Zero Waste for Zero Warming

RESPECT FOR RECYCLERS:

Protecting the Climate through Zero Waste

Neil Tangri
Global Alliance for Incinerator Alternatives
www.no-burn.org
October 2010

gaia

Photos by Gigie Cruz/GAIA

Summary

Reducing, reusing, and recycling municipal waste is one of the easiest and most effective means of reducing greenhouse gas emissions. It also provides gainful employment to millions of people in the developing world, mostly in the informal sector ("wastepickers" [1]). Yet rather than supporting these efforts, climate funds such as the Clean Development Mechanism are subsidizing incinerators and landfill gas systems, which compete directly with recycling and increase emissions, unemployment, and public costs. A new, non-market, climate finance mechanism is needed to support the formalization and expansion of the informal recycling sector.

Gigie Cruz/GAIA

The Climate Benefits of Recycling

Programs that reduce, reuse and recycle municipal waste are effective and high-impact means of reducing greenhouse gas (GHG) emissions.[2] When discarded materials are recycled, they provide industry with an alternative source of raw materials from which to make new products. This results in less demand for virgin materials whose extraction, transport and processing are major sources of GHG emissions. Recycling thus reduces emissions in virtually all extractive industries: mining, forestry, agriculture, and petroleum extraction.

Recycling of paper and wood products has a notable double impact. Not only does it reduce the demand for virgin wood fiber, thus reducing emissions from deforestation, but it also preserves forests' ability to continue to act as carbon sinks (removing carbon from the atmosphere).

Additional energy and associated emissions are saved in the manufacturing process, as recycled materials generally require less energy to be turned back into products.[3] While "waste to energy" incinerators capture some of the energy embodied in materials that they burn, recycling the same materials conserves three to five times as much energy.[4] This is particularly notable in products such as aluminum, where the direct energy use is reduced by 88% from that required to produce primary aluminum.[5]

Recycling of paper has a double impact: it reduces emissions from deforestation and preserves forests as carbon sinks.

Recycling also reduces GHG emissions and toxic pollutant releases from waste disposal facilities, which are a significant source of both. Waste incinerators emit carbon dioxide (CO_2) and nitrous oxide (N_2O); and landfills and dumps are a primary source of methane (CH_4), as well as CO_2.[6] Incinerators, landfills and open dumps are also major sources of toxic releases to air, water, and soil. The less material disposed of through dumping and burning, the fewer emissions result.

The Climate Impact of Zero Waste

When properly accounted for, the potential impact of emissions reductions through recycling is considerable, rivaling that of sectors such as transportation.[7] This is because the emissions reductions from recycling are spread throughout the economy, in sectors such as resource extraction, manufacturing, power generation, and agriculture. In the U.S., the provision of goods and products is responsible for 38% of GHG emissions; and food adds another 12%.[8] Another 9-14% of emissions are associated with goods produced abroad but consumed in the U.S.[9] This offers considerable scope to reduce emissions through recycling.

Each household that recycles reduces emissions by as much as if it stopped using a car.

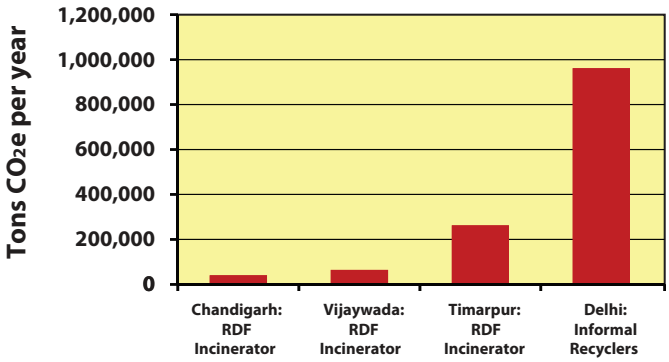
A strategy that addresses waste as a holistic part of all material flow is Zero Waste. Zero Waste means that the majority of municipal waste is handled through source reduction, re-use, recycling and composting. It addresses the residual fraction, which cannot be usefully composted or recycled, by requiring manufacturers to redesign their products and packaging so they can be safely channeled back into nature or the marketplace. As the residual shrinks, the system approaches its goal of zero waste to disposal. Incineration and related technologies are incompatible with Zero Waste, as they create an incentive to perpetuate the production of residual waste.

Zero Waste strategies are effective tools for GHG emissions reductions in both developed and developing countries. Industrialized countries, which tend to depend heavily on landfilling and incineration, can significantly reduce their GHG emissions by increasing recycling and keeping organics out of landfills (see below). In developing countries, where wastepickers already comprise an efficient if informal recycling system, considerable scope exists to tackle methane emissions and improve working conditions.

