Project design document form
(Version 11.0)

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION	
Title of the project activity	The TIMARPUR-OKHLA Waste Management Company Pvt. Ltd.'s (TOWMCL) integrated waste to energy project at Delhi.
Scale of the project activity	☒ Large-scale ☐ Small-scale
Version number of the PDD	15
Completion date of the PDD	29-08-2019
Project participants	Timarpur Okhla Waste Management Co Ltd
Host Party	India
Applied methodologies and standardized baselines	AM0025 (version 06); "Avoided emissions from organic waste through alternative waste treatment process."
Sectoral scopes	13
Estimated amount of annual average GHG emission reductions	308,262 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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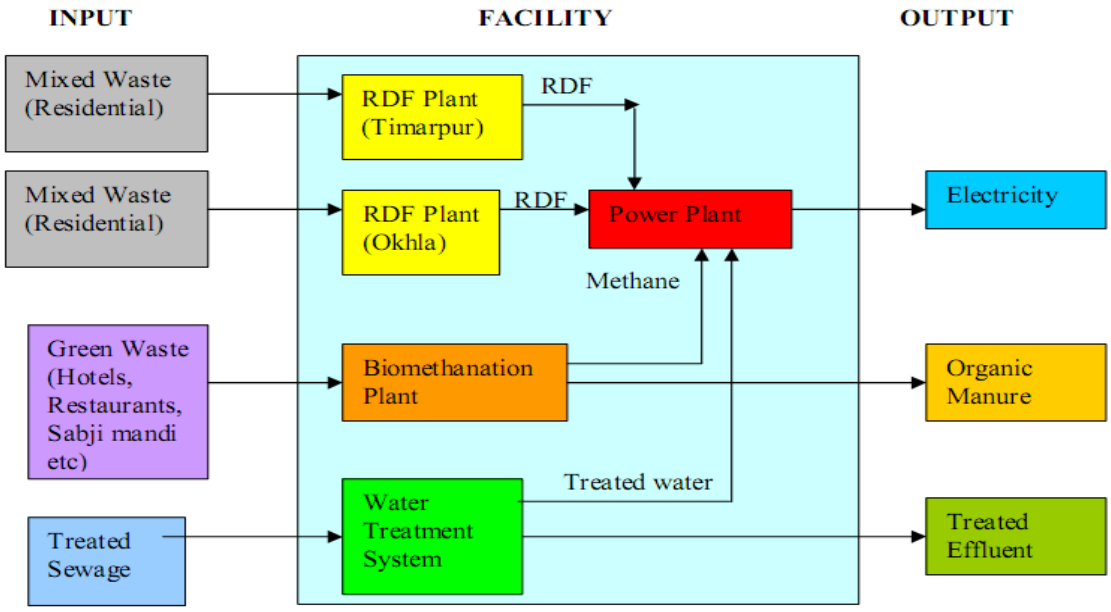
Recognizing the grave situation of waste management in Delhi, the state government has thought it fit to find a solution by developing a Waste to Energy (WTE) project through Public Private partnership (PPP) route. Timarpur Okhla Waste Management Co Ltd (TOWMCL) is a special purpose vehicle which shall be responsible for implementation of project activity.

The project was earlier envisaged to be developed at two different location, i.e. Timarpur and Okhla. About 650 Tonne Per Day (TPD) of Municipal Solid Waste (MSW) was envisaged to be processed at the Timarpur site while 1300 TPD of MSW was envisaged to be processed at Okhla site for the preparation of Refuse Derived Fuel (RDF). Additionally, 100 TPD of green waste (waste collected from garden like dry leaves, cut grass, etc) was to be utilized at Okhla site for genetration of biogas through biomethanation plant. The PP had also envisaged to generate electricity to the tune of 16 MW by utilizing the RDF produced from the project activity.

