BANKROLLING POLLUTING TECHNOLOGY:

The World Bank Group and Incineration

GAIA (Global Alliance for Incinerator Alternatives
Global Anti-Incinerator Alliance)
Full report available at **www.no-burn.org**

GAIA

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Summary

World Bank Group Promotes Polluting Technology

Incineration is a dangerous, costly, and unsustainable method of treating waste. Despite the known health hazards and extreme economic burdens of incineration, the World Bank Group (WBG) continues to promote this polluting technology. At least 156 projects in 68 countries since 1993 and 26 projects since 2001 have included incineration, according to documents on WBG websites.

In its roles as lender and policy advisor, the World Bank Group promotes incineration for industrial wastes, healthcare wastes, and municipal wastes (including wastes from tourism projects). Incinerators waste resources and create hazardous releases. Incineration of several of the waste streams in World Bank Group projects since 2001 is particularly hazardous, such as pesticide residues and organochlorine compounds. Incineration of these wastes would result in even higher quantities of extremely dangerous pollutants. Among the organochlorines proposed to be burned are PVC byproducts and PCBs.

Economic and health concerns have forced a reexamination of incineration's viability around the world. Incinerators have come under attack in countries that are large-scale lenders to the World Bank Group, such as the United States and Japan, and countries that are large-scale borrowers, such as India. The Philippines passed a national ban on incineration in 1999.

The 2001 U.N. Stockholm Convention on Persistent Organic Pollutants (POPs) is a global treaty that obligates participating nations to minimize certain POPs, including dioxins and furans, and identifies incineration as a major source of dioxins and furans. To be consistent with its stated goals of "sustainable development" and public commitment to reducing and eliminating the release of POPs from developing countries, the WBG should conform to the Stockholm Convention by immediately stopping the funding of projects that include incineration.

Recommendations to the World Bank Group

- **Institute an Operational Policy that will prohibit projects that include waste incineration.**
- **Stop disseminating publications that endorse incineration, or amend them to remove endorsements of incineration.**
- **Institute an Operational Policy that will prohibit projects not compliant with the U.N. Stockholm Convention on POPs, regardless of the Convention's legal status within the host country.**

The Problems of Incineration: Incinerators Produce Hazardous Releases

Incinerators release toxic pollutants in the form of stack gases, solid residues and sometimes liquid effluent. Hazardous pollutants from incineration include Persistent Organic Pollutants (POPs) such as dioxins and furans, as well as heavy metals, acid gases, particulates and greenhouse gases. POPs are especially dangerous because they bioaccumulate, biomagnify, resist decomposition and are capable of being transported great distances, thus threatening human populations and ecosystems around the world.

Technology to mitigate the air pollution from incinerators is extremely

expensive and rarely utilized in less-industrialized nations. Additionally, such technology collects pollutants including dioxins and concentrates them in the ash, which changes the form but does not solve the problem of hazardous emissions. No matter the air pollution control technology, hazardous ash remains a threat. In fact, the better the air pollution control technology, the more hazardous the ash.

Increasing pollution in regions already suffering from widespread health problems due to byproducts of combustion such as particulates, POPs and mercury is especially unsustainable and threatening to public health.

Alternatives to Incineration Exist

Viable alternatives to incineration exist for healthcare wastes, municipal wastes, and industrial and hazardous wastes. Healthcare waste is primarily composed of non-infectious waste that is similar to general municipal waste. Maintaining separate waste streams for potentially infectious and non-infectious wastes is inexpensive and cost-effective because it reduces the total amount of potentially infectious waste that needs treatment. Non-combustion alternatives exist for treating potentially infectious medical waste.

Programs for waste reduction and the separation of discards into categories such as reusables, recyclables and compostables, are financially and environmentally better strategies than incineration for dealing with municipal waste. The best approach for industrial wastes is prevention: reducing or eliminating hazardous industrial inputs and waste-intensive products as well as minimizing the quantity and toxicity of remaining wastes. For hazardous waste that already exists, non-burn treatments have been developed that are less dangerous than incineration.

Additional Problems of Incineration in Southern Countries

In Southern countries, economic and environmental problems of incinerators are further magnified. Among the reasons for this exacerbation are inadequate legislative and regulatory infrastructures, a lack of facilities to adequately monitor and test emissions and residues, less transparency and fewer opportunities for public participation, different waste content (municipal waste in less-industrialized countries consists of more organic and inert matter), and greater budget uncertainties which adversely affect maintenance of facilities.

World Bank Group Continues to Promote Incineration

Despite the overwhelming problems with incineration, the World Bank Group continues to fund incinerators and to promote incineration in its publications. Some World Bank Group projects do recognize concerns about incineration or promote alternative methods of treatment and waste management. But the Bank's publications and advice to Southern countries continue to endorse waste incineration and largely fail to address current research on its environmental and economic problems. Public interest organizations from World Bank Group borrowing and lending countries have attempted to engage the World Bank Group about these issues, but have received little constructive response. The World Bank Group has not developed any official mechanism for monitoring or restricting its funding of incinerators.

Introduction

As the world's premier development agency, the World Bank Group's lending practices and policy recommendations have great impact around the globe. The influence of the World Bank Group's practices and publications extends far beyond its own projects.

Despite years of criticism, the World Bank Group continues to promote waste incinerators throughout the world. Incineration is an extremely problematic waste treatment technology that is increasingly falling into disfavor in the North. Rather than solve a waste problem, incineration produces multiple residue streams which are often more hazardous in nature than the waste being burned. The Stockholm Convention bans and regulates a class of hazardous chemicals known as Persistent Organic Pollutants (POPs) and has identified waste incineration as a principal source of POPs.

The World Bank Group's continued support of incineration bespeaks the institution's unwillingness to change its own business as usual in order to protect public health and the environment around the world. Even as it seeks additional funds to implement certain provisions of the POPs treaty, its other operations continue to defy the Convention's goal of POPs elimination.

The Problems of Incineration

Incineration does not make waste vanish; it converts waste into gases, ashes and other residues that are often more hazardous and more difficult to manage than the original waste. Incineration is often proposed as a technology that can sterilize or reduce the quantity of waste that is sent to landfills; however, other approaches are also able to meet these objectives without incurring the serious problems of incineration.

Incinerator Residues and Pollutants

Incinerators produce large quantities of gaseous, solid and sometimes liquid residues. Large volumes of gases are created during combustion of the wastes and are sometimes subject to treatment before release into the air. The solid residues consist largely of bottom ash or slag, which collects at the bottom of the furnace. A second solid residue, fly ash, consists of particulate matter that is removed from the combustion gases by the air pollution control equipment. Some forms of air pollution control also generate liquid residues, such as scrubber water. The composition of these gaseous, solid and liquid incinerator residues depends on many factors, including the composition of the waste burned, the incinerator design, and the condition and maintenance of the incinerator. However, generally, all of these incinerator residues are contaminated with toxic substances, such as heavy metals, dioxins, furans and other persistent organic pollutants.

Dioxins cause a wide range of health problems including cancer, immune system damage, reproductive and developmental problems.

Dioxins are the most notorious pollutants associated with incinerators. They are a class of chemicals formally known as polychlorinated dibenzo-*p*-dioxins. The term usually includes a related class of chemicals, the polychlorinated dibenzofurans. Dioxins cause a wide range of health problems including cancer, immune system damage, reproductive and developmental problems.[1] Dioxins bioaccumulate, selectively building up in the fatty tissues of living organisms, and they biomagnify, meaning that they are passed up the food chain from prey to predator. They concentrate in fish, meat, eggs and dairy products, and ultimately in humans. Dioxins are of particular concern because they are ubiquitous in the environment; and they are found in human populations at levels that have been shown to cause health problems, implying that entire populations are now suffering their ill-effects.[2] Incinerators release 69% of dioxins worldwide.[3]

Dioxins, furans and ten other chemicals or groups of chemicals are subject to the restrictions of the Stockholm Convention on Persistent Organic Pollutants (POPs).[4] POPs are chemicals that bioaccumulate, biomagnify, resist decomposition and are capable of long-distance transport, meaning that populations may be exposed to POPs that originate thousands of kilometers away. Other POPs presently subject to the Stockholm Convention that are released by incinerators include polychlorinated biphenyls (PCBs) and hexachlorobenzene. In addition, incinerators release many other compounds of related structure and composition that cause significant problems for human health and the environment and may display other POP-like qualities.[5] Many of these may eventually be candidates for inclusion in the list of POPs regulated by the Stockholm Convention, but until now they have not received the same degree of scientific or regulatory scrutiny that dioxins have.

Many of the technical developments in the field of air pollution control for incinerators have been aimed at reducing the air emissions of dioxins. Even on their own terms, these technologies have met with limited success, as dioxin emissions from even the most modern incinerators remain high; and the difficulties of measuring dioxin emissions indicate that current estimates are likely to drastically under-report true emissions.[6] But the primary function of most air pollution control equipment is not to reduce dioxin

formation but simply to transfer dioxins from air emissions into ash. Indeed, one of the most effective technologies for cleaning flue gases actually stimulates increased dioxin formation.[7] As such, some studies have shown that the vast majority of dioxin releases from some European incinerators are in the form of ash.[8] As dioxins are long-lived and likely to re-enter the environment from the ash, merely transferring them from one release medium to another does little to protect public health or the environment.

Incinerators are also a major source of mercury pollution.[9] Mercury is an element, so it cannot be destroyed in an incinerator; but it volatilizes quite rapidly and is commonly found in stack emissions. If air pollution control equipment is used, it may capture a portion of the mercury and release it in the ash, from which it will eventually volatilize to the air or dissolve into ground- or surface waters, and so re-enter the environment. Once mercury is released into the environment, it can be methylated into methylmercury by various organisms. Like dioxins, methylmercury bioaccumulates and biomagnifies, and enters humans primarily through their diet. Mercury is a powerful neurotoxin, impairing motor, sensory and cognitive functions.[10] Mercury contamination is widespread, with approximately one-tenth of all children in the U.S. born each year with an elevated risk of neurological impacts because of low-level mercury exposures during the pregnancy.[11]

Other heavy metals released in significant quantities from incinerators include lead, cadmium, arsenic, chromium and beryllium. These metals attack a number of organs, including the lungs, kidney, stomach, intestines, skin, heart and central nervous system.[12]

Other pollutants of concern released by incinerators include acid gases, which are precursors to acid rain; particulates, which damage lung function; nitrous oxides, which generate photochemical smog; and greenhouse gases. However, characterization of incinerator pollutant releases is still incomplete, and many unidentified compounds are present in air emissions and ashes.[13] This belies the common claim that incinerator air emissions are “under control”; the composition and quantity of the air emissions and other releases is still largely unknown.

Incinerator Performance

The 10 municipal waste incinerators in the U.K. together exceeded their emissions limits 553 times in a single year.

Incinerator operations in Northern countries are plagued with technical problems and frequently fail to achieve the operations standards they are designed for, although even these standards are inadequate to ensure protection of public health or the environment. The Netherlands’ most modern incinerator simply bypasses its air pollution control equipment 10% of the time.[14] The 10 municipal waste incinerators in the U.K. together exceeded their emissions limits 553 times in a single year.[15] In a high-profile U.S. example, an incinerator operator was shown to rig tests to generate artificially low emissions levels.[16] Incinerator ash, instead of being vitrified and sent to a hazardous waste landfill, is often used to make concrete, roadbeds or simply left in the open. This ensures that those pollutants which were so laboriously and expensively removed from the air emissions are eventually returned to the environment.

