

DELHI'S OBSESSION WITH "WASTE-TO-ENERGY" INCINERATORS:

The Timarpur-Okhla Waste to Energy Venture

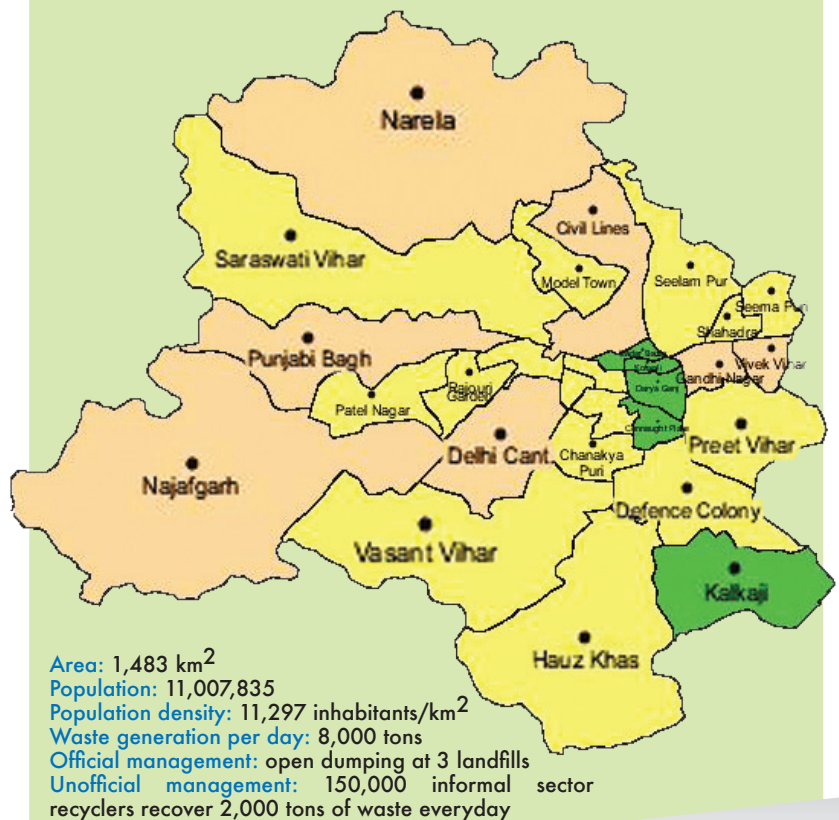
by Dharmesh Shah



The state of Delhi is the largest producer of solid waste in India; nearly 8,000 metric tons of solid waste are produced every day.² Over 78% of this waste is dumped in one of three garbage dumps in the city outskirts. As Delhi continues to grow, its appetite for landfill sites remains insatiable. Over 14 landfill sites have already been used up, and the three disposal sites currently in use have already far exceeded their capacity.

Still, they continue to receive waste. Three municipal bodies—the Municipal Corporation of Delhi (MCD), the New Delhi Municipal Council (NDMC) and the Delhi Cantonment Board (DCB)—are responsible for solid waste management in New Delhi. Of the three, the MCD covers almost 95% of the total area of New Delhi. Addressing the issue of waste has become a priority for all Urban Local Bodies (ULBs) in New Delhi. Several private companies have been roped in to manage waste through various technology-intensive methods.

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Photo Credit: Rajiv Bhatt, The Hindu, January 2010

This case study explores the political, socio-economic, and environmental implications of the proposed TIMARPUR-OKHLA Waste Management Pvt. Ltd's integrated waste-to-energy (WTE) project at Delhi¹. Being promoted as a milestone, the project is the first of its kind in a series of projects across the country and is predicted to revolutionize waste management in India. But serious questions remain about its feasibility and desirability.

Challenges with Business as Usual

An estimated 100 sq. km of landfill space would be required to meet the city's waste disposal needs through 2050 if the ULBs were to carry on with business as usual. This is impossible in a densely populated city like Delhi. Apart from posing serious public health hazards, garbage dumps in major cities across India, including Delhi, are in violation of the Municipal Solid Waste Rules 2000. These rules mandate waste segregation at the source with the aim to gradually eliminate open dumping.

