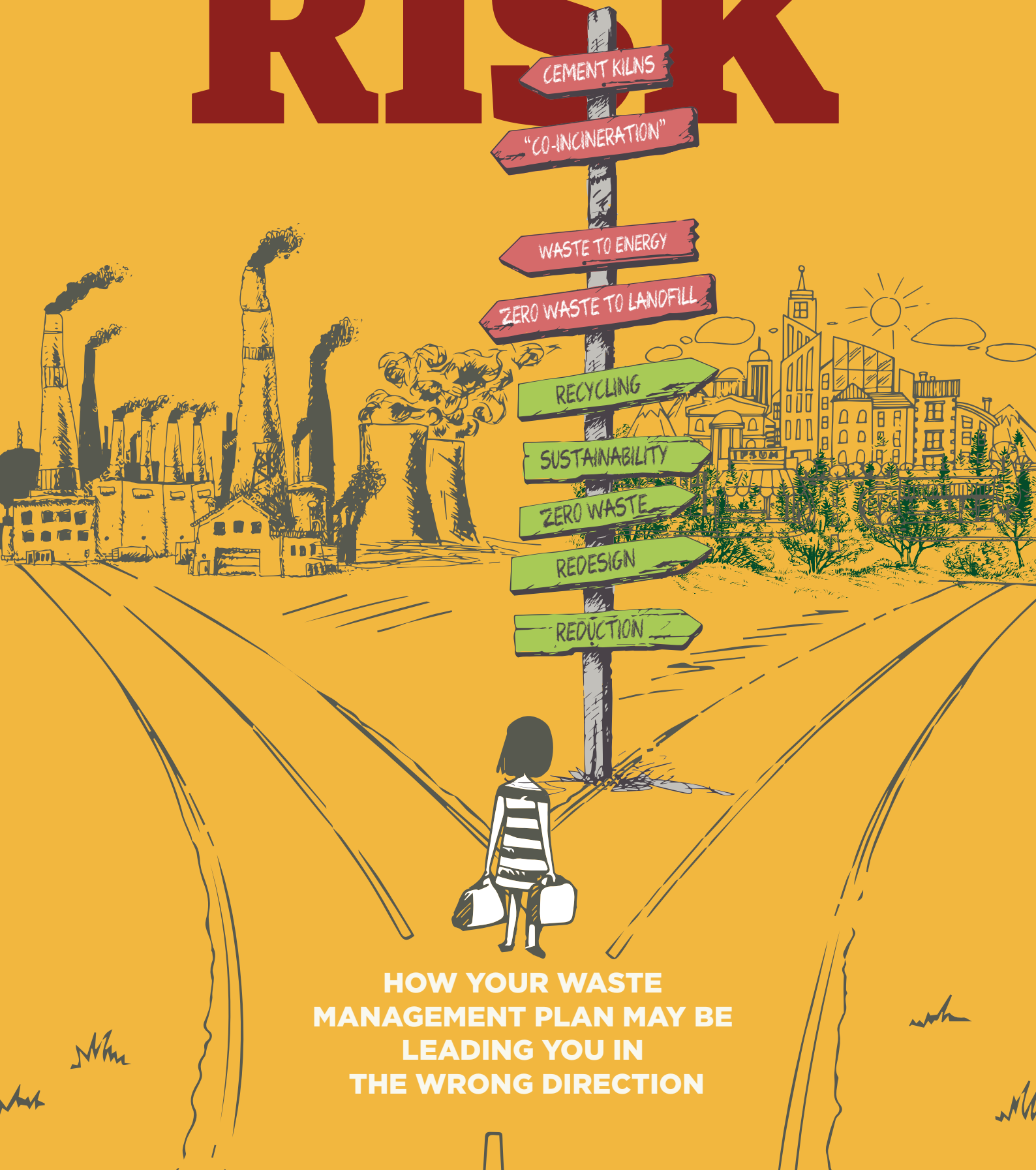


GREEN BUSINESSES AND CITIES AT **RISK**



HOW YOUR WASTE
MANAGEMENT PLAN MAY BE
LEADING YOU IN
THE WRONG DIRECTION

Contributors: Megan Ponder, Rachel Anne Crowley, Claire Arkin, Ahmina Maxey, Antonia Bruno, Kartik Amarnath, Ana Baptista, Monica Wilson. Thanks to Tishman Environment and Design Center at The New School, and to the many GAIA staff, allies, advisors, and member organizations who reviewed this report.

GAIA gratefully acknowledges the support of the Lisa & Douglas Goldman Fund, the Overbrook Foundation, and all our donors.



This report was published in September 2017 by GAIA and the Tishman Environment and Design Center at The New School.

To find out more, visit our websites:

www.no-burn.org

www.newschool.edu/tedc

Report & Cover Design: Pietro Bruni- helloo.org

Abstract

Businesses that attempt to meet sustainability goals through programs like “waste-to-energy,” “zero waste to landfill,” or “refuse derived fuel” undermine their own intentions by burning up valuable resources in polluting processes. The practice of burning waste using co-incineration in cement kilns and boilers has recently become more dangerous. A 2013 U.S. Environmental Protection Agency loophole made it easier to burn waste in non-incinerator combustion facilities with weaker emission regulations and reporting requirements. **Business and cities should be aware that burning waste in any form and by any name is a false path to zero waste, and undermines true sustainability goals.** Many companies are already shifting to better waste management practices and choosing better products and packaging, with subsequent cost savings and revenue increases. This report addresses the problems with burning waste, and recommends that businesses pursue true zero waste strategies and sustainability goals.

Table of contents

Introduction	6
Part 1: True zero waste vs. “waste-to-energy” & co-incineration: Burning waste courts controversy, risk for business	9
Part 2: EPA Deregulation makes waste burning more dangerous	15
Part 3: Do you know where your waste goes? Zeroing in on waste burning in cement kilns, coal plants, and other industrial facilities	19
Setting a dangerous precedent: “Hefty Energy Bag” Program in Omaha, Nebraska collects plastic to burn in cement kilns, calls it ‘recycling,’ plans expansion to more locations	20
Adding fuel to the fire: Waste Management makes pellets out of garbage, plans to burn in coal plant already plagued by harmful lead emissions	21
Alternative Fail: Logistical problems force Lehigh Southwest Cement Plant to halt burning waste in Tehachapi, California	23
Risky Business: RePower South loses Virginia contract, faces continued controversy over financial instability and unproven technology in South Carolina proposal	24
Part 4: The Way Forward: Waste incineration in any form subverts sustainability goals, businesses can achieve success with zero waste planning	25
Appendix: A Guided Explanation of the Non-Hazardous Secondary Materials Rule, Process, and Related Regulations	29
References	32

Introduction

In today's competitive business environment, customers and policy makers increasingly demand that the private sector adopt sustainability as a core operating practice. Careful procurement and planning for waste reduction, recycling, and composting offer unique opportunities to significantly and quantifiably reduce both operating costs and environmental impacts and have become key components of sustainability planning.

While some businesses are focused on truly sustainable waste management, others are attempting to achieve sustainability through misguided programs like "waste-to-energy," "zero waste to landfill," or "refuse derived fuel" that replace reduction and recycling with the burning of valuable resources under the guise of zero waste. In particular, while a number U.S. standard mass burn incinerators have closed in recent years – largely due to high costs and local resistance to the associated toxic and climate pollution – some industries are trying to expand the troubling practice of co-incineration. Co-incineration is the burning of waste – generally alongside other fossil fuels – in cement kilns or other non-traditional incinerators. Like standard incineration, co-incineration is known for the release of harmful pollutants into the surrounding environment, and locks in a "built to be burned" economy that relies upon dangerous fossil fuel extraction to needlessly expend virgin materials and resources. **For these reasons, both standard incineration and co-incineration in cement kilns and coal plants undermine business and municipal sustainability goals.**

The "Hefty Energy Bag" project (described in the following case studies) sponsored by Dow and Keep America Beautiful, and including partners Recyclebank, Reynolds, Conagra, and Systech (subsidiary of LafargeHolcim cement company) is an apt example of this misguided approach to waste management. The program encourages businesses and municipalities to burn waste plastics in cement kilns rather than increasing recycling rates or eliminating problematic single-use products. Dow and Keep America Beautiful even promote this plastic burning project as "recycling."¹ Claiming to reduce landfill waste and promote sustainable waste management, this project demonstrates how the plastics industry undermines efforts towards true zero waste by increasing burning instead.

The practice of burning waste in cement kilns and other combustion facilities has been exacerbated and made more dangerous by a 2013 EPA loophole that made it easier to burn waste in cement kilns, coal plants, and biomass boilers with weaker emission regulations and reporting. This "Non Hazardous Secondary Materials" (NHSM) rule redefines what gets called waste because municipal solid waste (which includes commercial waste)² can now be processed to become "non-waste fuel products." The processing of municipal solid waste is intended to remove PVC and create higher heat value, but is left to waste processors to determine and not subject to EPA or other regulatory oversight. This means that the same or similar waste under a different name can be burned in facilities that do not have to meet emissions regulations that were created specifically for waste incineration, such as regulations for carcinogens like heavy metals and dioxins, among other hazardous air pollutants.