Incinerator Costs

Mitigation of these problems is exorbitantly expensive. Large municipal waste incinerators often cost hundreds of millions of U.S. dollars in capital costs.[17] Smaller incinerators may not be proportionately cheaper unless sacrifices are made in terms of environmental protection, as there are significant economies of scale in the air pollution

Future generations will pay the cost of today's use of incinerators.

control equipment. Operation costs are also quite high, as a staff of highly-trained engineers is required to run a modern incinerator around the clock and replacement parts must often be imported. Conducting rigorous emissions testing also adds considerable costs, yet without this monitoring, there is no way to ensure optimal operation of the incinerator. Even so, these expenses do not capture the true costs of incineration. In terms of volume, the largest waste byproduct of incineration is its air emissions. As these are released into the environment, a global commons, their costs are effectively externalized onto others: neighbors whose air quality and health are directly affected by the air pollution; distant populations which consume persistent toxic substances (PTSs) in their foods; and those who suffer the effects of acid rain and smog. Similarly, containing these pollutants in ash and landfilling them only delays their release into the environment. Thus, future generations will pay the cost of today's use of incinerators.

Healthcare Waste

Incinerators cause additional problems depending on the waste stream combusted. Incinerators are often proposed as a solution to the problem of potentially infectious wastes resulting from health care. Yet health care wastes contain large proportions of polyvinyl chloride (PVC), a plastic commonly used in items such as intravenous fluid and blood bags, and tubing. Because of its chlorine content, PVC creates dioxins when burned. Health care wastes also often contain significant quantities of mercury from broken thermometers, sphygmomanometers (blood pressure cuffs), other diagnostic equipment, and lab reagents and other chemicals. If spilled mercury is collected, it is often incinerated with infectious waste or general waste, resulting in the mercury simply being released to the air or concentrated in the ash.

The knowledge that all waste is going to be burned undermines sharps separation programs — the best guard against disease transmission.

Virtually all the risk of disease transmission from health care wastes lies in the sharps (such as needles and scalpels), which are capable of breaking the skin and harboring virulent pathogens. These constitute approximately 1% of health care wastes; the vast majority of wastes from hospitals and clinics are no different in nature from ordinary municipal waste and require no special treatment. Those in greatest danger are the individuals who handle the sharps: nurses and janitorial staff. To protect them, health care facilities must implement a strict source separation system that minimizes the handling and contact of sharps. Yet standard practice in much of the world is to burn all health care wastes together, without source separation; and the knowledge that all waste is going to be burned undermines sharps separation programs — the best guard against disease transmission. Sharps and other potentially infectious wastes can be disinfected using autoclaves, microwaves or similar technologies that do not use combustion, avoiding most of the problems of incineration.

The World Health Organization concluded from observation of practices throughout the world that "incineration will seldom be the best available technology to treat hospital waste in developing countries." To substantiate this, the report cites a series of studies of operating incinerators in Mexico, Argentina, Brazil, and Peru that found the majority of facilities functioning poorly or not at all.[18]

Municipal Discards

The problems of municipal discards incineration are interwoven with questions of sustainability and materials policy. In Southern countries, the largest component of the municipal discards stream is food scraps, which are wet and therefore not amenable

to burning. They can, however, be fed to animals or composted into a soil amendment for depleted agricultural lands. The failure to return these nutrients to the land also drives demand for chemical fertilizers that have their own set of problems. The other major fractions of the municipal discards stream – paper, cardboard, metals, glass and plastics – are usually scavenged and recycled. This work, though insalubrious, does provide many thousands of people with at least a minimal livelihood. In some places, such as Cairo and Mumbai (formerly Bombay), where collection systems are well organized, materials recovery can be a reasonable living. In Cairo alone, some 40,000 people are estimated to make a living from wastepicking.[19] In some cases, wastepickers have organized to obtain worker protection, educational opportunities and other improvements in their livelihood.

In addition to this important economic function in poor countries, the informal materials recovery sector provides an important function in returning these materials to the economy. The more materials are recycled into new manufactures, the less demand there is for virgin materials. This helps to ease pressure on diminishing natural resources such as forests, mineral and petroleum deposits. As the human pressures on natural resources continue to grown, manufacturing will eventually have to learn to rely entirely on reused and recycled materials, creating a closed-loop economy in which every discard is fed back into the economy. That will require intensive recycling operations but also significant redesign of the materials and products produced, with an eye towards their end-of-life reclamation.[20]

Incineration undermines all these efforts towards sustainability. It deprives the poorest of the poor, those who depend on wastepicking, of even that livelihood. It increases the demand for natural resources and imported goods to replace those that have been destroyed in the incineration process. The additional processing and transport needed for these goods also consumes large quantities of energy – far greater than can be obtained by burning the waste.[21] Ultimately, municipal waste incineration relies upon an infinite supply of natural materials to produce society's goods and an infinite sink for its own waste products, neither of which exist.

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Alternative approaches have been put in place in a number of places in the South, including Cairo (Egypt), Curitiba (Brazil) and Mumbai (India), which have succeeded in composting and recycling the vast majority of their municipal discards.[22] One key is source separation, which enables the resource recoverers[23] to use organic discards (primarily food waste) for animal feed or composting without fear of contamination by glass, metal or household toxics. Although these approaches have proven capable of reducing the waste going to landfill by as much as 85% (incinerators reduce the quantity of waste going to landfill by only 50-70% because of the high percentage of ash), additional measures will be needed to completely close the materials cycle. This is because many products that are currently manufactured are not easily reclaimed at the end of their useful lives, such as products made of materials that cannot be safely recycled (i.e. PVC), products which contain hazardous materials such as heavy metals, and products consisting of composites which cannot be readily separated for recycling. Programs such as Extended Producer Responsibility, under which firms take responsibility for their products over their entire lifecycles, encourage producers to redesign their products for easy and safe recycling.[24]

Hazardous Waste

Hazardous process wastes, that is, hazardous wastes that result from industrial manufacturing, are also sometimes slated for incineration. Often, however, incineration does not eliminate the hazardous nature of these wastes. Heavy metals are liberated and released to the air or to the land in the form of ash. Incineration of chlorinated wastes is a major source of dioxin releases and other chemically hazardous wastes entail similar problems. Nor is landfilling an option for most hazardous wastes, which are likely to pollute surface- and groundwater supplies. Rather, the key to handling

hazardous wastes is to avoid producing such wastes in the first place, an approach known as Clean Production. Many firms do not seriously attempt to minimize or eliminate hazardous wastes because they can easily send them to an incinerator or dump. It is only when cheap, unregulated dumping options such as landfills and incinerators are closed off that most companies seriously look at ways to minimize waste generation. The United Nations has endorsed Clean Production, creating a series of technical assistance centers throughout the world to assist businesses in minimizing their waste generation.[25]

There is one type of hazardous waste to which Clean Production methods cannot be applied: this is known as historical or stockpile wastes. In other words, these are wastes that are not being produced currently but have already been produced and are being stockpiled until a solution can be found. Many of these wastes, such as obsolete pesticides and used PCBs, are POPs and the Stockholm Convention on POPs is quite specific in how they must be dealt with. The Convention states that stockpiles of POPs wastes must be "disposed of in such a way that the persistent organic pollutant content is destroyed or irreversibly transformed so that they do not exhibit the characteristics of persistent organic pollutants."[26] As incinerators often release uncombusted wastes and always form dioxins and other POPs from chlorinated wastes, incineration clearly does not meet the criteria of an acceptable POPs treatment technology. Instead, a variety of other technologies, most of which rely upon low pressure and controlled conditions, have been shown capable of rendering these wastes less harmful without the uncontrolled releases that are characteristic of incineration.[27]

Additional Problems in Southern Countries

Most incinerators to date have been built in the industrial countries of the global North. Incineration is an extremely expensive technology, requiring high capitalization and generating few jobs, so it is reasonable to think of it as a technology more suited for the industrialized North than the South. This history, however, creates an unrealistic track record when evaluating the suitability of incinerators for Southern settings. Most data on incineration have been collected in the North and therefore most critiques have been based upon incineration's performance record in the most technologically advanced countries of our time. It would be difficult, if not impossible, to run an incinerator in most Southern countries in the same manner as is typical in, for example, Switzerland; and if it were possible, it would be prohibitively expensive.[29]

Many incinerators in the South are little more than simple furnaces. These furnaces are unable to regulate combustion temperatures or ensure sufficient mixing and oxygenation, resulting in partial combustion of the waste and increased formation of byproducts such as carbon monoxide and dioxins. Most such incinerators have little or no air pollution control equipment.

"Incineration has had very limited use for municipal solid waste and has not had much success in the cities of Asian developing countries where it has been installed because most of these cities have encountered many problems with imported incinerators either due to design problems or high operating and maintenance costs." Asian Development Bank 2000 [28]

There are many problems particular to transferring incineration technology to Southern countries. Discussed below are a few such issues that are known to exist; but as with all such engineering adventurism, the unanticipated problems are the most forbidding.

- **Lack of monitoring.** Few Southern nations have the ability to regularly monitor stack emissions or ash toxicity from an incinerator, yet a regular testing regimen is essential to the operation and oversight of any such plant. Indeed, the cuts that have been achieved in air emissions in Northern countries are due largely to the continuous feedback loop of regular emissions testing. Without that testing, it can only be presumed that Southern incinerators will function at far more polluting levels than their Northern cousins.

- **Lack of technical ability to test releases.** The lack of monitoring ability is not only due to a lack of legislation, regulations, sufficient government apparatus and the like; many countries have no physical infrastructure to conduct tests for dioxins and other important pollutants, and must send such assays abroad for testing. Quite apart from the time delay in receiving those results, the expense of such testing is literally prohibitive.

- **Lack of secure landfills for ash.** In many countries, the highly hazardous incinerator ash will be dumped in an unlined pit, where it runs the risk of contaminating groundwater. It is also often impossible to control access to the ash landfill, so people and animals may enter it, as they do in Phuket, Thailand,[30] to look for metals or other salable materials in the ash. This of course represents an extreme danger to human health.

- **Corruption.** Corruption bedevils many major Southern infrastructure projects, but incinerators are particularly troublesome in this regard, as their regular operation depends highly upon capable, reliable and independent government monitoring.

- **Shortages of trained personnel.** Incinerators in Europe, Japan and North America function with a full complement of highly-trained engineers. Few Southern countries are able to muster the necessary numbers of engineers, nor are their skills best utilized in monitoring the burning of trash.

- **Budget uncertainties affect maintenance.** One of the keys to a properly-run incinerator is regular maintenance and replacement of equipment, which requires significant expenditures. Given the budgetary chaos experienced in many Southern countries, it can be assumed that such maintenance will be less frequent and rigorous than in the North. Other disruptions, such as interruptions in the regular delivery of waste or electricity, are also more frequent, and will have significant impacts on the functioning of an incinerator.

