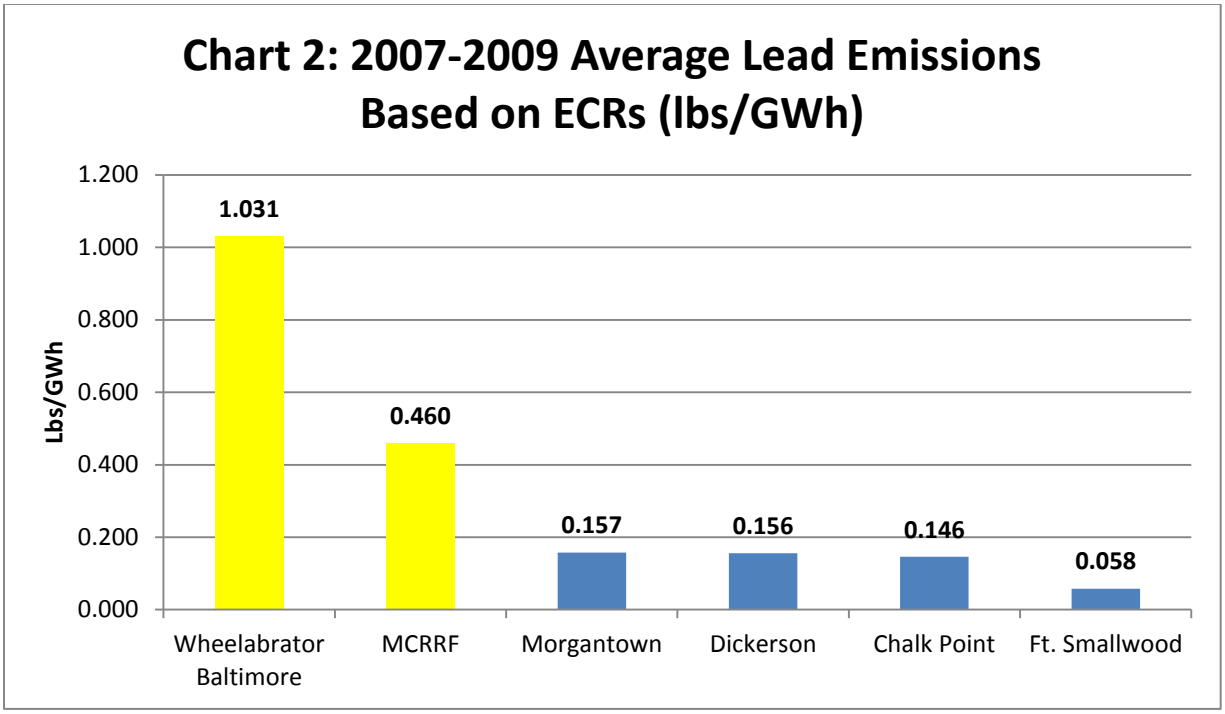
Lead

Lead is another toxic metal emitted by the incinerators in Maryland at rates exceeding those of the coal-fired power plants. Between 2007 and 2009, MCRRF produced on average 3-8 times more lead per hour of energy than the coal power plants, while WBI produced on average *between 6.5 and 18 times as much lead per hour* (see Chart 2).[c] As with mercury, these emissions rates make WTE incinerators among the largest sources of lead in the state.

Lead emissions are of particular concern because, while it is already known that exposure to lead at even a very low level can be quite damaging, the more it is studied, the lower the threshold at which scientists observe its impacts.[23,24] Like mercury, lead poses an

[c] Ft. Smallwood lead emissions rate only includes 2009 data (previous years' data not available).

elevated risk to children, as overexposure can cause permanent developmental damage.[25] Overexposure to lead can also impact kidney function, as well as the nervous, immune, reproductive and developmental systems.[26] Though ingestion is the primary source of exposure, lead can also be inhaled and have short and long term impacts, as it can be stored in human bone for long periods of time.[27]



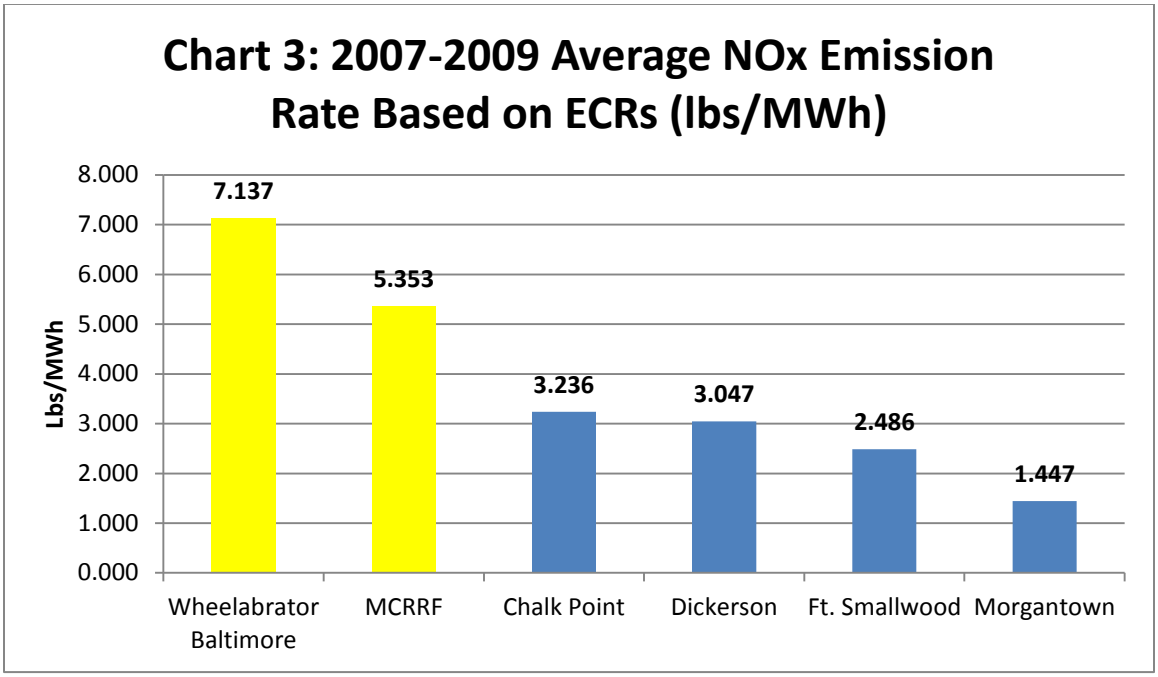
Nitrogen Oxides (NOx)

