



Waste Incinerators: Bad News for Recycling and Waste Reduction

Waste incineration undermines recycling. Rather than operating in tandem—where recyclables are recycled and only non-recyclables are burned—incineration and recycling typically compete for the same waste materials, the same government funds, and the same waste management contracts. This conflict is particularly clear in so-called “waste-to-energy” incinerators, and is also true for burners that do not recover energy. Despite the fact that incinerators are below recycling in the waste hierarchy,¹ they are very often prioritized above recycling at the local level, and as a result, they have had a consistently negative impact on waste prevention and recycling efforts, as well as on workers who make a living from recycling.

Incineration is an expensive and rigid, technology-dependent, long-term waste management strategy. Thus, for many local governments, opting for this method means using all or most of their waste management budgets, leaving little funds for strategies such as prevention, recycling, and composting. Incinerators that produce some energy depend upon the materials in waste that have high calorific value, and the items with high calorific value are precisely the materials readily processed by recycling programs: paper, cardboard, and plastics. Burning these valuable materials is wasteful because incineration captures only one fifth of the calories in these materials, while recycling saves three to five times the energy due to energy savings from using recycled feedstock for manufacturing instead of extracting virgin resources.

When competing for the same materials, incineration tends to beat out recycling for several reasons:

1. Incineration contracts typically include a “put-or-pay” clause that requires the municipality to deliver a minimum quantity of waste or pay fees to compensate the incinerator company for lost profits. Put-or-pay agreements, which the incinerator industry typically includes in contracts, encourage the incineration of discards and undermine waste prevention, composting, and recycling.
2. Investing in an incinerator sets a community on a long-term path tied to this outdated, inefficient approach. Incinerators are among the most expensive and least efficient forms of generating electricity. The associated high costs lock up funds instead of making them available for less expensive, more effective strategies.
3. Incinerators often win out over less powerful recycling businesses that may be managed by the informal sector, not consolidated, and/or not big enough to confront such a centralized and capital-intensive technology that also has a highly paid public relations arm.

The cases presented in this briefing paper clearly illustrate the many ways that incineration has worked against waste prevention and recycling in various locations around the globe.

1. Incinerators that burn waste to generate some energy cannot operate with only non-recyclable materials as fuel; they need the high calorific (heat generating) content of recyclable materials, such as paper and plastics, or even additional fossil fuels, to produce energy.

China: The low calorific value of municipal solid waste means incinerators must burn recyclables or added coal or diesel. Municipal solid waste in China contains a large percentage of material that, when burned, generates very little heat. As a result, incinerators add fossil fuel—coal or diesel—to keep the incinerator burning.² **The addition of supplementary fuel as a result of low calorific value of waste makes it impossible to gain net energy from municipal solid waste incineration in China.**³ The World Bank even has acknowledged that combustion without supplementary fuels takes place in a minority of cases, and only when recyclables are also burned: **“Only the largest upper-income cities have sufficient wastes that are high enough in plastic, paper, textile, cardboard, and other dry combustibles to self-sustain combustion (most of these materials are readily recyclable).”**⁴

Argentina: A proposed gasification incinerator would have needed to burn paper, cardboard, and plastic to produce energy.⁵ In 2010, Innviron Corporation presented a proposal for a facility in Villa María, Córdoba province to burn refuse derived fuel (RDF) from municipal solid waste. The company claimed to be able to produce 20 megawatts of electric power by burning 500 tons of waste per day from Villa María and nearby localities. In the project design, the company stated that recyclables would be separated out in order to boost local recycling initiatives. However, in the details of the project, the only materials listed as recyclable were glass, ferrous metals, and aluminum (which do not burn), and e-waste (which is too toxic to burn). Recyclable materials with high calorific value such as paper, cardboard, and plastics (and which were actually recycled in the Villa María area) were not included in the company’s recyclable list, and were instead listed as fuel for the proposed plant.