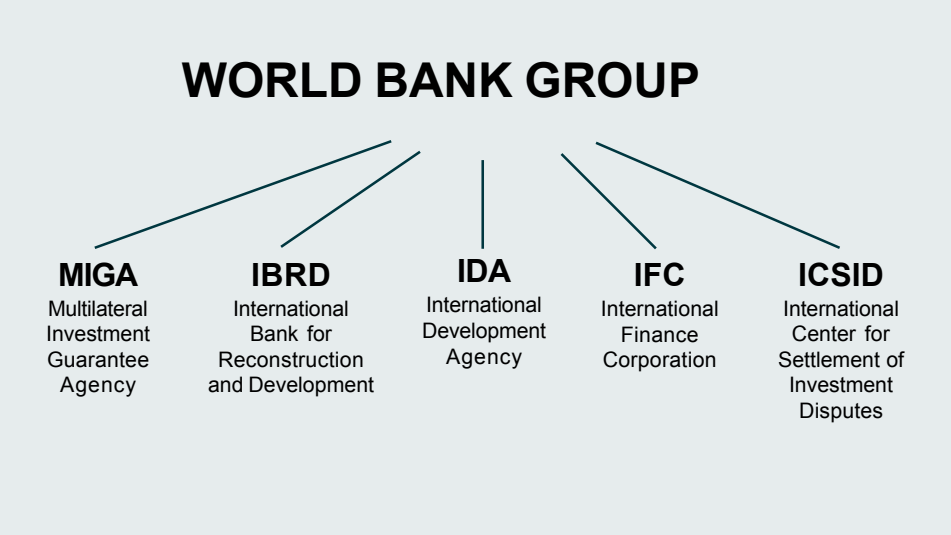
- **Differing physical conditions.** Southern countries can have significantly different physical conditions which will affect incinerator operations. In one case, a Danish incinerator built in New Delhi is unable to function because the engineers miscalculated the calorific value (energy content) of the waste.[31] Indian waste contains more inert material (ash, grit) and fewer combustibles (paper, plastic) than European waste. A high calorific value is needed for the waste to sustain combustion; otherwise the flame goes out or merely smolders. Most Southern countries' discards have low calorific value. Other circumstances, including monsoon weather that will moisten garbage, can also be a significant factor.

- **Lack of robustness of technology.** In general, for a technology to function well in a Southern environment, it must be robust. Incineration, on the other hand, functions well only in an extremely limited range of several parameters, such as the furnace temperature, input rates of waste and activated charcoal, exhaust gas temperatures, calorific value of waste, etc.

Incineration Projects of the World Bank Group

The World Bank Group (WBG) is the most important development agency in the world. With US$17.3 billion in annual lending,[32] it is one of the two largest such agencies,[33] but its influence is also exercised through its extensive in-house generation of policy prescriptions. Its primary role has been in project lending and implementation. It also carries out a prodigious amount of research on economic development and related fields and is known as one of the most-cited research institutions in the world. As such, the opinions of the WBG, both official and unofficial, as well as its advice, carry significant heft in the global South.

The World Bank Group comprises five distinct organizations, all headquartered in Washington, D.C. They share the same president and board of directors, but have distinct roles and policies. Rather confusingly, two of the WBG's component institutions, the International Bank for Reconstruction and Development (IBRD) and International Development Agency (IDA), are referred to collectively as the World Bank; the term "World Bank Group" encompasses all five.



This report looks at three institutions within the World Bank Group: the IBRD, IDA (referred to jointly as the "World Bank") and International Finance Corporation (IFC):

- The **IBRD** is the largest component of the World Bank Group, and functions both as a lender and advisor on development.
- The **IDA** lends to the world's poorest countries (a subset of the IBRD's borrowing countries) and shares policies and project approval procedures with the IBRD.
- The **IFC** funds private sector investment in Southern countries.

For more on the World Bank Group, see the accompanying **Campaign Supplement.**

Incineration has been a subject of public concern in the South since at least the 1970s, when Chile banned incineration in several parts of the country. Debates about the human health and environmental costs of incineration raged in the U.S., the World Bank Group's host country, throughout the 1980s and 1990s, when the growth of the American incinerator industry was brought to a halt.[34] Incinerators have come under serious attack in many countries, including countries that are principal shareholders of the World Bank Group, such as Japan, and countries that are large-scale borrowers, such as India.[35]

Nevertheless, the World Bank Group has used both its roles — as lender and as policy adviser — to promote incineration. It has done so through three major methods: by financing projects that include the purchase and construction of new incinerators; by financing projects that result in elevated waste flows to existing incinerators; and by promoting the notion, through its publications, that incineration is an appropriate waste management technology. In terms of project lending, this reflects a failure of the WBG's internal environmental policies, particularly the environmental screening project categorization system. This system assigns projects an environmental category of A, B, C or FI, which determines the extent of environmental assessment each project receives. On the policy side, the WBG has failed to adopt a forward-looking policy on waste management.

As the WBG has no systematic means of tracking its incineration projects,[36] it is not known how long it has been promoting incineration, nor in how many projects. The issue first became public with the discovery of the State Health System Development Project II (India) in 1996. This project included plans to purchase hundreds of new incinerators for hospitals in three Indian states: Karnataka, Punjab and West Bengal.[37] The project was protested by Indian public-interest organizations, which wrote letters to the World Bank, met with World Bank staff, and eventually coordinated a letter-writing campaign with Global Response[38] to dissuade the Bank from installing these incinerators. As a result of the public outcry, Bank staff privately assured the concerned NGOs that it was placing a moratorium on funding of health care waste incinerators in India, and in particular the State Health System Development Project II would go ahead without the originally planned incinerators.[39] The Bank refused to make this moratorium official or public, however, and has never clarified why it considers medical waste incinerators appropriate elsewhere in the world when they are inappropriate in India.

Multinationals Resource Center and Health Care Without Harm issued a brief report in 1999 listing 30 projects involving medical waste incineration in 20 countries and calling on the Bank to halt its funding of medical waste incineration.[40]

PROJECTS INCLUDING INCINERATION

According to publicly available documents, the World Bank Group has proposed financing at least 156 projects promoting incineration in the last 10 years, and financing has been approved for the majority of these. An inventory of the projects can be found online at *www.no-burn.org* or can be requested by contacting GAIA or Essential Action.[41] These projects were financed by both the IFC and the World Bank, in every region in which they operate, and for a wide variety of different waste streams.

For the purposes of this report, projects that promote incineration are those that include the construction of a new incinerator, increase the quantity of waste being incinerated or specifically name incineration as an acceptable waste treatment technology. In some cases, the WBG documents do not clearly indicate which waste management method or technology is to be employed, but list incineration as a recommendation or an acceptable option.

The documents used to compile this inventory are the World Bank Group's own documents: primarily Public Information Documents (IBRD/IDA), Summaries of Project

Information (IFC) and Environmental Review Summaries (IFC). These documents are posted on the IFC's and World Bank's websites when projects are in the pipeline – that is, when they are being considered for WBG investment. After the project is approved for financing and implementation begins, the documents are not usually updated. Therefore, they reflect the projects as proposed or intended rather than as implemented. Project documents are sometimes not updated to indicate that they have been approved. As such, there may be projects that are listed in the inventory which do not in fact utilize incineration because the project design was changed during implementation and the documents were never updated. By the same token, projects that were not originally envisioned to include incineration may have an incineration component added at a later stage, without any change in the documentation. Therefore, both under- and over-counts are inevitable in the inventory. However, these are the only documents the WBG regularly makes public and therefore form the best available basis for compiling such an inventory.

Another systematic error is present in the inventory because the WBG is not required to mention incineration even in those projects for which it is intended during the design phase. Solid waste disposal is often mentioned in project documents as a concern and is one of the issues that the WBG considers sufficiently serious to merit mention. But incineration per se is not uniformly recognized as an issue of serious environmental concern, and therefore may be omitted from many project documents simply because those drafting the documents did not think it worthy of note. This can be seen in documents that indicate that waste will be handled "appropriately" without specifying a methodology for doing so.

To the extent that the inventory does not reflect the realities of the projects as they are implemented, it is due to these two factors: the WBG's poor reporting practices and its failure consistently to recognize incineration as a problematic technology.

With one exception, all the projects in the inventory belong to the last decade, that is, since 1993.[42] This is significant because incineration had been recognized as a problematic technology in the North since well before this period. By 1993, the USEPA had identified incinerators as the country's primary source of airborne dioxin emissions; the idea that dioxin formation could be eliminated through high furnace temperatures had been discredited; dioxins had been shown to be highly hazardous to human health; incinerators had been identified as a primary source of mercury emissions; and incinerator ash from Philadelphia, U.S. was on the eighth year of its 16-year quest to find a country willing to accept it, exemplifying one of the primary quandaries of incinerators to this day: the hazardous nature of its byproducts.

THE PROJECTS

One important feature of the WBG's incineration projects is that most include incineration as a secondary or minor aspect, rather than being projects whose primary objective is incineration. Only three projects are primarily concerned with incineration. The Singapore Environmental Control Project financed the construction of a 1200 ton per day municipal solid waste incinerator for the city-state of Singapore, one of the world's largest incinerators. The Mauritius Solid Waste Management Project consists primarily of installing one or two municipal waste incinerators with a 150-200 ton per day capacity each. And the Korea Waste Management Project consisted of two components, one of which was the construction of a "model" hazardous waste incinerator. In most of the 156 projects, waste management is an environmental side-effect of the project which must be mitigated.

The projects are widely distributed, but not evenly. The 156 projects are in 68 countries in every region where the WBG operates. However, 49% are in Africa, 22% in Asia and the Pacific, 19% in the Americas and Caribbean, and 10% in Europe. Although many countries had only one project, almost half the projects (46%) were in just 12 countries.

World Bank Group Promotes Polluting Technology

DISTRIBUTION BY REGION

Africa	49%
Asia and Pacific	22%
Americas and Caribbean	19%
Europe	10%

COUNTRIES WITH MOST INCINERATOR PROJECTS

Country	Projects	Country	Projects	Country	Projects
Kenya	12	Zimbabwe	6	South Africa	5
Brazil	8	Tanzania	5	Zambia	5
Turkey	7	Mexico	5	China	4
India	6	Argentina	5	Nigeria	4

Kenya, in particular, is host to 12 incineration projects. Brazil and Turkey are next in line, with 8 and 7 projects respectively. These figures do not necessarily reflect the numbers of incinerators; many projects involve only one incinerator while others have multiples. The Gleneagles International Labs project in particular calls for 30 incinerators in several unnamed countries across Asia. The project figures are an even less reliable guide to the quantity of waste incinerated, as incinerators vary widely in size. The Singapore incinerator alone may burn as much waste as all other WBG incinerators put together. Furthermore, it is difficult to know to what extent the geographic distribution is due to differing reporting practices among the different regions. Those preparing the WBG's environmental summaries in Africa may simply be more conscientious about including a mention of incineration in the project documents than their counterparts working in other regions.

Approximately 59% of the projects involve incineration of a wide variety of industrial and manufacturing waste streams; about 29% health care wastes; and the remainder, general municipal wastes. 12 of the 19 municipal waste projects are tourism-related;[43] that is, the incinerators are intended to cope with the increased quantity and complexity of waste generated by tourism, as distinct from the local population. Several of these are luxury hotels in remote locations and safari camps isolated from municipal services.

Several of the industrial waste incineration projects raise particular concerns because of the nature of the waste stream. For example, seven projects involve the incineration of wood byproducts such as paper and cardboard that could easily (and usefully) be recycled. Similarly, eight projects propose to incinerate food and natural textile residues such as tea leaves and cotton trimmings. It is important to note that the incineration of even a relatively benign waste stream is problematic – particulates, for example, are a serious health hazard, regardless of the nature of waste incinerated; and trimmings destroyed in an incinerator must be replaced by virgin materials. Moreover, incinerators tend to attract variegated waste streams. Even if they are intended only for a specific waste stream, many people will use incinerators as a general disposal device for all kinds of packaging and miscellaneous wastes.