In addition to heavy metals, incinerators also emit several criteria air pollutants at a rate exceeding that of coal-fired power plants. For example, between 2007 and 2009, WBI and MCRRF emitted on average between 2 and 5 times as much NOx as the coal-fired power plants (see Chart 3).

NOx comes from multiple sources in Maryland, including cars. However, when NOx emissions from WTE incinerators are compared with emission levels that will result from coal-fired power plants after reductions required by the Maryland Healthy Air Act, it is clear that WTE incinerators will continue to be one of the largest sources of NOx in the state.

NOx is listed as a criteria air pollutant under the Clean Air Act, and can cause irritation of the eyes, nose, throat and lungs, nausea, shortness of breath, respiratory problems, reduced oxygenation of body tissues and a buildup of fluid in the lungs.[28,29] Additionally, NOx

contributes to ground level ozone formation as well as the formation of particulate matter. Although Maryland has made progress in reducing levels of ozone, adding another major source of NOx will complicate these efforts and contribute to ozone formation. New NOx emissions will also result in deposition in the Chesapeake Bay, which is already impaired for this pollutant.[30,31]

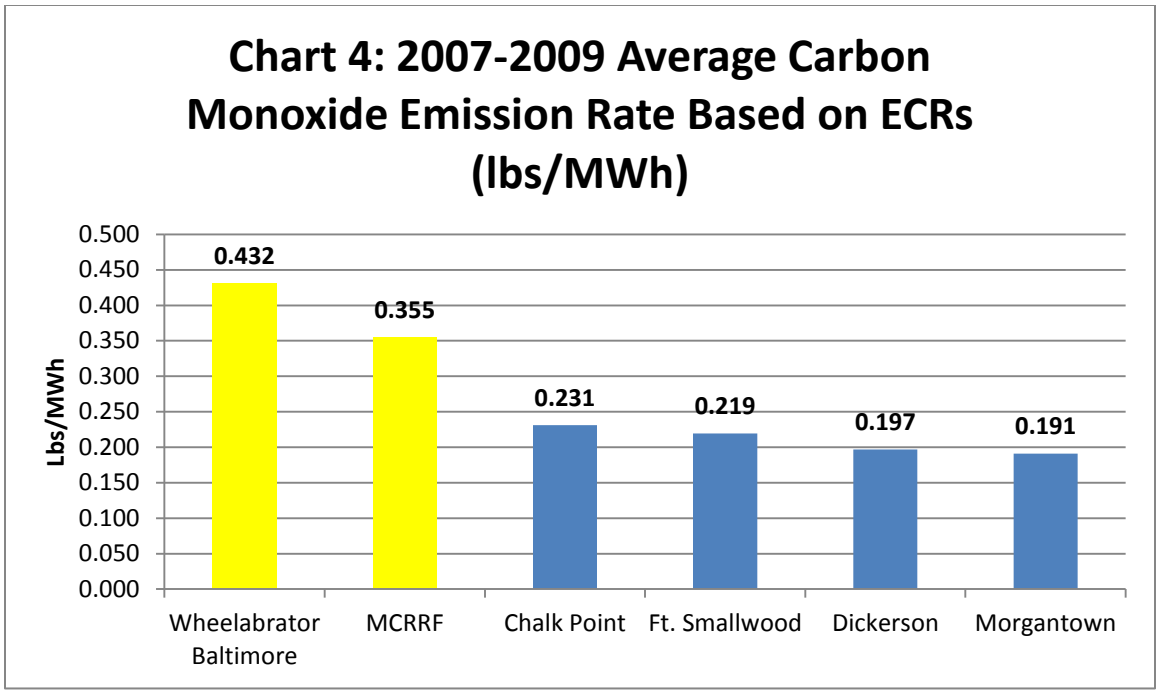


Carbon Monoxide

Another criteria air pollutant emitted by incinerators is carbon monoxide, which causes ozone and can lead to respiratory problems. This is also emitted at a greater rate than the coal-fired power plants (See Chart 4).[32,33]

Other Pollutants

In addition to the pollutants described above, these facilities generate many other pollutants in significant amounts, often at or near the rate of coal-fired power plants. These emissions include particulate matter (PM), hazardous air pollutants (HAPs), volatile organic compounds (VOCs), hydrochloric acid (HCl) and dioxins/furans. Of these pollutants, dioxins and furans are particularly toxic.