Industry has already begun to make use of this ruling in their operations; the largest waste management company in the U.S., Waste Management, is using the NHSM rule to their advantage through their venture to pelletize waste at a facility near Philadelphia, Pennsylvania (detailed in the second case study of this report). RePower South is pursuing a new waste processing facility in South Carolina, although Virginia's Southeastern Public Service Authority cancelled an agreement with RePower for a \$100 million facility on August 23, 2017.

Burning waste in cement kilns and coal boilers is the latest pretense that disguises incineration, and businesses and cities should be aware that burning waste in any form and by any name is a false path to zero waste and undermines true sustainability goals.

Rather than burning up hard won natural resources and hindering the transition to real renewable energy sources, there are multiple opportunities for businesses to be on the cutting edge of an economy based in the principles of zero waste and the circular economy, both in business operations and in the design of products and packaging.

It is time for mainstream businesses to embrace true sustainability and create an economy without waste.

The first section of this report details the various negative impacts of incineration on human health, the climate, and the pursuit of true zero waste, as well as the public relations risks for businesses using incineration in any form as part of their sustainability goals. The second section discusses the NHSM ruling in greater detail, and how the associated lack of transparency and weaker emissions standards exacerbates the overall waste incineration problem in the United States. The third section features four case studies that exemplify the risks associated with participating in a 'camouflaged' incineration scheme that takes advantage of the NHSM ruling, and the troubling histories of the facilities and industries that are utilizing this loophole. The report concludes with recommendations for businesses to align waste management approaches with sustainability goals, and examples of companies that are already leading the way in this regard, through recycling, redesign, and other methods.

Waste burning takes many forms. The below industry terms and phrases describe the various processes that fall under the umbrella of waste incineration, many of which are addressed in this report:

- Mass burn incinerators: These are traditional incinerators, called "municipal solid waste combustors" by the EPA, while the incinerator industry uses euphemisms like "waste-to-energy" and "energy from waste." U.S. incinerators have problems with emissions, high costs, fires, and other impacts on communities, health, and the climate.³
- Co-incineration: a term used in many countries to describe the combustion of waste at non-traditional incinerators, such as cement kilns,⁴ coal plants, and industrial boilers. The U.S. regulations for burning waste at these sites have been loosened under the NHSM ruling to allow burning of many types of waste, including plastics. Cement kilns and other industries engaged in this practice in the United States refer to waste used for co-incineration as "engineered fuel," "engineered municipal solid waste," and "alternative fuel."
- Refuse derived fuels: Mixed waste that is processed and burned in facilities regulated as mass burn incinerators.⁵
- Staged Incineration: The treatment of waste using gasification, pyrolysis, and plasma which is nearly always followed by combustion. Some of these processes are classified as a form of incineration by the U.S. EPA,⁶ and these approaches have a troubled, unproven, and costly track record.⁷



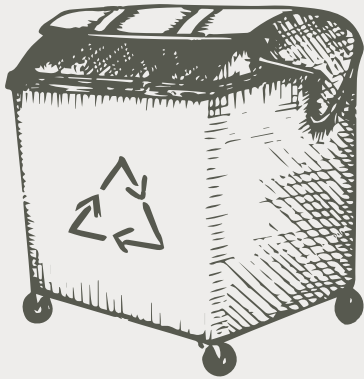
Part 1

True zero waste vs. "waste-to-energy" & co-incineration:

Burning waste courts controversy, risk for business

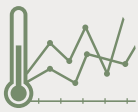


ZERO WASTE



VS.

WASTE BURNING



Mitigate climate change

Zero waste practices conserve finite resources and prevent fossil fuel extraction to produce virgin materials. Research shows that adopting waste reduction strategies in the U.S. alone would be comparable to closing 1/5 of the country's coal-fired power plants.



Worsen climate change

Incinerators emit more carbon dioxide per megawatt-hour than coal-fired power plants.



Create jobs & save money

Recycling and composting create 10-20x as many jobs as incinerators, for a fraction of incinerator capital costs.



Hurt recycling

Incinerators burn valuable resources that can be recycled and composted, and incinerators compete for the same materials as recycling programs. Countries in Europe that have high waste incineration rates typically recycle less.



Improve public health

Waste reduction and recycling help improve overall health by decreasing exposure to hazardous materials and preventing pollutants associated with landfiling and incineration from contaminating the environment.



Harm communities

Heavy metals, organic and inorganic pollutants and other toxins released by incinerators pose increased risk of cancer, neurological and developmental disorders to humans as well as damage the environment in the neighboring communities and beyond.

THE SOLUTION

THE PROBLEM

Source: Global Alliance for Incinerator Alternatives (GAIA). (2012). *Incinerators: Myths vs. Facts about "Waste-to-Energy"*

Waste incineration has been known to cause a host of problems that run contrary to corporate social responsibility. Some of the most troubling aspects of incineration are the toxic pollutants that result from burning waste, as well as resulting greenhouse gas emissions that endanger clean energy goals. Incineration also undermines recycling and other zero waste efforts, leading businesses and cities in the opposite direction from true environmental solutions.

There is mounting evidence that burning waste releases toxic pollutants that have public health and climate impacts. A 2011 New York Department of Environmental Conservation study found facilities burning waste in the state released up to 14 times more mercury and more than twice as much carbon dioxide per unit of energy than coal plants.⁸ In 2011, a study published in the *American Economic Review* found that among U.S. industries, the waste incineration industry has the highest ratio of negative economic impacts from air pollution compared to the financial value added by the industry.⁹ Incineration is the most expensive waste management approach and such facilities are particularly vulnerable because they depend financially on local, state, and federal subsidies and local contracts.¹⁰ In addition, despite claims that burning waste allows for fewer emissions than fossil fuels, incinerators have been shown to emit carbon dioxide at 2.5 times the rate of coal power plants.¹¹ In the case of plastics, which come from fossil fuels, there can be no debate that burning plastics results in fossil fuel emissions and enables the continued extraction of fossil fuels to make more and more plastic.

Not only is incineration a detriment to public health and the climate, it also siphons off resources and political will from authentic zero waste solutions. Incinerators create demand for waste, undermining waste prevention goals and competing with composting and recycling programs. Although President Obama's Clean Power Plan was discarded by the present administration, the following text from the Clean Power Plan provides relevant insight:

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.¹²

Communities, public officials, and industry leaders have increasingly recognized the destructive impacts of incineration described above, making the practice a sure-fire route to controversy. For decades, communities have fought to protect public health, conserve natural resources, and reduce waste incineration, resulting in the rejection of hundreds of incinerator proposals. Opposition to waste burning in incinerators, cement kilns, and other burning facilities is active in many areas in Europe, Latin America, and Asia, and public concern is growing (For example, see box "In the News: Goldman Prize Winner brings international scrutiny to LafargeHolcim, the world's largest cement company").

The concept of "waste-to-energy" is also becoming less popular in the U.S. Only 77 municipal waste incinerators (including mass burn and RDF) currently operate, down from the industry's zenith of 114 facilities in the 1980s and early 1990s.¹³ Additionally, in 2017 the U.S.

Conference of Mayors specifically excluded “waste-to-energy” incineration from their new commitment to 100% renewable energy.¹⁴ Many cities¹⁵ and businesses¹⁶ have also adopted zero waste programs based on the concept of No Burn, No Bury, No Toxics that specifically excludes “waste-to-energy.”

In other countries where “co-incineration” of waste in cement kilns is more common, evidence shows the hazards and public relations risks of association with the cement industry. In India, the government allowed co-incineration of industrial and municipal waste in cement plants in 2010. Air samples near cement kilns have found high levels of heavy metals like lead, manganese, and copper at cement plants, leading to increased community protests and regulatory challenges.¹⁷

To some businesses, the concepts of ‘zero waste to landfill’ or ‘waste-to-energy’ may seem to be progressive alternatives that are not associated with the distasteful concept of burning waste, but these terms are merely euphemisms. Incineration is at the core of these practices, and as described above, incineration is becoming increasingly scrutinized for inefficiencies, high costs, financial risks, and pollution.

A “zero waste to landfill” goal implicitly places incineration above landfilling in a waste hierarchy, and can lead to equating waste incineration with recycling. Companies striving for “zero waste to landfill” can simply change the destination of materials from the landfill to various types of incineration facilities, rather than pursue comprehensive upstream measures to design products for reuse, recycling, composting, and waste prevention. Ironically, incinerators also send waste to landfills in the form of ash, undermining the idea of incinerators as alternatives to landfills.¹⁸

“Zero waste to landfill” goals contradict true sustainability by ignoring harmful pollution, social impacts, and climate impacts. In short, such goals can seriously damage a company’s environmental credibility. Leading experts in the field, including the Zero Waste International Alliance and Zero Waste Europe condemn “zero waste to landfill” as a false path to zero waste.¹⁹Increasing scrutiny around the reality of “waste-to-energy” and “zero waste to landfill” mean that these practices will no longer be recognized as viable strategies to meet sustainability or zero waste goals, and businesses will be expected to pursue a zero waste model of recycling, reduction, and redesign.