India: The low calorific value of Indian municipal solid waste creates difficulties for incinerators. India has a 25-year history of failed attempts to produce energy from incinerated waste. The core reason for the failures is that municipal solid waste in India has a high percentage of wet organics and ashes; thus it has a low calorific value. The first waste-to-energy endeavor took place in Timarpur, Delhi, in 1987, and it failed because the waste could not sustain combustion, it contained too much inert material (soot, ash), too much food waste (wet), and too little burnable material. Other more recent attempts include the 6 megawatt power plants using refuse derived fuel in Vijayawada and Hyderabad, in the South Indian State of Andhra Pradesh, both of which started commercial operations in 2003. **Given the poor calorific value in municipal solid waste, these plants have to add agricultural waste as auxiliary fuel and even then are underutilized because they are not receiving the expected amount of discards.**^{6,7}

Scotland: In order to supply fuel for an incinerator, Dumfries and Galloway Council told residents not to bother separating discards anymore. The Council decided to stop its recycling program so that all of the region’s waste could go to a mechanical biological treatment plant that produces refuse derived fuel (RDF) to be burned. The RDF was transported to Wales to power cement kilns until an incinerator was built near the plant. The council then decided to take all of its waste there and stop promoting recycling. When consulted about the recycling program, a Council official confirmed that the residents had been told not to bother separating their waste anymore.⁸ The council sent leaflets to the residents stating that collection of the blue box (where papers were separated for recycling) would stop and “If you put paper waste in your wheeled bin or Council refuse sacks, over 90% of this waste is processed at the Ecodeco

plant. Here, paper is mechanically extracted from the mixed waste and can become part of the solid recovered fuel (SRF) material that is produced. This fuel is used by industrial companies to make energy and is classed as 'Energy from Waste'."⁹

Brazil: The incinerator in Rio de Janeiro claims to result in less landfilling of organics but actually burns mostly dry recyclables.¹⁰ The Brazilian company Usina Verde S/A is operating an incinerator on the campus of the Federal University of Rio de Janeiro located in Ilha do Fundão, north of Rio de Janeiro. The small facility has the capacity to incinerate 30 tons of solid waste per day. Although it has been built as an experimental plant, not for commercial purposes, the company uses this incinerator as a model for the promotion of its technology in the local market. The company sought carbon credits from the Clean Development Mechanism,¹¹ claiming the incinerator prevents greenhouse gas emissions through the avoidance of methane at the dumpsite. But in fact, methane is produced by landfilled organics, whereas most of the waste the incinerator burns is not organic, but dry materials, most of which could be recycled. Even Usina Verde admits as much: **"In order to produce energy, municipal solid waste cannot be of any type, it should be mostly plastics, dry papers, and petrochemicals."**^{12 13}

2. Where incinerators operate, they burn a lot of recyclable materials

Sweden: An analysis of waste delivered to a Swedish incinerator showed that **73.3% of the waste incinerated was recyclable or compostable**; 40.3% was recyclable material (including 4.6% non-combustible) and 33% was organic waste, which could have been composted or anaerobically digested.¹⁴ In 2009, a representative of the Swedish Environmental Protection Agency was quoted as saying, "Perhaps Sweden has gone too far down the incineration route and is not recovering enough materials by recycling."¹⁵

Minamata, Japan: The city of Minamata is taking steps to get away from waste incineration by running a successful recycling program. With a 40.3% recycling rate (57.2% of waste being incinerated and 2.5% being landfilled), it recycles twice as much as the national average. But the city recognizes that more can be done if incineration were phased out. According to a characterization of incinerated waste, **51.6% of the materials being incinerated was recyclable or compostable.** The city has declared a zero waste goal and will attempt to phase out waste incineration by 2026 to meet that goal.¹⁶

United States: Data from a 2011 waste characterization study conducted at six municipal waste incinerators operating in the state of Massachusetts show that most of the materials being burned could have been recycled or composted. According to the data, on average paper represents 23.7% of the waste burned, organic materials 21.3%, plastics 13.4%, metals 5.5%, and glass 1.7%.¹⁷ **Over 65% of what is burned is actually recyclable or compostable.**

Taiwan: An analysis of waste being burned in incinerators in the cities of Taichung, Taipei, and Tainan found that **at least 57.9% of the materials burnt are recyclable or compostable.**¹⁸ The figure is probably an underestimate, given that much what was characterized as not recyclable could be composted.