Dioxins are particularly worrisome because, although concentrations in the environment have been declining since the 1970s, EPA has stated that "current exposure levels still remain a concern."[34] These toxic chemicals are produced as a byproduct of combustion, such as municipal solid waste incineration and burning fuels like coal and oil.[35] Dioxins are dangerous compounds that have "been shown to cause cancer of the liver, mouth, adrenal gland, and lungs," as well as "anemia and other blood problems."[36] Dioxin in particular is known for its potential to damage a multitude of physiological systems including the immune, nervous, and endocrine systems.[37,38] Health effects associated with dioxin exposure include chloracne, skin rashes, discoloration of the skin, liver damage, and increase cancer risk.[39] Similarly, the World Health Organization has identified dioxin as a "known human carcinogen."[40] In addition to having a wide array of health effects, dioxins and furans are "resistant to being degraded, and thus they tend to be persistent" in the environment.[41] Like mercury, dioxins and furans can bioaccumulate and can remain a health threat for long periods of time.[42] Specifically, "more than 90% of human exposure to dioxins is through the food supply, mainly meat and dairy products, fish and shellfish."[43]

It is not only the rate at which these pollutants are emitted by WTE incinerators that is of concern. The quantities of pollutants emitted are also substantial. As Table 1 shows, even

though incinerators produce much less electricity than coal-fired power plants, they still produce a significant amount of pollution, similar to the amount emitted by coal-fired power plants. This is because the emissions rates at incinerators are so much greater than those at coal-fired power plants.

Table 1: Annual Emissions from Coal-Fired Power Plants and WTE Incinerators[d]				
FACILITY		**Average Emissions per Year**		
WTE Incinerators	**Electricity Generating Capacity (Megawatts)**	**Lead (lbs)**	**Mercury (lbs)**	**NOx (tons)**
Wheelabrator Baltimore	65	275	68	1,099
MCRRF	68	130	46	765
Energy Answers Fairfield (Permitted Limit)	*160*	*1,000*	*240*	*600*
Coal Fired Power Plants	**Electricity Generating Capacity (Megawatts)**	**Lead (lbs)**	**Mercury (lbs)**	**NOx (tons)**
Ft. Smallwood	2429	11	80	5,246
Morgantown	1548	110	19	1,870
Chalk Point	2563	180	20	4,483
Dickerson	930	74	12	3,857

Additionally, while in the past these incinerators have produced fewer sulfur oxides (SOx) – another criteria air pollutant that can cause adverse respiratory problems and causes acid rain – than coal-fired power plants, many of Maryland's coal plants are now being retrofitted with SOx reduction devices (e.g. flue gas desulfurization scrubbers), which are already utilized by the incinerators.[44] These technologies will significantly reduce the coal plants' SOx emissions, thus reducing the gap between the rate of SOx emitted by coal fire plants and WTE incinerators. [45]

Finally, new emissions standards established under the Maryland Healthy Air Act have already resulted in, and will continue to result in, decreased emissions from coal-fired power

[d] Because of the variability of metals emissions from incinerators, emissions from the Wheelabrator Baltimore and MCRRF sites are 3 year averages between 2007 and 2009. Emissions from coal-fired power plants are taken from EPA's TRI Explorer and Clean Air Markets for 2010 because 2010 data most accurately reflects current emissions from coal plants and Emissions Certification Reports were not available for that year. The reason that recent data is more accurate for coal plant emissions is that emissions have declined due to changes required under the Maryland Healthy Air Act. The Maryland Healthy Air Act requires additional reductions in 2012 and 2013, meaning that the NOx emissions from coal plants will decline even further in the future.

plants. Reductions that have occurred after 2010 are not reflected in our comparison of incinerator and power plant emissions rates, will be even lower than those reflected here, further increasing the disparity between emissions rates at WTE incinerators and coal-fired power plants.

Greenhouse Gases

WTE incinerators also produce more greenhouse gases per hour of energy than coal-fired power plants. While there have been attempts to diminish the impact of these emissions by claiming that only a portion of the waste burned is anthropogenic (man-made) and the remainder biogenic (resulting from biological processes), this is an unrealistic assumption that fails to account for differences in the recycling rates of certain goods.[46] The assumption is that carbon emissions from the combustion of paper and food products leads to zero carbon impact and, therefore, need not be counted when calculating the carbon emissions from a WTE incinerator. However, this does not account for the fact that paper and food products often require intense processing and could be recycled or composted, instead. Similarly, when incineration is only evaluated in comparison with landfilling, it ignores altogether the best options, recycling and source reduction, which could prevent the waste altogether and eliminate the need for both incineration and landfilling.

Table 2: Emissions of Carbon Dioxide Equivalent (CO2e) Greenhouse Gases per Hour of Energy[e]

Facility	CO2e/MWh (tons)
Wheelabrator Baltimore	3,492
MCRRF	4,537
Ft. Smallwood	2,029
Morgantown	1,830
Chalk Point	2,116
Dickerson	1,988

Incinerator Ash

In addition to producing toxic emissions, incinerators also generate ash during the combustion process. During the incineration of municipal solid waste (MSW), "serious pollutants (e.g. cadmium, lead, and mercury) have not burned at all and hence are still there in the ash, with some *four times* the concentration as in the original MSW."[47,f] Because of this, incinerator ash can contain highly toxic materials and must be carefully tested regularly to

[e] In order to compare greenhouse gases, these are converted to the equivalent amount of carbon dioxide or CO2e.
[f] Emphasis added.

determine whether or not it must be managed as a hazardous waste.[48] While the waste ought to be treated for these pollutants before it is combusted, this rarely occurs because of the "administrative difficulty and collection cost of separating them out in the MSW collection process."[49]

As demonstrated by their toxic emissions at or above levels of coal-fired power plants and generation of potentially highly toxic ash, WTE incinerators are hardly a clean technology. Furthermore, many of the pollutants emitted by these facilities have the ability to disperse across broad regions and to persist in the environment for long periods of time. As mentioned earlier, unlike coal power plants, these facilities are often sited in highly populated urban areas (e.g. Baltimore City), where an even greater number of people are exposed to these emissions. In contrast, nearly all other renewable energy options rely on *significantly* cleaner technologies that have either zero or nearly zero emissions and utilize naturally occurring energy (i.e. the sun, wind and flow of water). Therefore, the benefits of these other renewables greatly exceed those of WTE incinerators and based on these facts, Maryland should seriously reconsider its treatment of WTE incinerators under the RPS.