Implementation of these rules has been poor due to lack of monitoring and awareness among citizens. In order to overcome this, the Delhi government has adopted a policy which is a combination of Waste to Energy (WTE) and landfill projects. Two new sites have been earmarked on the outskirts of Delhi—105 acres in Bawana to the northwest and 26 acres in Jaitpur in the south—to accommodate the excess waste. These new landfill spaces are required in addition to two proposed WTE plants in Ghazipur and Bawana, along with the landfills which are already operational.

The 1987 Timarpur Incinerator Experience

In 1987, the Ministry of Non-Conventional Energy Sources (MNES)³ commissioned the Timarpur Refuse Incineration-cum-Power Generation Station at a capital cost of Rs. 20 crores (US\$ 4.4 million). Built by Volund Miljoteknik Ltd. of Denmark, the plant was designed to incinerate 300 tons of municipal solid waste (MSW) per day to generate 3.75 MW of electricity.⁴

The plant ran for 21 days of trial operations before shutting down due to the poor quality of incoming waste. It required waste with a net calorific value of at least 1462.5 kcal/kg, but the calorific value of the supplied waste was in the range of 600-700 kcal/kg. Plant operators tried to supplement the combustion with diesel fuel, but were unsuccessful.

Following this failure, the Delhi High Court ordered an enquiry by the Comptroller Auditor General (CAG). In its findings, submitted in its annual report dated March 1990, the CAG observed that "The Refuse Incinerator-cum-Power Generation Plant installed by Ministry of Non-Conventional Energy Sources in March 1985 remained inoperative since its installation. The Ministry failed to utilise or dispose off the inoperative plant and incurred an expenditure of Rs 1.25 crore (US\$ 278,000) on maintenance and insurance of the plant." The project was officially scrapped in July 1990.⁵

In the "White Paper on Pollution in Delhi with an Action Plan," the Union Ministry of Environment and Forests (MoEF) stated that, "The experience of the incineration plant at Timarpur,

Delhi and the briquette plant at Bombay support the fact that thermal treatment of municipal solid waste is not feasible, in situations where the waste has a low calorific value. A critical analysis of biological treatment as an option was undertaken for processing of municipal solid waste in Delhi and it has been recommended that composting will be a viable option. Considering the large quantities of waste requiring to be processed, a mechanical composting plant will be needed." These observations echo the views of several sustainability and zero waste experts who strongly oppose any thermal destruction of waste and emphasize segregation at source in order to efficiently manage the organics.

Timarpur-Okhla Integrated Waste Management Company

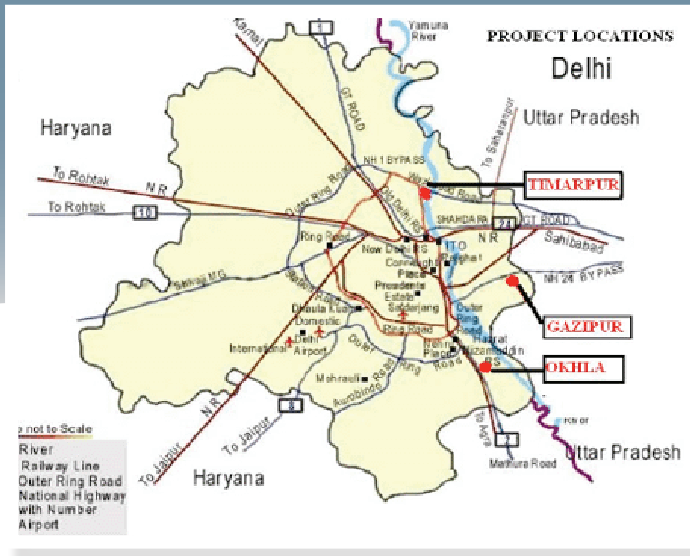
Despite strong legal and political reservations, the failure of the first plant only temporarily stalled plans for future investments in WTE ventures. Based on new and untested innovations in the field of WTE, a proposal for a new and "improved" plant on the old project site at Timarpur was floated within five years. In March of 2005, the private firm Infrastructure Leasing & Financial Services (IL&FS) signed a Memorandum of Understanding (MOU) with the Municipal Corporation of Delhi to set up a municipal solid waste processing facility at the erstwhile Timarpur incinerator plant site.