***Setting a
“zero waste to landfill”
goal instead of a
“zero waste” goal can
seriously undermine a
business’ environmental
credibility.***



In the news:



Photo from Goldman Environmental Prize

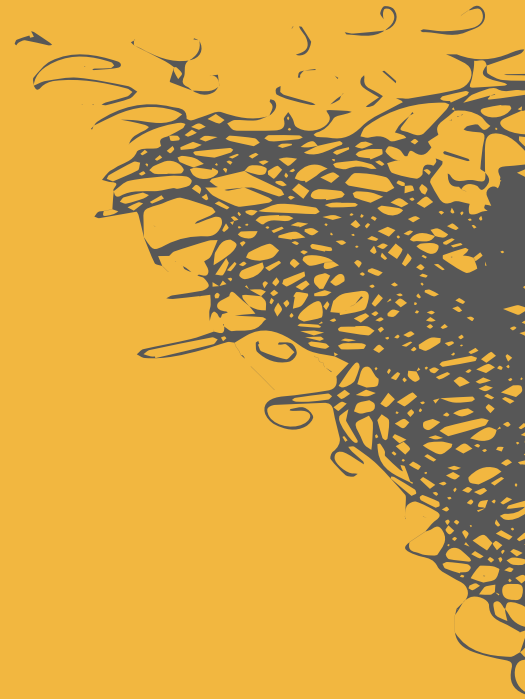


Goldman Prize Winner brings international scrutiny to LafargeHolcim, the world's largest cement company

In April 2017, Slovenian farmer and activist Uroš Macerl was awarded the prestigious Goldman Environmental Prize for exposing the adverse health and environmental effects of LafargeHolcim's cement plant on the community in Trbovlje, Slovenia. The cement plant burned waste, including plastics, in violation of its permit. High levels of hazardous emissions from the cement plant affected the health of livestock on Macerl's farm²⁰.

Macerl and the local organization Eko krog (Earth Circle) educated the public on the plant's history of emissions violations and permit violations, leading to a public demonstration of over 3,000 people demanding that the Prime Minister of Slovenia intervene. After this highly public campaign against waste co-incineration at the cement plant, the facility was forced to shut down.

LafargeHolcim is the world's largest cement company, and this case has received international attention. Environmental media and organizations around the world are becoming more watchful of the practice of co-incineration in cement kilns²¹.



Part 2

EPA deregulation makes waste burning more dangerous



Despite the numerous problems with incinerators and their declining numbers across the country, in 2013 the U.S. Environmental Protection Agency (EPA) created a loophole to allow the practice of incineration in thousands of facilities nationwide. The EPA's regulation, entitled "Non Hazardous Secondary Materials" (NHSM), redefines what gets called waste. Municipal and industrial waste can now be processed and reclassified as "non-waste fuel products," including mixed waste, plastics, tires, chemically-treated wood, paper sludge, and coal byproducts.²² Once this processed waste is considered "non hazardous secondary material," it can be burned in facilities including coal plants, cement kilns, and biomass plants which are not regulated as waste incinerators.²³

This means that the same or similar waste composition under a different name can be burned in facilities with weaker regulations for hazardous air pollutants like heavy metals and dioxins. Earthjustice attorney Seth Johnson, who helped file a court challenge against this EPA loophole, questioned, "How can you have plants burning waste and releasing toxins into the air and the rest of us being told that basically no regulation and no monitoring is necessary? Garbage is still garbage, whether it's thrown in a landfill, discarded in a river or burned. Communities should know what toxins they're being exposed to."²⁴

Under this ruling, 14,000 large combustion facilities (called "major source boilers") and over 180,000 smaller combustion facilities (called "area source boilers") nationwide may co-incinerate industrial and processed municipal waste, and are not required to notify nearby communities²⁵ – even though these facilities are allowed to emit higher levels of dangerous pollutants like particulate matter, sulfur dioxide, and dioxins than standard mass burn incinerators. Since standard incinerators are notorious for exceeding emissions regulations for these pollutants, it is of great concern that facilities exploiting the NHSM ruling will have even less accountability.

Many of these facilities do not even monitor for dioxins created by burning plastics like PVC.²⁶ As the World Health Organization states, "Dioxins are highly toxic and can cause reproductive and developmental problems, damage the immune system, interfere with hormones and also cause cancer."²⁷

Accompanying this new loophole was an associated policy that created another major loophole for many combustion facilities. Biomass is derived from organic materials, a broad definition including woody debris and some municipal waste. The additional EPA regulation allows boilers to avoid meeting air quality regulations for coal boilers by burning only 15% biomass and up to 85% coal. The danger is that biomass boiler regulations are much weaker than coal facility regulations.

Businesses and cities that care about environmental performance and reputation must avoid using a waste disposal technique that exploits lax pollution controls, and instead demonstrate meaningfully sustainable solutions.

For more information on EPA deregulation of waste burning, please see Appendix A



POTENTIAL POLLUTANTS GENERATED FROM BURNING OF PLASTICS

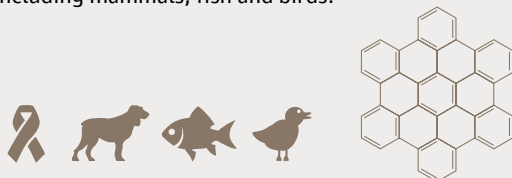
CARBON MONOXIDE

Causes dizziness, headaches and slowed reflexes. Affects mental function, visual acuity and alertness. Reacts with other pollutants in the air to form ground level ozone.



POLYNUCLEAR AROMATIC HYDROCARBONS (PAH)

Cancer causing agent in most animal species including mammals, fish and birds.



PARTICULATE MATTER (PM)

A complex mixture of extremely small particles and liquid droplets. Causes irritation of respiratory tract, aggravated asthma, contributes to chronic obstructive pulmonary disease.



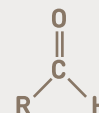
DIOXINS AND FURANS

May cause cancer; causes growth defects; affects DNA; affects immune and reproductive systems.



VOLATILE ORGANIC COMPOUNDS (VOCs)

May cause problems ranging from cancer risks to nervous disorders, respiratory irritation/illness, chronic lung disease. Contributes to low level ozone (smog).



ALDEHYDES

Toxic chemicals that result from the combustion of hydrocarbons. An animal carcinogen. Causes eye and respiratory illness and headaches.



Source: Saskatchewan Ministry of Environment (<http://www.sask20.ca/PDF/epb433.pdf>)

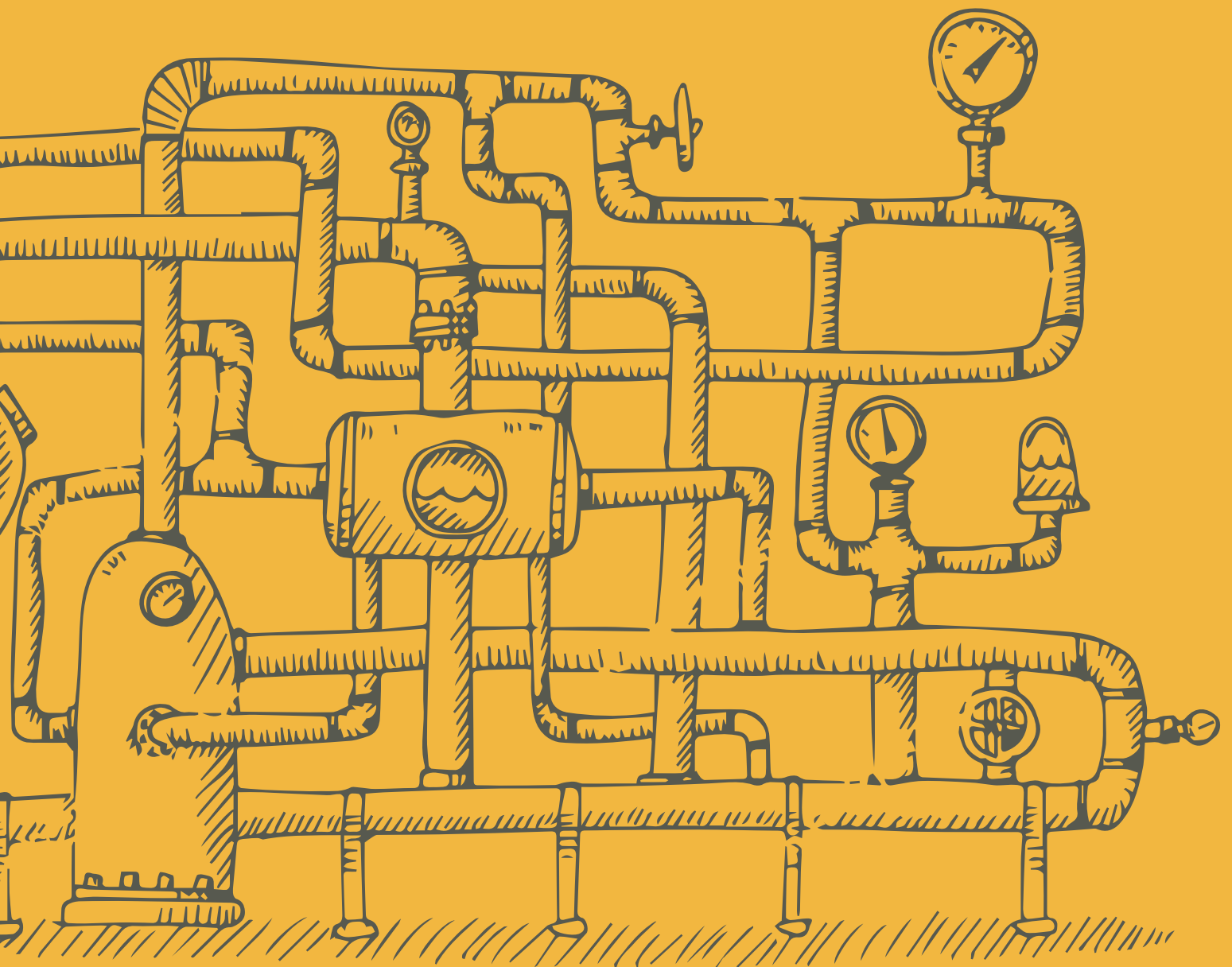
* Modern air pollution control devices can capture and concentrate some of the pollutants in the incinerators. However, they neither prevent captured pollutants from being released into the environment in the form of ash, slag, or sludge, nor can they capture many hazardous emissions such as ultra-fine particles. - GAIA (2012), Incinerators: Myths vs. Facts about "Waste to Energy"