Incentives for Dirty Technology

While it is important to understand how much air pollution WTE incinerators emit, it is also important to understand why they are suddenly being proposed and sited in Maryland, and how this will impact other types of renewable energy facilities. In order to do so, it is necessary to look at the policies that have driven this interest.

Maryland's Renewable Portfolio Standard and Clean Energy Production Tax Credit Program

1. Renewable Portfolio Standard

The Maryland Renewable Portfolio Standard (RPS) was passed by the state in order to set annual minimum standards finalizing in 2022 for the minimum amount of electricity generation that must come from "renewable" energy sources.[50] The RPS requires electric generating companies within the state to meet the same thresholds that are set across the state as a whole.[51] For example, in 2012, the state must generate 6.5% of its energy from Tier 1 renewables and 2.5% from Tier 2 renewables, and each in-state generating company must also achieve these percentages within its own generation portfolio. The requirement is then met

with Renewable Energy Credits (RECs), which corporations are awarded based on their generation of renewable energy and can be purchased on an REC market (discussed more fully below).[52]

Maryland's RPS is divided into tiers, which is a common practice across states, "to differentiate between different technologies and allow different targets to be set for different classes."[53] Maryland has two tiers. Tier 2 credits make up a small portion of the RPS (see Table 3) and are no longer included in the RPS after 2018, indicating that Tier 2 sources were originally intended to be a transitory form of renewable energy and not a long term solution. [54] Tier 1 credits can be used to meet Tier 1 or Tier 2 requirements, while Tier 2 credits only satisfy Tier 2 requirements.[55] Thus, it can be deduced from this structure that renewables in Tier 1 are considered to have greater value under the RPS than those in Tier 2.

Table 3: Annual RPS Requirements

Tier	Year -->																
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Tier 1	1.0%	1.0%	2.005%	2.01%	3.025%	5.0%	6.5%	8.2%	10.3%	10.5%	13.1%	13.1%	15.8%	17.4%	18.0%	18.7%	20.0%
Tier 2	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	0.0%	0.0%	0.0%	0.0%

As the chart above shows, while the RPS initially includes 2.5% generation from Tier 2 sources, these units are phased out of the RPS in 2019 and are no longer eligible for RECs.[56]

Currently, Tier 1 sources include solar, wind, qualifying biomass, methane from anaerobic digestion, geothermal, ocean, and hydroelectric, while Tier 2 sources originally included WTE incinerators and a specific type of hydroelectric facility.[57] However, this past summer the Maryland legislature passed, and Governor O'Malley signed into law, a revision to the RPS that promotes WTE incinerators to Tier 1 status, beginning October 1, 2011.[58] According to Governor O'Malley, the justification for this change is that, "generating 20% of [Maryland's] energy from Tier 1 renewable sources by 2022. . . will require a diverse fuel mix including. . .waste-to-energy if [the state is] to realize [its] 20% goal."[59] Clearly, the rationale for this change to the RPS is *not* based on new technologies making WTE incinerators cleaner or a belief that these facilities will improve the quality of Maryland's environment and public health. Rather, Maryland did not believe it could meet its goals without incorporating this dirty technology as a Tier 1 renewable.[60] Thus, rather than re-evaluating the RPS or the credit

(incentive) program itself, Maryland has simply elected to water down its standard in order to claim it achieved a 20% renewable portfolio.

With the recent reclassification of WTE incinerators as Tier 1 resources, and virtually no limitations on their contribution to the RPS, Maryland now has among the most lax RPS programs in the entire country with respect to incinerators. Of the 31 states that have enforceable Renewable Portfolio Standards with annual requirements, Maryland is one of only five states that have no restrictions on WTE incinerators' contribution to the RPS.[g] Furthermore, 17 of the 31 states either explicitly prohibit MSW from being used for renewable energy requirements or do not include it in the RPS.

2. Renewable Energy Credit (REC) Trading Program

The RPS functions via the Renewable Energy Credit (REC) trading program. Under this program, facilities generating renewable energy are allocated credits, at a rate of one credit per megawatt-hour. Credits can then be traded or auctioned on an REC market.[61] Each energy company must own the required number of RECs which is equivalent to that year's RPS rate and the amount of energy generated by the company.[62] Because companies simply have to own credits and not generate their own renewables, this allows other power producers, such as those that own coal-fired power plants, to purchase these credits in lieu of constructing renewable energy facilities to meet the RPS requirement. Thus, companies that produce only renewable energy can sell their excess credits and profit. While there is no direct regulation of Tier 1 and Tier 2 credit prices, Tier 1 credits are often worth significantly more because they satisfy both requirements and comprise a much larger fraction of the RPS. Hence, the promotion of WTE incinerators from Tier 2 to Tier 1 sources will increase in value the credits these facilities auction or trade.