Located in the nation's capital, the high-profile Timarpur-Okhla project is touted to pave the way for the Indian WTE market, with a projected annual growth rate of 9.7% through 2013.⁶ But previous WTE projects elsewhere in India have been failures, both technically and economically. Worse yet, successful projects dismantle the country's recycling system, which provides informal employment to over 15 million individuals.

Following the MOU, the Unique Waste Processing Company (a fully-owned subsidiary of IL&FS), in collaboration with the Andhra Pradesh Technology Development Center (APTDC), incorporated the Timarpur Waste Management Company Limited (TWMCL) in April 2005. TWMCL (a special purpose vehicle) entered into a 25-year concession agreement with the Municipal Corporation of Delhi and the New Delhi Municipal Council under a Public Private Partnership framework to set up a 650 tons-per-day (TPD) Refuse Derived Fuel (RDF) processing facility, a 50 TPD bio-methanation plant, a 6 MW power plant, and a 6 million gallons per day (MGD) sewage treatment plant at a total cost of Rs. 591.27 million (US\$ 13.13 million).⁷



Photo Credit: Down to Earth



Delhi map, location of the plants

Eventually, the project developers proposed an expansion that included project activity at an additional location: Okhla in south Delhi. In 2006, the company formally changed its name to Timarpur-Okhla Waste Management Company Private Limited (TOWMCL) and proposed the "Integrated Municipal Solid Waste Processing Facility at Timarpur and Okhla."

According to the Environmental Impact Assessment presented to the Ministry of Environment and Forests in December 2006, the salient features of the project were:

1. A 650 tons-per-day (TPD) processing plant that will generate 225 tons of Refuse Derived Fuel (RDF) and a 50 TPD bio-methanation plant at Timarpur (North Delhi)
2. A 1300 tons-per-day processing plant that will generate 450 tons of RDF per day, a 100 TPD bio-methanation plant and a 16 MW power plant at Okhla (South Delhi).

Both the processing facilities together would manage 2,050 TPD of mixed municipal waste. In its expanded capacity, the project would process 643,500 tons of MSW per year and produce 222,750 tons of RDF per year and 5000 m³ of biogas daily. This raised the capital cost of the expanded project to Rs. 174.26 crores (US\$ 38.7 million), which was later revised to Rs. 204 crores (US\$ 45 million). The reasons for the increase are unclear, as the company continues to provide conflicting documentation and has made several amendments to the project design since its inception. The Table at right provides a list of

major deviations in the project design from the EIA report and the conditions laid down by the Ministry of Environment and Forests (MoEF) while granting the Environmental Clearance. These deviations from the original proposal require a thorough reassessment of the environmental impacts and the viability of the project. All these changes indicate that the project is now reduced to a conventional mass burn incinerator similar to the old Timarpur plant that was decommissioned in 1989 due to its inability to handle Indian waste.

Power Games

Since the inception of the project, there have been several conflicting reports and changes in the power generation and distribution arrangements of the project. These are largely due to the confusion arising out of the complex structure of the company ownership and the unproven nature of the technology.

The energy production capacity of the plant was revised three times. As discussed above, the project was initially designed to produce 15MW of power which was soon revised to 16MW. In March 2011, an expansion proposal for an additional 4.9MW was presented before the Expert Appraisal Committee (Thermal Power) of the MoEF. These revisions were made based on certain improvements and additions to the plant design. All the modifications were proposed after the Rapid Environmental Impact Assessment was conducted, but no new studies were carried out to assess the impacts of the modifications. However, the status of this expansion remains suspended for various reasons, both legal and financial. The expansion proposal might come up in the future for reconsideration.

According to all the official documentation, including the Project Design Document submitted to the CDM Executive Board and the Power Purchase Agreements (PPA), the project is expected to generate roughly 16MW per day or 98 million units (MUs) per