Part 3

Do you know where your waste goes?

Zeroing in on waste burning in cement kilns, coal plants, and other industrial facilities



Communities near facilities that are—or could be—burning waste are increasingly concerned about the associated pollution, and the lack of transparency when companies use the “Non Hazardous Secondary Materials” (NHSM) loophole. The following cases are examples of co-incineration projects in facilities across the country that have led to controversy, and logistical and economic complications. Some of these cases are also connected to facilities with troubling emissions trends. In general, these projects appear to be difficult to scale up and may be unreliable as waste management approaches.

Given that the NHSM EPA regulation does not require facilities to disclose waste burning to the general public (unlike the process of proposing a new waste incinerator), these case studies likely do not cover all of the companies are exploiting these pollution loopholes, and that more communities are unknowingly living next to facilities incinerating waste. Businesses that contract with waste management companies involved in co-incineration should be aware of the risks and withdraw from this misguided practice.

Setting a dangerous precedent: “Hefty Energy Bag” Program in Omaha, Nebraska collects plastic to burn in cement kilns, calls it ‘recycling,’ plans expansion to more locations

In September 2016, DOW Chemical Company announced a new partnership with Reynolds Consumer Products, First Star Fiber Recycling, Recyclebank, and Systech Environmental Corporation (a subsidiary of Lafarge North America) to create the “Hefty Energy Bag” program in the cities of Omaha and Bellevue, Nebraska. The project’s initial goal was to collect an estimated 36 tons of so-called “hard to recycle plastics” in orange Hefty Bags²⁸ for curbside pickup.²⁹ According to the plan, First Star Fiber would then ship the plastics to be burned in Sugar Creek Cement, a Systech-operated plant located outside of Kansas City, to burn alongside coal-derived fuel. The pilot was launched in late 2016 with 6,000 participating households, chosen through their membership in the national organization Recyclebank.³⁰

To claim incineration as the solution to the disposal issues of non-recyclable plastics is problematic in many ways, not least of which is the potential for plastic incineration to cause releases of particularly toxic pollutants, including dioxin (see chart in Section 2).

In the case of the Hefty Energy Bag program in Omaha, it is unclear to what extent the project partners will continue to audit the contents of the collected bags to ensure the bags do not include the most harmful plastics or other types of waste. For example, PVC plastic (also known as vinyl and plastic #3) is well known to create dioxin when burned. Whether systems exist to keep PVC out of the “Energy Bag” project and thus out of the cement kiln is a serious question.

Sugar Creek Cement, the kiln that Omaha residents’ plastics are slated to be burned in, has a history of violations, and has also long been using industrial waste as an alternative fuel source. As of 2013, 60% of the plant’s fuel was comprised of this waste stream, sourced through partnerships with such manufacturers as Harley Davidson, Sprint, Hallmark, Cargill, Cook Composites and Polymers.³¹ In 2010 Sugar Creek was part of settlement between the U.S. EPA and 13 Lafarge cement plants (Lafarge sold Sugar Creek Cement in 2012 to Eagle Materials³²) and was ordered

to install equipment to control SO₂ emissions and to maintain NO_x emission limits.³³ The EPA facility report also indicates past violations of the Clean Water Act and the Resource Conservation and Recovery Act.³⁴ According to Sugar Creek's Toxic Release Inventory, emissions of n-hexane and ammonia have quadrupled in the past 10 years, and the lack of transparency over industrial waste co-incineration leaves questions about whether changes of fuel stream may be a factor in these emissions increases.³⁵ Other types of emissions show less dramatic changes, including greenhouse gases, which may indicate that cement production at the kiln has not radically increased during this period.

Sugar Creek is one of many Lafarge/Systech operated cement plants that have failed to remain in compliance with emissions regulations. Since 2010, LafargeHolcim has been fined a total of \$213,537,394 in U.S. penalties, almost entirely for environmental violations, including air violations.³⁶ Lafarge faces criticism for emissions and resulting health impacts in other countries as well. In 2015, a LafargeHolcim plant in Trbovlje, Slovenia was ordered to halt operations after lacking the required environmental permits, the culmination of a grassroots community effort that revealed the plant's doctoring of emissions data and illegal use of petcoke, amongst other issues.³⁷ Community backlash over toxic emissions has similarly blocked production at Montcada I Reixac plant in Barcelona, Spain.^{38,39}

The fact that DOW's Hefty Energy Bag program relies on co-incineration through an industry plagued by violations raises more questions than it supposedly solves. In Omaha the project appears to have collected relatively little material, possibly not even enough to merit the cost of shipping to the intended cement kiln. However, Hefty Energy Bag has served as a public relations focal point for Dow, Hefty, and other partners, who have sought recognition at industry conferences, in social media, and in industry press – all at a time when the public increasingly recognizes the role of plastics producers in the growing plastic pollution crisis and the dangers of waste burning.

Recently, DOW and partners announced plans to expand this type of program to 50 U.S. locations in the next five years,⁴⁰ spreading the dangerous notion that production and consumption of non-recyclable plastics is acceptable if they can just be sent to a cement kiln or other incinerating facility to be burned.

Adding fuel to the fire: Waste Management makes pellets out of garbage, plans to burn in coal plant already plagued by harmful lead emissions

In 2013, Waste Management, the largest U.S. waste management company, began to process waste into pellets at a facility near San Antonio, Texas. The facility, which has since closed, operated for 2-3 years before operations relocated to Philadelphia, Pennsylvania. Waste Management originally termed this material "SpecFUEL," and now describes SpecFUEL LLC as a partnership between Waste Management and Continuous Energy LLC. The facility's website implies that it processes 1000 tons per day of "incoming waste," and sells 400-500 tons per day of "SpecFUEL" for co-incineration at facilities including "Cement, Utilities, Industrial Boilers, Bio-Fuels and Gasification."⁴¹ The SpecFUEL plant in Philadelphia sources its waste from the city of Philadelphia⁴² despite significant local opposition,⁴³ as well as other undisclosed clients.

In videos posted online by Waste Management about the process, the pellets appear to be primarily composed of plastic and paper. Due to the EPA deregulation described in this report, no agencies are required or obliged to verify that Waste Management is actually removing PVC or other hazardous components of municipal solid waste during this process, before sending the processed waste to be burned by other companies at other locations.

The Northampton Generating Company coal waste combustion plant in Northampton, Pennsylvania disclosed plans in 2014 to co-incinerate this processed waste sold as SpecFUEL.⁴⁴ According to SpecFUEL LLC, test burns started in August 2017,⁴⁵ raising questions about the reasons for this delay.

The idea that this facility would be appropriate for an experimental project like burning SpecFUEL is highly questionable. Northampton Generating Company is a 112-megawatt facility that is currently burning tire-derived fuel and other materials such as propane, coal, and residual paper products, and lead emission violations at the facility have faced increasing scrutiny by residents.⁴⁶ Between 2009 and 2012, Northampton Generating Company was fined \$119,000 for submitting erroneous data and for failing to report emission violations after exceeding sulfur dioxide and carbon monoxide emission limits.⁴⁷ In 2015, Northampton Generating Company asked state regulators to allow the plant *to pollute twenty times more lead per hour*.⁴⁸

The EPA has long recognized the strong evidence associating environmental lead exposure and increased childhood blood lead level, which can increase chances of learning and behavior problems in children.⁴⁹ Marc Weisskopf, an associate professor of environmental and occupational epidemiology at Harvard's School of Public Health, conducted two studies finding that pregnant women who are exposed to higher levels of air pollution containing heavy metals such as lead have a "greater risk of bearing children who develop autism."⁵⁰ Such a link was strongest during the third trimester of pregnancy, with the risk of developing autism increasing twofold.⁵¹

According to local media coverage, nine children within a mile of the Northampton plant have already been diagnosed with autism,⁵² and residents in Northampton are concerned that the EPA's guidelines do not consider the evidence provided by studies such as Weisskopf's studies.⁵³ Children are especially vulnerable to lead exposure, as their brains are still developing and they absorb more environmental lead compared to adults due to smaller body size. With 12 schools being located within a two-mile radius of the Northampton facility, residents call for children's health to be a first priority.⁵⁴ Tom Schuster, a member of the volunteer environmental organization Sierra Club of the Lehigh Valley, states that for children "there is no safe level of lead exposure."⁵⁵

Residents near the Northampton facility testified about their concerns over the plant's emissions at a public hearing in June 2015. Mobilization efforts are taking place to ensure that the state denies the lead limit increase requested by Northampton Generating Company.⁵⁶ Given the track record of the plant and the toxic pollution inherent in burning waste, sending waste to be burned at this facility - or the many others like it - is irresponsible.