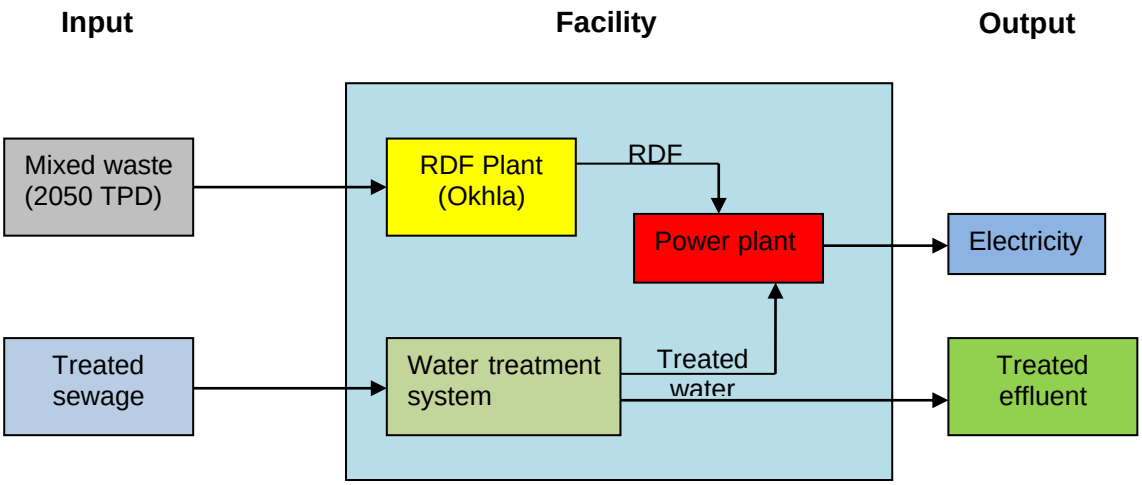
Earlier design



However, after accessing the success rate of existing technologies and availbility of better technologies for such project activities the board took a decision to implement the project activity with a better technology (technical details are provided section A.4.3) and some design changes. The Timarpur site has been dropped from the project and the entire waste (1950 TPD) is now processed at the Okhla site. Further, the envisaged plant of biomethanation is dropped as the green waste envisaged in the initial phase is not supplied to the project activity and a seperate tender has been floated for the same. Instead, PP shall be now be sourcing an additional 100 TPD of MSW for the project activity. Also, since PP is implementing a better technology for waste processing and power generation, it was established that the RDF produced shall be capable of producing 20.9 MW of electricity instead of 16 MW as envisaged in the first place.

Therefore, the project activity would now involve processing of 2050 TPD of MSW to generate about 20.9 MW of power using a turbine at the Okhla site. At a PLF of 90% the gross energy generation is expected to be 151.23 GWh/year considering an operation period of 335 days. Auxiliary consumption is envisaged to be 18% of the power produced.

Design implemented



One Bleed cum condensing TG Set of 20.9MW capacity and three boilers with individual capacity of 26 TPH, amounting to a total of 78 TPH, shall be installed and a fourth boiler with 26 TPH capacity shall be installed in second phase. One deaerator (capacity of 72 m^3/hr), one bolier feed water pump (capacity of 40 m^3/hr), an Air cooled condensor (capacity of 95 TPH) and a cooling tower (capacity 600 m^3/hr) is installed in the project activity.

Purpose of the Project Activity:

The project has been taken up by the project participants to address a critical environmental problem faced in solid waste management by both MCD and NDMC. This will contribute in significant reduction of greenhouse gas emissions, which otherwise would have taken place in form of methane emission from solid waste being dumped in the open landfill (dump) sites. In addition, the project activity will also address to some extent the acute energy crisis faced by northern India by producing 20.9 MW of clean electricity that will be supplied to the NEWNE grid.

Pre- project scenario:

In the absence of the project activity, the waste would have continued to be dumped in the existing landfills without any pre-treatment as per the existing practise, leading to release of GHG over a period of time. Despite the introduction of MSW (Management & Handling) Rules, 2000, there is no structured system available for management and handling of MSW across most of the states. The objective of the project activity is to provide an alternative treatment option for the generated MSW. Continuation of the pre-project scenario, i.e. open landfilling is considered as the baseline scenario as this is the mostly economically viable option and has been practiced in the city of Delhi over a period of time[1].