3. The huge capital investment required for incinerators breeds backroom deals, drains public waste management funds, and blocks business investment in low-tech resource management, leaving recycling without support.

United States: Taxpayers in the now-bankrupt Detroit, Michigan, have spent over US \$1.2 billion dollars in debt service payments from construction and upgrading one of the world's largest incinerators. Construction costs for the incinerator, which began operating in 1989, totaled US \$438 million. After two years, an additional US \$171.5 million was needed to upgrade the plant's pollution control devices. As a result, at one point Detroit paid about US \$150 for each ton of waste taken to the incinerator while private operators paid only US \$12 per ton. In effect, Detroiters were underwriting other cities' use of the incinerator. Detroit's previous contract with the incinerator expressly prohibited curbside (household) collection of recyclables, but the city has been piloting recycling collection since 2009. **In 20 years of operation, the incinerator has cost the city over US \$1.2 billion, while the city has a 7% recycling rate—much lower than the national average of 34%.**

United States: Incinerator debt in Harrisburg, Pennsylvania, directly led to the city's 2011 bankruptcy filing. Harrisburg's incinerator debt totaled over US \$300 million. Harrisburg's annual incinerator debt payments were US \$68 million in 2010, larger than the city's entire operating budget. City officials had borrowed money to revamp the incinerator at least 12 times since it was built in the early 1970s. It was shut down in 2003 because it could not meet air quality standards, then refurbished and restarted in 2006. The money spent on the incinerator not only drained funds that could have been invested in recycling, but has had significant adverse consequences for the entire city government.¹⁹

United Kingdom: Nottinghamshire set a higher recycling target after rejecting an incinerator.²⁰ Once the Sherwood Forest incinerator proposal was defeated, Nottinghamshire County embraced a 70% recycling target to replace the 52% recycling target that had been part of their incinerator plan. During the 2010 public inquiry into the proposed incinerator, it was revealed that the County Council would have been charged substantial fixed costs—whether or not the county used the full 180,000 ton incinerator capacity—something that would have undermined investment in waste minimization. In fact, as part of the Planning Inquiry, Nottinghamshire County Council's Head of Waste Management, Mick Allen, stated that if the incinerator were refused planning permission, the Council would opt for higher recycling rates. Once the incinerator application was refused, and Nottinghamshire County Council moved forward with plans for a 70% recycling rate.

4. Incineration competes with recycling businesses.

Germany and United Kingdom: Paper industry warns about competition with incinerators for the same materials. According to the United Kingdom Confederation of Paper Industries, over 70% of the fibers used to make paper in the UK come from paper collected for recycling by households and businesses.²¹ This is also true in Germany. Germany's waste management model is based on eliminating the landfilling of raw waste²² and promoting prevention as well as recycling and composting (64%) along with some waste incineration (35%). Recycling policies have worked so well that there is now competition between the recycling and incinerator industries for the same materials. In 2007, Dr. Helge Wendenburg, German General Director of the Environment, acknowledged that the **“paper industry had said that it is necessary to make sure that energy is not lost from recycling of paper through the thirst of incineration**

plants for material,” and stated that recycling of high grade paper should be a higher priority than incineration in the country.²³ In September 2012, the United Kingdom Confederation of Paper Industries called on the government to phase out subsidies to incinerators as they compete with recycling for the same materials: **“Subsidies for Energy from Waste and large scale energy-only biomass should be phased out as they put at risk supplies of the paper industry’s basic raw materials—recycled fibres and wood pulp.** Raw material scarcity is potentially a huge issue over the coming years and we need a waste strategy based on resource efficiency and a ‘circular economy’ where the priority is closed-loop recycling.”