2001- 2002 Projects by Waste Stream

Healthcare waste	5
Municipal waste	2
Organochlorines	3
Pharmaceuticals	2
Wood, paper, cardboard, etc.	1
Tourism waste	2
Organics e.g. cotton, tea	3
Pesticides	1
Other industrial wastes	5
Mixed/multiple waste streams	1
Unspecified	1
Total:	**26**

Of greater concern are the 12 projects that recommend the incineration of pesticide residues. For the most part, the project designers seem concerned that pesticide containers not be re-used for drinking water, a real problem in many parts of the world. A few projects recommend that the containers be returned to the manufacturer, which is generally the best way to deal with such wastes; but they then go on to give detailed instructions on rendering the containers useless (by puncturing) and incinerating them. Pesticide incineration is particularly dangerous because of the high proportion of heavy metals, organochlorines and other persistent toxic substances in the releases. Although the WBG has a safeguard policy requiring it to minimize the use of pesticides, in fact it has been shown to encourage their use.[44] If the WBG adhered to its own pesticides policy, the question of pesticide residues would appear far less often; and in those cases, returning hazardous materials to the manufacturer should be a requirement of the project, not an option.

The most worrisome use of incineration in the WBG's projects are the six projects which specifically call for the incineration of organochlorine compounds. This is in addition to the pesticide residue projects, as some pesticides are also organochlorines. Organochlorines are chemicals that contain carbon and chlorine. When burned, they produce large quantities of dioxins, furans, PCBs and hexachlorobenzene – all of these are POPs slated for elimination under the Stockholm Convention – as well as other pollutants. The WBG has funded or proposed funding six projects which specifically propose to incinerate significant quantities of organochlorine wastes, thus ensuring the production and release of large quantities of POPs. For the most part, the project documents take no notice of this problem. Only one of the six projects[46] even mentions dioxin and it relies upon a single stack test conducted in 1998 to assert that no dioxins will be emitted from the incinerator. No mention is made of other releases. Yet WBG staff have long been aware of the concerns of incinerating such particularly hazardous materials. As far back as October 1996, a Division Chief responded to criticism by defending the use of incineration as a component of hazardous waste management program for India but wrote that, "Incineration of halogens or mercury-containing waste will not be considered."[47]

1993-2002 Incinerator Projects by Waste Stream [45]

Healthcare waste	45
Pesticides	12
Tourism waste	12
Organics (e.g. cotton, tea)	8
Municipal waste	7
Animal wastes	7
Pharmaceuticals	7
Wood, paper, cardboard, etc.	7
Organochlorines	6
Mixed/multiple streams	10
Other industrial wastes	26
Unspecified	9

Of the six organochlorine projects, 3 are large PVC factories. PVC is a cheap plastic made largely of chlorine; it is problematic at every stage of its lifecycle, and is responsible for much of the dioxins produced in municipal waste incinerators. The production of PVC is thus a problem in its own right as well as an aggravating factor in municipal waste management. Two projects involve the removal and disposal of electric transformers containing PCBs. While PCB removal and destruction is important, it is crucial to use non-incineration technologies such as has been done in Japan, Australia, Canada and elsewhere. The approval of two projects financing the incineration of PCBs literally within a month of the Stockholm Convention's signing indicates the WBG's complete disregard for the treaty's injunctions to utilize non-incineration methods for treatment of POPs wastes. The sixth project, the only one to take some notice of dioxin, is ironically a project of the Global Environmental Fund whose aim is to reduce the emissions of ozone-depleting substances.[48] This project includes an incinerator "constructed for the purpose of incineration of all fluorine and chlorine containing waste" – precisely those wastes that are most dangerous to incinerate.

A few of the WBG's incineration projects do contain good provisions on waste management. In particular, a few of the health care projects specify the need for source separation and proper handling of health care waste and two projects emphasize the importance of waste minimization in the health care context. Unfortunately, these projects then call for the incineration of some of the source-separated wastes. Strangely enough, it is not always the potentially infectious wastes; in two projects, that portion is treated by autoclave (a non-burn technology), and general wastes are sent for incineration.[49] Similarly, three tourism projects in areas without any infrastructure place great emphasis on waste minimization, reuse of containers, and packing out what is brought in; but specifically state that they intend to incinerate some portions of the waste stream.[50]

The approval of two projects financing the incineration of PCBs literally within a month of the Stockholm Convention's signing indicates the WBG's disregard for the treaty's injunctions to utilize non-incineration methods for treatment of POPs wastes.

In project documents, comments such as "There are no major environmental issues… All health facilities to be rehabilitated by the project will have incinerators"[51] are not uncommon. Two documents baldly state that the projects will use incinerators that produce no dioxins – presumably unaware that this is a huckster's claim on the part of the incinerator vendor. Similarly, incinerator ashes are twice referred to as "non-hazardous" despite their classification under European Union and international law as hazardous wastes.[52] A few documents even claim that incinerators will have a beneficial effect upon the environment, and another stated that "pressurized containers will be incinerated," a practice widely blamed for incinerator explosions.[53]

The World Bank Group's Environmental Classification System

One of the WBG's safeguard policies is its Environmental Assessment policy. At first glance, the categorization of incineration projects seems fairly consistent: 135 of the 156 projects are category B. Of others, six are Category A, seven are Category C, and two are of unkown category. These projects are required to undergo a full Environmental Impact Assessment, which must be disclosed to the public at least 60 days before the project is considered by the Board of Executive Directors for approval. Category B projects are those whose "potential adverse environmental impacts ... are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases mitigatory measures can be designed." Category B projects are required only to have a cursory Environmental Assessment, which is to be made public 30 days before the Board votes on the project. Category C projects are those expected to have minimal or no environmental impacts, and no environmental review is necessary. Category FI refers to loans made to financial intermediaries (such as private banks) in order for them to loan the money to "subprojects." In such cases, responsibility for environmental oversight is passed on to the financial intermediary. The IFC follows similar policies, although the terminology is somewhat different. Clearly, the Environmental Assessment policy is riddled with weaknesses, including the short time that the public has to review (and therefore attempt to influence) projects, and the entire Category FI process of shirking responsibility for environmental performance.

The WBG categorizes all of its projects according to their expected environmental impact (see box). At first glance, the categorization of incineration projects seems fairly consistent: 135 of the 156 projects are category B. Of the others, six are category A, seven are category C, and eight are of unknown category. Yet upon closer inspection, inconsistencies appear. All seven of the category C projects involve health care waste. In spite of this, the projects are considered to have no or even beneficial effects on the environment. Yet health care waste is cited in some category B projects as one of the primary environmental issues. However, incineration is not given as a cause for concern; more often, it is presented as a solution to the issues of solid waste management. Most worrisome, none of the projects involving pesticide incineration is classified as category A, in spite of the significant concerns around pesticide use and incineration. Similarly, two mining projects involve the use of cyanide and incineration of cyanide residues; yet all are classified in category B. And, most obviously, only one of the organochlorine incineration projects is classified as category A – a PVC plant similar to two PVC plants classified as category B. Yet all POPs-producing projects can be expected to have global impacts, which should place them in category A.

The inconsistency of categorization was first raised with the Bank in February of 1997 in a letter from Multinationals Resource Center; no response was received. It was subsequently highlighted by a USAID report of June 1998 that stated, "The variable classification demonstrates a major inconsistency in dealing with environmental assessment of medical waste."[54]

This failure to properly categorize projects reflects a lack of importance placed on incineration and related problems such as POPs. Of all the projects involving incineration, only four even mention dioxin and each dismisses it with a single line.[55] Two speak of it as a public perception problem. The categorization problem may also be due to a deliberate effort on the part of WBG staff to avoid scrutiny of their projects. A lower categorization means a lower level of environmental assessment and less information made public, and so reduces the possibility of project delays for environmental reasons. As WBG staff are evaluated on their ability to make loans, they have a clear incentive to reduce the scrutiny to which their projects are subject; and they can do so by reducing the categorization of projects. As a consultant who has worked for the

Bank over the last 22 years remarked, “At that time,1995-96, the SAR [South Asia Region of the World Bank] listed all health sector projects, even the fledgling HIV program, under category C to escape the expense and hassle of doing EIAs.”[56]

The vast majority (130) of the 156 incineration projects are IFC projects; 25 are IBRD or IDA (World Bank) projects and one (the Chad-Cameroon Pipeline) receives financing from both. Interestingly, none of the IFC projects are category C. This probably indicates that the IFC has been more consistent than the IBRD/IDA in categorizing its incineration projects, particularly those involving health care waste.

World Bank Group Projects Promoting Incineration by Country

Algeria	3	Ghana	1	Philippines	2
Antigua and Barbuda	1	Grenada	2	Poland	1
Argentina	5	Hungary	3	Russia	1
Benin	1	India	6	St. Kitts and Nevis	1
Bolivia	1	Indonesia	3	St. Lucia	1
Botswana	2	Jamaica	2	St. Vincent and the Grenadines	1
Brazil	8	Kenya	12	Samoa	2
Burkina Faso	1	Korea (South)	1	Senegal	1
Cameroon	3	Lebanon	2	Slovakia	1
Cape Verde	1	Lithuania	1	South Africa	5
Chad	3	Madagascar	3	Sri Lanka	2
China	4	Malawi	1	Tajikistan	1
Colombia	2	Maldives	1	Tanzania	5
Comoros	1	Mali	1	Tunisia	1
Costa Rica	1	Mauritania	2	Turkey	7
Cote d'Ivoire	3	Mauritius	1	Uganda	3
Croatia	1	Mexico	5	Uzbekistan	1
Dominica	1	Mozambique	2	Venezuela	2
Dominican Republic	1	Namibia	1	Viet Nam	3
East Timor	1	Nepal	1	Yemen	1
Egypt	2	Nicaragua	1	Zambia	5
Eritrea	1	Nigeria	4	Zimbabwe	6
Fiji	1	Papua New Guinea	2		

TOTAL COUNTRIES: 68

TOTAL PROJECTS: 156*

*Because of three regional projects, this number is different from the total projects listed in this table. Six countries included in a single Eastern Caribbean project (P006970) are included in this table. Two projects are not included in this table because they are regional projects and the host countries are not listed. IFC project 10851 is listed as being located in the “Africa Region,” but project documents state the project will build tourist resorts in Africa, South America and the Caribbean. IFC project 7816 is for “several countries” in the East Asia/Pacific Region.

World Bank Group Policy and Incineration

GUIDELINES FOR WORLD BANK GROUP PROJECTS

The World Bank requires its projects to comply with an array of policies and minimum standards. In spite of much public scrutiny of World Bank Group incineration projects and worldwide concern around POPs, the WBG has not developed any official mechanism for monitoring or restricting its funding of incinerators. It has not developed an Operational Policy on incineration, as has been done with pesticides.[57] It has not issued a Best Practices, Guideline, or Guidance Note to encourage alternatives to incinerators. And it has not even used its environmental categorization policy consistently to raise awareness of incinerator projects within the institution. The World Bank Group has failed to institute any binding policy or mechanism that would prevent it from funding incinerators.

On the other hand, the following World Bank Group documents that serve as guidelines or recommendations for WBG projects explicitly endorse the use of incineration.