3. Clean Energy Production Tax Credit Program

Lastly, Maryland has a tax credit for utilities that produce renewable energy. Under this program, renewable facilities that were placed into service after 2006 or will be placed into

[g] Other states are Pennsylvania (whose RPS includes sources like coal mine methane, waste coal, and IGCC coal plants), Hawaii (where a lack of open space for landfills and difficulty importing power plant fuel make WTE incineration more practical), Minnesota, and Nevada. Analysis based on a review of state RPS programs through the U.S. DOE's Database of State Incentives for Renewables & Efficiency, available at http://www.dsireusa.org/.

service before 2016, are eligible to receive a tax credit of 0.85 cents ($0.0085) per kilowatt-hour of energy produced with a maximum credit over five years of $2.5 million (state-wide, credits cannot exceed $25 million).[63] With the potential to offer up to $500,000 annually in additional revenue, this tax credit can provide a significant additional income stream for facilities classified as renewable, and for WTE incinerators in particular, which tend to produce the most energy of the current renewable energy technologies.

Federal Renewable Electricity Production Tax Credit Program and ARRA

In addition to Maryland's programs, the federal government has several incentives that promote the construction of renewable energy facilities, including WTE incinerators. The first of these is the Renewable Electricity Production Tax Credit (PTC). This is nearly identical to the Clean Energy Production Tax Credit program administered in Maryland, except that it offers an incentive of 1.1 cents ($0.011) per kilowatt-hour rather than the 0.85 cents ($0.0085) offered in Maryland.[64] Further, these credits do not have the $500,000 annual limit that is included in the Maryland rules, although there is a ten year maximum.[65] Because there is no annual limit on the amount of the credit, the PTC offers a substantial boost in revenue.

More recently, the American Recovery and Reinvestment Act of 2008 (ARRA) provides grants in lieu of PTC tax credits for renewable energy projects including WTE incinerators.[66] Under ARRA §1603, renewable energy producers can forego their tax credits and in turn receive upfront payments of between 10% and 30% of the total cost of construction.[67] This provision makes it much easier to finance the construction of facilities classified as renewable, and WTE incinerators in particular, because of their enormous construction costs. In fact, the statute specifically identifies WTE incinerators as eligible to receive the maximum allowable stimulus funds: 30% of construction costs. [h]

The tax and credit programs of both Maryland and the Federal government provide a significant incentive to construct WTE incinerators. Further, because Maryland has now classified WTE incinerators as Tier 1 sources, it has increased competition with solar and wind producers, and will likely reduce the number of these facilities that would otherwise have been constructed. Thus, federal stimulus and state funds that now could be contributed toward

[h] Facilities limited to 10% are: Geothermal under IRC sec. 48, microturbines, combined heat and power, and geothermal heat pumps.

constructing truly renewable energy facilities such as wind farms and solar facilities will soon be diverted to giant trash incinerators that emit toxic chemicals and produce potentially hazardous ash.

Maryland's initial classification of WTE incinerators as Tier 2 sources that, in 2019, will no longer contribute to the RPS clearly suggests that the government recognized these facilities as a less valuable source of renewable energy, not meant as a long term solution. Rather than address the need to increase incentives for solar and wind, the state has undermined the RPS by allowing incinerators to replace other renewables. If Maryland truly intends to move toward energy generation that is clean and renewable, incorporating WTE incinerators into its RPS so it can simply meet its numbers is not the way to achieve success.

Maryland's Waste Disposal Policies – Misplaced Priorities

Policies promoting WTE incineration as a renewable energy option in Maryland are also not necessary for waste disposal purposes. Maryland does not have an immediate need to reduce its landfilling or a resultant need to incinerate its waste. Through the end of 2009, Maryland still had just short of 57% of its MSW landfill capacity, or nearly 60,485,412 tons, still available.[i,68] The majority of Maryland's major landfills have projected full capacity dates beyond 2030, further demonstrating that there is ample time to invest in alternatives before landfills reach capacity.[69] However, if Maryland does want to improve its waste management practices, rather than constructing new incinerators and continuing to combust waste, the state should focus on improving recycling and source reduction programs.

Proponents of WTE incineration have consistently presented a false set of choices relating to waste management options in Maryland, arguing that incineration is preferable to landfilling. However, this argument does not evaluate the significant benefits of increased recycling and source reduction programs, which the EPA has consistently stated are preferable to WTE incineration. Specifically, the EPA notes that, "not producing [trash] in the first place is the preferred management strategy [and that] recycling is preferred over any method of disposal."[70] Further, a review of several different studies evaluating waste management

[i] MDE has determined that this results in approximately 96,008,590 cubic yards, using a compaction factor of 0.63.

programs concluded that, for solid waste output, energy use, and air emissions/waterborne wastes, recycling is preferable to, and showed many benefits over, WTE incineration.[71]

Maryland ranks a commendable 4th in the nation in state recycling rates according to a 2010 study. However, there are still three states – California, Oregon and Massachusetts - with better recycling rates than Maryland (See Appendix C).[72] These states serve as examples of the fact that there is room for Maryland to improve its recycling program, especially given all of the benefits of recycling as compared to incineration. Instead of investing hundreds of millions of dollars in constructing and expanding incinerators, Maryland's government should use these funds to improve recycling programs that help to reduce the need for virgin materials and reduce the waste stream. In addition to reducing the demand for raw materials, the amount of energy recycling saves, through reuse of materials, greatly exceeds that produced by WTE incinerators.[73]

If the proposed and permitted projects go forward as planned, and assuming that waste generation rates will remain the same in Maryland (which is conservative, as waste generation has been declining every year for the past several years), Maryland will have the capacity to incinerate over 32% of the waste generated in the state.[j,74,75,76,77,78] Furthermore, Baltimore City alone will have the capacity to burn up to 2,427,250 tons per year of waste, despite the fact that, in 2009, the City generated only 1,287,482 tons of waste (just over half of its capacity).[79] This means that Baltimore City may have to import *over 1,000,000 tons of trash each year* in order to feed its incinerators, and almost half of the trash incinerated will be imported from outside Baltimore. This raises the question of whether Baltimore is about to become a dumping ground for trash from elsewhere in Maryland and perhaps other states.

