CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

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Integrated Municipal Waste Processing Complex at Ghazipur, Delhi

A.2. Description of the project activity:

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"Unique Waste Processing Company" ("UWPC") is a 100% subsidiary of IL&FS Infrastructure Development Corporation Limited (IIDC) that has been incorporated for developing municipal waste management and processing projects through Public Private Partnership (PPP) framework in various parts of the Country. "East Delhi Waste Processing Company Private Limited" ("EDWPC") is a special purpose vehicle, incorporated by UWPC for developing project for processing municipal waste using the technologies of processing municipal waste and also to produce as by-products, inter alia, refuse derived fuel, fluff, organic manure, and use such products for generating electricity at the Ghazipur site.

EDWPC is working in close co-ordination with Municipal Corporation of Delhi (MCD) for developing a waste processing facility at the Ghazipur site to be developed on a build, operate and transfer basis to enable augmentation of the waste disposal capabilities of MCD.

The Project activity is also supported by the Delhi Government. 'New Delhi Waste Processing Company Private Limited' a Joint Venture company of Delhi Government, IL&FS and APTTDC is supporting the project with respect to the clearances that will be required for the project.

The integrated municipal waste-processing complex is proposed to include a MSW processing plant at Ghazipur to produce Refuse Derived Fuel (RDF) along with a power plant of 10 MW capacity where the RDF derived from the waste will be used as fuel to produce renewable electricity. MSW processed will be on an average 1300 Tons per day (TPD). The components of the project are further listed below.

a. MSW processing plant on the lines of DST-TIFAC technology for RDF preparation. The plant shall be capable of processing 1300 TPD of MSW

b. Power Plant of 10 MW capacity

The project has been taken up by the project proponent to address a critical environmental problem faced in solid waste management by the state of Delhi and particularly MCD. In addition the project activity will also address to some extent the acute energy crisis faced by northern India by producing 10MW of clean electricity that will be supplied to the local region which is being fed by Northern grid. Thus the project would achieve significant reduction in green house gas emission due to the following two components

- Avoidance of methane emission from dumping solid waste in the landfill (dump) sites.
- Replacement of energy from carbon intensive northern regional grid of India by supply of renewable electricity

The Project Proponent envisages a host of benefit from the project which shall contribute to the parameters of sustainable development. A summary of benefits envisaged is provided below:

Social well being:
The project contributes in improving the environmental condition in the city of Delhi by hygienic treatment of municipal solid waste resulting in improvement of health standard in the city. The manual as well as mechanical segregation of waste prior to feeding the solid waste for size reduction results in separation of substantial quantity of inert non-biodegradable matter like plastics, rags, stones, metals, glass, tyres etc. Some of these items like textiles, large woody biomass etc. will be recycled within the plant itself as feed for the dryer furnace. Other recyclable items will be disposed of through local contractors/kabari, thereby providing monetary benefits to the local population. The project proposes to provide employment opportunity to the rag pickers who can work in close co-ordination with the plant. Without the project the rag pickers would have operated in the same unhygienic conditions prevailing in the region and would have been exposed to serious health risks while collecting the recyclables from the open dumping sites. The project would provide both direct and indirect employment opportunity to the people of the region.

Economical well being:

The investment requirement for the integrated project is about **1356 million INR**. Apart from that the project participants will further infuse **97.5 million INR** annually as production cost. There will be inflows of funds from sale of CERs. All these financial inputs in the project will have direct and indirect positive effect on the economics of the region. The project activity will generate both direct and indirect additional employment opportunities. This will improve the livelihood of the local people. It will also result in savings of public money that is otherwise being utilised by MCD in the present scenario. Further unmanaged land filling of MSW may cause health hazards in the locality, which are in close proximity with the landfill site resulting in additional health related expenditure. The project, by avoiding land filling and scientifically treating the MSW shall improve the hygienic conditions, resulting in reduced health related expenditure in the nearby localities. The project converts solid waste into electricity, which helps in reducing the demand on limited natural resources. The project will also earn additional revenue to the local and central government.

Environmental well being:

From an environmental perspective, the project helps in avoidance of methane emission as well as any leachate that would otherwise have generated from the current practice of waste disposal i.e crude dumping of waste. The project activity avoids land filling of 1300 tons of waste per day and thus reduces the requirement of further land filling area for dumping of equivalent amount of waste. This indirectly enables city of Delhi towards a better way of land utilisation, like construction of housing, hospital etc. The project also results in a net decrease in transportation distance for MSW due to reduced transportation distance in future, when the present landfill would have exhausted. This again reduces emission associated with transportation of MSW in the Delhi region. Further, by generating electricity through utilising the RDF produced, the project helps in replacing fossil fuel intensive power generation in the region.

Technological well being:

The technology adopted by the project to produce RDF pellets and fluffs ensures that the fuel is homogeneous in nature. This homogeneous nature of the fuel ensures an uninterrupted electricity generation, which improves the sustainability of the project. The technology adopted by the Project developer is relatively new in India. In-spite-of lot of barriers faced by the Project developer they have adopted this new technology considering its effectiveness in mitigating the problems associated with management of solid waste in India.

A.3. Project participants:

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Table A.1 Project participants of the CDM project activity

Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (Host)	East Delhi Waste Processing Co. Pvt. Ltd.	No

East Delhi Waste Processing Co. Pvt. Ltd.

C/o IL&FS IDC Limited

Core 4B, 4th Floor, India Habitat Centre

Lodhi Road, New Delhi – 110 003

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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Ghazipur , Delhi

A.4.1.1. Host Party(ies):

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India

A.4.1.2. Region/State/Province etc.:

>>

Delhi

A.4.1.3. City/Town/Community etc:

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Delhi

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

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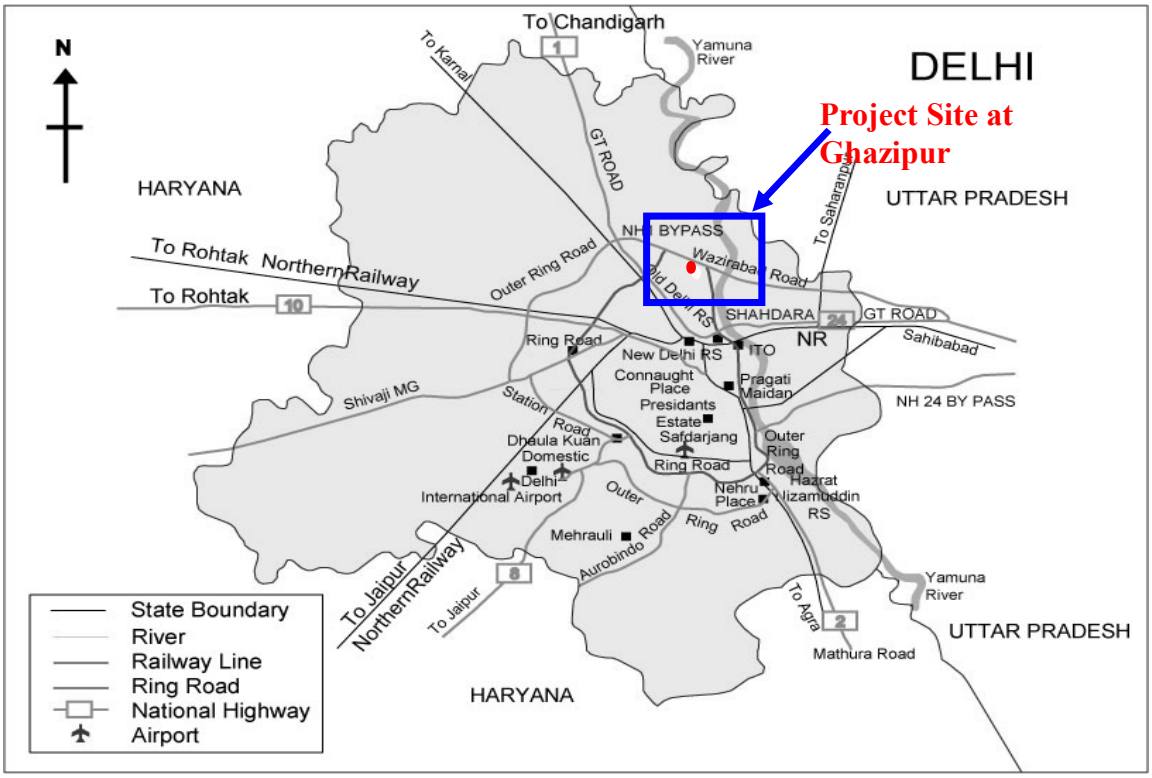
The location detail of the project activity along with the map is given below.

Location	Latitude	Longitude
Ghazipur	28° 37’	77° 20’



The site is near to Ghazipur Landfill site and earmarked by brick masonry boundary wall. The site is currently a defunct biogas plant.

A.4.2. Category(ies) of project activity:

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The project uses UNFCCC Approved Methodology AM0025 ‘Avoided emissions from organic waste through alternative waste treatment processes’ Version 10 under the sectoral scope 13 ‘Waste handling and Disposal’.

A.4.3. Technology to be employed by the project activity:

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The Ghazipur plant will produce RDF by processing approximately 429,000 TPA of MSW collected from the North and South Shahdra regions of Delhi. The RDF fluff produced will be used as the only fuel in the boiler for producing steam. The steam generated will be utilized in Turbine Generators to produce 10 MW of electricity.

Technology for the RDF plant

The RDF plant proposed by EDWPC for use at its Ghazipur project is based on the DST-TIFAC technology which has been developed indigenously.

To process the MSW collected by MCD from the North and South Shadra region the following processes will be carried out before feeding the MSW to the RDF plant:

- Receipt of MSW in separate pits.
- Receipts of leaves and horticultural waste directly to the RDF storage.
- Spraying of the waste collected with herbal pesticide to minimize odour and rodent control

Once done the MSW will go through the following processes as a part of the RDF plant activities:

- Manual Segregation
- Shredding
- Screening to separate both fine inerts and some percentage of bio-degradable matters
- Rotary conveying and as per requirements drying system
- Fines Screening
- Density Separator (Ballistic separator)

The RDF plant will be able to process 1300 TPD of MSW through two identical streams of 650 TPD capacities each. The plant will produce 433 TPD of RDF fluff which can also be converted to RDF pellets, if required, for which the plant will also have 4 TPH pelletisation capacity. The RDF pellets thus produced can be used for boiler start up and high moisture RDF firing.