- ***The Pollution Prevention and Abatement Handbook***

This is the principal publication that guides internal decision-making on environmental issues at the World Bank Group. It is an industry-by-industry set of guidelines to what the WBG considers best or suitable environmental practices. Incineration is endorsed throughout the Handbook; it is specifically cited as an appropriate waste treatment method in the chapters on hazardous waste, tourism facilities, cement kilns, pesticide manufacture, pesticide formulation and petrochemicals. Of particular concern is the fact that the Handbook endorses the use of cement kilns for waste incineration; and specifically recommends incineration for wastes from pesticide manufacture and formulation, including organochlorines and organophosphates. These are precisely the waste streams most likely to produce dioxins and related compounds, yet neither dioxins nor POPs are mentioned in chapters endorsing incineration. The only mention of dioxins in the entire 457-page Handbook is under the section on General Environmental Guidelines, which states "Pollutants such as dioxins and furans, toxic organics, and toxic metals should not exceed risk-specific doses or reference air concentrations at the receptor end. The dioxin emissions level for 2,3,7,8-TCDD equivalent should be less than 1 nanogram per normal cubic meter." This standard is ten times higher (less strict) than the international norm.[58] Mercury fares slightly better, being the subject of its own 3-page section that mentions waste incineration as a significant source of mercury releases. The Handbook also includes a chapter on Clean Production. Unlike the other chapters, it focuses on policy implementation rather than technical aspects. In itself that is not bad, but the lack of detail suggests that Clean Production is seen as complementing rather than supplanting traditional end-of-pipe pollution control measures. The chapter does not define Clean Production nor discuss the principles underlying it; nor does it include any discussion of product redesign, a necessary component of Clean Production programs. On the other hand, the Handbook's chapter on hazardous waste is much more specific. It properly prioritizes waste prevention over treatment and disposal and underlines the importance of forcing generators

Operational Policies are the WBG's strongest internal restrictions on lending practices. OPs apply to the World Bank and IFC.

to take responsibility for their wastes. But it devotes only one paragraph to prevention, leaving the implicit message that prevention, although important, is not practical or achievable.

- ***The Health Care Waste Management Guidance Note*** [59]

Although the Note does make mention of non-burn technologies and the importance of waste minimization and segregation practices, it is largely supportive of incineration. The Guidance Note includes factually inaccurate statements such as "ensuring that the incinerator plant continually burns its materials at a temperature at or above 1200 degrees will virtually eliminate dioxins from release."[60] However, numerous studies have established that the majority of dioxins released from incinerators are not formed in the furnace but after the exhaust gases leave the combustion chamber, as they cool while cooling to the outside temperature.[61] The Guidance Note's analysis of treatment technologies is summed up in a quick-reference table which gives a side-by-side contrast of various treatment technologies ranked by 11 criteria.[62] Incineration garnered 10 ratings of "very good" and one of "poor to moderate" (in a category, "avoidance of secondary impacts," in which no treatment method was rated better than "moderate"). By contrast, non-combustion and environmentally preferable treatment options, such as autoclaving, microwaving and chemical sterilization, received only three grades of "very good." The Bank published this document in 1999 in spite of significant critiques of its pro-incineration bias from outside experts.[63]

- ***IFC Guidelines for Waste Management Facilities***

These guidelines explicitly endorse the use of incinerators for waste treatment. The document makes no mention of waste minimization, waste avoidance, or source separation. Instead, its focus is solely on end-of-the-pipe interventions. The guidelines do state that "waste should be composted whenever possible" and that projects should "include materials recovery facilities in the project to receive, separate, process and market or reclaim materials where possible." But these are the only two mentions of alternative approaches to waste management; the focus is clearly upon landfills and incinerators. The guidelines establish incinerator stack emissions levels for a handful of pollutants (particulates, NO2, SO2, dioxin and furan separately). These levels are far higher than international norms (combined dioxin and furan levels of 2 ng/Nm3 instead of 0.1 ng/Nm3), and they are not sufficiently specific to be functional. For example, they do not indicate whether the levels apply to total dioxins and furans or to TEQ measurements; how often sampling should be taken; by what method, etc. Heavy metals, HCl, and other pollutants are not mentioned at all, nor are contaminants in residues.

Note on IFC Guidelines

The IFC uses both the ***Pollution Prevention and Abatement Handbook*** and a separate set of guidelines developed by the IFC. Unlike World Bank guidance notes, compliance with IFC guidelines is intended to be built into the contracts, so it is contractually binding.[64] Four of these guidelines specifically mention incineration.

- ***IFC Environmental, Health and Safety Guidelines for Polychlorinated Biphenyls (PCBs)[65]***

These guidelines are of special note because PCBs are listed as one of the 12 POPs regulated by the Stockholm Convention and because PCB incineration releases not only unburnt PCBs but also large quantities of dioxins and furans in the gaseous and solid byproducts. The Stockholm Convention indicates that stockpiles of POP wastes must be destroyed by technologies that do not produce or release POPs – clearly eliminating incineration. Nevertheless, the IFC guideline states that "High temperature incineration is the preferred method of destruction for PCB waste," in direct contradiction to the Convention. The guideline predates the Convention, but the negotiations and discussions were under way at the time the guideline was finalized, and were clearly not taken into account. Nor has the IFC updated the guideline since the Convention was signed.

- ***IFC Guidelines for Pesticide Handling and Application [66]***

This document states that "outdated pesticides should be returned to the manufacturer or supplier whenever possible" but also recommends incineration "under the direct supervision of technically qualified personnel."

- ***IFC Guidelines for Health Care Facilities [67]***

This document is specifically for hospitals and other health care facilities, one of the IFC's target sectors for increased lending. Although the document does emphasize the importance of waste minimization and proper segregation procedures, it also also explicitly endorses incinerators. The document sets air emissions standards for incinerators that are almost unbelievably lax – for example, 125 ng/Nm^3 of total dioxins and furans. The guidelines fail to mention alternative means of treating potentially infectious wastes.[68]

As far back as 1996, at least some WBG staff were aware of serious problems and limitations as reflected in a World Bank assessment of India's environmental programs. The assessment states that "…incinerators in public hospitals however, are poorly maintained, insufficiently filtered for particulates, do not enable revolving or turbulence, and usually operate at too low a temperature."[69] The report also calls for "…appropriate technology for sustainable environmental and health protection, rather than imported high-technology incinerators that are expensive to purchase and difficult to maintain."[70]

THE WORLD BANK'S "KEY READINGS" ON WASTE MANAGEMENT

In addition to the World Bank's role as a lender, it is also one of the most important purveyors of policy advice to Southern countries. To this end, it conducts extensive research and publishes a wide variety of documents. Even when these documents are not official Bank policy, they have significant influence in policy-making circles. In this context, therefore, it is important to review the World Bank's publications record on the question of incineration and the alternatives.

The Bank's website lists 30 Bank publications labelled "key readings" on the question of urban waste management.[71] Of these, two deal specifically with incineration; five treat various aspects of landfilling; and only two are dedicated to an alternative waste management strategy — composting. The Bank has published no guides dedicated to Extended Producer Responsibility, Clean Production, working with the informal resource recovery sector or any of the other approaches to a sustainable waste strategy.

These are some specific concerns about three of the "key readings" on waste management from the World Bank:

- ***"Municipal Solid Waste Incineration: Decision Maker's Guide"[72] and "Municipal Solid Waste Incineration: Requirements for a Successful Project"[73]***

This pair of documents indicates a strong endorsement of incineration. Indeed, the Director of the World Bank's Environment Department writes in the Forward to the latter report that it is part of the Bank's effort to give guidance on waste management techniques that are "basically financially self-supporting, socially and environmentally responsible."[74] The reports point out some of the economic and technical pitfalls of incineration and admit that, "capital and operating requirements for these plants are generally an order of magnitude greater than required for landfills."[75] Nevertheless, they are sanguine about the application of the technology under the right policy constraints. These are clearly enumerated and include public assumption of all financial risk, guaranteed incomes for the incineration plant, unfettered access to foreign currency, removal of the informal recycling industry, and effective "flow control" over waste to ensure that it is not disposed of in cheaper ways.[76] Rather than noting that these prerequisites may be impractical or objectionable, however, the papers simply note that they must be firmly in place before an incineration project is embarked upon.

The papers do not address alternatives to incineration other than landfilling. The authors acknowledge the existence of an informal recycling sector in most of the global South, but regard this as an obstacle to incineration rather than a a foundation for building a safe recycling system. When describing the waste hierarchy — the scheme that ranks waste management techniques in order of their environmental preference — they simply omit reduction, re-use and recycling. In fact, incineration is often listed at the bottom of the waste hierarchy or just above landfilling.[77] Although the report is careful to point out the hazardous nature of fly ash, it enthusiastically endorses the use of bottom ash for construction and roadbuilding purposes, neglecting to mention that bottom ash also contains large quantities of hazardous pollutants.

Far worse, however, is both papers' cavalier treatment of emissions issues. The technical report[78] baldly states that "waste incineration plants equipped

with a modern standard flue gas cleaning system create little air pollution or odor,"[79] going as far to suggest, at one point, that air emissions problems can be solved by simply building a high enough smokestack.[80] The report also completely neglects to mention the difficulties in measuring many of the pollutants of concern, such as dioxins. No mention is made of post-combustion formation of dioxins (the primary source of dioxins in incineration), despite the last 15 years of literature on the problem; and worse, none of the recommendations for pollution control equipment include the standard rapid quench equipment that is designed to minimize post-combustion formation. Instead, they endorse the use of electrostatic precipitators (ESP) in conjunction with hot exhaust gases — a practice that has been shown to dramatically increase dioxin formation.[81]

The technical paper on municipal waste incineration asserts that dioxins, mercury and NO_x can be fully removed from air emissions — contrary to current research in the field — but then goes on to imply that such a high level of air pollution control is probably an unnecessary expense.[82]

- ***World Bank Technical Paper Number 93, "The Safe Disposal of Hazardous Wastes: The Special Needs and Problems of Developing Countries" [83]***

This is the World Bank's most current guidance on hazardous waste treatment technologies, dating to 1989. Perhaps because of its age, this document is unabashedly pro-incineration. It incorrectly claims that "Incineration is an ultimate disposal process,"[84] ignoring the problem of residuals, which will ultimately require landfilling. It specifically recommends incineration for wastes containing "organically bound halogens, lead, mercury, cadmium, zinc, nitrogen, phosphorus or sulfur" — precisely the compounds of greatest concern in the incineration process.[85] The paper not only endorses all forms of incineration, including small incinerators with no flue gas treatment technology, but it specifically recommends incineration in cement and lime kilns, industrial boilers, open pits, and other furnaces not intended for waste incineration.[86] It even goes so far as to recommend incineration at sea (subsequently banned by the OSPAR convention[87]), stating that "gas cleaning is not necessary. Incineration at sea is therefore economically attractive for highly chlorinated materials."[88] This document is still available on the World Bank website, and is referenced in more recent World Bank Group papers.

THE WORLD BANK GROUP AND THE STOCKHOLM CONVENTION

There is growing global agreement that incineration is a hazardous and obsolete technology, which has found expression in a number of local and national laws and a few international treaties.[89] The London Convention, for example, banned incineration at sea in 1996 and the Bamako Convention defines incineration as incompatible with Clean Production. The Stockholm Convention on Persistent Organic Pollutants establishes a global goal of the eventual elimination of 12 POPs, including dioxins and furans, and identifies incineration as the predominant source of dioxins and furans.