Deviations since Project Approval

Original proposal by the company (as approved by MoEF)	Deviations
The plant at Timarpur will process 650 TPD of garbage to produce 225 TPD of RDF. The Okhla site will process 1300 TPD of mixed garbage into RDF, and burn this along with the 225 TPD of RDF from Timarpur to produce 16MW of power.	The Timarpur plant has been dropped. All the RDF production and combustion (2050 TPD) will take place at Okhla.
The Okhla plant will include a biodigester for 100 TPD of green waste.	Biodigestion is no longer included.
The power plant will have single boiler - single turbine combination.	The power plant is to now have 3 boilers - single turbine combination.
There will be provision in the plant for firing methane gas produced from bio-methanation plant.	The bio-methanation plant is not included in the new plan. 100 TPD of green waste may be burned directly to produce power.
There will be a 4 TPD capacity pelletising facility to produce RDF pellets from the biomass and horticultural waste.	This is not part of the new plan.
Depending on many factors, the gross calorific value of the fuel should be around 2600 cal/kg.	The gross calorific value of the fuel is now estimated to be 1100 - 1500 kcal/kg.
For reducing moisture in the waste, a hot air generator will be provided.	The altered plan envisages a drying mechanism built into the boilers which requires 45-60 minutes to reduce the moisture.



Photo Credit: Jacqui Kotyk, 2009

annum. However, as per the Detailed Project Report prepared by IL&FS, the plant's declared power generation capacity was increased to 19MW/121MUs of which BSES Rajdhani Power Ltd. (BRPL) proposed to purchase 60MUs of power per annum and the balance was to be sold to PTC India Ltd (a government authorized power trading company).

On January 1st 2008, the project operation contract was awarded to Jindal Urban Infrastructure Ltd. (JUIL), a subsidiary of Jindal SAW Ltd. JUIL's bid was the lowest at Rs. 2.833 per kWh with grants and subsidies and Rs. 2.844 per kWh without them. Interestingly, after winning the bid, JUIL declared its intent to use all the power generated from the project for captive use. In a letter dated 20 October 2008 to the Ministry of New and Renewable Energy (MNRE), JUIL stated, "We intend to use the entire power generated by TOWMPL for Captive Power Consumption for manufacturing units of our parent company M/S Jindal SAW Ltd. at Mundra, Gujarat by having access to wheeling facility."⁸

A crucial fact was pointed out by the MNRE in its internal file notes. In a file note dated 3.2.2010 the MNRE recorded that "The Power Purchase Agreement (PPA) also has a clause according to which M/S TOWMCL [Timarpur-Okhla Waste Management Company Limited] can use the entire power for its captive use. This clearly is not in accordance with the tender/bidding conditions according to which entire power

was to be sold to the Delhi Transco at quoted tariff." This problematic provision was observed in the previous PPA with Delhi Transco and might have been transferred onto the new PPA with BRPL. Because a copy of the new PPA is not available for analysis, this cannot be confirmed.

Destroying Livelihoods - Delhi's Green Workers

Delhi's waste supports a population of approximately 100,000 waste pickers,⁹ who recover nearly 1,600 tons or approximately 15-20% of usable materials such as metal, paper, cardboard, and plastic from the city's waste. These materials are manually or semi-mechanically processed and sold back to the industry as raw material for new products. This saves approximately US\$ 14,000 per day in operational costs for the city municipality.¹⁰ The waste pickers are the first link in the value chain of the recycling sector, and by one estimate their efforts prevent the emission of 962,133 tons of greenhouse gasses annually, or about 3.6 times more than that saved by any waste project accruing carbon credits in India.¹¹

The Timarpur-Okhla project proposes to process and burn a quarter of Delhi's mixed waste. Because incinerators cannot burn only food waste, which is high in moisture and low in calorific



Photo Credit: Gigie Cruz, GAIA 2010

value, a high proportion of plastics, paper and cardboard must be included for the incinerators to function. These are precisely the materials which the informal sector recycles. Recognizing this threat to their livelihoods, Delhi's waste pickers have begun agitating against the project, holding multiple rallies and demanding that local and national authorities halt the project.