Technology for the Power plant

The power plant at the site will comprise of one boiler of 50TPH capacity with steam outlet parameters of 43 ata and 415^{o}C with one 10MW bleed cum condensing turbo generator generating power at 11kV level.

The boiler will consume 16.27 TPH of RDF fluff of 2600 Kcal/kg for generation of 48 TPH of steam at 43 ata / 415^{o}C with boiler feed water entering the economizer at 125^{o}C.

Annually, the project will be able to sell approx. 50 MUs of electricity to the local grid that is otherwise being fed by the carbon intensive Northern Grid.

The project will be a net exporter of electricity to the state grid and will consume treated sewage water provided by DJB for its operations.

A.4.4 Estimated amount of emission reductions over the chosen crediting period:

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The estimated amount of emission reductions over the fixed ten year crediting period are:

Year	Annual estimation of emission reductions in tonnes of CO_2e
2010-11	32632
2011-12	60822
2012-13	86877
2013-14	110964
2014-15	104099
2015-16	120118
2016-17	134935
2017-18	148642
2018-19	161327
2019-20	173067
Total	**1133482**

The annual average over the fixed ten year crediting period is 113348 tonnes of CO_2e.

A.4.5. Public funding of the project activity:

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A grant of INR 100 Million may be available for the project activity.

However, the availability of the grant to this project is not yet finalised and is at the discretion of the Ministry of New and Renewable Energy, Government of India.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

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AM0025 'Avoided emissions from organic waste through alternative waste treatment processes' Version 10

Reference used in conjunction with the methodology:

Tool for the demonstration and assessment of additionality (ver 4)
Tool to calculate the emission factor for an electricity system
Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site

B.2 Justification of the choice of the methodology and why it is applicable to the project activity:

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The project activity meets all the applicability guidelines as set out in AM0025 version 10. They are:

- The project activity involves the following waste treatment options for the fresh waste that in a given year would have otherwise been disposed of in a landfill:
    - Mechanical process to produce refuse-derived fuel (RDF) and its use. The physical and chemical properties of the produced RDF being homogenous and constant over time;
- The produced RDF is not stored in a manner that it results in anaerobic conditions before its use.
- The project activity includes electricity generation from RDF produced. The electricity will be exported to the grid. The emission reductions will be claimed only for the cases where the RDF used for electricity generation can be monitored.
- Waste handling in the baseline scenario shows a continuation of current practice of disposing the waste in a landfill despite environmental regulation that mandates the treatment of the waste
- The compliance rate of the environmental regulations during (part of) the crediting period is below 50%
- Local regulations do not constrain the establishment of RDF production plants nor the use of RDF as fuel or raw material.
- The project activity does not involve thermal treatment process of either industrial or hospital waste;

B.3. Description of the sources and gases included in the project boundary

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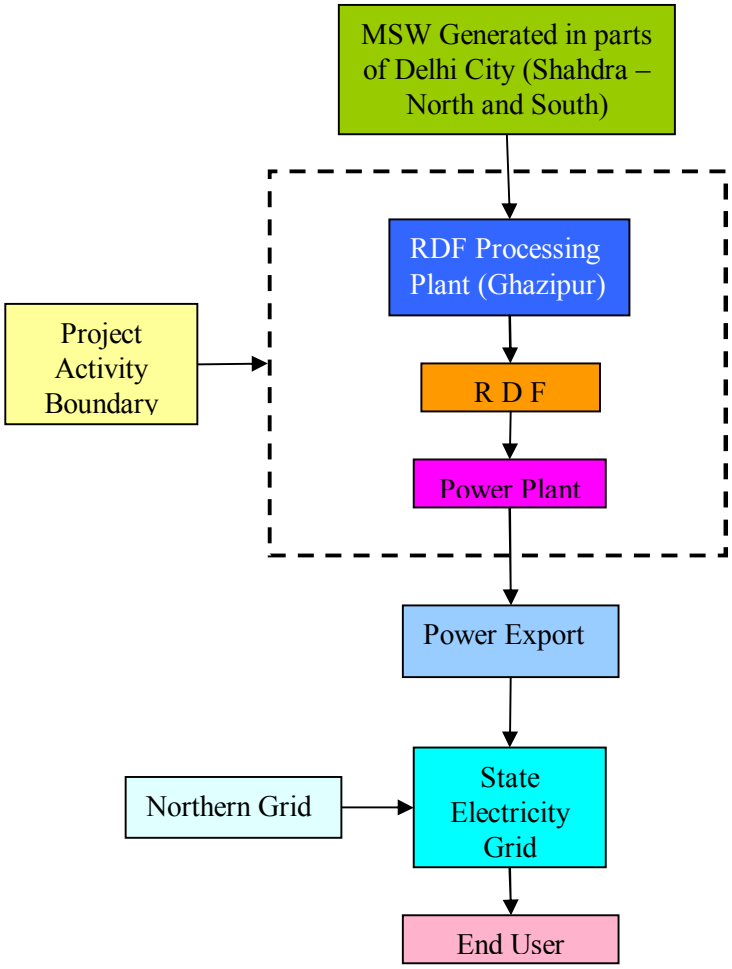
	Source	Gas		Justification/Explanation
Baseline	Emissions From decomposition of waste at the landfill site	CH_4	Included	The major source of emissions in the baseline.
		N_2O	Excluded	N_2O emissions are small compared to CH_4 emissions from landfills. Exclusion of this gas is conservative.
		CO_2	Excluded	CO_2 emissions from the decomposition of organic waste are not accounted.
	Emissions from electricity consumption	CO_2	Included	Electricity may be consumed from the grid or generated onsite in the baseline scenario.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
Project Activity	Onsite fossil fuel consumption due to project activity	CO_2	Included	May be an important emission source.
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small.
	Emissions from on-site electricity use	CO_2	Included	May be an important emission source. CO_2 emissions from fossil based waste from RDF combustion to generate electricity to be used on-site are accounted for.
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small.
	Direct emissions from the waste treatment processes	N_2O	Included	May be an important emission source. N_2O can be emitted from RDF combustion.
		CO_2	Included	CO_2 emissions from gasification or combustion of fossil based waste shall be included. CO_2 emissions from the decomposition or combustion of organic waste are not accounted.
		CH_4	Included	CH_4 may be emitted from stacks from RDF combustion.

A pictorial representation of the project boundary is given below.

The project boundary is limited to geographical boundary of the project sites; *i.e.* the site where all the facilities of the project are located. The following project activity and the emission sources are considered within the project boundary.



B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

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As per the guidelines provided in the used methodology AM0025, the latest version for the tool for demonstration and assessment of additionality (version 4) has been used to determine the most plausible baseline scenarios for the project. The baseline scenarios are described below:

Step 1. Identification of alternatives to the project activity consistent with current laws and regulations

The most realistic and credible alternatives available to the project activity have been identified using the following sub steps.

Sub-Step 1a: Define alternatives to the project activity

In the current Municipal Solid Waste scenario in India which generates more than 100,000 MT of waste per day in which Delhi accounts for about 7000-8000 MT of waste per day. In the current scenario, most of the waste is disposed to a landfill site which are usually not scientifically managed and operated.

The most plausible scenarios for utilization of the MSW generated are provided below:

Scenario No.	Scenario	Remarks
1	Disposal of the waste on a landfill without the capture of landfill gas	This is the most common practice followed in India. Even in Delhi where the project is located, almost 99% of MSW generated by Delhi goes to a landfill. The only investment required in this option is the cost of the land. There are no barriers applicable to this scenario and is the most widely used method for MSW disposal throughout the country. This alternative is taken as the baseline scenario for this project activity.
2	Conventional incineration of the waste without RDF processing	In the Indian Scenario, mass incineration of MSW is not a relatively successful technology, due to the typically high moisture content MSW. For efficient incineration, it is required to reduce the moisture content as well as segregate combustibles from the MSW collected
3	Disposal of the waste on a landfill with electricity generation using landfill gas captured from the landfill site.	When large amount of MSW are disposed off at landfill sites, the sites act as bio-reactors in which micro-organisms produce bio-gas composed of about 50 % carbon dioxide and 50 % methane. In an engineered/sanitary landfill, this can be extracted from gas wells through network of perforated plastic pipes laid within the refuse. About 400 cubic meters of gas (at NTP) can be produced from each tonne of waste in a landfill. Over a period of 10 years, one tonne of domestic solid waste is expected to produce in excess of 100 times its own volume in bio-gas. This is a relatively simple technology which does not require setting up of MSW processing plant.
4	Disposal of the waste on a landfill with delivery of landfill gas captured from the landfill site to nearby industry or households for heat generation	The technology to be used in this scenario is similar to the one identified in scenario 2 with the difference being that no electricity generation is required. The collected gas is

		distributed to the users through a network of gas pipelines for its use. However, due to non assurance of gas generation (dependant on environmental conditions in the landfill site), the projects have a higher technological and financial risk.
5	Disposal of the waste at a landfill where landfill gas captured is flared	The technology for this scenario is similar to the one identified in scenario 2. The landfill gas is flared using appropriate equipments. However, it is unlikely to be implemented in the Indian scenario due to no regulatory compulsion enforced for destruction of methane in India.
6	The project activity (i.e. RDF processing of organic waste with energy generation) not implemented as a CDM project	The technology comprises of converting MSW to RDF fluff using mechanical processes. The RDF fluff is then utilized as fuel for boiler to generate electricity using steam. The technology being relatively new in India, it can be understood that the project promoter will be taking huge financial and technological risk in adopting this technology. Further the fact that so far all similar projects from India have applied to UNFCCC for CDM benefit proves the long term financial unsustainibility of this kind of projects without CDM benefit.

Sub-step 1b. Consistency with mandatory laws and regulations:

The applicable law in the waste management sector in India is Municipal Solid Waste (Management & Handling) Rules 2000 (MSW Rule 2000). The law stipulates that all municipalities in the country should implement effective MSW treatment facilities by 2003. Thus all the above alternatives are in compliance to the legal requirement in India, but the compliance rate of Indian Municipal Corporations with the MSW Rule 2000 is much less than 50% since municipalities across the country faces acute resource crunch (both financial and technical) to set up modern MSW processing plant.