Alternative Fail: Logistical problems force Lehigh Southwest Cement Plant to halt burning waste in Tehachapi, California

On February 6, 2015, the Lehigh Southwest Cement Plant secured permits to begin using alternative fuels for cement product at its plant in Tehachapi, California.⁵⁷ Lehigh calls this waste “engineered municipal solid waste (EMSW)” and claims to provide an “environmentally friendly reuse of municipal waste.” The EMSW process theoretically removes recyclable and other materials such as dirt, rocks, food waste, plastic bottles, and cans, and the remaining materials are shredded and sent to the Lehigh facility to be incinerated.⁵⁸ The facility built additional equipment to burn EMSW and began experimenting with burning waste soon after securing permits, but apparently had trouble finding a solid waste supplier that provided the right blend. The plant returned to burning traditional fuels when the logistical problems of securing the waste outweighed the “cost-saving” benefits.

The plant has no future plans to use waste as alternative fuel, according to staff of the East Kern Air Pollution Control District.⁵⁹ This outcome raises questions about the long-term feasibility of cement kilns burning waste.

Like the Northampton Generating Company in the previous case study, Lehigh has a storied track record of violations that has led to fierce local opposition. In 2010, 872 pounds of mercury were emitted by the kiln, which is the largest emitter in California and the second largest of all U.S. cement plants.⁶⁰ Jane Williams, executive director of California Communities Against Toxics, who has tracked this facility, states, “This cement kiln has been one of the most polluting in the state, and it needs to do more to reduce its pollution, not try to reduce its rule costs by burning wastes.”⁶¹

Community members and officials have voiced their opposition towards the plant and emissions of dust, mercury, and other substances. Residents living a mile away from the plant reported clouds coming from the plant and the presence of plant dust residue on their cars. Media outlets have covered the health risks of mercury exposure from the plant, as mercury is a neurotoxin that can threaten the health of pregnant women and small children, resulting in reduced IQs, heart conditions, and behavioral problems for those affected.⁶² In the case of Lehigh, burning waste was not only a precarious fuel stream but a public relations upset as well, inciting the scrutiny of residents already concerned with the facility’s operations.

Risky Business: RePower South loses Virginia contract, faces continued controversy over financial instability and unproven technology in South Carolina proposal

RePower South, a South Carolina company, set out in 2015 to receive a contract to build new solid waste processing and trash sorting facilities in South Carolina’s Charleston and Berkeley Counties,^{63,64} as well as Virginia’s Southeastern Public Service Authority. RePower claims that waste burning should be a key part of municipal recycling rates. Berkeley County Council voted to sign the contract with RePower beginning in November of 2015,⁶⁵ and in May 2016 the contract was finalized to make RePower the primary processing company in the area.⁶⁶

RePower states it will sort garbage for high-end recyclables, and remaining paper and plastics will be made into fuel pellets to sell for co-incineration in coal plants or other industrial facilities.^{67,68} According to local media, “RePower officials say their methods will dramatically increase the county’s recycling rate,” but the same article found that RePower plans to only recycle 20% of collected waste (just 5% more than the 2015 recycling rate)⁶⁹ while 45% of trash will be made into pellets for co-incineration and 35% will be landfilled.⁷⁰

Completion of the new Berkeley County facility is uncertain due to delays in the permitting process.⁷¹ During these delays, concerns have been raised by the community and other waste companies in the area. Officials in Charleston County and Berkeley County questioned whether RePower will be able to divert at least 70 percent of the counties’ municipal solid waste from the landfills and proof has been demanded that this approach could be replicated.⁷² This is exemplary of the kind of controversy associated with waste burning projects, and calls into question the reliability of such partners in a waste management plan.

In contrast to Berkeley County, Charleston County chose not to pursue an agreement with RePower citing the proposal’s reliance on unproven technology.⁷³ Charleston County is now breaking ground on a state-of-the-art recycling center at a cost of \$24 million, exactly half of the cost of RePower’s \$48 million dollar proposal.⁷⁴ The new recycling center will be five times larger than an existing one, with enough capacity to process recycling from Berkeley County and other counties in the area.⁷⁵ The new recycling operation calls into question the need for a separate facility for Berkeley County.

On August 23, 2017, the Southeastern Public Service Authority (SPSA) terminated a deal with RePower for a \$100 million trash complex in Chesapeake, VA.⁷⁶ RePower “promised to separate recyclables from everyday trash and make much of the remaining paper and plastic into pellets that would be burned alongside coal at a Dominion Energy power plant.”⁷⁷ But the SPSA board voted to cancel the deal after the project’s numerous financing and construction delays, and after “[SPSA] board members learned, in questioning RePower representatives during a closed session prior to the vote, that the pellet supply agreement with Dominion had hit a snag.”⁷⁸ The board members’ lack of confidence in RePower’s unproven technology and its inability to find a stable market for its pellets indicates the riskiness of investing in these new waste management schemes.



Part 4

The Way Forward:

Waste incineration in any form subverts sustainability goals, businesses can achieve success with zero waste planning



There are real opportunities in waste management for businesses to legitimately achieve sustainability. Businesses can greatly reduce and eliminate waste through comprehensive procurement, waste prevention, recycling, and composting programs.

Increased recycling brings a wide range of benefits, the majority of which come from the reduced impacts of production. Recycling provides manufacturing inputs that replace virgin materials, reducing the impacts of raw material extraction and production. Businesses that recycle and use recycled materials in production conserve natural resources and significantly reduce energy and pollution impacts. Increased recycling rates could create millions of new jobs while reducing GHG emissions and pollutants dangerous to public health.⁷⁹

As opposed to burning waste, if the United States increased recycling and composting to reach a 75% diversion rate by 2030 – a level already reached in some cities – it would result in the reduction of almost 515 million metric tons of carbon dioxide – equivalent to shutting down about 72 coal power plants or taking 50 million cars off the road.⁸⁰

Furthermore, businesses have a responsibility to design products and packaging to minimize waste creation upstream, create new delivery systems that avoid single-use disposable packaging, and as a last option, make sure products and packaging are recyclable or compostable. These innovations are critical if we are to address the scale of the waste problem.

Many companies are already shifting business models to better waste management practices and choosing better products and packaging, with subsequent cost savings and revenue increases. The Sierra Nevada Brewing Company received the U.S. Zero Waste Business Council's highest possible rating for diverting 99.8% of its waste, **resulting in \$5,398,470 in avoided disposal costs and \$903,308 in 2012 revenue, while avoiding 11,812 tons of carbon dioxide emissions.**^{81,82} Dell has started to replace styrofoam packaging with mushroom cushioning, and is developing a system to recycle plastic from discarded Dell products into new products, resulting in the reuse of 10.5 million pounds of recycled e-waste plastic.⁸³ There are many alternatives to the crudeness of waste incineration. Even some companies in the cement industry are gearing up for renewable energy innovations, like Ohorong Cement, which just broke ground on a solar-powered cement plant in Namibia.⁸⁴ **Consumers are looking for businesses to be leaders in sustainability, and to rely on incineration is to squander an opportunity to truly embody the sustainable models that customers demand.**

This report recommends that to maintain the integrity of their sustainability goals companies should avoid using any form of incineration. Rather than burning up hard won natural resources and hindering the transition to real renewable energy sources, there are multiple opportunities, as well as outside pressure, for businesses to be on the cutting edge of waste management.

Moving toward strengthened waste reduction, recycling and composting represents a meaningful opportunity to meet climate goals, create jobs, and improve public health. Successful zero waste programs deliver real environmental benefits and credibility to brands and businesses.

Recommendations for businesses and municipalities :

1. Companies should redesign products and packaging to minimize waste creation upstream, create new delivery systems that avoid single-use disposable packaging, and as a last option, make sure products and packaging are recyclable or compostable. Companies should also use recycled content for new products and packaging, and minimize virgin material inputs.
2. To maintain the integrity of sustainability goals, businesses should avoid using any form of incineration in waste management programs for all their operations.
3. All business operations should aim for zero waste through careful procurement choices and waste reduction, recycling, and composting systems onsite.
4. Municipalities should also avoid all forms of incineration and aim for zero waste.