Project scenario:

The project activity shall involve processing of 2050 TPD of MSW to produce RDF, in turn to produce power (As depicted in the above figure). Thus, the project activity would achieve significant reduction in greenhouse gas emission due to the following two components

- Avoidance of methane emission from dumping solid waste in the landfill site.
- Avoidance of CO_2 emissions by replacing the energy supplied by power plants running on non-conventional (carbon intensive) energy sources by renewable electricity generated in the project activity to the NEWNE electricity grid of India.

[1] http://www.seas.columbia.edu/earth/wtert/sofos/Sustainable%20Solid%20Waste%20Management%20in%20India_Final.pdf

View of project participants on the contribution of the project activity to sustainable development:

TOWMCL, the owner of the project activity, believes that the project activity has the potential to enhance the economic, environmental and social life of the people in the region. The project activity has beneficial effect on the local industries and employment in the region. Government of India has stipulated the following indicators for sustainable development in the interim approval guidelines for CDM projects.

- Social well being
- Economic well being
- Environmental well being
- Technological well being

Social wellbeing:

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 organics, textiles, large woody mats etc. will be recycled within the plant itself as feed for the dryer furnace to produce flue gas for the dryer. 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 collect the recyclables from the plant (manual segregation). 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.

Economic wellbeing:

The investment requirement for the integrated project is about **2619.1 million INR**. 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 and NDMC 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 wellbeing:

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. The project activity avoids land filling of 2050 tons of waste per day and thus saves 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 optimisation of transportation route. This again reduces emission associated with transportation of MSW in the

Delhi region, however the same are not being claimed. Further, by generating electricity through utilising the RDF, the project helps in replacing fossil fuel intensive power generation in the region.

Technological wellbeing:

The technology adopted by the project activity to produce RDF ensures an uninterrupted electricity generation, which improves the sustainability of the project. The technology adopted by the Project developer is 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.2. Location of project activity

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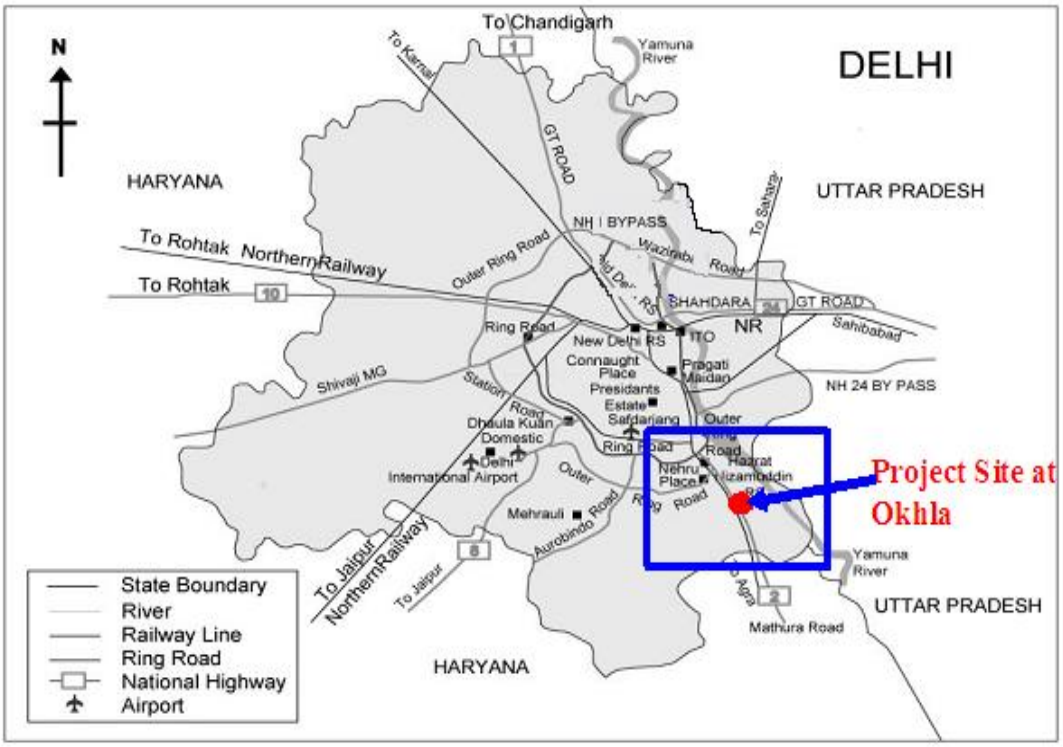
The project activity is proposed to be implemented in Delhi, India as shown in the map below. The nearest international airport is Indira Gandhi International airport. The location detail of the project activity along with the map is given below:

Location	Latitude	Longitude
Okhla	28º 33’	77º 17’



A.3. Technologies/measures

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Pre- project scenario:

In Delhi, MSW was usually dumped in the open landfill sites. The waste was dumped in heaps and was allowed to decay on its own without application of any kind of treatment or disposal technology. This had led to emission of harmful gases from the landfill including CH_4 which is one

of the identified GHGs. It also created nuisance for the local people and gave rise to a lot health related issues.

Project scenario:

The project activity will process 686750 MT of waste per year @ 2050 TPD of MSW at Okhla to produce power after segregation, screening, sorting and magnetic separation.

The technology employed in the project activity produces homogeneous RDF and at the same time recyclable material in the process of segregation of the MSW. By utilizing RDF as fuel, 20.9MW power will be generated. Annually, the project will sell 121.53 GWh of electricity out of which 60 GWh shall be sold to the local grid (otherwise being fed by Northern Grid) as per the PPA and 61.53 GWh is envisaged to be sold in the open access. The whole process of RDF production and ultimately utilizing it to produce electricity is described below:

Technology adopted in the RDF Plant:

The conversion process of Municipal Solid Waste (MSW) into Refuse Derived Fuel (RDF) involves the following operations:

- Receipts of leaves and horticultural waste directly to the RDF storage pit.
- Receipt of MSW in the pits.
- Manual separation and rejection of odd size objects and unwanted items.
- Screening to remove minus 15 mm size.
- Screening to remove Grits.
- Drying of the screened sorted refuse within the Stoker zone (The boiler has an in-built drying zone at the inlet)

MCD and NDMC will supply MSW as per agreement to TOWMCL site in compactors or tipper trucks in two or three shifts, as per regulation. After weighment and inspection, trucks will be brought to MSW storage area and the material shall be unloaded into the pits hoppers. Slat conveyors installed below the hoppers carry the material to the primary belt. The inert material like construction debris would be removed manually from the belt conveyors. The main conveyor shall discharge the MSW to a manual inspection conveyor. From the slow moving inspection conveyor, all the odd sized and unwanted objects shall be handpicked at the manual separation station. These will be mostly ceramics, hard plastics, thermocole, any dead animal, tyres or rubbers. The material after manual inspection is subjected through magnetic separator to remove ferrous objects. The same is then taken by the conveyors to a rotary screening Trommel having minus 15 mm holes for screening. The screened material from the trommel is discharged into the secondary conveyors for carrying and discharging the prepared material into the storage pit. Depending upon the quality of MSW and possible dewatering in the pit, the material can be directly used for power generation using a specially designed boiler equipped with large pre-drying section (This RDF technology can be used without any additional drying other than what is provided within the boiler itself).

Grab Cranes, equipped with continuous online monitoring arrangement to quantify the amount of MSW, will pick up this material from the storage pits through Grab buckets and deposit it on to a main conveyor through the feeding Hopper which guides the material to a closed pre-processing hall.

Salient features of the RDF plant:

a. The plant will be designed to work for two shifts per day and shall operate for 335 days in a year. There may be forced closure of plant during the short rainy days in Delhi.

b. Depending on many factor, the GCV of the fuel should be about 1150 kcal/kg ± 100 kcal/kg.

Technology adopted in the power Plant:

Conventional Rankine cycle would be used for power generation. The power plant consists of three major systems:

- With a view to improve the power efficiency, it is proposed to use HP feed water heaters
- Stroker Boiler system which can dry and fire RDF and produce steam required for power generation.
- Bleed cum condensing Steam turbo generator with a capacity of generating 20.9 MW of power by converting high pressure.
- Plant water system to meet power plant water needs such as power cycle make up, auxiliary system cooling requirements etc.