Interestingly, the O'Malley Administration has cited European waste management practices, which includes a large number of incinerators, as a model for Maryland because of its environmental advantages, specifically its reduced reliance on fossil fuels.[80] However, there are two key distinctions between U.S. and European waste management practices. First, nearly all of Western Europe has recycling rates substantially higher than those in the United States and

[j] Projections based on maximum design capacity of Harford County Incinerator (1,500 TPD with modifications), Montgomery County Resource Recovery Facility (1,800 TPD), Wheelabrator Baltimore Facility (2,250 TPD), Frederick County Incinerator (1,500 TPD proposed), and the Energy Answers Incinerator (4,000 TPD permitted).

in Maryland. In fact, when ranked against European countries, Maryland comes in tied for 14th place (see Appendix B). If the O'Malley Administration wishes to follow European waste management practices, it should first target higher recycling, composting, and source reduction rates, which EPA has cited as best practices for the environment and reducing energy use.

Second, Europe's waste management practices, and specifically an increased reliance on WTE incinerators, have evolved out of a different set of social and geographic conditions than the United States'. One cause of different waste management practices in Europe than those in the United States "is the relative scarcity of open, cheap land in Europe."[81] However, "in Europe, it is not uncommon to find common heating arrangements for entire districts, and this provides a ready market for the steam generated by incinerators [for heating purposes, which] is more energy efficient and less capital intensive than producing electricity, [and which] contributes greatly to the profitability of European incineration."[82] In contrast, WTE incinerators in the United States typically convert this steam into electricity, decreasing their efficiency and driving up the costs of these facilities. Therefore, the employment of WTE incinerators in Europe is appropriate for, and has evolved to fit the large market for steam there, which is considerably different than that in the United States, where it is less in demand and harder to distribute.

Finally, in an era where jobs are in high demand, it is important to note that recycling generates far more jobs per ton of waste managed than incineration. While there is limited data available on the issue of waste disposal methods and job creation, the Institute for Local Self Reliance has found that for each ton of waste managed, recycling generates 10 times as many jobs as incineration.[83] Similarly, a 2009 review of existing studies conducted by the CASCADIA consulting group concluded that throughout the studies they reviewed, recycling continuously had more economic benefits than other forms of disposal.[84]

In summary, given the remaining landfill capacity within Maryland, the need to import waste into certain areas in order to supply incinerators, the increased jobs created by recycling programs, and the environmental and public health risks posed by WTE incinerators, it is clear that the benefits of recycling and source reduction far outweigh any benefits gained from burning waste.

Case Study: Energy Answers Fairfield Renewable Energy Center

The Energy Answers (EA) Fairfield Renewable Energy Center (Fairfield Incinerator) is a WTE incinerator that was granted a Certificate of Public Convenience and Necessity (CPCN) by the Maryland Public Service Commission in August of 2010. This incinerator is sited in Curtis Bay, Maryland, in southern Baltimore City.[85] This area has consistently been among the most polluted places in the country. In 2009 for example, the Curtis Bay zip code (21226) was ranked 2nd *in the entire country* for releases of toxic air emissions, with over 13.6 million pounds of toxic air releases.[86] In March 2010, the Brandon Shores Generating Station, one of the two power plants comprising the Ft. Smallwood Complex, began operating newly installed baghouses and wet scrubbers, which have resulted in a significant decrease in the toxic pollution generated at this facility.[k,87] However, despite these upgrades, the Curtis Bay zip code still ranks 87th in the country for toxic air emissions (out of 10,497) and 1st in Maryland (out of 81).[l,88] Despite the fact that this is clearly an area already overburdened with air pollution and air toxics, the Maryland Public Service Commission, Mayor of Baltimore, and Governor O'Malley have given their support to the Fairfield Incinerator and fast-tracked the CPCN for the plant.

Like the aforementioned facilities in Maryland, the Fairfield Incinerator will emit many pollutants into the environment. In fact, this new incinerator has been permitted to release 240 pounds of mercury, or as much as is currently emitted by large coal-fired plants in the state.[89,m] Additionally, the incinerator will emit NOx, the health impacts of which were discussed earlier, in significant quantities. While the EPA and Maryland have both continuously tried to reduce emissions of NOx within the state, the Fairfield Incinerator, has yet to complete, as of August 2011, modeling showing that it can meet EPA's new one hour NOx air quality standard. Additionally, because there is currently no NOx ambient air monitor in the Curtis Bay area, it will be difficult to assess the full impact of Energy Answer's NOx emissions will have on the area. What is also disconcerting is that this proposed facility is located just over a mile from

[k] Based on EPA's TRI Explorer, toxic air emissions from the Ft. Smallwood complex decreased from 13,141,248 pounds in 2009 to 1,958,800 pounds in 2010.

[l] Based on 2009 and most current version of TRI data, which includes 98% of facilities required to report in 2010.

[m] Fairfield Incinerator emissions limit compared to reported annual emissions of mercury from Emissions Certification Reports for coal power plants.

Curtis Bay Elementary School and Benjamin Franklin Middle School. [n,90] The emissions from this plant will contribute to an already heavily polluted area, and could pose a threat to the children in this community.