Of the Convention's 12 initial POPs, eight are pesticides, two are useless byproducts (dioxins and furans) and two are produced both intentionally and unintentionally in industrial processes (PCBs and hexachlorobenzene). While it is relatively easy to ban the manufacture, sale or use of intentionally produced chemicals, the byproduct POPs are a more complex issue, because they result from so many different industrial processes. Therefore, the Convention calls for their "continuing minimization and, where feasible, ultimate elimination."

The World Bank Group's responsibility towards this growing body of international law is in dispute. The Bank argues that it is only obliged to respect international environmental treaties to the extent that they are obligations of the host country. In other words, if a country does not ratify a treaty, the WBG's projects in that country do not have to conform to the treaty. When a single project can have global ramifications, as in the case of POPs, however, this is clearly an unacceptable approach. In any case, there is little possibility of using formal legal mechanisms to force WBG compliance with international law. So at the moment, although the WBG's activities should clearly conform to the Stockholm Convention, there is no enforcement mechanism for ensuring that they do so.[90]

Nevertheless, the World Bank Group has dedicated itself to the mission of "sustainable development," which it defines as "ensuring that actions taken today to promote development and reduce poverty do not result in environmental degradation or social exclusion tomorrow."[91] In 2001, the World Bank Group's Board formally adopted an Environmental Strategy for the entire institution, which includes, among other goals, "reducing people's exposure to indoor and urban air pollution, waterborne diseases, and toxic chemicals."[92] According to the World Bank Group's website on POPs, the World Bank Group established a POPs Unit in 2001 whose stated goal is "to improve various operational policies by integrating POPs issues."[93] The WBG, therefore, can reasonably be expected to go beyond minimal compliance with international environmental treaties such as the Stockholm Convention, and — at the very least — actively look for ways to reduce the negative environmental impacts of its own projects and policy advice. Yet by continuing to fund projects with incineration, the WBG is failing to bring itself into compliance with the byproducts provisions of the Stockholm Convention.

The WBG does have policies that prevent it from lending to projects that use the pesticides listed as POPs under Stockholm.[94] On PCBs, the Bank (IBRD and IDA) and its sister institutions have divergent policies. The IFC categorically states that it will not fund projects that produce or trade in PCBs. The Bank, however, only discusses PCBs in its (non-binding) General Environmental Guidelines, saying that they "should not" be used.[95] But on the question of byproduct POPs, Bank policy is almost entirely silent.

This is not to say that the WBG has simply been ignoring the Stockholm Convention. Bank staff have been present at the negotiating sessions leading up to the treaty and have met with members of the International POPs Elimination Network. The Bank

recognizes that the Convention opens up the possibility of tackling the very serious problems of hazardous waste stockpiles around the world. Many of these wastes – including much of the estimated 50,000 tons of obsolete pesticide stockpiles abandoned in Africa by multinational pesticide companies – are POPs.[96] Few are stored under anything resembling secure storage conditions. Many are in leaking barrels, exposed to weather, and sited close to water sources, agricultural lands or fishing areas. Several organizations, such as Pesticide Action Network and the Food and Agriculture Organization, have been pushing for many years to have these stockpiles removed and the sites remediated.

The clean-up of existing POPs stockpiles and transitions away from current POPs-producing technologies are important activities and the WBG, like other agencies, is eager to work on these issues and access the new funds that the Stockholm Convention is making available. While continuing to fund technologies such as incineration, the World Bank Group may find itself in the ironic situation of simultaneously financing POPs remediations and the production of byproduct POPs.

Recommendations to the World Bank

- Institute an Operational Policy that will prohibit projects that include waste incineration.

- Stop disseminating publications that endorse incineration, or amend them to remove endorsements of incineration. These include, at a minimum, "Municipal Solid Waste Incineration: Decision Maker's Guide," "Municipal Solid Waste Incineration: Requirements for a Successful Project," "The Safe Disposal of Hazardous Wastes: The Special Needs and Problems of Developing Countries," and "Health Care Waste Management Guidance Note."

- Institute an Operational Policy that prohibits all projects not compliant with the Stockholm Convention regardless of the Convention's legal status within the host country.[97]

Additional recommendations to the World Bank Group regarding toxics

- Institute an Operational Policy that will prohibit projects that employ, produce or release Persistent Toxic Substances (PTSs).

- Institute a Bank Procedure that uses the Precautionary Principle[98] to evaluate all projects and avoid funding projects that, in the case of scientific uncertainty, may cause harm to human health or the environment.

- Institute a Bank Procedure that requires industrial projects to implement Clean Production, which prioritizes the minimization of hazards and waste rather than waste disposal.

Recommendations to Borrowing Country

- Be informed of the content of World Bank Group proposals for projects in your country, especially those involving waste streams, and refuse projects that include incineration.

Recommendations to World Bank Member Countries

- Direct your country's Executive Director to vote against projects promoting incineration.

Recommendations to Civil Society around the World

- Work with your governments to urge them to stop projects promoting incineration in your own country and in other countries.

Resources

RESOURCES ON ALTERNATIVES TO INCINERATION

Healthcare Wastes

Eleven Recommendations for Improving Health Care Waste Management, McRae, G., CGH Environmental Strategies, December 1997 (revised May 2000).

Hospital Waste: Time to Act; Srishti's Factsheets on 8 Priority Areas, Srishti, New Delhi, India, 2000.

Managing Hospital Waste: A Guide for Health Care Facilities (Revised Edition), Kela, M. et al., Srishti, New Delhi, India, 2000.

Medical Waste Treatment Technologies: Evaluating Non-Incineration Alternatives: A Tool for Health Care Staff and Concerned Community Members, Health Care Without Harm, 2000.

Non-Incineration Medical Waste Treatment Technologies: A Resource for Hospital Administrators, Facility Managers, Health Care Professionals, Environmental Advocates, and Community Members, Health Care Without Harm, August 2001.

Update on Pyrolysis: a Non-traditional Thermal Treatment Technology, Health Care Without Harm, 2002.

Municipal Discards

Creating Wealth from Waste, Murray, R., Demos, London, 1999.

Ecological Waste Management Manual, Mother Earth Unlimited, Quezon City, Philippines, 2002.

Resources up in Flames: The Economic Pitfalls of Incineration versus a Zero Waste Approach in the Global South, Platt, B., Global Alliance for Incinerator Alternatives, 2002.

Hazardous Waste Treatment

Learning Not to Burn: A Primer for Citizens on Alternatives to Burning Hazardous Waste, Crowe, E. and Schade, M., 2002.

Technical Criteria for the Destruction of Stockpiled Persistent Organic Pollutants, Costner, P. et al, Greenpeace International Science Unit, October 1998.

Clean Production (including prevention of industrial wastes)

Citizen's Guide to Clean Production, Thorpe, B., Clean Production Network, August 1999.

Clean Production Resource List, ANPED: http://www.anped.org/PDF/11spaccleanprsclist.pdf

Materials Matter, Geiser, K., Boston: MIT Press, 2001.

Wingspread Statement on the Precautionary Principle, published in Rachel's Environment & Health Weekly #586, February 19, 1998.

Resources

RESOURCE ORGANIZATIONS ON INCINERATION AND ALTERNATIVES

GAIA (Global Anti-Incinerator Alliance / Global Alliance for Incinerator Alternatives) Secretariat
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info@no-burn.org, www.no-burn.org

Basel Action Network Secretariat
c/o Asia Pacific Environmental Exchange
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Seattle, Washington 98101, USA
Tel: +1-206-652-5555, Fax: +1-206-652-5750
info@ban.org, www.ban.org

Chemical Weapons Working Group
Kentucky Environmental Foundation
P.O. Box 467, Berea, KY 40403, USA
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kefcwwg@cwwg.org, www.cwwg.org

Earthlife Africa
PO Box 11383, Johannesburg 2000,
South Africa
Tel. +27-11-951-4803, Fax. +27-11-955-3940
www.earthlife.org.za

Essential Action
PO Box 19405, Washington, DC 20036 USA
Tel. +1-202-387-8030, Fax: +1-202-234-5176
www.EssentialAction.org

Grassroots Recycling Network
P.O. Box 49283, Athens, GA 30604-9283, USA
Tel: +1-706-613-7121, Fax: +1-706-613-7123
zerowaste@grrn.org, www.grrn.org

Health Care Without Harm
1755 S Street, NW Suite 6B, Washington DC 20009, USA
Tel: +1-202-234-0091, Fax: +1-202-234-9121
info@hcwh.org, www.noharm.org

Institute for Local Self-Reliance
2425 18th Street, NW, Washington, DC 20009-2096, USA
Tel: +1-202-232-4108, Fax: +1-202-332-0463
ilsr@ilsr.org, www.ilsr.org

International POPs Elimination Network
517-401 College St, Toronto, Ontario M6G 4A2
Canada
mcarter@ipen.org, www.ipen.org

Lowell Center for Sustainable Production
Kitson Hall, Room 200, One University Avenue,
Lowell, MA 01854, USA
Tel: +1-978-934-2980, Fax: +1-978-452-5711
LCSP@uml.edu, www.uml.edu/centers/LCSP

Mother Earth Unlimited
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Telefax: +632-925-3829
motherearth@surfshop.net.ph

National Cleaner Production Centers Programme
United Nations Industrial Development Organization (UNIDO)
PO Box 300, A-1400 Vienna, Austria
Tel: +43-1-26026 5079, Fax: +43-1-21346 6819
ncpc@unido.org, www.unido.org/doc/331390.htmls

Srishti
H-2 Jungpura Extension, New Delhi-14, India
Telephone: +91-11-432-1747, 8006, 0711
srishtidel@vsnl.net

Sustainable Hospitals Project
Kitson 200, One University Avenue, Lowell, MA 01854, USA
Tel: +1-978-934-3386
shp@uml.edu, www.sustainablehospitals.org

Thanal Conservation Action and Information Network
Zero Waste Kovalam Organizers
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thanal@vsnl.com

Toxics Use Reduction Institute
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librarian@turi.org, www.turi.org

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office@waste.nl, www.waste.nl

Zero Waste New Zealand Trust
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New Zealand
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mailbox@zerowaste.co.nz,www.zerowaste.co.nz

United Nations Environment Programme
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Geneva, Switzerland
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RESOURCE ORGANIZATIONS ON THE WORLD BANK GROUP

50 Years Is Enough Network
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50years@50years.org, www.50years.org

Bank Information Center
733 15th Street NW, Suite 1126, Washington, D.C.
20005, USA
Tel: +1-202-737-7752, Fax: +1-202-737-1155
info@bicusa.org, www.bicusa.org

Focus on the Global South
c/o CUSRI, Wisit Prachuabmoh Building,
Chulalongkorn University, Bangkok -10330
Thailand
Ph:+66-2-2187363-65; Fax: +66-2-2559976
admin@focusweb.org, http://www.focusweb.org/

Jubilee South
jubileesouth@skyinet.net, www.jubileesouth.org

International Finance Corporation
2121 Pennsylvania Avenue, NW, Washington, DC
20433, USA
Tel.: +1-202-473-1000
www.ifc.org

Multinationals Resource Center
Information Resources for People in the Global South
PO Box 19405, Washington, DC 20036 USA
Tel. +1-202-387-8030, Fax: +1-202-234-5176
mrc@essential.org, www.essential.org/mrc

Pesticide Action Network North America (PANNA)
World Bank Project, 49 Powell St., Suite 500, San
Francisco, CA 94102, USA
Tel: +1-415-981-1771, Fax: +1-415-981-1991
Mie@panna.org, www.panna.org

Third World Network
228 Macalister Road, 10400 Penang, Malaysia
Telephone: +60-4-2266728, Fax: 60-4-2264505
twnet@po.jaring.my, www.twnside.org.sg

World Bank Group
1818 H Street, N.W., Washington, DC 20433 USA
Tel: +1-202-473-1000, Fax: +1-202-477-6391
www.worldbank.org

World Bank Bonds Boycott
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733 15th St., NW, Suite 928, Washington, DC
20005
Tel: +1-202-393-6665, Fax: +1-202-393-1358

Terms used in this Report

Biomagnification: the process in which a pollutant builds up in the body over an individual's lifetime.