Boiler:

Boiler shall be capable of firing RDF. RDF on combustion will have components, which may cause corrosion and erosion of heating surface. Generally RDF is fired in travelling grate type boiler and the grate in project activity is specially designed for firing RDF so as to avoid clinker formation with heat resistant, wear resistant properties and longer life. The combustion chamber shall be designed to avoid formation of NO_x, CO and Dioxin. The pressure parts will be so designed that corrosion and erosion are avoided by avoiding high flue gas velocities and sharp changes in direction of flow. The modified technology implemented involved reconfiguring of the boiler so as to pre-heat the MSW in the boiler itself rather than having a separate arrangement for drying of the RDF. This has contributed in improvement of the RDF combustion efficiency and thus power generation. Apart from this, an arrangement has been made to feed the MSW in a more homogenous manner in the boilers thus further enhancing the efficiency of the process.

The boiler will have an adequate cleaning system in place to remove combustion dust settled on boiler surface impairing heat transfer ultimately affecting steam generation the steam generation. A combination of steam operated soot blowers and mechanical cleaning devices in adequate numbers will be provided. Boiler will be provided with a suitable Flue gas scrubbing and cleaning system followed by a Bag filter House to limit the dust emission to less than 50 mg/Nm3. A Chimney of height 60 m will be provided to dissipate the flue gas over a wide area. Lime injection before the reactor and activated carbon injection before the bag house is proposed for capturing HCL, SO_2, HF & heavy metals. The following are the specification of the boiler to be used.

No of boilers	4 – 26 TPH
Steam pressure at super-heated outlet	41 Kg/cm^2 (a)
Steam temperature at super-heated outlet	400 $\pm$ 5 ^oC
Feed water temperature at economizer inlet	130 ^oC

Turbo Generator:

The turbo generator will operate at 38 kg/cm^2, 395^{0}c and has a capacity of 21 MW while the turbine is having a capacity of 20.9 MW. The turbo generator will be a bleeding cum condensing type and of high efficiency. All casings and stator blade carriers shall be horizontally split and the design

shall be such as to permit examination of the blades without disturbing shaft alignment or causing damage to the blades. The design of the casing and the supports shall be such as to permit free thermal expansion in all directions.

Air Cooled Condenser:

Air Cooled condenser (ACC) is being installed in lieu of the water cooled condenser, this is to reduce the usage of water and utilise air instead. This is a step for the conservation of water. The ACC shall be fin type.

Electrical arrangement:

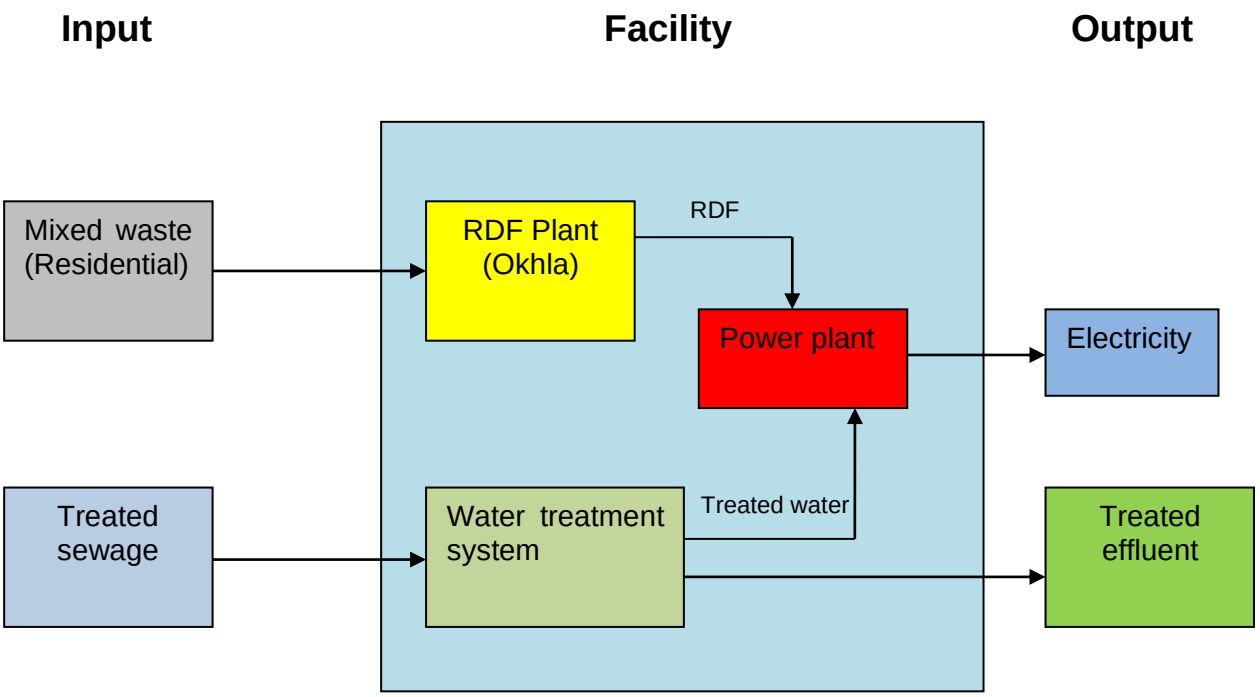
The power plant would be centrally controlled from the control room with display and recording of major parameters would be displayed in the control room. Evacuation of power would be carried out by installing a 33/11 KV sub-station in the plant and laying 33 KV transmission line to the 33 KV system of the 33 KV grid sub-station of BSES Rajdhani Power Ltd. The plant electrical system comprises of the main turbo-generator unit, step up sub-station and plant auxiliary system. The generated power will be stepped down to 433 V through transformers for total in-house power distribution. The balance will be stepped up to 33 kV level and connected to the nearby sub-station which is located at about 2.0 km from the plant.

Water System:

The main source of raw water available for the power plant is treated sewage water, which is made available from the sewage treatment plant. This treated sewage water is clarified in a clarifier and clarified water is stored in a storage tank. From this the cooling tower make up will be provided after softening. Clarified water is further treated in a series of filters and fed to the RO plant. Plant service water shall also be obtained after treatment of treated sewage to the desired norms. Potable water would be taken from Delhi Jal Board.

Process Flow Diagram:

As stated above, the technology deployed is a safe and tested technology sourced from local technology suppliers and does not involve any technology transfer for the project activity. Also, the adopted technology does not pose any threat to the environment or to the operators



A.4. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (Host Party)	TIMARPUR-OKHLA Waste Management Company Pvt. Ltd (TOWMCL) (Private entity)	No

A.5. Public funding of project activity

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No public funding from parties included in Annex I is available in project activity.

A.6. History of project activity

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Registered on 10th November 2007
PRC approved on 25th June 2014

A.7. Debundling

>> Not Applicable

SECTION B. Application of methodologies and standardized baselines

B.1. References to methodologies and standardized baselines

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Title: Approved baseline methodology AM0025 (version 06); "Avoided emissions from organic waste through alternative waste treatment process."

Reference:

- NM0090: "Organic waste composting at the Matuail landfill site Dhaka, Bangladesh"
- NM0127 ¨Integrated solid waste management with methane destruction and energy generation¨
- NM0032: "Municipal Solid Waste Treatment cum Energy Generation Project, Lucknow, India"
- NM0178: "Aerobic thermal treatment of municipal solid waste (MSW) without incineration in Parobé - RS".
- "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (ACM0002),
- Small-scale methodologies 1.D ¨Renewable electricity generation for a grid¨
- The latest version of the "tool for the demonstration and assessment of additionality".

For more information please log on to

http://cdm.unfccc.int/methodologies/PAmethodologies/approved.

B.2. Applicability of methodologies and standardized baselines

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The above mentioned methodology is being referred as the project activity involves processing of fresh waste to produce RDF which shall in turn be utilized to produce electricity. The project activity

meets all the applicability criteria of the approved methodology AM0025, version 06 as given below:

- The project activity involves one or a combination of the following waste treatment options for the fresh waste that in a given year would have otherwise been disposed of in a landfill:

  a) a composting process in aerobic conditions;

  b) anaerobic digestion with biogas collection and flaring and/or its use;

  c) mechanical process to produce refuse-derived fuel (RDF) and its use.