Step 3: Barrier analysis

The project is coming up in Delhi. As per CPCB published data, out of 5,922 tons of MSW generated per day only 53 tons of MSW is treated. Thus, making the compliance rate with MSW rule 2000 in Delhi region to be only 0.89%. This poor compliance rate is because of various barriers faced by the municipalities to implement advanced waste management plant. All the alternatives except land filling without capture of land fill gas faces considerable prohibitive barriers for implementation, which is evident from the above data. This makes the land filling without capture of landfill gas as the baseline scenario.

This is the most prevalent mode of waste disposal in the country with MSW being crudely dumped in low lying or undulated area. The barrier analysis is given in detail in section B.5.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality): >>

As discussed in section B.4 apart from dumping of MSW in the land fill sites all the other alternatives as faces prohibitive barriers. Of which the project activity being a better way of waste management technology among other alternatives. The project activity faces more barriers than other alternatives which are further explained in details below.

The project proponent is required to conduct

Step 2. Investment analysis: Investment analysis is not used for the project activity.
OR
Step 3. Barrier analysis

EDWPC proceeds to establish the project activity additionality by conducting Step 3: Barrier Analysis.

The project proponent is required to determine whether the project activity faces barriers that:

(a) Prevent the implementation of this type of project activity; and
(b) Do not prevent the implementation of at least one of the alternatives through the following sub-steps

All the barriers that prevail for the project activity are detailed in Sub-step 3a.

Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed project activity

The following barriers are identified in the project activity.

(i)**Investment Barrier**:

The Project activity is expected to receive a grant of INR 100 million from Ministry of New and Renewable Sources under the MNRE scheme promulgated by the Government of India. This is the only public funding which is expected to be provided for the project. However, the grant of this assistance is totally at the discretion of the concerned ministry and shall be decided on a future date.

However, it may be taken into consideration that even in the scenario that the project activity receives this one time grant there are financial barriers preventing the implementation of the project.

The summaries of financial details regarding the project are provided below for both the scenarios below. In both the scenarios (Project activity without grant and project activity with grant), there is conclusive inference that the project activity is dependant on CDM assistance for its financial viability.

Scenario 1 Project Activity without Government of India Grant

The summary of financial details for the project in scenario 1 is presented below.

Description	Cost(In Million INR)
Total Project Cost	1356.08
Equity	30%
Debt	70%
Equity debt ratio	30:70
IRR of the project (cost based) (20 year)	10.8%
DSCR of the project (cost based)	1.07%

The cost based IRR and DSCR as worked out by the project proponent is the best case where it has been assumed that project proponent will be able to sell power at a tariff to recover their cost of power generation. Which is unlikely to happen as levelised tariff in this scenario works out to be Rs. 5.23/Kwh, which is more than the actual rate at which power is being sold to the consumer. To present a more realistic scenario the project proponent carried out a sensitivity analysis with various variables. The summary of the sensitivity analysis has been provided below.

Tariff (Rs/Kwh)	Cost of CER (EUR/tonCO2)	IRR	DSCR	WACC
4.00	0	5.5	0.78	12.6
	5	8.1	1.01	
	7	9.1	1.11	
	10	10.5	1.25	
4.50	0	8.0	0.92	
	5	10.3	1.15	
	7	11.2	1.25	
	10	1.39	12.5	
5.00	0	10.1	1.06	
	5	12.3	1.30	
	7	13.2	1.39	
	10	14.4	1.53	

Scenario 2 Project Activity with Government of India Grant

The summary of financial details for the project in scenario 2 is presented below.

Description	Cost(In Million INR)
Total Project Cost	1342.89
Equity	30%
Debt	70%
Equity debt ratio	30:70
IRR of the project (cost based) (20 year)	11.2%

DSCR of the project (cost based)	1.09%

The cost based IRR and DSCR as worked out by the project proponent is the best case where it has been assumed that project proponent will be able to sell power at a tariff to recover their cost of power generation. Which is unlikely to happen as levelised tariff in this scenario works out to be Rs. 5.01/Kwh, which is more than the actual rate at which power is being sold to the consumer. To present a more realistic scenario the project proponent carried out a sensitivity analysis with various variables. The summary of the sensitivity analysis has been provided below.

Tariff (Rs/Kwh)	**Cost of CER (EUR/tonCO2)**	**IRR**	**DSCR**	**WACC**
4.00	0	6.7	0.85	12.6
	5	9.4	1.10	
	7	10.4	1.20	
	10	11.9	1.35	
4.50	0	9.2	1.00	
	5	11.6	1.25	
	7	12.6	1.35	
	10	14.0	1.51	
5.00	0	11.4	1.15	
	5	13.7	1.41	
	7	14.6	1.51	
	10	15.8	1.66	

Further the above financial calculation has been done on the basis that even 50 % of the CDM benefit has been passed through to the consumer. Above financial data clearly indicates that the project activity could not have been taken as the business as usual with such a low IRR and DSCR. The project activity would require CDM contribution to make it financially viable. Investment barriers are the requirement of upfront investment for the project activity and additional production and maintenance cost of INR 105.7 Million annually, which are not available for a MSW project in India. The financial additionality for the project activity is further substantiated by the fact that currently only four similar projects are operational in India. All the projects have applied to UNFCCC for CDM benefit. This further proves the financial unavailability of such projects without CDM benefit.

(ii)Technological Barrier:

India processes only approximately 9% of its total MSW generated in a scientific manner as per limited data available in the public domain. The remaining is dumped in land fill site which involves practically no technology or operational guidance. This is mainly due to non availability of cheap and country specific technologies for waste disposal. The MSW processing technique to be used for this project activity also shares the same technological risk as the technology to be used for this project activity is relatively new with almost no project being operated on a successful commercial basis. The project proponent is taking a huge technological risk in implementing this modern but yet unproven technology in India.

The high cost, technological know-how and uncertain financial viability are the key barriers for these projects in India. The limitations of various waste treatment technologies and their limitations are explained in detail in the Detailed Project Report (DPR) of the project activity.

(iii) **Barrier due to prevailing practices:**

In India, landfill is common method of MSW treatment and disposal, as it is considerably easy and cost effective to municipalities when compared to other methods such as RDF production. For landfill activity, the main cost is only from the purchase and acquisition of land. There is no perceived risk in implementing the activity as it is predominantly followed everywhere in the country.

Whereas conversion of MSW to RDF fluff is a technologically more advanced option which is not a business as usual scenario / prevailing practice in the country considering requirement of significant investment (apart from land acquisition) in the form of identification of project finance sources, sourcing, sorting and fine segregation of wastes after removing contaminants and other refuse (glass, stones, metals), setting up the equipments for RDF plant, operation and maintenance of the plants, training personnel, availability of resources to run the plant effectively.
Thus landfill can be considered as a prevailing practice in the country which has least cost of treatment and disposal and can therefore be easily adopted by the municipalities.

Sub-step 3 b. Show that the identified barriers would not prevent a wide spread implementation of at least one of the alternatives (excepted the proposed project activity):

Implementation of alternative 1 i.e. dumping of solid waste in the landfill site without the capture of landfill gas is the common mode of municipal solid waste disposal practice in India as per CPCB. This practice would have continued in absence of the project activity. This can be further consolidated by the fact that as per the report published by CPCB only 9.03% of the MSW generated in the country is treated in some scientific manner whereas the remaining is dumped in identified landfill sites untreated. It may also be noted that the above data is based only on the data available from the cities and town which usually have some monitoring mechanism available. The data for the rural areas is not part of this study. The MSW generated in the rural areas is almost always dumped on open land with no treatment.

Step 4. Common practice analysis:

Sub-step 4a. Analyze other activities similar to the proposed project activity:

Currently there are only 4 similar project activities taken up in India. All of them have applied for CDM benefit. This itself proves that without CDM benefit, these kind of projects are not sustainable without CDM benefit.

Sub-step 4b. Discuss any similar options that are occurring:

As explained above no similar options are occurring without considering CDM benefit. As explained above, land filling is the common practice of MSW disposal in India. Municipalities are forced to resort to this method of waste disposal due to lack of fund and technology. Lack of interest from private developer in this type of project due to poor return and longer payback period further aggravates the situation. The

project activity with its integrated waste management complex is not common practice and is additional. Project proponent believes a successful implementation of the project activity will create a positive environment in the sector and will encourage other parties to take up similar project activities which will help to mitigate the severe problem of solid waste management faced by municipalities in India.

Based on the above analysis, it can be concluded that the project activity considered here is additional and not a business as usual scenario.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Emission reduction is estimated following the approved methodology AM0025. The estimation of project emission, baseline emission and leakage emission are described below.

Project Emission:

The project emissions in year y are:

$$PE_y = PE_{fuel,onsite,y} + PE_{r,y} \qquad \textbf{(1)}$$

Where:

PE_y is the project emissions during the year y (tCO2e)

$PE_{fuel, onsite, y}$ is the emissions on-site due to fuel consumption on-site in year y (tCO2e)

$PE_{r, y}$ is the emissions from the combustion of RDF in year y (tCO2e)

Emission from fuel use on-site:

Project participants shall account for CO_2 emissions from any on-site fuel combustion (other than electricity generation, e.g. vehicles used on-site, heat generation, for starting the boiler etc). Emissions are calculated from the quantity of fuel used and the specific CO2-emission factor of the fuel, as follows:

$$PE_{fuel,onsite,y} = F_{cons,y} * NCV_{fuel} * EF_{fuel} \qquad \textbf{(3)}$$

Where:

$F_{cons, y}$ is the fuel consumption on site in year y (l or kg)

NCV_{fuel} is the net caloric value of the fuel (MJ/l or MJ/kg)

EF_{fuel} is the CO2 emissions factor of the fuel (tCO2/MJ)

Project participants may use IPCC default values for the net calorific values and CO2 emission factors.