Carbon Credits for Destroying Resources

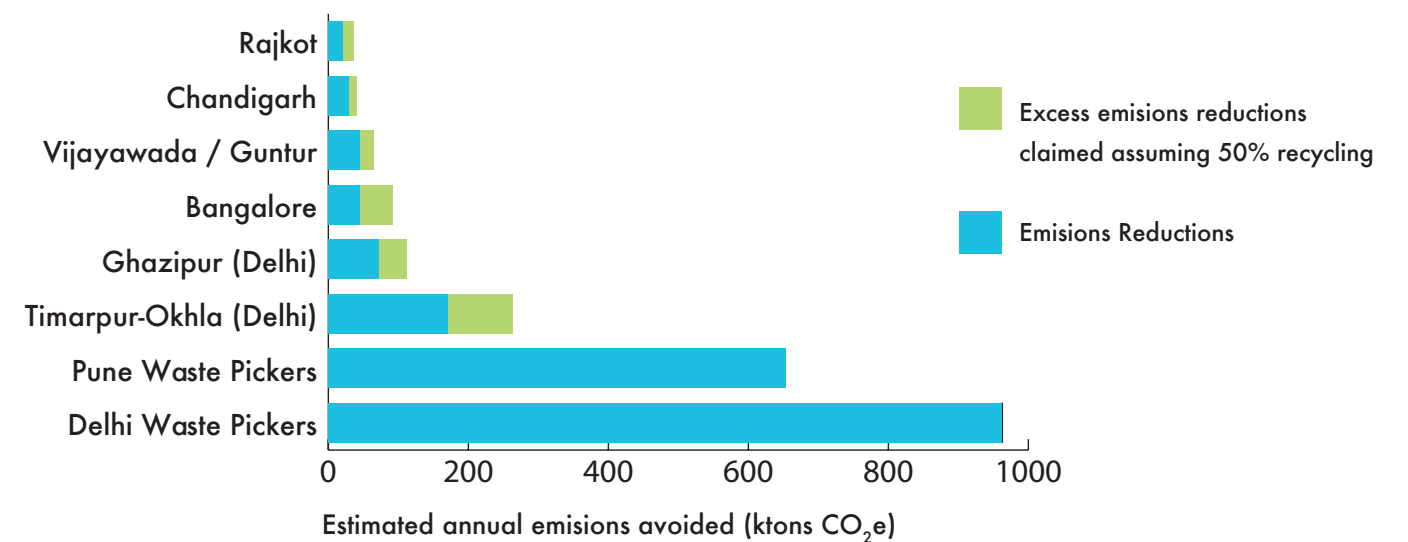
Despite its social and environmental impacts, the TIMARPUR-OKHLA Waste Management Pvt. Ltd's integrated waste to energy project at Delhi has been registered under the Clean Development Mechanism (CDM) for reducing emissions of greenhouse gases. The project, according to its promoters, will "avoid emissions from organic waste disposal at landfill sites." The project anticipates offsetting nearly 262,791 tons of CO₂ per annum. This would earn the project participants 2.6 million CERs or approximately 23 million euros.¹²

It is true that municipal landfills are one of the primary global sources of methane, a greenhouse gas 25-72 times as potent as

carbon dioxide.¹³ However, since methane is generated by wet, organic waste which does not burn readily, it is doubtful that much organic waste will be diverted from the landfills. Furthermore, the project fails to take into account the role of Delhi's informal recycling sector, which prevents three times more emissions than the incinerator's projected emissions reductions. By incinerating waste that would otherwise be recycled, the project in fact displaces authentic emission reductions achieved by the waste workers and overstates its own emissions reductions.

The actual emissions picture worsens when biogenic emissions are taken into account. Under the CDM, it has become standard practice for companies to claim that burning biomass—including wood, paper, food waste, and plant material—has no net effect on the climate. Scientists have pointed out that this rule does not reflect reality—all CO₂ has the same effect on the atmosphere, regardless of source—and its widespread application would have disastrous consequences, including the complete deforestation of the planet.¹⁴ In the case of the Timarpur-Okhla project only 16% of its CO₂ emissions from burning waste are reported, since the other 84% are assumed to be biogenic in origin.¹⁵

Estimated Annual Emissions Reductions from RDF Incinerators and Waste Pickers



Source: L. Cushing, "Waste-to-energy or wasted opportunity? Informal Sector Recycling for Climate Change Mitigation in India." Energy and Resources Group, University of California, Berkeley, 2010.

Environmental Health Concerns

As with all incinerators, toxic emissions from the Timarpur plant are inevitable.¹⁶ Considering this, the location of the plant, in the midst of a densely populated region of South Delhi, is cause for grave concern. Human settlements are barely 100 meters from the plant site. Several colonies, including Sukhdev Vihar, Haji Colony, Gaffar Manzil, Jasola Vihar, Noor Nagar, Masih Garh, Johri Farms, and Sarita Vihar, dot the area. Hospitals such as Holy Family, Fortis-Escorts, and Apollo Indraprastha are in close proximity to the plant as well. Also important to note is that two crucial wildlife sanctuaries, the Okhla Bird Sanctuary and the Assola Wildlife Sanctuary, fall within 10km radius of the plant site. The project is in violation of city zoning laws that prohibit the use of the allotted land for purposes other than composting, and the Municipal Solid Waste Act of 2000, which requires waste processing facilities to be located in close proximity to landfills or as integral part of a landfill. There are no existing landfills in the selected site, and it is illegal to establish a new one due to high population density.