The Netherlands: In 2009, a municipal solid waste incinerator operating in Rotterdam was closed, according to the website of the proprietor, Van Gansewinkel Groep, due to three factors: the “economic situation, overcapacity in the Dutch waste processing market, and an uneven European playing field,” that, “make the planned investment in the incineration plant irresponsible.”²⁴ In 2012, Frans Beckers, the group’s Director of Materials, Concepts and Infrastructure stated, “We closed one of our incineration plants in the Rotterdam area. There is overcapacity in Germany and we hope some of our colleagues will follow suit. **We hope more capacity will be taken out of the market. In the end we could harm recycling performance.**”²⁵ In turn, the group’s CEO, Ruud Sondag, group, declared, “The social importance of incineration will decrease whilst recycling becomes increasingly relevant and important.”

5. Waste incinerators threaten the livelihoods of formal and informal recyclers.

The Netherlands: Dutch recycling industry reports threats to jobs posed by the incinerator industry.²⁶ In 2009, several recycling companies in The Netherlands sent an open letter to the Ministers of Economic Affairs and Housing, Spatial Planning and Environment concerned about the competition represented by the incinerator industry. The companies complained that the overcapacity of waste incinerators in the country was leading to a reduction in fees charged, and, as a result, municipalities were opting to burn instead of recycle. The companies called on the government to protect the recycling industry and its 80,000 employees to meet the Dutch environmental vision of promoting recycling over incineration.

India: The Chandigarh incinerator competes with waste pickers for recyclables. In Chandigarh, India, a Clean Development Mechanism-backed incinerator is struggling to operate. In 2009, officials blamed the local waste pickers for “taking out all the quality waste” for recycling. With the remaining waste too wet to burn, the company “imported a special machine from Germany at a very heavy cost”²⁷ to dry the waste.

Brazil: Incinerator destroys many more livelihoods than the number of jobs it claims to produce. As a way to legitimize its technology, Usina Verde’s incinerator in Rio de Janeiro claimed that its process—which in theory consisted of separating recyclables and burning residuals, but in practice meant separating very little recyclables and burning all type of waste—would create jobs for informal recyclers. This proved to be false, as the plant provides jobs for only six people, and the work is very unstable due to the recurring shut-downs of the incinerator. The incinerator actually undermines the livelihoods of the many people who work in the recycling sector.^{28 29}

India: The Okhla landfill provided livelihoods to over 700 informal recyclers from surrounding neighborhoods until the Sukhdev Vihar waste-to-energy incinerator opened nearby. That is when 1,300 tons of waste, which previously had been dumped at the landfill, started to be ferried directly to the

incinerator each day.³⁰ With this drastic reduction in access to waste, the number of adults working at the landfill less than a year later plummeted to 429. This loss was further worsened by the large number of children who dropped out of school in order to help their families earn enough to survive.³¹

6. Cities get locked into long-term contracts, because it can take decades to recover the initial investments in incinerator construction.

United States: Covanta, the largest US incinerator company, tried to require Cape Cod communities to sign contracts guaranteeing 50% of waste would be delivered for incineration.³² However, after the Massachusetts Sierra Club and Cape Cod zero waste advocates reminded towns that Massachusetts state law prohibits such “put-or-pay” contracts, Covanta dropped the put-or-pay requirement. The Cape Cod Commission's Regional Policy Plan established a 60% diversion goal of solid waste to composting/recycling from landfill and incineration by 2012, but Covanta’s proposed 50% waste requirement would have effectively capped recycling at 50%. With 20 towns in Massachusetts already diverting more than 50%—without organics diversion, in many cases—a goal much higher than 50% is clearly achievable for all Cape Cod towns.