Emissions from combustion of RDF (PE r, y):

The stack gas from the combustion of RDF may contain small amounts of methane and nitrous oxide. Moreover, fossil-based waste CO2 emissions from the combustion of RDF should be accounted for.

$$PE_{r,y} = PE_{r,f,y} + PE_{r,s,y} \quad \textbf{(11)}$$

Where:

$PE_{r,f,y}$	is the fossil-based waste CO2 emissions from RDF-combustion in year y (tCO2e)
$PE_{r,s,y}$	is the emissions from the final stacks from RDF-combustion in year y (tCO2e)

Emissions from fossil based waste ($PE_{r,f,y}$):

The CO2 emissions are calculated based on the monitored amount of fossil-based waste fed into the RDF-combustor, the fossil-derived carbon content, and combustion efficiency. The calculation of CO2 derived from gasification (combustion) of waste of fossil origin and combusting RDF including waste of fossil origin, is estimated as follows:

$$PE_{r,f,y} = \sum_i A_i \times CCW_i \times FCF_i \times EF_i \times \frac{44}{12} \quad \textbf{(12)}$$

Where:

A_i	is the amount of waste type i fed (t/yr)
CCW_i	is the fraction of carbon content in waste type i (fraction)
FCF_i	is the fraction of fossil carbon in waste type i (fraction)
EF_i	is the combustion efficiency for waste type i (fraction)
44/12	is the conversion factor (tCO2/tC)

Emissions from RDF combustor ($PE_{r,s,y}$):

Option 1:

$$PE_{r,s,y} = SG_{r,y} * MC_{N2O,r,y} * GWP_{N2O} + SG_{r,y} * MC_{CH4,r,y} * GWP_{CH4} \quad \textbf{(13)}$$

Where:

$SG_{r\,y}$	is the total volume of stack gas from the RDF combustion(m3/yr)
$MC_{N2O,r\,y}$	is the monitored content of nitrous oxide in the stack gas from RDF combustion in year y (t N2O/m3)
GWP_{N2O}	is the Global Warming Potential of nitrous oxide (tCO2e /tN2O)
$MC_{CH4,r,y}$	is the monitored content of methane in the stack gas from RDF combustion in year y (t CH4/m3)
GWP_{CH4}	is the Global Warming Potential of methane (tCO2e /tCH4)

Since the project activity is a future project, $MC_{N2O,r,y}$ and $MC_{CH4,r,y}$ is currently not available. So for estimation of emission from RDF combustor the following equation has been adopted from "2006 IPCC Guidelines for National Green House Gas Inventories Volume 5 Waste".

Option 2:

$$PE_{r,y} = Q_{biomass,y} \bullet \left(EF_{N2O} \bullet GWP_{N2O} + EF_{CH4} \bullet GWP_{CH4}\right) \bullet 10^{-3} \quad \textbf{(14)}$$

Where:

$Q_{biomass,y}$ is the amount of RDF combusted in tonnes/ yr
EF_{N2O} is the aggregate N2O emission factor for waste combustion (kgN2O/tonne of waste)
GWP_{N2O} is the Global Warming Potential of nitrous oxide (tCO2e /tN2O)
EF_{CH4} is the aggregate CH4 emission factor for waste combustion (kgCH4/tonne of waste)
GWP_{CH4} is the Global Warming Potential of methane (tCO2e /tCH4)

Default emission factors are chosen from section 5.4.2 and section 5.4.3 of Chapter 5 of "2006 IPCC Guidelines for National Green House Gas Inventories".

Baseline Emission:

To calculate the baseline emissions project participants shall use the following equation:

$$BE_y = (MB_y - MD_{reg,y}) + BE_{EN,y} \quad \textbf{(17)}$$

Where:
BE_y is the baseline emissions in year y (tCO2e)
MB_y is the methane produced in the landfill in the absence of the project activity in year y (tCH4)
$MD_{reg,y}$ is methane that would be destroyed in the absence of the project activity in year y (tCH4)
$BE_{EN,y}$ Is baseline emissions from generation of energy displaced by the project activity in the year y

Rate of Compliance

In the case of project activity there is a regulation called MSW Rule 2000 that mandates MSW treatment and which is not being enforced, the baseline scenario is identified as a gradual improvement of waste management practices to the acceptable technical options expected over a period of time to comply with the MSW Management Rules. The adjusted baseline emissions ($BE_{y,a}$) are calculated as follows:

$$BE_{y,a} = BE_y * \left(1 - RATE_y^{Compliance}\right) \quad \textbf{(19)}$$

Where:
BE_y Is the CO2-equivalent emission as determined from equation 17.
$RATE_y^{Compliance}$ Is the state-level compliance rate of the MSW Management Rules in that year y. The compliance rate shall be lower than 50%; if it exceeds 50% the project activity shall receive no further credit.

The compliance ratio $RATE^{Compliance}_y$ shall be monitored ex post based on the official reports for instance annual reports provided by municipal bodies.

Methane generation from the landfill in the absence of the project activity (MBy):

The amount of methane that is generated each year (MBy) is calculated as per the latest version of the approved "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site", considering the following additional equation.

$$MB_y = BE_{CH4,SWDS,y} \quad \textbf{(20)}$$

Where:
$BE_{CH4,SWDS,y}$ is the methane generation from the landfill in the absence of the project activity at year y,

calculated as per the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site".

Baseline emissions from generation of energy displaced by the project activity

To calculate the baseline emissions from generation of energy displaced by the project activity as per scenario 1:

$$BE_{EN,y} = BE_{elec,y} \qquad \textbf{(21)}$$

Where:

$BE_{elec,y}$ is the baseline emissions from electricity generated utilizing RDF in the project activity and exported to the grid (tCO_2e)

$$BE_{elec,y} = EG_{d,y} * CEF_d \qquad \textbf{(22)}$$

Where:

$EG_{d,y}$ is the amount of electricity generated utilizing the RDF in the project activity and exported to the grid during the year y (MWh)

CEF_d is the carbon emissions factor for the displaced electricity source in the project scenario (tCO_2/MWh)

Determination of CEF_d

In this project activity case the generated electricity from the RDF displaces electricity that would have been generated by other power plants in the grid in the baseline, CEF_d has been calculated according to the 'Tool to calculate the emission factor for an electricity system'. In India, the nodal agency for monitoring the power data has also published the Carbon Emission Factor for the displaced electricity source using the tool. This published data is utilized to arrive at the value of CEF_d[1] as it is conservative to the calculated value.

Leakage (L_y):

Sources of leakage considered in the methodology are CO2 emissions from off-site transportation of waste materials in addition and combustion of RDF. Leakage emissions should be estimated from the following equation:

$$L_y = L_{t,y} \qquad \textbf{(26)}$$

Where:

$L_{t,y}$ is the leakage emissions from increased transport in year y (tCO2e)

[1] Please refer http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

Emission from transportation ($L_{t,y}$):
The project may result in a change in transport emissions. This would occur when the waste is transported from waste collecting points, in the collection area, to the treatment facility, instead of to existing landfills. When it is likely that the transport emissions will increase significantly, such emissions should be incorporated as leakage. In this case, project participants shall document the following data in the CDM PDD: an overview of collection points from where the waste will be collected, their approximate distance (in km) to the treatment facility, existing landfills and their approximate distance (in km) to the nearest end-user.

In the project activity scenario, the only additional transportation envisages is the disposal of flyash from the project activity site to the landfill facility. In all other cases, the project activity will reduce the net transportation from the baseline scenario. This will be due to better planning and transportation management.

For calculations of the emissions, IPCC default values for fuel consumption and emission factors may be used. The CO2 emissions are calculated from the quantity of fuel used and the specific CO2-emission factor of the fuel for vehicles i to n, as follows:

$$L_{t,y} = \sum_{i}^{n} NO_{vehicles,i,y} * DT_{i,y} * VF_{cons,i} * NCV_{fuel} * D_{fuel} * EF_{fuel} \qquad \textbf{(27)}$$

Where:

$NO_{vehicles,i,y}$	is the number of vehicles for transport with similar loading capacity
$DT_{i,y}$	is the average additional distance traveled by vehicle type i compared to baseline in year y
$VF_{cons,i}$	is the vehicle fuel consumption in litres per kilometer for vehicle type i (l/km)
NCV_{fuel}	is the Calorific value of the fuel (MJ/Kg or other unit)
D_{fuel}	is the fuel density (kg/l), if necessary
EF_{fuel}	is the Emission factor of the fuel (tCO2/MJ)

Emission Reductions:

To calculate the emission reductions the project participant shall apply the following equation:

$$ER_y = BE_y - PE_y - L_y \qquad \textbf{(18)}$$

Where:

ER_y	is the emissions reductions in year y (t CO2e)
BE_y	is the emissions in the baseline scenario in year y (t CO2e)
PE_y	is the emissions in the project scenario in year y (t CO2e)
L_y	is the leakage in year y (t CO2e)

If the sum of PE_y and L_y is smaller than 1% of BE_y in the first full operation year of a crediting period, the project participants may assume a fixed percentage of 1% for PE_y and L_y combined for the remaining years of the crediting period.

B.6.2. Data and parameters that are available at validation:

Project emission parameters:

Data / Parameter:	NCV_{fuel}
Data unit:	Kcal/ kg
Description:	Net Calorific Value of Fuel
Source of data used:	IPCC
Value applied:	10317
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value has been chosen for conservative estimation
Any comment:	IPCC default factor or country-specific data may be applied, resulting in no error due to measurement.

Data / Parameter:	EF_{fuel}
Data unit:	Ton CO2/TJ
Description:	CO2 emission factor of fuel
Source of data used:	IPCC
Value applied:	74.1
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value has been chosen for conservative estimation
Any comment:	IPCC default factor or country-specific data may be applied, resulting in no error due to measurement.

Data / Parameter:	CCW_i
Data unit:	%
Description:	Fraction of carbon content in waste type i
Source of data used:	IPCC
Value applied:	Please refer table 2.4 of Chapter 2 of "2006 IPCC Guidelines for National Green House Gas Inventories Volume 5 Waste" for all the values.[2]
Justification of the choice of data or description of measurement methods	IPCC default value has been chosen for conservative estimation.