Bottom ash: the residue from an incinerator that falls through the grate mechanism at the bottom of the furnace.

CAO: Compliance Advisor Ombudsman, an office of the IFC and MIGA charged with ensuring the institutions' compliance with policies, especially regarding the environment.

Clean Production: an approach to designing products and manufacturing processes that takes a life cycle view of all material flows, from extraction of the raw material to product manufacture and the ultimate fate of the product at the end of its life. It aims to eliminate toxic wastes and inputs and promote the judicious use of renewable energy and materials.

Dioxins: as used in this report, polychlorinated dibenzo dioxins (PCDD), polychlorinated dibenzo furans (PCDF) and coplanar polychlorinated biphenyls (PCBs). These are all aromatic chemical compounds formed during the incineration process. Dioxins belong to the class of chemicals known as persistent organic pollutants (POPs).

Discards: materials of no immediate use to their present owner, to be differentiated from waste, which are materials of no possible use to anyone.

Extended Producer Responsibility (EPR): a policy approach that makes firms responsible for their products and packaging in the post-consumer phase, providing an incentive to design products for end-of-life recycling.

Flow control: legal measures adopted by certain jurisdictions to ensure that all municipal discards from that jurisdiction go to a particular waste treatment facility rather than finding the cheapest option available on the market.

Fly ash: the ash recovered from an incinerator's air pollution control equipment. Cf. bottom ash.

IBRD (International Bank for Reconstruction and Development): The largest and central institution of the World Bank.

ICSID (International Center for the Settlement of Investment Disputes): An arm of the World Bank Group which provides for dispute settlement on international investment issues.

IDA (International Development Association): Part of the World Bank, it offers subsidized loans to the poorest countries.

IFC (International Finance Corporation): Part of the World Bank Group, it invests in private sector ventures.

MIGA (Multilateral Investment Guarantee Agency): Part of the World Bank Group, it provides political risk insurance to businesses investing in Southern countries.

Municipal Discards: also known as municipal waste; see discards.

NGO (non-governmental organization): an organization, usually working in the public interest, not affiliated with a government or business.

North/Northern: as used in this report, Northern refers to those countries with relatively high per capita (average) incomes and large industrial bases, roughly corresponding to the 30 member countries of the Organization for Economic Cooperation and Development. It is not a strictly geographic term. Cf. Southern.

PBTs (persistent, bioaccumulative toxics): a class of chemicals whose members are persistent in the environment; bioaccumulate in living creatures; and are toxic to life.

PCBs (polychlorinated biphenyls): a class of chemicals composed of two benzene rings linked by a single carbon-carbon bond, with one or more chlorine atoms in place of hydrogen. Often, coplanar PCBs (those with the two benzene rings in the same plane) are included in the set of dioxin-like compounds for their similar structure, origin, and effects.pipeline:

POPs (Persistent Organic Pollutants): synthetic chemicals which display the following properties: they are organic (composed of hydrocarbons); persist long times in the environment; are capable of long-distance transport; and are toxic to humans. Subject to regulation by the Stockholm Convention.

PTS (Persistent Toxic Substance): a substance which is persistent in the environment and toxic to humans.

PVC (polyvinyl chloride): a common form of plastic, often referred to as vinyl, with chlorine as a major component.

Quench: a pollution control device in an incinerator which sprays water into the exhaust gases shortly after they leave the furnace chamber. The object is to quickly reduce the gases' temperature under 200°C, the minimum temperature for dioxin formation.

Releases: all byproducts from a process (e.g. incineration) including emissions (to air), effluent (to water bodies) and solids (to land).

South/Southern: as used in this report, Southern refers to most of the countries of Africa, Asia, Latin America and island nations; also referred to as Third World, developing, or less-industrialized countries. It is not a strictly geographic term. Cf. Northern.

Stockholm Convention: The Stockholm Convention on Persistent Organic Pollutants. An international treaty which bans or regulates production and emissions of a class of synthetic chemicals.

US EPA (United States Environmental Protection Agency): an agency of the United States government.

WB (World Bank): this term commonly refers to two organizations, the IBRD and the IDA.

WBG (World Bank Group): this term refers to all organizations within the World Bank Group: the IBRD, IDA, IFC, MIGA, and ICSID.

Endnotes

1. Allsopp, Michelle; Costner, Pat; Johnston, Paul, "Incineration And Human Health -State of Knowledge of the Impacts of Waste Incinerators on Human Health," Greenpeace Research Laboratories, University of Exeter, UK, March 2001.
2. DeVito, M.J., Birnbaum, L.S. et al, "Comparisons of Estimated Human Body Burdens of Dioxinlike Chemical and TCDD Body Burdens in Experimentally Exposed Animals", *Environmental Health Perspectives*, Vol. 103, No. 9, pp. 820-831, Sept. 1995.
3. UNEP Chemicals, *Dioxin and Furan Inventories: National and Regional Emissions of PCDD/PCDF*, Geneva, Switzerland, May 1999.
4. The Stockholm Convention on Persistent Organic Pollutants (POPs) can be found online at www.chem.unep.ch/sc/
5. These pollutants include chlorinated benzenes, polychlorinated naphthalenes (PCNs), halogenated phenols, brominated and mixed halogenated dioxins, iodinated dioxins, polychlorinated dibenzothiophenes and many aza-heterocyclic compounds.
6. De Fre And Wevers, "Underestimation Of Dioxin Inventories," *Organohalogen Compounds*, Vol. 36, pp. 17-20, 1998.
7. Chang, M. and Lin, J., "Memory effect on the dioxin emissions from municipal waste incinerator in Taiwan," *Chemosphere*, Vol. 45, pp. 1151-1157, 2001.
8. A number of studies showing this are referenced in: Allsopp, Michelle; Costner, Pat; Johnston, Paul, "Incineration And Human Health -State of Knowledge of the Impacts of Waste Incinerators on Human Health," Greenpeace Research Laboratories, University of Exeter, UK, March 2001, p. 52; available online at www.greenpeace.org
9. Pirrone, Nicola et al., "Regional Differences in Worldwide Emissions of Mercury to the Atmosphere," *Atmospheric Environment,* Vol. 30, No. 17, pp. 2981-2987, 1996.
10. National Academy Of Sciences, *Toxicological Effects Of Methylmercury,* 2000 and U.S. Agency for Toxic Substances and Disease Registry, *Toxic FAQs: Mercury,* April 1999.
11. Centers for Disease Control and Prevention, "Blood and Hair Mercury Levels in Young Children and Women of Childbearing Age --- United States, 1999," *Morbidity and Mortality Weekly Report*, Vol. 50, No. 8, pp. 140-3, March 2, 2001.
12. Schmid, J.; Elser, A.; Strobel, R.; Crowe, M., *Dangerous Substances in Waste,* Copenhagen: European Environment Agency, 2000.
13. U.S. Environmental Protection Agency, Background Document for The Development of PIC Regulations From Hazardous Waste Incinerators, Draft Final Report, Office of Solid Waste, Washington D.C., October 1989.
14. Eberg, Jan, *Waste Policy And Learning : Policy Dynamics Of Waste Management And Waste Incineration in the Netherlands and Bavaria*, Delft, The Netherlands: Uitgeverij Eburon, 1997.
15. Greenpeace U.K., *Criminal Damage: A review of the performance of municipal waste incinerators in the UK*, 2001a.
16. Work On Waste, *Waste Not,* issue 302, September 1994.
17. See forthcoming report: "Incineration: A Dying Technology," Essential Action, 2002.
18. Coad, Adrian, "Managing Medical Waste in Developing Countries. A report of a Consultation on Medical Waste Management in Developing Countries," World Health Organization, September 1992, published and released by the World Health Organization in 1994.
19. Kamel, Laila Iskandar, "Cairo: A City that Learns from the Mokattam Recyclers," Community and Institutional Development (C.I.D.), The Social Research Center, The American University in Cairo, Egypt, March 1999.
20. For more on this concept, which is known as Zero Waste, see the GrassRoots Recycling Network (www.grrn.org) and Zero Waste Trust New Zealand (www.zerowaste.co.nz)
21. Morris, Jeffrey and Canloneri, Diana, *Recycling Versus Incineration: An Energy Conservation Analysis*, Sound Resource Management Group (SRMG) Seattle, Washington, September, 1992. (This report has been summarized in the Sound Resource Management's publication, The Monthly UnEconomist, Vol. 2, No. 2-4, February, March and April 2000)
22. See forthcoming report: Platt, Brenda, "Resources Up In Flames: The Economic Pitfalls of Incineration versus a Zero Waste Approach in the Global South," Institute for Local Self Reliance, 2002.
23. The term "resource recoverer" is used to refer to those individuals who recover discarded items and return them to use or manufacturing, as it does not have the derogative character of "ragpicker," "scavenger" or other terms in more common use.
24. For more on EPR, see INFORM (www.informinc.org/eprgate.htm)
25. UNIDO and UNEP website about National Cleaner Production Centres (NCPCs) is at: http://www.uneptie.org/pc/cp/ncpc/home.htm
26. Stockholm Convention on Persistent Organic Pollutants (POPs), page 7. Found at www.chem.unep.ch/sc/
27. For more on these technologies, see: Crowe, Elizabeth and Schade, Mike, *Learning Not to Burn: A primer for citizens on alternatives to burning hazardous waste,"* Chemical Weapons Working Group and Citizens' Environmental Coalition, June 2002.
28. Asian Development Bank, "Partnerships for Better Municipal Management," Vol. 4 in the series "Asian Cities in the 21st Century: Contemporary Approaches to Municipal Management," 2000, Page 28.