Spain: Palma de Mallorca discourages recycling and imports waste to amortize the costs of its new incinerator. In 2011 the local government of Palma de Mallorca, in the Balearic Islands, signed a 30-year contract to expand the Son Reus incinerator. After the expansion, the incinerator capacity is 700,000 tons per year, about 200,000 tons more than the amount of waste produced on the island. However, if the plant does not operate at capacity, it will not recover the costs of the massive investment made in its construction. Therefore, the incinerator company urged the government to increase waste fees. To avoid this, the government decided to import waste to burn. Further, any incentive for recycling must be discarded, as the government needs to supply as much waste as possible to the incinerator to keep waste fees from rising. The Environmental Director of the island admits it: **“The truth is that the more you recycle and the less waste enters the Son Reus system, the more you have to pay because there is an investment made by the incinerator that needs to be amortized and the contract does not end until 2041.”**³³ If a municipality in Mallorca decides to reduce or recycle waste—and there are some municipalities in the region recycling over 70% of their discards—they will have to pay for the waste that the incinerator will not receive.³⁴

United Kingdom: After a decade, Kent County Council pronounced contract with incinerator company a mistake.³⁵ In 1998, Kent County Council (KCC) signed a 25-year contract with incinerator company Kent Enviropower. It is estimated that the county has lost US \$1.6 million a year by burning materials that could otherwise be recycled, because of the annual quota required by the fluidized bed incinerator. In 2008, ten years after the contract was signed, councilor and spokesperson Keith Ferrin told a local newspaper, **“The people who thought they were being very clever and economical with people’s money ten years ago have produced a situation where the reverse is true, as KCC is now committed to a contract we can’t get out of...What seemed a very wise decision a very long time ago is a very stupid one today.”** He added, “At the time, people were saying nationally that this was the only way ahead.”

United States: Lake County, Florida hunts for waste to meet tonnage obligations with an incinerator company.³⁶ Under contract with the incinerator company Covanta, Lake County in Florida has agreed to deliver 163,000 tons of waste annually to the waste-to-energy plant located in Okahumpka. In return—and as long as the county delivers that amount of waste—it earns about US\$ 580,000 a month in

electric revenues given by the company Progress Energy, which buys the energy from Covanta. When the economic crisis hit the USA in 2008, waste production dropped, and the County had to consider importing waste from nearby counties to meet the supply obligations to the Covanta incinerator. A county solid waste manager was quoted in a local newspaper, **"We're looking all around to find what waste we can. We're committed to succeeding because of the financial impact if we fail...not doing this will be very, very costly because of the [energy] revenue we get."** While at least seven communities delivered their waste to the incinerator, the county barely met the tonnage required in 2009. The incinerator's appetite is also undermining the local recycling program. **"We don't want to turn off what we've turned on. But we're also not promoting recycling in a big way right now,"** the solid waste manager admitted.

7. Incineration hides evidence of unsustainable patterns.

Denmark: A so-called model in waste management actually has one of the highest waste per capita rates in Europe.³⁷ While Denmark is often presented as a model in waste management with both high recycling and incineration rates, a closer look at the data shows that it is not a positive example at all. Denmark generates some of the most waste per capita in the European Union (673kg each year),³⁸ and over 80% of what is burned in Danish incinerators is actually recyclable or compostable. Moreover, data from 2005 show that regions with higher incineration rates have lower recycling rates:

Region	Recycling	Incineration	Landfill
Hovedstaden	21%	77%	2%
Nordjylland	29%	63%	8%
Sjælland	31%	59%	10%
Midtjylland	40%	53%	7%
Syddanmark	41%	52%	6%

Waste Centre Denmark, 2005 data for household waste.

United Kingdom: The top nine incinerating waste districts are mediocre recyclers.³⁹ Data from the UK Department for Environment, Food and Rural Affairs (DEFRA) show that none of the nine districts that incinerate the most are in the top 100 recycling districts.