[2] The table is enclosed in Annex 3

and procedures actually applied :	
Any comment:	

Data / Parameter:	FCF_i
Data unit:	%
Description:	Fraction of fossil carbon content in waste type i
Source of data used:	IPCC
Value applied:	Please refer table 2.4 of Chapter 2 of "2006 IPCC Guidelines for National Green House Gas Inventories Volume 5 Waste" for all the values.[3]
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value has been chosen for conservative estimation.
Any comment:	

Data / Parameter:	EF_i
Data unit:	Fraction
Description:	Combustion efficiency for waste type i
Source of data used:	IPCC
Value applied:	1
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per IPCC the combustion efficiency for incineration can be considered as 100%.
Any comment:	IPCC default factor or country-specific data may be applied, resulting in no error due to measurement.

Data / Parameter:	EF_{N2O}
Data unit:	Kg N2O/ton of waste (dry)
Description:	Aggregate N2O emission factor for waste incineration.
Source of data used:	IPCC
Value applied:	0.05
Justification of the choice of data or description of measurement methods and procedures actually	Default value as per IPCC.

[3] The table is enclosed in Annex 3

applied :	
Any comment:	As per guidance from the the Board, IPCC default values should be used only when country or project specific data are not available or difficult to obtain.

Data / Parameter:	EF_{CH4}
Data unit:	Kg CH4/ton of waste (dry)
Description:	Aggregate CH4 emission factor for waste incineration.
Source of data used:	IPCC
Value applied:	0.006
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value as per IPCC.
Any comment:	As per guidance from the the Board, IPCC default values should be used only when country or project specific data are not available or difficult to obtain.

Baseline emission parameters:

Data / Parameter:	$CEF_{baseline}$
Data unit:	T CO2 e/MWh
Description:	Emission factor of baseline electricity for EG_d.
Source of data used:	Publicly available data as published Central Electric Authority (CEA) of India
Value applied:	0.75
Justification of the choice of data or description of measurement methods and procedures actually applied :	This data is taken from publicly available "Central Electric Authority: CO2 Baseline Database" Version 3. At present this is the most authentic and reliable data available[4]. The same has also been calculated based on the latest 'tool to calculate grid emission factor' A calculation based on actual generation figures was also carried out. However, the value was more than the published data. To be more conservative the lesser of the two values i.e. the CEA published data has been taken.
Any comment:	Calculated as per appropriate methodology at start of crediting period.

Data / Parameter:	$RATE_y^{Compliance}$
Data unit:	%
Description:	Rate of Compliance
Source of data used:	Central Pollution Control Board (CPCB) of India/ Municipal bodies
Value applied:	10
Justification of the choice of data or description of	This data is taken from the most authentic publicly available source. The compliance rate is based on the annual reporting of the municipal bodies issuing these reports. The state-level aggregation involves all landfill sites in the country.

[4] Please refer http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

measurement methods and procedures actually applied :	If the rate exceeds 50%, no CERs can be claimed. It is to be noted that this data is for pan India activity from around 53 cities and town. The MSW generated from the rural areas is not covered as no authentic or published data is available for the same.
Any comment:	In the ex-post emission reduction calculation, the most recent $RATE_{y}^{Compliance}$ as published by CPCB will be considered for calculating baseline emission for methane emission from dumping of solid waste in unmanaged landfill in the baseline scenario. The project will stop receiving any credit once the compliance reaches 50% limit. This data will be monitored annually.

Leakage Emission Parameters:

Data / Parameter:	NCV_{fuel}
Data unit:	Kcal/ kg
Description:	Net Calorific Value of Fuel
Source of data used:	IPCC
Value applied:	10,317
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value has been chosen for conservative estimation.
Any comment:	IPCC default factor or country-specific data has been applied, to eliminate any error due to measurement.

Data / Parameter:	D_{fuel}
Data unit:	Kg/ l
Description:	Density of fuel
Source of data used:	High Speed Diesel/ Gas Oil specification of Indian oil Corporation
Value applied:	0.84
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value chosen is country specific and publicly available. This is realistic assumption of the density of diesel in India.
Any comment:	The monitoring of this data will be done annually or ex-ante.

Data / Parameter:	EF_{fuel}
Data unit:	Ton CO2/TJ
Description:	CO2 emission factor of fuel
Source of data used:	IPCC
Value applied:	74.1
Justification of the choice of data or	IPCC default value has been chosen for conservative estimation

description of measurement methods and procedures actually applied :	
Any comment:	IPCC default factor or country-specific data may be applied, resulting in no error due to measurement.

B.6.3 Ex-ante calculation of emission reductions:

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Ex-ante estimation of Baseline Emission:

Baseline emission has been estimated using equations (17) to (22) as described in section B.6.1. The various values adopted to calculate the baseline emission and the final values as calculated by using these values are given below in a tabulated form.

Parameter	Values	Unit	Reference	Remarks
MB_y (Compliance adjusted)	1,112,219	Tonnes of CO_2 e	Equation 20 of B.6.1	The value given is cumulative value for the entire 10 year crediting period
$EG_{d,y}$	49	MU/annum	Equation 22 of B.6.1	
CEF_d	750	tonnes of CO2/ MU	Equation 22 of B.6.1	
$BE_{EN,y}$	367,920	tonnes of CO_2 e	Equation 21 and 22 of B.6.1	The value given is cumulative value for the entire 10 year crediting period

Ex-ante estimation of Project Emission:

Project emission has been estimated using equations (1) to (16) as described in section B.6.1. The various values adopted to calculate the leakage emission and the final values as calculated by using these values are given below in a tabulated form.

Parameter	Values	Unit	Reference	Remarks
$PE_{fuel, onsite, y}$	53.14	Ton CO2/ year	Equation 3 of B.6.1	
$PE_{r,y}$	34,559	Ton CO2/year	Equation 11 of B.6.1	

Ex-ante estimation of Leakage Emission:

Leakage emission has been estimated using equations (26) to (31) as described in section B.6.1. The various values adopted to calculate the leakage emission and the final values as calculated by using these values are given below in a tabulated form.

Parameter	Values	Unit	Reference	Remarks
$L_{t, y,}$	53	Ton CO2/annum	Equation 27 of B.6.1	

Ex-ante estimation of emission reduction:

Emission reduction has been estimated using equations 18 as described in section B.6.1. The various values adopted to calculate the leakage emission and the final values as calculated by using these values are given below in a tabulated form.

Parameter	Values	Unit	Reference	Remarks
BE_y	1,480,139	Ton CO2	Equation 17 of B.6.1	The value given is the cumulative value for the entire 10 year crediting period.
PE_y	346,126	Ton CO2	Equation 1 of B.6.1	The value given is the cumulative value for the entire 10 year crediting period.
L_y	531	Ton CO2	Equation 26 and 18 of B.6.1	The value given is the cumulative value for the entire 10 year crediting period.
ER_y	1,133,482	Ton CO2	Equation 32 of B.6.1	The value given is the cumulative value for the entire 10 year crediting period.

B.6.4 Summary of the ex-ante estimation of emission reductions:

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Year	Avoidance of Methane Emissions	Compliance %	BAU (%)	Compliance adjusted	Project emissions	Leakage	Net emissions	Emissions due to export of power	Total net emissions
2010-11	33895	10.00	90	30505	34612.6	53	-4160	36792	32632
2011-12	65217	10.00	90	58695	34612.6	53	24030	36792	60822
2012-13	94168	10.00	90	84751	34612.6	53	50085	36792	86877
2013-14	120930	10.00	90	108837	34612.6	53	74172	36792	110964
2014-15	145675	30.00	70	101973	34612.6	53	67307	36792	104099
2015-16	168559	30.00	70	117992	34612.6	53	83326	36792	120118
2016-17	189726	30.00	70	132808	34612.6	53	98143	36792	134935
2017-18	209309	30.00	70	146516	34612.6	53	111850	36792	148642
2018-19	227430	30.00	70	159201	34612.6	53	124535	36792	161327
2019-20	244201	30.00	70	170941	34612.6	53	136275	36792	173067
Total				**1112219**	**346126**	**531**	**765562**	**367920**	**1133482**

B.7 Application of the monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Project emission parameters:

Data / Parameter:	**F_{cons}**
Data unit:	Litres
Description:	Fuel consumption
Source of data to be used:	Purchase invoice and or metering
Value of data applied for the purpose of calculating expected emission reductions in section B.5	19,800
Description of measurement methods and procedures to be	The onsite fuel consumption will be monitored daily by making entry into the log book for fuel consumption of each vehicle/instrument as the case may be.

applied:	
QA/QC procedures to be applied:	The amount of fuel will be derived from the paid fuel invoices (administrative obligation).
Any comment:	Monitoring Frequency: Annually Data will be archived till 2 years after the end of crediting period

Data / Parameter:	A_i
Data unit:	ton/ year
Description:	Amount of waste type i
Source of data to be used:	Project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To see the break up of quantity for each type of waste, please see Annex 3.
Description of measurement methods and procedures to be applied:	Measured with calibrated scales/load cells.
QA/QC procedures to be applied:	A_i for each type of waste will be calculated based on waste characteristics, which will be determined in the approved laboratory. Ten random waste samples shall be taken on a quarterly basis and an annual average value shall be applied for use in calculations
Any comment:	Monitoring Frequency: Annually Data will be archived till 2 years after the end of crediting period

Data / Parameter:	$Q_{biomass}$
Data unit:	ton/ year
Description:	Amount of RDF combusted
Source of data to be used:	Project participants

Value of data applied for the purpose of calculating expected emission reductions in section B.5	148,500
Description of measurement methods and procedures to be applied:	Measured with calibrated scales/load cells.
QA/QC procedures to be applied:	Weighbridge will be subject to periodic calibration (in accordance with stipulation of the weighbridge supplier).
Any comment:	Monitoring Frequency: Annually Data will be archived till 2 years after the end of crediting period

Data / Parameter:	R_t
Data unit:	ton/ year
Description:	Total weight of RDF produced (t/yr)
Source of data to be used:	Project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	148,500
Description of measurement methods and procedures to be applied:	Weighbridge
QA/QC procedures to be applied:	Weighbridge will be subject to periodic calibration (in accordance with stipulation of the weighbridge supplier).
Any comment:	Monitoring Frequency: Annually Data will be archived till 2 years after the end of crediting period

Baseline emission parameters:

Data / Parameter:	EG_d

Data unit:	MWh
Description:	Electricity exported to grid from the project using RDF
Source of data to be used:	Electricity meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	49,000
Description of measurement methods and procedures to be applied:	The total power generated and net power exported to grid by the project will be measured in the plant premises to the best accuracy as prescribed by the regulatory norms as applicable at the time and will be recorded, monitored on a continuous basis through DCS.
QA/QC procedures to be applied:	Maintenance and calibration of equipment will be carried out according to internationally recognized procedures. Third parties will be able to verify.
Any comment:	Monitoring Frequency: Continuous Data will be archived till 2 years after the end of crediting period

Data / Parameter:	$A_{j,\,x}$
Data unit:	Tones/year
Description:	Amount of organic waste type j prevented from disposal in the landfill in the year x (Tones/year)
Source of data to be used:	Sampling/ Sorting/ weighing
Value of data applied for the purpose of calculating expected emission reductions in section B.5	429,000
Description of measurement methods and procedures to be applied:	The composition of waste will be determined quarterly by a certified laboratory.