In Delhi, current recycling practices by the informal sector prevent the emission of 962 tons of CO_2 per year – about 3.7 times the savings from a CDM-backed RDF incinerator.[10] In Massachusetts, USA, a recycling and composting program would reduce GHG emissions by 1.8 tons CO_2e per ton of waste (incineration would reduce emissions by only 0.072 tons CO_2e per ton of waste).[11] Nationally, a Zero Waste strategy in the US would reduce emissions by 406 megatons (Tg) CO_2 equivalent per year.[12] At the household level, each household that recycles reduces emissions by as much as if it stopped using a car.[13]

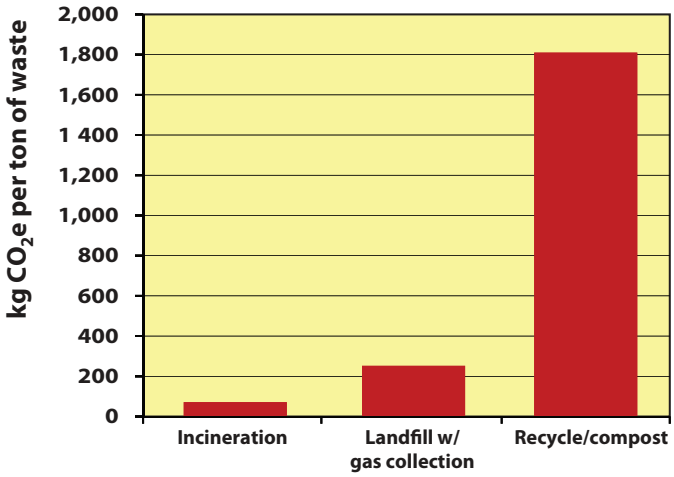
Recycling is also an extremely cost effective method of achieving emissions reductions. Avoiding one ton of CO_2 emissions through recycling costs 30% less than doing so through energy efficiency and 90% less than wind power.[14]

Annual Greenhouse Gas Emissions Reductions from Waste Management in Delhi, India



Source: Chintan, "Cooling Agents: An Examination Of The Role Of The Informal Recycling Sector In Mitigating Climate Change," 2009.

Annual Greenhouse Gas Emissions Reductions from Waste Management in Massachusetts, USA



Source: Tellus Institute, "Assessment of Materials Management Options for the Massachusetts Solid Waste Master Plan Review," December 2008.

Solving the Methane Problem

An important part of reducing emissions from municipal waste is dealing with organic[15] material, particularly food waste. When deposited in a sanitary landfill, organic material decomposes under largely anaerobic (oxygen-starved) conditions, producing methane. As methane is an extremely powerful greenhouse gas, particularly over the short term[16], landfilling of organic waste is the source of much of the GHG emissions traditionally attributed to the waste sector.[17]

Although landfill gas collection is proposed as a solution to this problem, its effectiveness is in doubt.[18] In some cases, the perverse incentives associated with selling the energy generated may actually increase methane generation.[19] A far better option is to avoid landfilling organics in the first place. There are inexpensive, time-tested and effective techniques for handling organic material without significant methane releases.

- The simplest is aerobic decomposition, or composting. This simply requires that organic materials be regularly mixed with air as they decompose. It results in compost, a carbon- and micronutrient-rich soil supplement which can be applied to fields, displacing petroleum-based fertilizers (another GHG savings).[20] Compost also improves the fertility, workability and water retention of soil.[21]

- Animal feed is another traditional use for organic materials, with an important co-benefit: animal protein.

- A third approach is small-scale biogas (also known as anaerobic digestion, biodigesters, biomethanation, etc.) This generates and captures methane in an enclosed vessel, avoiding the problem of fugitive emissions. The methane can be burned for energy and the liquid byproduct ("digestate") can be composted. Unlike "waste-to-energy" technologies such as incineration, biogas complements recycling, as it can treat only organic material.