	Rank Incineration	% Incineration	% Recycled	Rank Recycling
Council of the Isles of Scilly	1	80	20	120
Westminster City Council	2	78	13	123
Lewisham LB	3	74	17	122
Birmingham City Council	4	71	24	118
Slough Borough Council	5	63	30	107
Western Riverside Waste Authority	6	62	24	117
Portsmouth City Council	7	62	28	114
Kirklees MBC	8	60	35	103
Southampton City Council	9	60	25	116

Sources: DEFRA and UKWIN

Conclusion

Although incineration companies and supporting government officials consistently claim that the priority will be reducing and recycling even with an incinerator project, these examples show that it is often only a matter of time before a community with an incinerator realizes that these two strategies are incompatible. Even sincere intentions to prioritize recycling often fail in the face of financial pressure to burn resources in order to meet, for example, put-or-pay contracts or investment costs.

For many communities, a centralized strategy like waste incineration—which is designed to treat all waste—may at first glance appear to be easier than a decentralized and multi-level zero waste strategy. Of course, once factors related to monitoring, pollution prevention and remediation, ash landfilling, health impacts, and sustainability are considered, the analysis shifts in favor of waste prevention and diversion over disposal. The fact is that zero waste strategies such as waste prevention, recycling, and composting create more jobs and are more flexible, less polluting, and more oriented to directly benefiting communities than incineration. Incineration is an obstacle to waste reduction, which is ultimately more environmentally and economically sustainable.

End Notes

- ¹ The **waste hierarchy** is a classification of waste management options in order of their environmental impact, such as: prevention, minimization, reuse, recycling, and, finally, disposal (landfilling or incineration).
- ² Balkan, Elizabeth. "Dirty Truth about China's Incinerators." *Chinese Waste Incineration: Dirty Truths about Trash-burning*. Chinadialogue.net, 7 Apr. 2012. Web. 10 Sept. 2013. <https://www.chinadialogue.net/article/show/single/en/5024>.
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 - Green Alternatives to Incineration in Scotland <http://www.gainscotland.org.uk/>
- ⁹ "Blue Box Paper Recycling Will Stop on 1 April 2010." *Http://www.dumgal.gov.uk*. Dumfries and Galloway Council, n.d. Web. Mar. 2012. <http://www.dumgal.gov.uk/CHttpHandler.ashx?id=4202&p=0>.
- ¹⁰ Incineração, recuperação energética e a Nova Política de Gestão de Resíduos Sólidos brasileira: o caso da Usina Verde S/A by André Abreu and Marcelo Negrão.
- ¹¹ The Clean Development Mechanism (CDM) allows a country with an emission-reduction or emission-limitation commitment under the Kyoto Protocol to implement an emission-reduction project in developing countries. Such projects can earn saleable certified emission reduction (CER) credits, each equivalent to one tonne of CO₂, which can be counted towards meeting Kyoto targets. From "Clean Development Mechanism (CDM)." *Clean Development Mechanism (CDM)*. UN Framework Convention on Climate Change, n.d. Web. 10 Sept. 2013. http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php.
- ¹² In "Incineração, recuperação energética e a Nova Política de Gestão de Resíduos Sólidos brasileira: o caso da Usina Verde S/A, written by André Abreu and Marcelo Negrão. Personal communications of the authors with company representatives.
- ¹³ Abreu, A, and Negrão, M. "The Usina Verde incinerator in Rio de Janeiro, GAIA, 2012. <http://no-burn.org/cdm-case-studies>
- ¹⁴ Petersen, C. M., P. E. O. Berg, et al. (2005). "Quality control of waste to incineration - waste composition analysis in Lidköping, Sweden." *Waste Management Research* 23(6): 527-533 quoted in "Response to the Consultation on a National Policy Development Process For High Temperature Thermal Waste Treatment", Public Interest Consultants, Wales, UK, 2007. According to Eurostat, in 2005 Sweden incinerated over 450 kg per capita of municipal solid waste and had a population of over 9 million, which accounts for over 4 million tons burned.
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