Lastly, although the cost of constructing the Fairfield Incinerator has been estimated between 400 and 700 million dollars, the energy center has been projected to create, at most, between 144 and 180 permanent jobs. [o,91,92]

Conclusion

There are clearly many problems with WTE incinerators that are mostly, if not entirely, avoided by constructing other renewable energy facilities. The state of Maryland implicitly acknowledged this fact when it originally classified WTE incinerators as Tier 2 energy sources that would be phased out of the RPS in 2019. Despite the clear drawbacks of these facilities and their enormous price tags, Maryland nevertheless decided to include them in its Clean Energy Production Tax Credit program and Renewable Portfolio Standard anyway to promote their construction. By opting to include WTE incinerators, Maryland has provided an incentive for the construction of these facilities, which sacrifices valuable funds and allows the state to avoid constructing other Tier 1 renewables that are truly clean and utilize naturally occurring forms of energy.

Further, by electing to reclassify these facilities as Tier 1 renewables in order meet its RPS, Maryland has undermined the entire program for the ostensible purpose of meeting numerical goals. Weakening Maryland's renewable energy policy simply to say that its targets have been met without achieving the underlying objectives of that policy will not benefit the environment or public health, and is not a good investment of taxpayer money.

Additionally, the construction and use of almost any of the other energy sources listed in Maryland's RPS would avoid these emissions entirely. Clearly, classifying WTE incinerators as clean and renewable energy is not only inaccurate, but also adds more pollution to areas that are already struggling to meet air quality standards.

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[n] All distances measured from the stack; Curtis Bay Elementary School and Benjamin Franklin Middle School are less than one mile from the property boundary.

[o] Cost and employment projections have ranged between EA's CPCN application, press releases, and news articles identifying the facility.

In sum, WTE incinerators not only impact the health of nearby and distant populations, but also replace other Tier 1 renewable energy projects. Therefore, we urge the state to remove WTE incinerators from Maryland's RPS, and, more broadly, to re-evaluate their role in a new clean energy economy.

Recommendations

There are several steps Maryland ought to take in order to rectify its renewables and waste disposal programs, and ensure the continued health of the public and the environment:

1. *Remove WTE Incinerators as Tier 1 Renewables under the Maryland RPS*

Maryland should, at a minimum, re-categorize WTE incinerators as Tier 2 renewables or create a new tier for these facilities. However, the best option is for the state to remove WTE incinerators altogether from the RPS. As our research has shown, of the 31 states with enforceable Renewable Portfolio Standards, Maryland is one of only five states in the entire country (the other four are Hawaii, Minnesota, Nevada and Pennsylvania) that has no restrictions on the incineration of waste as a renewable energy source. To improve the effectiveness of the RPS, Maryland ought to remove WTE incinerators from the RPS.

2. *Invest in Recycling and Source Reduction Programs*

As much research has shown and as EPA has stated repeatedly, the best waste management practices for achieving environmental improvements and reduced dependence on fossil fuels are increased recycling and source reduction rates. Improving these programs will lead to benefits far exceeding anything that could be obtained by relying on WTE incinerators.

3. *Reconfigure the Maryland Clean Energy Production Tax Credit (PTC)*

The PTC program, which originally began in 2006 and was intended to end in 2011, has subsequently been amended to extend to 2016, primarily because of the dearth of companies utilizing this credit. To date, the program has only credited out approximately $8.8 million of its $25 million budget, meaning that the state still has about $16.2 million in PTCs to hand out to renewable energy companies.[93] Presumably, the state is having trouble meeting the RPS at least in part because of the cost of, and lack of incentives for, new projects. Maryland ought to revise the PTC program to offer more, out of the substantial amount remaining in the PTC fund, in incentives to solar, wind, and hydro energy producers and to create a tiered credit system to

preference certain technologies over others. Doing so will help spur innovation in truly clean technologies, and help extend the benefits of the PTC to more renewable energy producers across the state.

4. *Increase Statewide Ambient Air Monitoring Program*

While Maryland has made progress improving ambient air quality throughout the state, there are simply not enough monitoring stations to adequately track fluctuations and trends in air quality, particularly from the installation of new generating facilities. This is particularly important in Curtis Bay, where the new Energy Answers facility will be located and which lacks a monitor for NOx. As of August 2011, Energy Answers still had not submitted modeling showing that it could meet EPA's new 1-hour NOx standard, and, thus, it is important to be able to monitor the effects of that plant on the surrounding area. Additionally, before issuing permits, Maryland should ensure that all planned and proposed facilities demonstrate through modeling that they can meet all ambient air emissions requirements, and should be required to install monitors to continuously determine compliance.

Data and Methodology

EIP acquired publicly available annual Emissions Certification Reports and statewide Emissions Inventories from the Maryland Department of the Environment, as well as publicly available data from the U.S. Energy Information Administration in calculating its emissions rates. In order to determine these rates, the total annual emissions were divided by the megawatt-hours of energy produced in the given year. This yielded a lbs/MWh value which was comparable across different facilities.

EIP's analysis of incinerator emissions is based on company self-reported data obtained through publicly accessible Energy Information Administration websites and publicly obtainable Maryland Department of the Environment documents. Occasionally, government data may contain errors, either because information is inaccurately reported by the regulated entities or incorrectly transcribed by government agencies. In addition, this report is based on data retrieved in November 2010, and subsequent data retrievals may differ slightly as some companies correct prior reports.

EIP is committed to ensuring that the data we present are as accurate as possible. We will correct any errors that are verifiable.