These techniques are already in use by wastepickers and other recycling workers in many places,[22] and there is great potential to expand their capacity to recover organic materials. Apart from biogas, these techniques generally do not require specialized equipment or technology. They do, however, rely upon a stream of organic materials uncontaminated by plastics, metals and household toxics. This can only be guaranteed by a good management system in which organics are not mixed with other discards but rather maintained as a separate stream from the point of generation.

groundWork, South Africa

Gigie Curz/GAIA

Wastepickers and Recycling

While municipally-run recycling systems are commonplace in industrialized countries, in the developing world, most recycling is done by wastepickers.[23] Wastepickers are self-employed workers, mostly in the informal economy, who retrieve reusable and recyclable items from the waste stream.[24] They collect, sort, clean and in some cases, process the recyclables, returning them to industry as an inexpensive and low-carbon raw material. In doing so, wastepickers relieve the public authority of much of the expense of waste management and lengthen the lifespan of landfills. Recycling provides a livelihood to approximately 15 million people worldwide – 1% of the urban population in the developing world.[25] Wastepickers can be incredibly efficient recyclers, achieving recycling rates higher than 80% in places where they handle organic material, such as Cairo.[26] Yet, in spite of their efforts, much municipal waste around the world is not effectively recycled. Wastepickers thus represent a huge opportunity to reduce GHG emissions through increased recycling rates, if given the proper recognition and support.

Challenges for Wastepickers

Although wastepickers are generally eager to expand their recycling activities, they confront a variety of constraints, which vary considerably from place to place. As discussed below, many of these constraints can be overcome by redirecting subsidies and public funds away from incinerators and landfills and into recycling and composting programs that value the work of wastepickers.

Most local authorities do not value the contribution of wastepickers to the environment and to municipal services, and do not officially recognize or engage with wastepicker organizations.[27] Instead, they are too often seen as nuisances or even thieves who damage the image of the city by making it look different from first world cities. In the minds of many—although not all—developing country governments, "world class cities" do not include wastepickers.[28] This conflict with the local authority is a constant danger and prevents the formation of useful partnerships.

Market-driven waste management results in lower levels of recycling and composting than could be achieved by systems focused on minimizing greenhouse gas emissions.

A more direct conflict comes about when local authorities seek to privatize municipal waste management by giving an exclusive contract to a private firm. This deprives waste pickers of their livelihoods and almost always results in lower rates of collection of recyclable materials.

Even without such direct competition, the existing waste system poses challenges. Wastepickers' working conditions are extremely hazardous. Few communities separate their household waste at source, so wastepickers have to deal with a mixed waste stream. This also means that materials such as paper and organics are cross-contaminated, lowering

their value and the recycling rate, as well as introducing occupational hazards. Also, many manufacturers do not design their products and packaging for recycling, so they include non-recyclable or toxic materials.

Other constraints are economic: wastepickers generally lack access to credit and to sufficient space within urban areas to set up their sorting and cleaning operations.[29] The global market for recycled materials is highly cyclical, which adds an extra layer of financial stress to wastepicker operations. And, in many places, there is not a sufficient market for certain items, such as compost, whose recycling is an environmental priority. The current global economic crisis has worsened this situation: the price of recycled materials has dropped by up to 50%, causing wastepickers extreme hardship.[30] Many materials are no longer economically viable to collect, so they have reduced collecting them or stopped altogether. Market-driven waste management results in lower levels of recycling and composting than could be achieved by systems focused on minimizing greenhouse gas emissions.

Waste-to-energy: the Clean Development Mechanism's false solution

The latest threat to wastepickers and recycling comes from "waste-to-energy" technologies such as waste incinerators (including gasification, pyrolysis and "refuse-derived fuel"[31]) and landfill gas facilities. These technologies are promoted as solutions to the problem of methane from landfills, but in fact are intense sources of GHG emissions themselves: incinerators emit 33% more CO_2 than do coal-fired power plants to produce the same amount of energy.[32] Even worse, they actively compete with recycling programs, which offer much greater total greenhouse gas reductions, especially when combined with biological treament methods.[33,34] To burn waste, incinerators require a high proportion

CNIID, France

of paper, cardboard and plastic – materials which are far better recycled. Lacking these materials and high in moisture, municipal waste in developing countries often will not burn without the addition of auxiliary fuel.[35]

Landfill gas systems, which are supposed to reduce methane emissions, often depend financially upon sales of energy from the methane. This creates a perverse incentive to generate more methane in the landfill – some of which inevitably escapes to the atmosphere.[36]

Incinerators and landfill gas systems cost hundreds of millions of dollars and compete for the limited money available to this sector, leaving few funds and no incentive to invest in recycling or composting initiatives.[37]

Unfortunately, the Clean Development Mechanism (CDM) has become a major supporter of incinerators and landfill gas projects. As of September 2010, the CDM pipeline had 185 landfill gas and incineration projects, only 34 composting projects,[38] and no recycling projects.[39] This badly skewed allocation of resources does not reflect climate priorities but rather the profitability of these technologies to the large, multinational corporations that are the CDM's primary beneficiaries.