For resources, guides, and zero waste certification resources visit:
www.no-burn.org/ZeroWasteForBusiness





Part 5

Appendix:

A Guided Explanation of the Non-Hazardous Secondary Materials Rule, Process, and Related Regulations

Recent EPA policies that enable burning waste and waste pellets

Policy	Purpose	What it says	Impact
Non-Hazardous Secondary Materials (NHSM) Rule	Identify which materials are not considered waste when burned. Determines which emission standards under the Clean Air Act apply.	Mixed waste, as well as used plastics, tires, chemically-treated wood, paper sludge, coal byproducts are not "waste" but so-called "non-hazardous secondary materials" under certain circumstances, including when municipal solid wastes are "processed."	Allows facilities to take mixed waste and process into waste pellets for co-incineration in facilities that do not meet incineration pollution regulations.
Industrial Boiler and Heater Rule	Changes Clean Air Act standards for industrial boilers and heaters burning coal, oil, biomass, and non-waste materials.	Coal plants and other facilities can qualify as biomass plants if they burn 15% biomass.	Allows coal plants and other facilities to burn coal without meeting coal pollution regulations if they mix in as little as 15% of material considered "biomass," a term often manipulated to include waste.

The Non-Hazardous Secondary Materials loophole allows mixed waste, plastics, tires, chemically-treated wood, paper sludge, and coal byproducts to be reclassified as "non-waste fuel products" and burned in facilities including coal plants, cement kilns, and biomass plants that are not regulated as waste incinerators.⁸⁵ Additionally, the EPA allows contaminant levels in processed waste "to be compared to the highest contaminant levels for coal."⁸⁶ This means the processed waste can be as dirty as the dirtiest coal. Even more concerning, EPA allows these facilities to self-determine which materials meet the loose requirements of this loophole, requiring only that the facility keep its own records.

As mentioned above, existing incinerators have a track record of exceeding emissions limits and emitting dangerous pollutants at higher volumes than coal plants, per unit of energy.⁸⁷ This dismal track record raises legitimate and troubling questions about how much more polluting the practice of burning waste will be at facilities with weaker emissions standards.

Accompanying this new regulation was an associated policy allowing coal plants and other facilities to qualify as biomass plants if 15% or more of energy comes from biomass. Biomass plants exemplify the dangers of decreased regulations for facilities using the above loopholes. A 2014 Partnership for Policy Integrity report found existing and proposed biomass plants that planned to burn plastics and other wastes without changing regulatory status to incinerators. The report explains "Since biomass plants do not have to meet any actual emissions standards for heavy metals, dioxins, or carcinogenic organic HAPs [hazardous air pollutants] like benzene and formaldehyde, EPA's deregulation of contaminated fuels means that many facilities will be able to burn these materials with no accountability."⁸⁸

The process and composition of NHSM

Processing municipal or commercial waste into smaller and compressed pieces is the first stage in exploiting the loophole that allows companies to burn municipal solid waste as a less-regulated fuel. Some techniques include separating, shredding, and drying waste to produce waste pellets or other prepared mixes for industrial burners.

The graphic below depicts the linear flow of waste that occurs in the NHSM procurement and burning process, and the players involved. The waste can be sourced from businesses, manufacturers, and/or municipalities, who pay a tipping fee to dump their refuse directly at a

MAP OF NHSM PROCESSING

EXAMPLE 1



EXAMPLE 2



combustion facility. In the first example, waste is sent to an intermediary waste processing facility, such as the SpecFUEL plant listed in the case study in part 3 of the report. The waste processing facility reconstitutes the waste into pellets, called “engineered fuel” or other terms by the industry, to resell to combustion facilities. In the second example, waste is sent to a co-incinerating facility like a cement kiln or coal plant with in-house waste processing equipment that prepares the waste for burning.

Mixed waste includes a wide variety of materials, and in these sorting processes, mechanical sorters are typically used to separate metals and other substances. Mechanical sorters rely on the physical properties of waste and are an inefficient way to ensure all potentially hazardous materials are removed. Mixed waste has an unpredictable chemical composition, and given the relatively minimal processing described by companies, it is to be expected that the waste pellets contain an unknown mix of pollutants.^{89,90} Waste pellets typically contain various toxic plastics and paper materials, and even waste-derived biomass pellets are subject to variations in chemical composition. For example, high levels of chlorine-based pollutants can be found in biomass portions of waste depending on the type of food that is in the waste stream.⁹¹ All waste pellets-- including waste pellets that do not contain plastics -- can contain materials that are hazardous to burn.

In the NHSM regulation, the EPA clearly states that waste would need to be *cleaner than the dirtiest coal* in order to be considered NHSM, but EPA’s own limited review process has not guaranteed this standard. As described earlier, EPA does not oversee these processing operations, and depends on these operations to determine contamination levels of the waste material and to compare contamination levels to coal (the EPA also allows the operators to determine which coal the waste is compared to). The EPA does not require testing, but allows operations to use “expert or process knowledge to either rule out certain constituents or determine that the NHSM meets the contaminant legitimacy criterion.”⁹² Waste processing facilities and sites burning this material may request EPA review of their approach and any tests they decide to perform, and in those voluntary cases, EPA will respond with a letter (sometimes called a “comfort letter”) assessing compliance with the NHSM regulation.

However, Partnership for Policy Integrity review of the EPA’s letters to companies found that EPA endorsed Waste Management’s processed waste fuel called SpecFUEL, even though SpecFUEL contains phthalates (a likely human carcinogen not found in coal) and higher levels of fluorine than coal.⁹³ More about SpecFUEL and a Pennsylvania coal plant where it is burned is in the case study found in part 3 of the report.

The lack of oversight for the sourcing and processing of the supposed “non-hazardous” secondary materials, as well as the lax emissions standards for the facilities burning them, threatens public health and the environment, and conflicts with true sustainable waste management solutions.

References

1. Program Overview. Keep America Beautiful. Retrieved 24 August 2017, from <https://www.kab.org/hefty-energy-bag-program/program-overview>
2. Municipal Solid Waste sources include: residential waste (including waste from apartment houses) and waste from commercial and institutional locations, such as businesses, schools, and hospitals. (Source: U.S. Environmental Protection Agency. (2016). Advancing Sustainable Materials Management: 2014 Factsheet. Retrieved from http://epa.gov/sites/production/files/2016-11/documents/2014_smmfactsheet_508.pdf)
3. More information available at <http://www.no-burn.org/incineration-resources/>
4. More resources available at <http://www.no-burn.org/cement/>
5. More information available at <http://www.no-burn.org/wp-content/uploads/RDF-Final.pdf>
6. EPA definition of municipal waste combustion including pyrolysis is in USA 40 CFR §60.51a
7. Waste Gasification & Pyrolysis: High Risk, Low Yield Processes for Waste Management. Global Alliance for Incinerator Alternatives. Retrieved 24 August 2017, from <http://www.no-burn.org/gasification-pyrolysis-risk-analysis/>
8. NY Department of Conservation, Comments to New York State Public Service Commission in the Matter of the application of Covanta Energy Corporation, August 19, 2011.
9. Muller, N., Mendelsohn, R., & Nordhaus, W. (2011). Environmental Accounting for Pollution in the United States Economy. *American Economic Review*, 101(5), 1649-1675. <http://dx.doi.org/10.1257/aer.101.5.1649>
10. GAIA. (2011). "Burning Public Money for Dirty Energy Misdirected Subsidies for "Waste-to-Energy" Incinerators." [no-burn.org/wp-content/uploads/Burning-Public-Money-GAIA-2011_2.pdf](http://www.no-burn.org/wp-content/uploads/Burning-Public-Money-GAIA-2011_2.pdf)
11. EPA eGRID 2010 CO₂, SO₂ and NO_x Emissions Data for U.S. Electric Power Plants. Energy Justice Network. Retrieved 24 August 2017, from <http://www.energyjustice.net/egrid>
12. U.S. Environmental Protection Agency. (2015). Clean Power Plan. pp. 64900. Retrieved from <https://www.gpo.gov/fdsys/pkg/FR-2015-10-23/pdf/2015-22842.pdf>
13. Chart of operating U.S. incinerators is at www.energyjustice.net/incineration, and recent incinerator closures can be found at no-burn.org/incinerators-blocked-closed-u-s-canada-2012-2016-2/
14. Sierra Club (2017). Press Release: Mayors Announce Support for 100% Renewable Energy. sierraclub.org/planet/2017/06/mayors-announce-support-for-100-percent-clean-energy; Global Alliance for Incineration Alternatives (GAIA) (2017). Press Release: U.S. Mayors Stand Up to Incinerator Industry in Landmark Renewable Energy Resolution. www.no-burn.org/incinerators_denied/
15. Zero Waste Case Studies. Zero Waste Europe. Retrieved 24 August 2017, from <http://www.zerowasteurope.eu/zw-library/case-studies/>
16. U.S. Zero Waste Business Council. uszwbc.org
17. Global Alliance for Incinerator Alternatives (GAIA) - India & Community Environmental Monitoring, The Other Media. (2014). Concrete Troubles: A report on the emissions from Cement Plants in India and a critique of the ongoing co-incineration of Hazardous Wastes in the Cement Industries. Retrieved from <http://theothermedia.in/wp-content/uploads/2016/02/Report-on-Cement-Co-incin-Jan-2014.pdf>
18. Waste burned in incinerators, as well as in coal and biomass plants, creates fly ash and bottom ash (about 25% of the weight of the waste). When cement kilns burn waste, the material that would be ash is incorporated into the cement itself, raising questions about safety of cement containing heavy metals and other pollutants in waste.
19. Zero Waste International Alliance. Zero Waste to Landfill is a False Concept. Retrieved 23 August 2017, from <http://zwia.org/standards/zero-landfill-is-not-zero-waste/>
20. Uroš Macerl, 2017 Goldman Prize Recipient, Europe. Goldman Prize. Retrieved from www.goldmanprize.org/uroš
21. GAIA (2017). Community action defeats waste burning in cement kilns. Retrieved from www.no-burn.org/cement/
22. Zero Waste Europe. Zero Waste to Landfill: False Paths to a Circular Economy. Retrieved 23 August 2017, from <https://www.zerowasteurope.eu/downloads/zero-waste-to-landfill-false-paths-to-a-circular-economy/> For more details see Appendix A.
23. Non-Waste Determinations for Specific Non-Hazardous Secondary Materials When Used as a Fuel, 40 C.F.R. pt. 241 (2013). Retrieved from <https://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol26/pdf/CFR-2013-title40-vol26-part241.pdf>
24. EPA Faces Court Challenge Over Solid Waste Loophole. Earthjustice. Retrieved 20 June 2017, from earthjustice.org/news/press/2014/epa-faces-court-challenge-over-solid-waste-loophole. A federal court upheld the EPA ruling.
25. Final Opening Brief for Environmental Petitioners, Solvay US Inc. v. EPA, No. 11-1189 (2014). Retrieved from http://earthjustice.org/sites/default/files/files/200_Enviro_Final%20Opening%20Brief_11-12-2014.pdf
26. Final Opening Brief for Environmental Petitioners, Solvay US Inc. v. EPA, No. 11-1189 (2014) Retrieved from <http://earthjustice.org/sites/default/>