29. See, for example, figures on non-functioning or poorly-functioning incinerators in: World Health Organization, "Managing Medical Waste in Developing Countries," edited by Dr. Adrian Coad, 1994.
30. As witnessed by the author.
31. *Times of India*, "Govt told to fix blame for failure of garbage plant," April 11, 2001; and personal communication with Ravi Agarwal.
32. Fiscal Year 2001 figure from World Bank website.
33. The other agency is the Japan Bank for International Cooperation.
34. Walsh, Edward; Warland, Rex; Smith, Clayton, *Don't Burn It Here: Grassroots Challenges to Trash Incinerators*, Pennsylvania State University Press, 1997.
35. Even the World Bank Group's President James Wolfensohn has supported the U.S. anti-incinerator movement. In September 1999, the *New York Times* reported that Mr. Wolfensohn had made a personal contribution of US$50,000 to an effort to prevent the construction of a mixed hazardous waste (for nuclear and other toxic waste) incinerator near his vacation home in the U.S. state of Wyoming. "2 Groups Fight Nuclear Incinerator Project Near Yellowstone," *New York Times*, page A12, Sept. 17, 1999.
36. A 1997 report entitled "Assessment of Investments in Solid Waste Management: Strategies for Urban Environmental Improvement" by P. Gopalan and C. Bartone is listed on the World Bank website, but has not been made public.
37. World Bank, "India-State Health Systems Development Project III," November 5, 1997.
38. Global Response is a non-profit organization based in the U.S., which organizes letter-writing campaigns on issues of environmental protection. See www.globalresponse.org
39. Personal communication to Ann Leonard, Multinationals Resource Center.
40. "The World Bank's Dangerous Medicine: Promoting Medical Waste Incineration in Third World Countries," Multinationals Resource Center and Health Care Without Harm, June 1999. Available at www.noharm.org
41. The inventory includes one older project, the Singapore Environmental Control Project of 1975. This project stands out for its sheer magnitude: the project financed the construction of a 1200 ton per day municipal waste incinerator.
42. The exception is the Singapore Environmental Control Project, included because of its size.
43. A thirteenth tourism-related project is classified as "multiple waste streams" because it incinerates both ordinary municipal trash and health care waste resulting from a tourism development.
44. Ishii-Eiteman, Marcia and Hamburger, Jessica, "Taking the World Bank to Task: A Case Study of Successful Community-Based Monitoring in Indonesia," *Global Pesticide Campaigner,* Volume 11, Number 1, April 2001.
45. Explanation of the waste stream categories:

    Healthcare waste: waste from healthcare institutions such as hospitals and clinics

    Tourism waste: general (municipal) waste primarily associated with the tourism industry

    Pesticides: obsolete pesticides or wastes noted to contain pesticide residues (such as containers)

    Mixed waste: multiple distinct waste streams

    Municipal waste: general, municipal solid waste

    Organics e.g. cotton, tea: primarily food and natural textile byproducts

    Animal wastes: primarily carcasses and wastes from slaughterhouses

    Pharmaceuticals: wastes from pharmaceutical production (not end use)

    Wood, paper, cardboard, etc.: discarded wood products

    Organochlorines: waste streams that are identified as containing large quantities of chlorinated compounds.

    Other industrial wastes: variety of waste streams that do not fit into the above categories.

    Unspecified: nature of the waste stream is unclear from the documentation.
46. World Bank, "Russia-Ozone-Depleting Substance Consumption Phase-Out Project," Project number P049968, December 31, 1999.
47. Letter from Luis Ernesto Derbez, Division Chief, Country Operations, Industry and Finance Division, Country Department II, South Asia Region, to Erik Jansson, dated October 2, 1996.
48. World Bank, "Russia-Ozone-Depleting Substance Consumption Phase-Out Project," Project number P049968, December 31, 1999.
49. India Duncan-Gleneagles Hospital, IFC project number 008165, 1997; Sri Lanka National HIV/AIDS Prevention Project, World Bank project number P074730, 2001.
50. IFC, "AEF/BOTSWANA: Abercrombie & Kent," Project number 009608, May 13, 1999.
51. World Bank, "Comoros-Health Project," Project number KMPE52887, January 15, 1997.
52. The Bamako Convention specifically defines incinerator residues and pyrolysis wastes as hazardous wastes. The Basel Convention defines pyrolysis wastes as hazardous and incinerator residues as "Wastes Requiring Special Consideration" but also gives a long list of constituents, most of which are typically found in incinerator residues, and defines any

waste containing one or more of those constituents to be hazardous waste. The European Union explicitly classifies fly ash and bottom ash as hazardous wastes (Council Regulation (EEC)No 259/93 of 1 February 1993 on the supervision and control of shipments of waste within, into and out of the European Community (OJ L 30, 6.2.1993, p. 1).

53. IFC, "Philippines – Asian Hospital project," Project number 009503, June 21, 1999. Fortunately, the Philippines has outlawed incineration, so this recommendation is unlikely to be put into practice.
54. U.S. Agency For International Development, "List Of Upcoming Multilateral Development Bank (MDB) Projects With Possible Environmental Concerns," June 1998, p. 19.
55. Brazil-Hospital Samaritano, IFC project number 009750; India-State Health Systems Development Project III, INPA10496; India-State Health Systems Development Project IV, World Bank project number INPA50651; and Russia-Ozone-Depleting Substance Consumption Phase-Out Project, project number P049968.
56. Personal communication, Dr. Don Foster, 30 July 2002.
57. World Bank, Operational Policy 4.09, December 1998. Available at www.worldbank.org
58. The European Union, Japan, South Korea, Taiwan and several other countries have adopted an emissions limit of 0.1 TEQ ng/Nm^3 of dioxins and furans from incinerators. U.S. limits are more complicated and measured differently.
59. World Bank, "Health Care Waste Management Guidance Note," May 2000, p. 48. Available on the World Bank website: www.worldbank.org
60. World Bank, "Health Care Waste Management Guidance Note," May 2000, p. 4.
61. Some of the studies showing that dioxin formation occurs after emissions leave the combustion chamber are: Taylor, P., and Lenoir, D., "Chloroaromatic formation in incineration processes," *The Science of the Total Environment*, Vol. 269, pp.1-24, 2001; Lemieux, P. et al., "Bench-scale studies on the simultaneous formation of PCBs and PCDD/Fs from combustion systems," *Waste Management,* Vol. 21, pp. 419-425, 2001; Blumenstock, M. et al, "Influence of combustion conditions on the PCDD/F-, PCB-, PCBz- and PAH-concentrations in the post-combustion chamber of a waste incineration pilot plant," *Chemosphere*, Vol. 40, pp. 987-993, 2000; U.S. Environmental Protection Agency, *Exposure and Human Health Reassessment of 2,3,7,8- Tetrachlorodibenzo-p-Dioxin (TCDD) and Related Compounds,* Part I: Estimating Exposure to Dioxin Like Compounds, Volume 2: Sources of Dioxin Like Compounds in the United States, Draft Final Report EPA/600/P-00/001Bb, (http://www.epa.gov/ncea) September 2000c; U.S. Department of Energy, National Energy Technology Laboratory (NETL), *A Comparison of Gasification and Incineration of Hazardous Wastes,* DCN 99.803931.02, by Radian International LLC, March 30, 2000b; U.S. Environmental Protection Agency, *Greenhouse Gas Emissions From Management of Selected Materials in Municipal Solid Waste*, EPA530-R-98-013, p. ES-15, September 1998a.
62. Ibid p.48.
63. Critiques of the Draft Guidance Note are available at: www.EssentialAction.org/waste
64. Personal communication, Rosa Orellana and Josefina Doumbia, IFC.
65. International Finance Corporation, "Environmental, Health and Safety Guidelines for Polychlorinated Biphenyls (PCBs)," July 1, 1998, p. 2.
66. International Finance Corporation, "Environmental, Health and Safety Guidelines for Pesticide Handling and Application," July 1, 1998, p. 2.
67. These comments are based on the draft of the revised IFC Health Care Facilities guidelines, dated January 2002. As of press time, this guideline had not been finalized.
68. To see the draft Health Care Facilities guidelines and a complete set of suggestions, visit www.EssentialAction.org/waste
69. World Bank, *India's Environment: Taking Stock of Plans, Programs and Priorities. An Assessment of the Environment Action Program – India,* South Asia Regional Office, January 1996, p. 212. These conclusions are in agreement with studies carried out by WHO and CGH Consulting.
70. World Bank, *India's Environment: Taking Stock of Plans, Programs and Priorities. An Assessment of the Environment Action Program – India,* South Asia Regional Office, January 1996, p. 215.
71. A list of these readings can be found at: http://wbln0018.worldbank.org/External/Urban/UrbanDev.nsf/Urban+Waste+Management/E34DBAD86F2C669B8525690400621D5B?OpenDocument
72. Rand, T., J. Haukohl, U. Marxen. "Municipal Solid Waste Incineration: Decision Maker's Guide," World Bank, Washington, DC, June 1999. Available at: www.worldbank.org
73. Rand, T., J. Haukohl, U. Marxen. "Municipal Solid Waste Incineration: Requirements for a Successful Project," World Bank Technical Paper No. 462. World Bank, Washington, DC, June 1999. Available at: www.worldbank.org
74. Georgieva, Kristalina, Forward to "Municipal Solid Waste Incineration: Requirements for a Successful Project", World Bank Technical Paper No. 462 by T. Rand, J. Haukohl, U. Marxen, 2000.
75. Ibid.
76. Rand, T., J. Haukohl, U. Marxen. "Municipal Solid Waste Incineration: Decision Maker's Guide," World Bank, Washington, DC, June 1999, p.4
77. U.S. Environmental Protection Agency, "Basic Facts: Municipal Solid Waste (MSW)," (no date on document), available at: http://www.epa.gov/epaoswer/non-hw/muncpl/facts.htm
78. Rand, T., J. Haukohl, U. Marxen. "Municipal Solid Waste Incineration: Requirements for a Successful Project," World Bank Technical Paper No. 462. World Bank, Washington, DC, June 1999.

79. Ibid, P.50.
80. Ibid, P.67.
81. U.S. Environmental Protection Agency**,** "Municipal Waste Combustors — Background Information for Proposed Standards: Post Combustion Technology Performance," EPA-450/3-89-27c, August 1989.
82. Rand, T., J. Haukohl, U. Marxen. "Municipal Solid Waste Incineration: Requirements for a Successful Project," World Bank Technical Paper No. 462. World Bank, Washington, DC, June 1999, P. 67.
83. Batstone, R., Smith, J. and Wilson, D. "The Safe Disposal of Hazardous Wastes: The Special Needs and Problems of Developing Countries," World Bank Technical Paper Number 93, World Bank, Washington, DC, 1989.
84. Ibid. p.653
85. Ibid. p.654
86. Ibid. p.654
87. The OSPAR Convention of 1992 seeks to safeguard human health and to conserve marine ecosystems, and bans dumping at sea and other sources of pollution.
88. Ibid. p.720
89. For a complete list, see the forthcoming GAIA report, *Dying Technology*.
90. Personal communication, Steve Herz, Friends of the Earth, July 2002.
91. Front page of the World Bank Group website accessed August 2002. See: www.worldbank.org
92. World Bank, "Environment Strategy at a Glance," undated (observed on website in August 2002).
93. World Bank Group POPs website, viewed Sept 2002, http://lnweb18.worldbank.org/ESSD/essdext.nsf/50ByDocName/AboutUs
94. The WBG is bound by Operational Policy 4.09, which says that pesticides employed in Bank-financed projects must "have negligible adverse human health effects..[and] must have minimal effect on nontarget species and the natural environment." The IFC further claims that it will not finance "Production or trade in pesticides/herbicides subject to international phase outs or bans." Although these provisions are distinct from each other, both clearly rule out any use of POP pesticides regulated under the Stockholm Convention.
95. World Bank, *Pollution Prevention and Abatement Handbook 1998: Toward Cleaner Production,* 1998, p. 439.
96. Davis, Mark, "Picking up the poison bill," *Pesticides News*, No. 52, June 2001 pp.3-5.
97. The WBG often argues that compliance with international treaties is the responsibility of the host country and that WBG projects are bound by the same laws as any other project in that country. As such, it is not bound by international treaties which have not yet entered into force or which the host country has not ratified. This argument is not accepted by the United Nations, which argues that the WBG must comply with all U.N. treaties in its project lending.
98. The Precautionary Principle states that, where evidence exists that an activity may cause harm, the activity shall not be permitted simply because full scientific proof of its harm is lacking. Where potential harm exists, the burden of proof lies with the proponent of the activity to show that it will not cause harm, rather than with those affected, as is often currently the case.