The Way Forward

Recycling (including composting and other appropriate systems for managing organics) is strongly preferable to waste disposal on virtually every criterion: greenhouse gas emissions, the release of toxins, employment, social inclusion, sustainability, and public expenditure. Governments and international agencies should therefore commit to maximizing recycling, minimizing landfilling, and eliminating incineration altogether.

In doing so, they must include wastepickers in every aspect of policy and project design and implementation. This is because wastepickers function as the actual, if unacknowledged, recycling system in most developing countries: they have the knowledge and expertise to make programs successful, if properly included. If excluded, they will be in conflict with new policies, significantly increasing the likelihood of failure.

Governments and international agencies should therefore commit to maximizing recycling, minimizing landfilling, and eliminating incineration altogether.

This policy shift will require redirecting subsidies and public funds away from incinerators and landfills and into recycling programs (including proper handling of organics). These monies should, where feasible, be channeled to wastepicker organizations to allow them to formalize and expand their operations. Carbon markets, however, are not an appropriate source of such funds. Aside from general problems with such markets, there are two issues specific to the waste sector. One is high price volatility in both carbon and commodity markets. Wastepickers' earnings vary tremendously with the commodity markets in which they sell their recyclable materials, which creates significant financial hardship and uncertainty for them. Any new source of finance should be predictable and steady; but carbon markets are also highly volatile and would simply exacerbate the problem. Second, while GHG analyses of waste management systems are unanimous in concluding that recycling is far preferable to waste disposal (including "waste-to-energy"), the methodologies are not yet precise enough to consistently assign an exact number to the emissions avoided, a degree of accuracy which is a prerequisite for a functioning carbon market. Financial support for recycling should therefore come from non-carbon market mechanisms. One such mechanism, a global climate fund, has been proposed by a number of parties within the United Nationas Framework Convention on Climate Change (UNFCCC) and holds real promise, particularly if it permits direct access by subnational governments and civil society organizations.

Wastepickers must be included in every aspect of policy and project design and implementation.

Dave Ciplet

Recommendations

The **CDM and other climate funds** should end all support to waste disposal technologies, including incinerators, landfill gas collection, and incinerator variants such as pyrolysis, gasification, plasma and RDF.

The **parties to the UNFCCC** should approve a new, global climate fund that offers financial support to recycling through multiple windows. One window should be directly accessible by wastepicker organizations for capital improvements, land acquisition, capacity-building, etc. Another should be accessible to subnational governments that implement recycling- and wastepicker-friendly policies such as formal recognition of wastepickers and source separation.

Governments should adopt policies which explicitly aim to reduce resource consumption and associated waste generation.

Local and national governments should recognize the informal recycling sector's contribution to climate change mitigation; and, when undertaking initiatives in the waste sector, should adopt inclusive and comprehensive planning processes that give wastepickers a voice and vote[40] at every stage of project and policy design.

Governments and international agencies should build upon the strengths of existing wastepicker networks with investments and technical support to increase recycling while ensuring decent livelihoods for all workers and traders in the recycling economy.

Wastepickers, with the support of local governments and climate funds, should prioritize the diversion of organic waste away from landfills through composting, animal feed and/or biogas.