- files/files/200_Enviro_Final%20Opening%20Brief_11-12-2014.pdf
27. Dioxins and their effects on human health. (2016). World Health Organization. Retrieved 24 August 2017, from <http://www.who.int/mediacentre/factsheets/fs225/en/>
 28. Program to Convert Plastics into Energy Launches in Omaha. The Dow Chemical Company (1995-2017). Retrieved 13 June 2017, from <http://www.dow.com/en-us/news/press-releases/dow-hefty-energy-bag-omaha>
 29. Johnson, J. (2016). Energy Bag film program comes to Omaha with a new color, sponsor. *Plastics News*. Retrieved 13 June 2017, from www.plasticsnews.com/article/20160921/NEWS/160929945/energy-bag-film-program-comes-to-omaha-with-a-new-color-sponsor
 30. Johnson, J. (2016). Energy Bag film program comes to Omaha with a new color, sponsor. *Plastics News*. Retrieved 13 June 2017, from www.plasticsnews.com/article/20160921/NEWS/160929945/energy-bag-film-program-comes-to-omaha-with-a-new-color-sponsor
 31. Get Involved. The Materials Marketplace. Retrieved 13 June 2017, from <http://materialsmarketplace.org/#get-involved>
 32. The Examiner (2012). Sugar Creek Lafarge plant sold to Eagle Materials. Retrieved from <http://www.examiner.net/article/20120927/NEWS/309279937>
 33. United States of America v. Lafarge North America (2010). Consent decree available at <https://www.epa.gov/sites/production/files/documents/lafarge-cd.pdf>
 34. Detailed Facility Report: Sugar Creek Plant. EPA's Enforcement and Compliance History Online. Retrieved 13 June 2017, from <https://echo.epa.gov/detailed-facility-report?fid=110012704136>
 35. Air Pollutant Report: Sugar Creek Plant. EPA's Enforcement and Compliance History Online. Retrieved 25 August 2017, from <https://echo.epa.gov/air-pollutant-report?fid=110012704136>
 36. Good Jobs First. Violation Tracker Parent Company Summary, Lafarge-Holcim. Retrieved from <http://violationtracker.goodjobsfirst.org/prog.php?parent=lafargeholcim>
 37. In defense of clean air: Slovenian community defeats multinational cement company. (2017). Global Alliance for Incinerator Alternatives(GAIA). Retrieved 13 June 2017, from http://www.no-burn.org/uros_blog/
 38. Slovenian Cement Plant Stops Operations as Environmental Permit Fails Approval. (2015). Zero Waste Europe. Retrieved 13 June 2017, from <http://www.zerowasteurope.eu/2015/07/the-fight-against-waste-incineration-in-slovenian-cement-plant-continues/>
 39. Zero Waste Europe. (2015). Press release: New report finds significant air pollution problems across waste incineration activities. Retrieved from <https://www.zerowasteurope.eu/2015/11/press-release-new-report-finds-significant-air-pollution-problems-across-waste-incineration-activities/>
 40. Han Zhang. (2017, April 25). "@hefty #energybag grant by @kabtweat and @DowChemical will help us reach 50 programs in 5 yrs. @JeffWoosterRS @nathan_wiker @KarenS_Carter" [Tweet]. Retrieved from <https://twitter.com/zhanghants/status/856908018167889920>
 41. 39 SpecFUEL LLC website, retrieved from <http://specfuelpartnersllc.com/>
 42. Mayes, E. (2012). Trash-to-fuel plant planned in Northeast. *The Philadelphia Tribune*. Retrieved from http://www.phillytrib.com/news/state-and-region/trash-to-fuel-plant-planned-in-northeast/article_5d6bf021-663b-59d9-a1df-68c14129eba5.html
 43. Bauers, S. (2012). Trash plan- and pellets- approved; more talk about all. *Philly.com*. Retrieved from <http://www.philly.com/philly/blogs/greenliving/Trash-plan----and-pellets----approved-more-talk-about-all.html>
 44. Northampton Generating Company (2014). Permit application. Submitted to Department of Environmental Protection (DEP) on October 16, 2014.pp. Retrieved from http://cleanair.org/wp-content/uploads/20160831_164126.pdf
 45. Rush, C. (2017, August 15). Personal Interview.
 46. Wojcik, S. (2015). Residents plead with state to deny Northampton Generating Co. emissions permit. *The Morning Call*. Retrieved from www.mcall.com/news/local/northampton-sd/mc-northampton-generating-dep-hearing-20150630-story.html
 47. Wojcik, S. (2015). Residents plead with state to deny Northampton Generating Co. emissions permit. *The Morning Call*. Retrieved from www.mcall.com/news/local/northampton-sd/mc-northampton-generating-dep-hearing-20150630-story.html
 48. Bresswein, K. (2015). Northampton Generating bid to emit more lead the focus of hearing. *Lehighvalleylive*. Retrieved from http://www.lehighvalleylive.com/northampton-county/index.ssf/2015/06/northampton_generating_bid_to.html
 49. Talbott, E., & Brink, L. (2014). What is the impact of environmental non-residential exposure on children's blood lead levels?. National Training Conference on the Toxics Release Inventory and Environmental Conditions in Communities. Retrieved from https://www.epa.gov/sites/production/files/2014-10/documents/bk2_wed_6_talbott_brink.pdf
 50. Cement Americas News (April 29, 2015). Lehigh Southwest Cement