The project claims zero emissions through state-of-the-art pollution control technology. However, at an investment of only Rs. 200 crores (US\$ 45 Million) to process 748,250 tons of RDF per year (TPY), the Timarpur-Okhla project clearly cannot afford state-of-the-art technology. By way of contrast, an RDF incinerator for processing 230,000 TPY was set up in Rostock, Germany in 2009 at the cost of 83 million Euros¹⁷ (US\$120 Million). In modern incinerators, half the construction cost is allotted to pollution control alone.

Process Irregularities

A fundamental requirement when proposing any industrial project is the environmental impact assessment. In India, this process is governed by the Environmental Impact Assessment (EIA) Notification 2006 under the auspices of the MoEF. There are two steps in the process: the EIA report and the

public hearing. In the case of the Timarpur project, neither the developers nor the government behaved in accordance with the true spirit of the EIA requirement.

The announcement for the Public Hearing was made via two local newspapers on 17-12-2006. The announcement read "Public Hearing for environmental clearance to the construction of proposed integrated municipal solid waste processing complex at Okhla—adjacent to existing Sewage Treatment Plant (STP) Delhi."¹⁸ The announcement was made within the existing guidelines but failed to communicate the nature of the project and excluded the most crucial fact about power generation. As a result no member of the public appeared at the hearing, and the project was passed without any objections. After the facts and the prospective impacts of the case became more available, the residents demanded a new hearing to present their objections against the plant.

The EIA report was not available for public comment at the time of the hearing and has not yet been made available to the public, even four years after the hearing. A Right to Information (RTI) request was filed with the Delhi Pollution Control Board (DPCC), one of the nodal state agencies mandated to have a copy of the project EIA as per the law. The DPCC in its response dated 8.6.2010 to the applicant stated that "Information regarding the EIA report of integrated Municipal Solid Waste processing facility proposed to be set up in Okhla, Delhi was dealt by the Ministry of Environment and Forests. Your application has been forwarded to MoEF." Following this, a RTI application was also filed with the MoEF by the same applicant in response to which the MoEF in a letter dated 16.8.2010 said "As per the records copy of EIA report is not available, however presentation on the EIA, application, public hearing report and Minutes of the Meeting etc. are available."

The government has granted permission to proceed with the project despite these clear violations of EIA law.

The project has been provided several subsidies by the state including a Rs. 10 crore (US\$ 2 million) grant by the MNRE and land from the MCD at a nominal rent. The state has so far made no attempts to implement the Municipal Solid Waste (Management and Handling) Rules 2000 in its true spirit by ensuring segregation at source and encouraging recycling. Instead, by backing this project, it encourages waste generation and discourages citizens from segregating waste.

Public Opposition

In its Project Design Document for the CDM, the project proponent has claimed that, "The role of the local population will be as beneficiary of the project. The project will be providing both direct and indirect employment opportunity to the local people. The project does not propose to displace any community; it does not have any direct conflict with the people of the region." This is a gross misrepresentation of the facts—the project is facing stiff resistance from local communities, including the residents of Okhla and the waste pickers of Delhi. A court case against the plant was filed by affected residents in 2009 and is currently being heard by the Delhi High Court. The agitation of the residents drew the attention of the Environment Ministry which ordered an inquiry into the environmental impacts of the plant.

The other impacted population, the waste pickers of Delhi, has been pitched in a non-legal battle against the project since it was first announced. Several demonstrations and rallies have tried to draw attention to the plight of the nearly 100,000 waste pickers of Delhi whose livelihood will be literally set on fire. Numerous studies around the world and in Delhi underline the invaluable contribution of the informal sector in waste recovery.^{19 20 21 22} Waste management models that integrate waste pickers have numerous well-documented social, financial, and environmental benefits. According to a study on the informal waste sector in Pune conducted by the International Labor Organisation, it was

found that each waste picker contributes Rs. 246 (US\$ 5.47) worth of free labour per month by recovering the waste. This accounts to a savings of Rs. 89 lakh (US\$ 198,000) for the municipal corporation²³ that would have otherwise spent the money in transportation and landfilling.