QA/QC procedures to be applied:	Regular sorting & weighing of waste (initially quarterly) by project proponent will be carried out. Procedures will be checked regularly by a certified institute/ DOE. Ten random waste samples shall be taken on a quarterly basis and an annual average value shall be applied for use in calculations
Any comment:	Monitoring Frequency: Continuous Data will be archived till 2 years after the end of crediting period

Data / Parameter:	MB y
Data unit:	t CH4
Description:	Methane produced in the landfill in the absence of the project activity in year 'y'.
Source of data used:	Calculated as per the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site".
Value applied:	Please refer to enclosure 1 for detailed calculation
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site".
Any comment:	Monitoring Frequency: As per the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site". Data will be archived till 2 years after the end of crediting period

Leakage emission parameters:

Data / Parameter:	$NO_{vehicles, i}$
Data unit:	Number
Description:	Vehicles per carrying capacity per year.
Source of data to be used:	Counting
Value of data applied for the purpose of	5940

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Counter should accumulate the number of trucks per carrying capacity
QA/QC procedures to be applied:	Number of vehicles must match with total amount of ash disposed. Procedures will be checked regularly by DOE.
Any comment:	Monitoring Frequency: Annually Data will be archived till 2 years after the end of crediting period

Data / Parameter:	$DT_{i,y}$
Data unit:	Km
Description:	Average additional distance traveled by vehicle type 'i' compared to the baseline in year 'y'.
Source of data to be used:	Expert estimate
Value of data applied for the purpose of calculating expected emission reductions in section B.5	59,400
Description of measurement methods and procedures to be applied:	The distance traveled by each truck for transporting ash will be recorded from the log book of each vehicle, and will be recorded in a consolidated record maintenance book.
QA/QC procedures to be applied:	Assumption to be approved by DOE.
Any comment:	Monitoring Frequency: Annually Data will be archived till 2 years after the end of crediting period

Data / Parameter:	VF_{cons}
Data unit:	Litre/km

Description:	Vehicle fuel consumption in liters per kilometer for vehicle type i
Source of data to be used:	Fuel consumption record
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.33
Description of measurement methods and procedures to be applied:	The diesel consumed by each vehicle for transportation of ash will be recorded daily from the log book of each vehicle and the cumulative diesel consumption will be determined by summing up individual diesel consumption of each vehicle and will be recorded in a consolidated record maintenance book.
QA/QC procedures to be applied:	Shall be cross checked with purchase invoice of diesel
Any comment:	Monitoring Frequency: Annually Data will be archived till 2 years after the end of crediting period

B.7.2 Description of the monitoring plan:

>>

The project participant will form a special CDM team, this team will be responsible for monitoring of all the data required to estimate emission reduction and leakage if any. The team will be reporting to the project in charge. The hierarchical set up that will run the plant and will be responsible for monitoring all the data required to estimate emission reduction is described below. The roles of each position are described in brief as well. Proper training programme will also be conducted right from the beginning to make the people who will be working in the plant well conversant with the technology and monitoring system of various parameters.

Designation	Roles and responsibilities
Project In charge	Over all in charge, will be responsible for the operation of the plant, as well as play a key role in establishing and maintaining monitoring procedures.
Process engineers	The key executives, will be responsible for day to day operations in the plant and will keep a continuous vigil on all the parameters to be monitored
Maintenance Technicians	Will be responsible for over all maintenance of the plant. Crucial for continuous operation of the plant.
Lab Chemist	Will monitor composition of RDF and MSW coming to the plant .
Process Operators	Will run the plant and will comply with monitoring requirements.

B.8 Date of completion of the application of the baseline study and monitoring methodology and

the name of the responsible person(s)/entity(ies)

>>
29/01/2008
East Delhi Waste Processing Company Private Limited and its associated experts. EDWPC is the project participant listed in annex 1.

Address:

East Delhi Waste Processing Company Private Limited
Lodhi Road
Core 4B, 4th floor, India Habitat Centre
New Delhi
Delhi
110 003
India
Ph :91-11-4179 0234
Fax: 91-11-2468 2070-71

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>
1st April 2008

C.1.2. Expected operational lifetime of the project activity:

>>
25 Years

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

>>
Not Applicable

C.2.1.2. Length of the first crediting period:

>>
Not Applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
01 April 2010

C.2.2.2. Length:

>>
10 Years

SECTION D. Environmental impacts

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D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

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The project promoter has conducted a Rapid Environmental Impact Assessment for the project activity, and all possible environmental issues that may arise from the project activity have been addressed. A brief summary of the rapid EIA has been described in section D.2 below.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>
A detailed Environmental Management Program has been framed under the Rapid Environmental Impact Assessment of the project. The EMP plan of the project envisages no major detrimental environmental impact of the project. However, there may be certain localized negative environmental impacts of the plant operations for which appropriate mitigation and control techniques and parameters have been incorporated at the planning stage of the project itself.

The major environmental impacts and their mitigation mechanism are listed below:

Project Activity	Category	Environmental Impact	Mitigation Mechanism
MSW Handling and Processing	Air Emissions (Air Pollution)	Increased amount of dust and odour	Activity to be carried out under negative pressure enclosures
	Leachate (Land & Water Pollution)	Land contamination due to leachate generation from waste pits	Sump pits to be provided to each waste pit. Leachate to be treated.
	Vectors and Rodent (Health)	Increased Health risk due to rodent and vectors	MSW to be sprayed with herbal pesticide
RDF Plant Operations	Air Emissions (Air Pollution)	Increased amount of dust	Air Pollution Control equipment comprising of Bag filters and cyclones integrated with RDF plant Stack of suitable height provided for discharge to atmosphere to ensure appropriate dispersion
	Solid Rejects	Waste Management	Proper disposal in a

			suitable method
	Noise Pollution	Discomfort	Noise enclosures will be provided to high noise areas. Appropriate PPE to be provided to all personnel working in the area
	Enhanced fire Potential due to RDF storage	Potential Fire Hazard	Provision for adequate fire fighting equipments provided
Power Plant	Air Emissions (Air Pollution)	Increased amount of dust, NOx, SOx	Stack of suitable height provided for discharge to atmosphere to ensure appropriate dispersion (60 mts) Chemical dosing will also be done to reduce the emissions from the plant Operational control to ensure maximum efficiency of the plant All discharge parameters to be within the applicable regulatory norms
	Water Pollution	Water Contamination	All discharges from the Power Plant operations to be treated in the CETP of MCD through the public sewage system
	Solid Waste and Ash	Waste management	Disposal of ash in a secure manner to land fill sites or utilization for fly ash brick manufacturing
	Noise Pollution	Discomfort	Noise enclosures will be provided to high noise areas. Appropriate PPE to be provided to all personnel working in the area
	Bird Menace		Ultra sonic hooters to be provided in the plant vicinity

In addition to above, regular monitoring and measurement of critical environmental performance indicators will be carried out to ensure the highest level of plant efficiency for minimum environmental impact.

SECTION E. Stakeholders' comments

>>

E.1. Brief description how comments by local stakeholders have been invited and compiled:

>>

The stakeholders of the project identified are:

- Technology providers.
- Municipal Corporation of Delhi
- Local population of Delhi and nearby area

The principal technology providers identified in the project activity are Andhra Pradesh Technology Development & Promotion Centre (APTDC). APTDC will provide the waste to energy technology. APTDC is patronized by the Government of Andhra Pradesh, Technology Information, Forecasting & Assessment Council (TIFAC) and Confederation of Indian Industry (CII). TIFAC is an autonomous organisation set up under the aegis of Department of Science and Technology.

For Municipal Corporation of Delhi, who is otherwise facing challenge of managing MSW the project is a welcome step and they have accorded their approval for the project.

The population of Delhi city will be indirectly benefited by the project, since the garbage will be managed in a more scientific way. Also the power exported will help to reduce the power deficit scenario of the Delhi region, there by doing a general well being to the population of Delhi. However, to invite the views of the population of Delhi city, a public hearing has been scheduled where observations of the populace will be addressed. A notice for the invitation has been published in three leading newspaper of the country and is also available on the website of the statutory agency (SPCB). A copy of the same is provided as part of Annexure 5.

E.2. Summary of the comments received:

>>

Will be provided to the verifier after the stakeholder comments are taken.

E.3. Report on how due account was taken of any comments received:

>>

Will be provided to the verifier after the stakeholder comments are taken.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	East Delhi Waste Processing Company Private Limited
Street/P.O.Box:	Lodhi Road
Building:	Core 4B, 4th floor, India Habitat Centre
City:	New Delhi
State/Region:	Delhi
Postfix/ZIP:	110 003
Country:	India
Telephone:	91-11-4179 0234
FAX:	91-11-2468 2070-71
E-Mail:	dinesh.mittal@ilfsindia.com
URL:	
Represented by:	
Title:	Chairman, IAS
Salutation:	Mr
Last Name:	Mittal
Middle Name:	K
First Name:	Dinesh
Department:	
Mobile:	
Direct FAX:	91-11-2468 2070-71
Direct tel:	91-11-4179 0234
Personal E-Mail:	dinesh.mittal@ilfsindia.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

A grant in the form of INR 100 Million may be available for the project. A communication by the concerned Ministry of Government of India is provided for reference.