---

1 "Wastepicker" is the most commonly understood English term for people who recover recyclable materials from the waste stream. Some work at landfills and dumpsites; others recover directly from the source (houses, businesses, etc.) They sell the recovered materials to the reprocessing industry for recycling. A variety of other terms are used in different countries: catador (Brazil), pepenador (Mexico), cartonero (Argentina), reciclador (Colombia), ragpicker (India), etc.
2 USEPA, *Solid Waste Management And Greenhouse Gases: A Life-Cycle Assessment Of Emissions And Sinks*, 3rd Edition. 2006.
3 ibid.
4 Morris, "Comparative LCAs for Curbside Recycling, Versus Either Landfilling or Incineration With Energy Recovery." *International Journal of Life Cycle Assessment*. (2005); 13(3) 226-234.
5 Schlesinger, *Aluminum Recycling* CRC Press 2006.
6 IPCC, AR4, Working Group 3, Chapter 10.
7 Platt, et al. *Stop Trashing the Climate*, Institute for Local Self-Reliance, June 2008. Available at www.stoptrashingtheclimate.org
8 USEPA, *Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices*, September 2009.
9 Weber and Matthews, "Embodied Environmental Emissions in U.S. International Trade, 1997-2004," *Environmental Science and Technology* 41, pp. 4875-4881, 2007.
10 Chintan, *Cooling Agents: An Examination Of The Role Of The Informal Recycling Sector In Mitigating Climate Change*, 2009. The analysis takes landfilling as its baseline.
11 Tellus Institute, *Assessment of Materials Management Options for the Massachusetts Solid Waste Master Plan Review*, December 2008. Analysis compared options to current practice, which is predominantly landfilling.
12 Platt, et al., op. cit. *Stop Trashing the Climate*, Institute for Local Self-Reliance, June 2008. www.stoptrashingtheclimate.org
13 ibid.
14 Skumatz, "What Provides The Biggest Bang? Comparing Carbon Footprint Effects And Costs from Diversion vs. Energy Programs" presentation at California Resource Recovery Association, August, 2008.
15 In the context of waste management, organic material refers to putrescible materials. The largest component is generally food waste; in some countries, yard waste (leaves, grass cuttings, etc) is also a significant component. Paper, particularly food-contaminated paper, is often included but wood, particularly treated wood, which tends not to decompose readily, is generally excluded. Plastics, although carbon-based, are not considered "organic material" for waste management purposes as they do not biodegrade.
16 Methane has a global warming potential of 25 over a 100 year timeframe but 72 over a 20 year timeframe (IPCC AR4 Chapter 2.10).
17 IPCC AR4, Chapter 10.
18 Anderson et al., *From Beneath the Ground: Gas from Landfills Threatens to Overheat the Earth*, Center for a Competitive Waste Industry, 2006.
19 *The Danger of Corporate Landfill Gas-to-Energy Schemes and How to Fix It*, Recycling Works, Sierra Club and International Brotherhood of Teamsters, 2010.
20 Favoino and Hogg, "The potential role of compost in reducing greenhouse gases," Waste Management Research 2008; 26; 61.
21 ibid.
22 including Bali, Cairo, Lima, Mumbai, Pune, San Francisco, Uganda, and elsewhere.
23 WASTE and SKAT, "Economic Aspects of Informal Sector Activities in Solid Waste Management," 2008.
24 for more information on wastepickers, see *Refusing to be Cast Aside: Waste Pickers Organising Around the World*, edited by Melanie Samson, Women in Informal Employment: Globalizing and Organizing (WIEGO), Cambridge, MA, USA, 2009.
25 Medina, "The informal recycling sector in developing countries: organizing waste pickers to enhance their impact," Gridlines No. 44, October 2008.
26 Personal communication, Laila Iskander.
27 WASTE and SKAT, op. cit.
28 Personal communication, Melanie Samson.
29 ibid.
30 *Scrap Crash! What the crash in prices of scrap means for wastepickers and other recyclers*, Chintan Environmental Research and Action Group, 2009.
31 Refuse Derived Fuel (RDF) is a technology in which waste is dried and compressed into bricks or pellets, then burned for fuel, often in cement kilns.
32 http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html
33 Tan, *Clean Development Mechanism Funding for Waste Incineration: Financing the Demise of Waste Worker Livelihood, Community Health, and Climate*, Global Alliance for Incinerator Alternatives, 2009.
34 *Zero Waste for Zero Warming: GAIA's Statement of Concern on Waste and Climate Change*, Global Alliance for Incinerator Alternatives, December 2008.
35 Rand, Haukohl, et al., "Municipal Solid Waste Incineration: Requirements for a Successful Project World Bank," Technical Paper No. 462, World Bank 1999.
"Waste Management in China: Issues and Recommendations," East Asia Infrastructure Department, Urban Development Working Paper No. 9. May 2005.
36 Tan, op. cit.
37 Platt, "Resources up in Flames: The Economic Pitfalls of Incineration versus a Zero Waste Approach in the Global South." Global Alliance for Incinerator Alternatives, 2004.
38 Most of these are mixed-waste, or "dirty" composting projects, where the resulting compost is not safe for agricultural application.
39 information downloaded from UNEP Risoe database, CDM database and web searches on 16 September 2010.
40 It is now commonplace for governments and major funders to undertake "consultation" or "engagement" with civil society including, occasionally, mass-based organizations. In general, such "engagement" is primarily informational in nature; it does not extend to any degree of power-sharing with the consulted groups. "Voice and vote" is used here to indicate that wastepickers need more than a forum to voice their opinion; they must be afforded a degree of control over the waste management system.

About the Author
Neil Tangri is GAIA's Waste and Climate Change Campaigner, and is one of its founding members.

Global Alliance for Incinerator Alternatives
GAIA is a worldwide alliance of more than 600 grassroots groups, non-governmental organizations, and individuals in over 90 countries whose ultimate vision is a just, toxic-free world without incineration.

www.no-burn.org