The case for the Timarpur project is based on faulty logic and poor assessment of its socio-economic and environmental implications. The government's justification for pushing ahead despite massive public opposition is that the project would serve the twin purposes of waste management and energy security. But this clearly is an untenable way to resolve these critical issues, particularly when the social and environmental effects would be so clearly detrimental.

End Notes:

- ¹ The project proponents have presented several conflicting reports and documents (both official and unofficial) over a period of six years with different facts, figures, project designs, etc. This has made the process of information gathering and authoritative presentation of facts very complex. As noted in the text, this report is based on certain key documents submitted to the government for the sake of environmental clearance.
- ² Delhi Pollution Control Committee - <http://dpcc.delhigovt.nic.in/waste-msw.html>
- ³ Now renamed the Ministry of New and Renewable Energy (MNRE).
- ⁴ 'Manual on Municipal Solid Waste Management', Published by Central Public Health & Environmental Engineering Organization (CPHEEO), Government of India http://www.indiawaterportal.org/sites/indiawaterportal.org/files/Manual%20on%20municipal%20solid%20waste%20management_%20MoUD_GOI_2000.pdf.
- ⁵ Comptroller and Auditor General of India - Union Government (Scientific Departments) for the year ended 31 March 1990; (No.2 of 1991).

- ⁶ Frost and Sullivan, "Analysis of Municipal Solid Waste-to-Energy Market in India," 2011
- ⁷ Executive Summary of the Integrated Municipal Waste Processing Complex at Timarpur, Delhi prepared by the Timarpur Waste Processing Company Pvt. Ltd.
- ⁸ Definition of Wheeling - the act of transporting electric power over transmission lines.
- ⁹ Kaul, *A Study of Ragpicker Children in Delhi*, ILO, 2003.
- ¹⁰ Chintan Environmental Research and Action Group, "Factsheet: Wastepickers," Delhi. <http://www.chintan-india.org/images/WastepickersFactSheet.pdf>
- ¹¹ Chintan Environmental Research and Action Group, "Cooling Agents," 2009.
- ¹² Based on third-quarter 2011 average price of 9 euros per CER.
- ¹³ The Global Warming Potential of methane (CH₄) is 25 on a 100-year timeline but 72 on a 20-year timeline, according to the IPCC's 4th Assessment Review (2007).
- ¹⁴ For example, Searchinger et al, "Fixing a Critical Climate Accounting Error," *Science* Vol. 326, pp 527-8, October 2009.
- ¹⁵ Calculations based on the project PDD, Annex 3.
- ¹⁶ Allsop et al., "Incineration and Human Health," Greenpeace Research Laboratories, University of Exeter, 2001.
- ¹⁷ List of incinerators in Germany <http://www.industcards.com/wte-germany.htm>
- ¹⁸ Extract from Writ Petition No. 9901 of 2009 – Sukhdev Vihar Resident Welfare Association & Others Vs The State of Delhi & Others
- ¹⁹ "SWM in Delhi - A Social Vulnerability Study", Toxics Link, New Delhi http://www.seas.columbia.edu/earth/wtert/sofos/Sarkar_SWM%20in%20Delhi%20-%20A%20Social%20Vulnerability%20Study.pdf
- ²⁰ Bikramaditya Kumar Choudhary, "Waste and Waste Pickers," *Economic and Political Weekly*, 13 December 2003.
- ²¹ Poornima Chikarmane and Lakshmi Narayan, "Formalising Livelihood," *Economic and Political Weekly*, 7 October 2000.
- ²² Chintan Environmental Research and Action Group, "Waste to Energy or Waste-of-Energy: Social and Economic Impact Assessment of WTE projects on wastepickers near Ghazipur and Okhla Landfills in Delhi," 2011.
- ²³ ILO-SNDT, "study of Scrap Collectors, Scrap Traders and Recycling Enterprises in Pune", 2001.



Global Alliance for Incinerator Alternatives
Global Anti-Incinerator Alliance

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

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