F.No 10/3/2005-UICA
Government of India
Ministry of New and Renewable Energy
(Urban Industrial and Commercial Applications Group)

Block No. 14, CGO complex
Lodi Road, New Delhi 110003
Date: 18.01.2008

To,
Chief Secretaries of State Governments
Administrators of Union Territories
Heads of State Nodal Agencies
Municipal Corporations / Urban Local Bodies

Subject: Programme on Energy Recovery from Municipal Solid Wastes – Sanction for the Year 2007-08 - Regarding.

Sir,

I am directed to convey the sanction of the Government of India for the implementation of a Central scheme, **"Programme on Energy Recovery from Municipal Solid Wastes (MSW)"** during the year 2007-08. The scheme provides financial assistance for setting up of five Pilot projects for power generation from MSW to be undertaken in accordance with the decision of Hon'ble Supreme Court given during a hearing held on May 15, 2007 and recommendations of the Expert Committee; administrative charges to State Nodal Agencies and grants-in-aid for Research, Development and Demonstration, organizing seminars, workshops, training courses, etc. on the subject of energy from MSW. The details of this programme are given below:

1.1 The expenditure on this scheme will be met from the provisions under Demand No. 65, as per the following details:

Major Head 2810-60-103 - Energy from Urban & Agriculture Waste
Sub Head - Energy from Urban & Municipal Waste
01.00.31 - Grants-in-Aid
01.00.33 - Subsidies

2. OBJECTIVES

The main objectives of the proposed Programme on Energy Recovery from MSW are as follows:

- To set up five Pilot projects for recovery of energy from MSW; and
- To create conducive conditions and environment, with fiscal and financial regime, to develop, demonstrate and disseminate utilisation of MSW for recovery of energy;

3. IMPLEMENTATION ARRANGEMENTS

Ministry will implement the proposed scheme by involving the State Nodal Agencies, Urban Local Bodies / Municipal Corporations. The Technical Institutions namely IISc, IIT's, CLRI, etc. and the organisations such as IL&FS, TCOs, FIs, IREDA, etc. will also be involved in development of Projects and preparation of Detailed Project Reports (DPR). The projects will be taken up by Urban Local Bodies and other Government organizations in Public Private Partnership mode. Financial Assistance will be provided for projects selected through a transparent competitive procedure.

4. GUIDELINES FOR DEVELOPMENT OF PROJECTS

4.1 The projects need to be developed in accordance with the decision of Hon'ble Supreme Court given during the hearing on May 15, 2007, and the recommendations of the Expert Committee referred therein. Key recommendations of the Expert Committee in regard to development of MSW based waste-to-energy projects are given below:

- The issues such as Project Development including characterization of wastes, sizing of projects, technology selection and project design, management model and operational issues including close co-ordination between Municipal Corporation and the Promoters, financial appraisal and approval of project should be adequately addressed.

- In view of the problems of treatment and disposal of municipal wastes (solid and liquid) in our cities and towns, which are only likely to increase with the growth of population and urbanization, an integrated approach to waste processing and treatment will be necessary, as brought out in the MSW Rules, 2000. Therefore, instead of focusing on individual technologies, it would be desirable to take an integrated approach to the management and treatment of MSW, which would necessitate deployment of more than one technology in tandem.

- The selection of technology for the solid waste management depends upon the quality of waste to be treated and the local conditions. Therefore, for the segregated waste, which is dedicated in nature, the selection of technology is relatively easier and its performance and success is beyond doubt. Therefore, it is desirable to have solid waste segregated at source, which is also required as per the MSW Rules, 2000.

- The Committee has also recommended that projects based on bio-methanation of MSW should be taken up only on segregated/uniform waste unless it is demonstrated that in Indian conditions, the waste segregation plant/process can separate waste suitable for bio-methanation.

4.2 The projects need to be developed for specific cities. It is expected that State Nodal Agencies, HUDCO, IREDA, IL&FS, TCOs, etc, will develop the projects with the help of consultants, as may be necessary, for the Municipal Corporations / Urban Local Bodies. The Project documentation involves the following:

- Analysis of MSW and assessment of quantity;
- Identification of project site;
- Preparation of MSW collection and transportation plan
- Finalisation of tie-up with the ULBs for land lease and supply of waste;
- Finalisation of power purchase agreement;
- Development of a bankable project with Feasibility Report and the DPR;
- Firming up of means of project finance;
- Assistance in entire process of bidding;
- Obtaining all statutory clearances for the projects; and
- Providing assistance and supervision during execution and commissioning.

5. DETAILS OF FINANCIAL ASSISTANCE

Financial support to be provided under this Programme for setting up five Pilot Projects on Energy Recovery from Municipal Solid Wastes is as follows :

i. Financial assistance at a flat rate of Rs. 2.00 crore per MW, subject to ceiling of 20% of project cost and Rs. 10.00 crore per project, whichever is less.
ii Financial Assistance to be provided for projects selected through a transparent competitive procedure.
iii. Financial assistance of 20% higher than those specified for different categories of projects will be provided for projects in North Eastern Region and Special Category States, namely, Himachal Pradesh, J&K, Sikkim and Uttranchal.

6. PROMOTIONAL INCENTIVES

Project Development Assistance

6.1 Financial assistance of 50% of the cost of preparation of Detailed Project Reports subject to a maximum of Rs 10.00 lakh per project will be provided.

Administrative Charges to State Nodal Agencies

6.2 Administrative charge of 1% of the MNRE's financial assistance with an upper limit of Rs 5.00 lakh per project, shall be payable to the State Nodal Agencies (SNA) to facilitate the development and implementation of the projects and monitoring for a period of one year after commissioning.

Financial Assistance for Training and Awareness Creation

6.3 Financial assistance may be provided upto a maximum of Rs 3.00 lakh per event for organisation of training courses, business meets, seminars, workshops and awareness raising activities on case-to-case basis.

Financial Assistance for Resource Assessment / Performance Evaluation Studies

6.4 Financial assistance may be provided upto a maximum of Rs 3.00 lakh per studies on resource assessment and performance evaluation of the plants

Research & Development:

6.5 Financial support will be provided for R&D projects in accordance with the R&D Policy of the MNRE. Financial support may also be provided for projects involving Applied R&D and technology up-gradation. This will also be governed by the procedures/ guidelines being issued by the R&D Division of MNRE separately.

7. MIXING OF OTHER WASTE / SUPPORT FUEL

Any waste of renewable nature or biomass can be mixed to the extent of 25% based on Gross Calorific Value.

8.0 RELEASE OF FINANCIAL ASSISTANCE

8.1 The financial assistance will be released by the Ministry in two installments as follows:

i. First installment of 50% of subsidy may be released to the financial institution/bank lending for the project upon release of 50% of sanctioned loan amount. This may be treated as interest free loan until the release of second installment of subsidy. In the event of the second installment not getting released within a period of one year after commissioning, this amount may be recovered by the FI/bank with interest and paid to MNRE on pari passu basis.

ii. Second installment of 50% of subsidy may be released three months after commissioning of the project, and achievement of an average Plant Load Factor (PLF) of 60% during the third month of operation. The quantum of second installment may be reduced by 5% per month in the event of delay in achieving the average monthly PLF of 60%.

8.2 In case of the projects set up by the developers through their own resources, financial assistance would be released directly to the developers after successful commissioning of the projects.

9. MONITORING MECHANISM

9.1 The concerned State Nodal Agencies will closely monitor the execution of the projects and provide guidance for their timely completion and submit monthly progress reports to MNRE. MNRE may also monitor the progress of implementation of projects as well as their performance through a Monitoring Committee consisting of representatives from the Technical Institutions namely IISc, IITs, CLRI, etc., and organisations such as IL&FS, TCOs, FIs, IREDA, etc. besides officials from MNRE and State Nodal Agencies.

9.2 As regards the monitoring of performance of projects, including the limit of utilisation of other wastes of renewable nature and biomass, MNRE may also engage the services of independent third party entities.

0. In case of any ambiguity in interpretation of provisions of this scheme, the decision of he MNRE shall be final.

1. This issues with the approval of competent authority and concurrence of IFD vide heir sanction No. IFD/SAN/108/776/2007-08 dated 18.1.2008.

Yours faithfully,

(V.K. Jain)
Scientist 'D'
Telefax: 011- 24369788
E-mail: jainvk@nic.in

Cc:

i) Secretary, Ministry of Urban Development, Nirman Bhavan, New Delhi
ii) Secretary, Ministry of Environment & Forests, Paryavaran Bhavan, CGO Complex, New Delhi
iii) Secretary, Planning Commission, Yojana Bhavan, New Delhi
iv) Secretary, Department of Science and Technology, New Mehrauli Road, Institutional Area, New Delhi
v) Managing Director, IREDA, India Habitat Centre, New Delhi

'opy for information to:

PS to MOS (NRE)
Sr. PPS to Secretary, MNRE
AS&FA, MNRE
Advisers / Joint Secretary / Directors, IFD
Copy for Sanction Folder / Guard File

Annex 3

BASELINE INFORMATION

Table 1:

Average waste characteristics of the incoming waste in the plant considered for estimation of baseline emission.