Appendix A

Health Impacts of Incinerator Pollutants

Toxic Agent	Health Impacts
Particulate Matter	Increased respiratory symptoms, decreased lung function, aggravated asthma, development of chronic bronchitis, irregular heartbeat, nonfatal heart attacks, and premature death in people with heart or lung disease[94]
Carbon Monoxide	Chest pain, cardiovascular effects, vision problems, reduced ability to work or learn, reduced manual dexterity, difficulty performing complex tasks, and respiratory problems[95]
Nitrogen Dioxide	Irritation of eyes, nose, throat, and lungs, nausea, shortness of breath, respiratory problems, reduced oxygenation of body tissues, and a buildup of fluid in the lungs[96]
HCl	Throat irritation, rapid breathing, blue coloring of the skin, accumulation of fluid in the lungs, swelling of the throat, reactive airways dysfunction syndrome, skin burns, respiratory problems, eye and skin irritation, and discoloration of teeth[97]
Cadmium	Severe lung damage, kidney disease, stomach irritation, increased bone fragility, and increased risk of lung cancer[98]
Lead	Adverse effects on nervous system, kidney function, immune system, reproductive and developmental systems, and cardiovascular system, and neurological effects (especially in children)[99]
Mercury	Brain, kidney, and developing fetus damage, lung damage, nausea, vomiting, increased blood pressure, and ocular and dermal irritation[100]
Chromium	Irritation of respiratory lining, runny nose, breathing problems (cough shortness of breath, wheezing), skin rashes, reproductive damage, increased lung cancer, and increased stomach tumors[101]
Arsenic	Sore throat, irritated lungs, nausea, vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, darkening of skin, skin irritation, and increased risk of skin, liver, bladder, and lung cancer[102]
Beryllium	Lung damage, acute beryllium disease, chronic beryllium disease, and increased risk of lung cancer[103]
Dioxins and Furans	Chloracne, increased risk of cancer, increased risk of heart disease, and increased risk of diabetes[104]
Polychlorinated Biphenyls (PCBs)	Increased risk of cancer, specifically rare liver cancers and malignant melanoma, immune system damage, reproductive system damage, nervous system damage, endocrine system damage, dermal and ocular effects, and elevated blood pressure, serum triglyceride, and serum cholesterol[105]
Polycyclic Aromatic Hydrocarbons (PAHs)	Increased risk of cancer[106]

Appendix B

2009 Recycling and Composting Rates in Europe, the United States, and Maryland[p]

Recycling + Composting Rates in 2009[107,108,109]		
Rank	*Country/State*	*Recycling+Composting Perentage*
1	Austria	70%
2	Germany	66%
3	Belgium, Netherlands	60%
5	Sweden	50%
6	Denmark	48%
7	Luxembourg	47%
8	Italy	43%
9	Great Britain	40%
10	Spain	39%
11	Finland, Ireland, Slovenia	36%
14	France, United States, Maryland	34%
17	Estonia	25%
18	Poland	21%
19	Portugal	20%
20	Greece	19%
21	Hungary	15%
22	Cyprus	14%
23	Slovakia	8%
24	Latvia	7%
25	Czech Republic, Lithuania, Malta	4%
28	Romania	1%
29	Bulgaria	0%

[p] Maryland rate determined using EPA's standards rather than MDE's

Appendix C

2009 Top 30 Recycling Rates in the United States, by State

Recycling Rates in 2009[110]					
Rank	*State*	*Estimated MSW Generation (tons/yr)*	*MSW Recycled (tons/year)*	*MSW Composted (tons/year)*	*Estimated Recycling Rate (tons/year)*
1	California	61,210,578	24,724,726	7,641,910	52.9%
2	Oregon	4,632,513	1,421,850	339,877	38.0%
3	Massachusetts	8,350,000	2,300,000	680,000	35.7%
4	Maryland	6,551,880	1,461,164	781,293	34.2%
5	Pennsylvania	17,043,945	4,677,083	748,723	31.8%
6	Maine	1,186,854	333,132	28,969	30.5%
7	Iowa	3,894,330	924,364	247,574	30.1%
8	New Jersey	13,169,025	2,012,583	1,913,678	29.8%
9	Washington	7,420,559	1,461,403	640,619	28.3%
10	Delaware	1,032,201	168,701	122,357	28.2%
11	Vermont	584,467	120,499	36,112	26.8%
12	Wisconsin	5,150,553	831,552	540,600	26.6%
13	Connecticut	3,489,034	607,691	302,928	26.1%
14	Minnesota	10,326,122	2,589,954	17,630	25.3%
15	Kansas	3,473,325	727,853	147,888	25.2%
16	South Carolina	4,448,935	914,056	167,457	24.3%
17	Texas	29,164,982	2,634,275	4,360,000	24.0%
18	Kentucky	6,335,476	1,185,541	258,752	22.8%
19	Hawaii	3,718,002	574,294	256,046	22.3%
20	Ohio	13,252,219	2,037,688	876,813	22.0%
21	New York	16,925,888	3,060,363	627,949	21.8%
22	Arkansas	4,696,134	483,896	501,221	21.0%
23	Virginia	14,858,903	2,716,198	379,826	20.8%
24	Missouri	4,851,821	951,860	0	19.6%
25	South Dakota	699,039	71,041	62,850	19.2%
26	West Virginia	2,110,381	337,661	0	16.0%
27	Rhode Island	1,014,846	101,883	48,380	14.8%
28	North Carolina	8,630,060	668,498	589,139	14.6%
29	Arizona	6,784,535	917,373	65,954	14.5%
30	New Mexico	2,031,891	230,865	45,279	13.6%

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