- Secures Permits for Alternative Fuel. Retrieved from <http://www.cementamericas.com/cement-scope/979-lehigh-southwest-cement-secures-permits-for-alternative-fuel.html>
51. Cement Americas News (April 29, 2015). Lehigh Southwest Cement Secures Permits for Alternative Fuel. Retrieved from <http://www.cementamericas.com/cement-scope/979-lehigh-southwest-cement-secures-permits-for-alternative-fuel.html>
 52. Wojcik, S. (2015). Residents plead with state to deny Northampton Generating Co. emissions permit. The Morning Call. Retrieved from <http://www.mcall.com/news/local/northampton-sd/mc-northampton-generating-dep-hearing-20150630-story.html>
 53. Wojcik, S. (2015). Studies linking autism and air pollution create worries in Northampton. The Morning Call. Retrieved from <http://www.mcall.com/news/local/northampton-sd/mc-northampton-generating-plant-dep-hearing-preview-20150629-story.html>
 54. Northampton Press. (2015). Emission. Retrieved from <http://northampton.thelehighvalleypress.com/2015/07/09/emission>
 55. Northampton Press. (2015). Emission. Retrieved from <http://northampton.thelehighvalleypress.com/2015/07/09/emission>
 56. Wojcik, S. (2015). Residents plead with state to deny Northampton Generating Co. emissions permit. The Morning Call. Retrieved from <http://www.mcall.com/news/local/northampton-sd/mc-northampton-generating-dep-hearing-20150630-story.html>
 57. Lehigh Southwest Cement Secures Permits for Alternative Fuel. (2015). Cement Americas. Retrieved 13 June 2017, from www.cementamericas.com/cement-scope/979-lehigh-southwest-cement-secures-permits-for-alternative-fuel.html
 58. Cement Americas News (April 29, 2015). Lehigh Southwest Cement Secures Permits for Alternative Fuel. Retrieved from <http://www.cementamericas.com/cement-scope/979-lehigh-southwest-cement-secures-permits-for-alternative-fuel.html>
 59. Stevens, G. (2017, May 24). Phone interview.
 60. Pearson, S. (2012). Calif. cement plant has one of nation's highest mercury emission levels. California Watch. Retrieved from californiawatch.org/environment/calif-cement-plant-has-one-nation-s-highest-mercury-emission-levels-14723
 61. Williams, J. (2017, July). Personal communication.
 62. Pearson, S. (2012). Calif. cement plant has one of nation's highest mercury emission levels. California Watch. Retrieved from californiawatch.org/environment/calif-cement-plant-has-one-nation-s-highest-mercury-emission-levels-14723
 63. Rindge, D. (2015). Future of recycling or bunch of garbage?. The Post and Courier. Retrieved from http://www.postandcourier.com/archives/future-of-recycling-or-bunch-of-garbage/article_01d-93cd8-b4b1-5624-ae4d-8ebce6efba8e.html
 64. What RePower South Does. Repower South. Retrieved 14 June 2017, from www.repowersouth.com/what-we-do/what-we-do
 65. Karidis, A. (2015). Controversy stirs over RePower's plan to burn trash pellets for electricity. Waste Dive. Retrieved from www.wastedive.com/news/controversy-stirs-over-repowers-plan-to-burn-trash-pellets-for-electricity/408919/
 66. Mayfield, D. (2016). Hampton Roads trash agency moves to finalize deal with RePower South. The Virginian-Pilot. Retrieved from www.pilotonline.com/news/local/environment/hampton-roads-trash-agency-moves-to-finalize-deal-with-repower/article_d154ef86-989a-56a9-930f-747e0a-3ba3db.html
 67. Knich, D., Rindge, B. Future of recycling or bunch of garbage?. The Post and Courier. Retrieved from www.postandcourier.com/archives/future-of-recycling-or-bunch-of-garbage/article_01d-93cd8-b4b1-5624-ae4d-8ebce6efba8e.html
 68. Karidis, A. (2015). Controversy stirs over RePower's plan to burn trash pellets for electricity. Waste Dive. Retrieved from www.wastedive.com/news/controversy-stirs-over-repowers-plan-to-burn-trash-pellets-for-electricity/408919/
 69. S.C. Department of Health & Environmental Control. (2016). South Carolina Solid Waste Management Annual Report. Retrieved from <http://www.scdhec.gov/library/OR-1151.pdf>
 70. Rindge, D. (2015). Berkeley County to ink recycling deal with 'unproven' RePower South. The Post and Courier. Retrieved from www.postandcourier.com/archives/berkeley-county-to-ink-recycling-deal-with-unproven-repower-south/article_7db1c63b-ec65-5bf0-a6db-220f6dfbec82.html
 71. Callanan, T. (2017, May 18). Phone Interview.
 72. Rindge, D. (2017). Future of recycling or bunch of garbage?. The Post and Courier. Retrieved from http://www.postandcourier.com/archives/future-of-recycling-or-bunch-of-garbage/article_01d-93cd8-b4b1-5624-ae4d-8ebce6efba8e.html
 73. Rindge, D. (2015). Berkeley County to ink recycling deal with 'unproven' RePower South. The Post and Courier. Retrieved from www.postandcourier.com/archives/berkeley-county-to-ink-recycling-deal-with-unproven-repower-south/article_7db1c63b-ec65-5bf0-a6db-220f6dfbec82.html
 74. Findlay, P. (2017). Charleston County ready to break ground on new state-of-the-art recycling center. The Post and Courier. Retrieved from http://www.postandcourier.com/archives/charleston-county-ready-to-break-ground-on-new-state-of-the-art-recycling-center/article_01d-93cd8-b4b1-5624-ae4d-8ebce6efba8e.html

- www.postandcourier.com/news/charleston-county-ready-to-break-ground-on-new-state-of/article_f6edaaaa-34e4-11e7-a956-ff91d63a3e67.html
75. Rindge, B. (2016). Berkeley's \$48M recycling, fuel pellet facility on track. *The Post and Courier*. Retrieved from http://www.postandcourier.com/archives/berkeley-s-m-recycling-fuel-pellet-facility-on-track/article_4aacaf40-b935-5d99-a476-849b68a3a6e8.html
 76. Agnew, T. (2017) SPSA terminates RePower. *Suffolk News-Herald*. Retrieved from <http://www.suffolknewsherald.com/2017/08/23/spsa-terminates-repower/>
 77. Mayfield, D. (2017) Trash authority board ditches deal with RePower South. Who will be the region's lead trash contractor? *The Virginian-Pilot*. Retrieved from https://pilotonline.com/news/local/environment/trash-authority-board-ditches-deal-with-repower-south-who-will/article_22e8e578-aa74-5f09-aaa5-df2c62aaf169.html
 78. Mayfield, D. (2017) Trash authority board ditches deal with RePower South. Who will be the region's lead trash contractor? *The Virginian-Pilot*. Retrieved from https://pilotonline.com/news/local/environment/trash-authority-board-ditches-deal-with-repower-south-who-will/article_22e8e578-aa74-5f09-aaa5-df2c62aaf169.html
 79. Tellus Institute with Sound Resource Management. (2011). More Jobs, Less Pollution: Growing the Recycling Economy in the U.S. Retrieved from <http://www.no-burn.org/wp-content/uploads/MoreJobsLessPollution-Final.pdf>
 80. Tellus Institute with Sound Resource Management. (2011). More Jobs, Less Pollution: Growing the Recycling Economy in the U.S. Retrieved from <http://www.no-burn.org/wp-content/uploads/MoreJobsLessPollution-Final.pdf>
 81. Sierra Nevada Brewing Achieves 99.8% Waste Diversion. *Sustainable Brands*. Retrieved 18 August 2017, from http://www.sustainablebrands.com/news_and_views/waste_not/mike-hower/sierra-nevada-brewing-achieves-998-waste-diversion
 82. Nguyen, T. (2017). Microsoft Achieves Gold at Redmond Campus. *U.S. Zero Waste Business Council*. Retrieved 18 August 2017, from <https://uszwbc.org/microsoft-achieves-gold-at-redmond-campus/>
 83. McMullen, C. (2017). Seven Ways Dell is Upgrading its Recycling and Sustainability Goals. *Waste360*. Retrieved 18 August 2017, from <http://www.waste360.com/generators/seven-ways-dell-upgrading-its-recycling-and-sustainability-goals>
 84. Ohorongo Cement breaks ground on new solar plant. (2017). *International Cement Review*. Retrieved 18 August 2017, from <https://www.cemnet.com/News/story/161842/ohorongo-cement-breaks-ground-on-new-solar-plant.html>
 85. Non-Waste Determinations for Specific Non-Hazardous Secondary Materials When Used as a Fuel, 40 C.F.R. pt. 241 (2013). Retrieved from <https://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol26/pdf/CFR-2013-title40-vol26-part241.pdf>
 86. 40 CFR Parts 60 and 241. Commercial and industrial solid waste incineration units: reconsideration and final amendments; non-hazardous secondary materials that are solid waste. *Federal Register* Vol. 78, No. 26, Thurs. February 7, 2013. p. 9152.
 87. Toxic Air and Ash Emissions from U.S. Covanta and Wheelabrator incinerators: dioxin, mercury, and other toxic contaminants. (2016), *Global Anti Incineration Alliance (GAIA)*, Retrieved from www.no-burn.org/toxic-air-and-ash-emissions-from-u-s-covanta-and-wheelabrator-incinerators-dioxin-mercury-and-other-toxic-contaminants/
 88. Booth, M. (2014). *Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal*. Partnership for Policy Integrity (PFPI). Retrieved from <http://www.pfpi.net/trees-trash-and-toxics-how-biomass-energy-has-become-the-new-coal>
 89. *Understanding Refuse Derived Fuel*. (2013). *Global Alliance for Incinerator Alternatives*. Retrieved from <http://www.no-burn.org/wp-content/uploads/RDF-Final.pdf>
 90. Baptista, A., & Amarnath, K. (2017). Garbage, Power, and Environmental Justice: The Clean Power Plan Rule. *William & Mary Environmental Law and Policy Review*, 41(2), pp. 429. Retrieved from <http://scholarship.law.wm.edu/wmelpr/vol41/iss2/4/>
 91. Baptista, A., & Amarnath, K. (2017). Garbage, Power, and Environmental Justice: The Clean Power Plan Rule. *William & Mary Environmental Law and Policy Review*, 41(2), pp. 428. Retrieved from <http://scholarship.law.wm.edu/wmelpr/vol41/iss2/4/>
 92. Non-Waste Determinations for Specific Non-Hazardous Secondary Materials When Used as a Fuel, 40 C.F.R. pt. 241 (2013). p. 9144.
 93. Booth, M. (2014). *Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal*. Partnership for Policy Integrity (PFPI). Retrieved from <http://www.pfpi.net/trees-trash-and-toxics-how-biomass-energy-has-become-the-new-coal>



THE
NEW
SCHOOL

TISHMAN ENVIRONMENT
AND DESIGN CENTER