Sl no	Type of Waste	Average Quantity (%)
A	**Fuel**	
	Wooden Pieces	0.67
	Paper	1.74
	Textiles	8.68
	Thermocol	0.42
	Straw/ Hay	1.64
	Dry Leaves	1.51
	Coconut Shell	2.72
	Polythene & Plastic	5.24
B	**Organics**	
	Green Leaves	3.28
	Green Matter	5.29
	Kitchen Waste	35.51
C	**Inerts**	
	Concrete/Stone	1.46
	Sand/Soil/Earth	27.12
	Brick	1.05
D	**Recyclables**	
	Glass	0.13
	Rubber/Leather	1.16
	Metal	0.03
E	**Others**	2.35
	Total	100

Table 2:

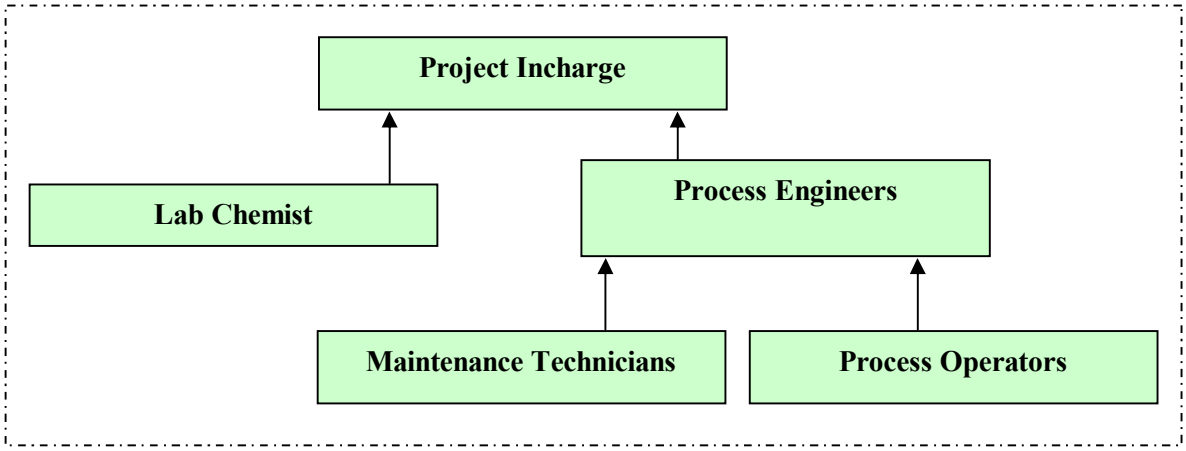
Default total carbon content and fossil carbon fraction of different MSW component		
MSW Component	**Total carbon Content in % dry weight (default)**	**Fossil carbon fraction in % of total carbon (default)**
Paper/cardboard	46	1
Textiles 3	50	20
Food waste	38	-
Wood	50	-
Garden and Park Waste	49	0
Nappies	70	10
Rubber and Leather	67	20

Default total carbon content and fossil carbon fraction of different MSW component		
MSW Component	**Total carbon Content in % dry weight (default)**	**Fossil carbon fraction in % of total carbon (default)**
Plastics	75	100
Metal	NA	NA
Glass	NA	NA
Other, inert waste	3	100

Annex 4

MONITORING INFORMATION

The operational and management structure that will monitor the project activity is described below.



Roles and responsibility:

1. Project Incharge will have the following responsibilities
    - Ensuring implementation of monitoring procedures
    - Internal audit and project conformance reviews
    - Organizing and conduct training programs on CDM
    - Reviewing of records and dealing with monitored data
    - Has the overall responsibility for closing project non-conformances and implementing corrective actions before the verification
2. Process Engineers will have the following responsibilities
    - Implementing all monitoring control procedures
    - Associating with the Manager (QA) towards maintenance and calibration of equipments
    - Has the overall responsibility for record handling and maintenance.
    - Organizing internal audit for checking the data recorded
    - Supervising and training the operators and maintaining training records.
3. Maintenance technicians will have the following responsibilities:
    - Has the overall responsibility of calibrating and maintenance of the instruments
    - Will assist the Process Engineers in record handling, records checks and review and during internal audit and check the data recorded by the shift in-charge.

4 Lab Chemists will have the following responsibilities:

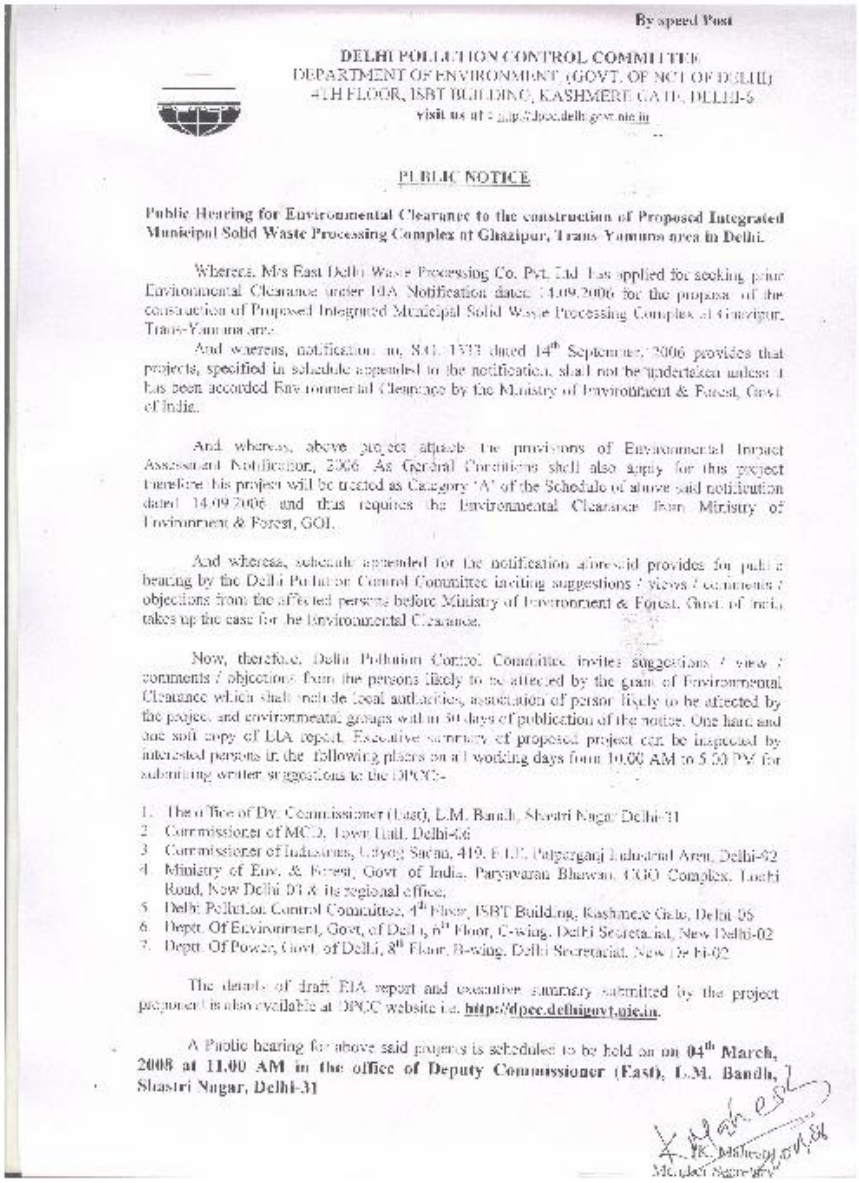
- Will monitor composition of RDF and MSW coming to the plant.

5 Process operators will have the following responsibilities.

- They will maintain the log books and will perform the day to day monitoring of the parameters.
- Will assist the process engineers in record handling, records checks and review and during internal audit

Annex 5

STAKEHOLDER COMMENT NOTIFICATION



By speed Post

DELHI POLLUTION CONTROL COMMITTEE
DEPARTMENT OF ENVIRONMENT, (GOVT. OF NCT OF DELHI)
4TH FLOOR, ISBT BUILDING, KASHMERE GATE, DELHI-6
visit us at : http://dpcc.delhigovt.nic.in

PUBLIC NOTICE

Public Hearing for Environmental Clearance to the construction of Proposed Integrated Municipal Solid Waste Processing Complex at Ghazipur, Trans-Yamuna area in Delhi.

Whereas, M/s East Delhi Waste Processing Co. Pvt. Ltd. has applied for seeking prior Environmental Clearance under EIA Notification dated 14.09.2006 for the proposal of the construction of Proposed Integrated Municipal Solid Waste Processing Complex at Ghazipur, Trans-Yamuna area.

And whereas, notification no. S.O. 1533 dated 14th September, 2006 provides that projects, specified in schedule appended to the notification, shall not be undertaken unless it has been accorded Environmental Clearance by the Ministry of Environment & Forest, Govt. of India.

And whereas, above project attracts the provisions of Environmental Impact Assessment Notification, 2006. As General Conditions shall also apply for this project therefore this project will be treated as Category 'A' of the Schedule of above said notification dated 14.09.2006 and thus requires the Environmental Clearance from Ministry of Environment & Forest, GOI.

And whereas, schedule appended for the notification aforesaid provides for public hearing by the Delhi Pollution Control Committee inviting suggestions / views / comments / objections from the affected persons before Ministry of Environment & Forest, Govt. of India takes up the case for the Environmental Clearance.

Now, therefore, Delhi Pollution Control Committee invites suggestions / view / comments / objections from the persons likely to be affected by the grant of Environmental Clearance which shall include local authorities, association of person likely to be affected by the project and environmental groups within 30 days of publication of the notice. One hard and one soft copy of EIA report, Executive summary of proposed project can be inspected by interested persons in the following places on all working days from 10.00 AM to 5.00 PM for submitting written suggestions to the DPCC:-

1. The office of Dy. Commissioner (East), L.M. Bandh, Shastri Nagar, Delhi-31
2. Commissioner of MCD, Town Hall, Delhi-6
3. Commissioner of Industries, Udyog Sadan, 419, F.I.E. Patparganj Industrial Area, Delhi-92
4. Ministry of Env. & Forest, Govt. of India, Paryavaran Bhawan, CGO Complex, Lodhi Road, New Delhi-03 & its regional office.
5. Delhi Pollution Control Committee, 4th Floor, ISBT Building, Kashmere Gate, Delhi-06
6. Deptt. Of Environment, Govt. of Delhi, 6th Floor, C-wing, Delhi Secretariat, New Delhi-02
7. Deptt. Of Power, Govt. of Delhi, 8th Floor, B-wing, Delhi Secretariat, New Delhi-02

The details of draft EIA report and executive summary submitted by the project proponent is also available at DPCC website i.e. **http://dpcc.delhigovt.nic.in.**

A Public hearing for above said projects is scheduled to be held on **on 04th March, 2008 at 11.00 AM in the office of Deputy Commissioner (East), L.M. Bandh, Shastri Nagar, Delhi-31**

M. (Member Secretary)

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