  Justification: *The project activity involves mechanical processing to produce refuse-derived fuel (RDF) and utilise it to produce power. Therefore, the applicability criteria is justified.*

- In case of anaerobic digestion and RDF processing of waste, the residual waste from these processes is aerobically composted and/or delivered to a landfill.

  Justification: *The project activity involves mechanical processing to produce refuse-derived fuel (RDF).* A study of the residual waste was conducted by third party and indicated that the process of RDF production is efficient and *the residual waste is only the inert material which shall be disposed of in the landfill. Therefore, the applicability criteria is justified.*

- In case of RDF processing, the produced RDF will not be stored in a manner that may result in anaerobic conditions before its use

  Justification: *The RDF produced in the project activity is combusted on a continuous basis as the same acts as the fuel for the power generation at the project site. The same is not envisaged to be stored at the plant premises for more than 10 days as the storage capacity for the same is not available. Precautions like aeration, avoidance of moisture, etc., shall be adopted to ensure that storage does not lead to anaerobic conditions. Therefore, the applicability criteria is justified.*

- The proportions and characteristics of different types of organic waste processed in the project activity can be determined, in order to apply a multiphase landfill gas generation model to estimate the quantity of landfill gas that would have been generated in the absence of the project activity.

  Justification: *The proportions and characteristics of different types of organic wastes processed in the project activity shall be determined on quarterly basis. Therefore, the applicability criteria is justified.*

- The project activity includes electricity generation and/or thermal energy generation from the biogas, captured or RDF produced, respectively, from the anaerobic digester, and RDF combustor. In the case of RDF produced, the emission reductions has been claimed only for the cases where the RDF used for electricity and/or thermal energy generation can be monitored.

  Justification: *The project activity includes electricity generation from RDF produced. The RDF used for the electricity generation shall be monitored from load cell weighing arrangement installed on the conveyor belt by which the RDF shall be fed in the boiler. Therefore, the applicability criteria is justified.*

- 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, using any of the treatment process mentioned above.

Justification: *The baseline scenario is considered as the continuation of the current practise of disposing the waste in the landfill. As per the latest publically available data by CPCB[2], out of 48,134 MT of MSW generated per day only 2786 MT of MSW is treated in class I cities like Delhi, thus making the compliance rate with MSW rule 2000 in the Class I cities only 5.78%. However, to be on conservative end PP has considered the value to be 10%. Therefore, the applicability criteria is justified.*

- The compliance rate of the environmental regulations during (part of) the crediting period is below 50%

  Justification: As explained in the above, *out of 48,134 MT of MSW generated per day only 2786 MT of MSW is treated in class I cities like Delhi, thus making the compliance rate with MSW rule 2000 in the Class I cities only 5.78%. During the project activity the compliance rate shall be monitored on annual basis from the latest publically available data. Therefore, the applicability criteria is justified.*

- Local regulations do not constrain the establishment of RDF production plants/thermal treatment plants nor the use of RDF as fuel or raw material.

  Justification: *As of now, there are no local regulations which restrain the establishment of RDF production/ thermal treatment plants or the use of RDF as fuel. In fact, the government has urged the municipalities to process the waste through alternate technologies, thereby reducing the waste burden (MSW rules 2000). Therefore, the applicability criteria is justified.*

- The project activity does not involve thermal treatment process of industrial or hospital waste;

  Justification: *MSW is delivered at the project site by the municipal authorities, Municipal Corporation of Delhi (MCD) and New Delhi Municipal Council (NDMC). The authorities take care of the fact that no industrial or hospital waste shall be a part of the MSW. Also, PP is segregating the waste before processing the same for RDF preparation and the project proponent shall make sure that no industrial or hospital waste is utilised in the thermal treatment process. Therefore, the applicability criteria is justified.*

B.3. Project boundary, sources and greenhouse gases (GHGs)

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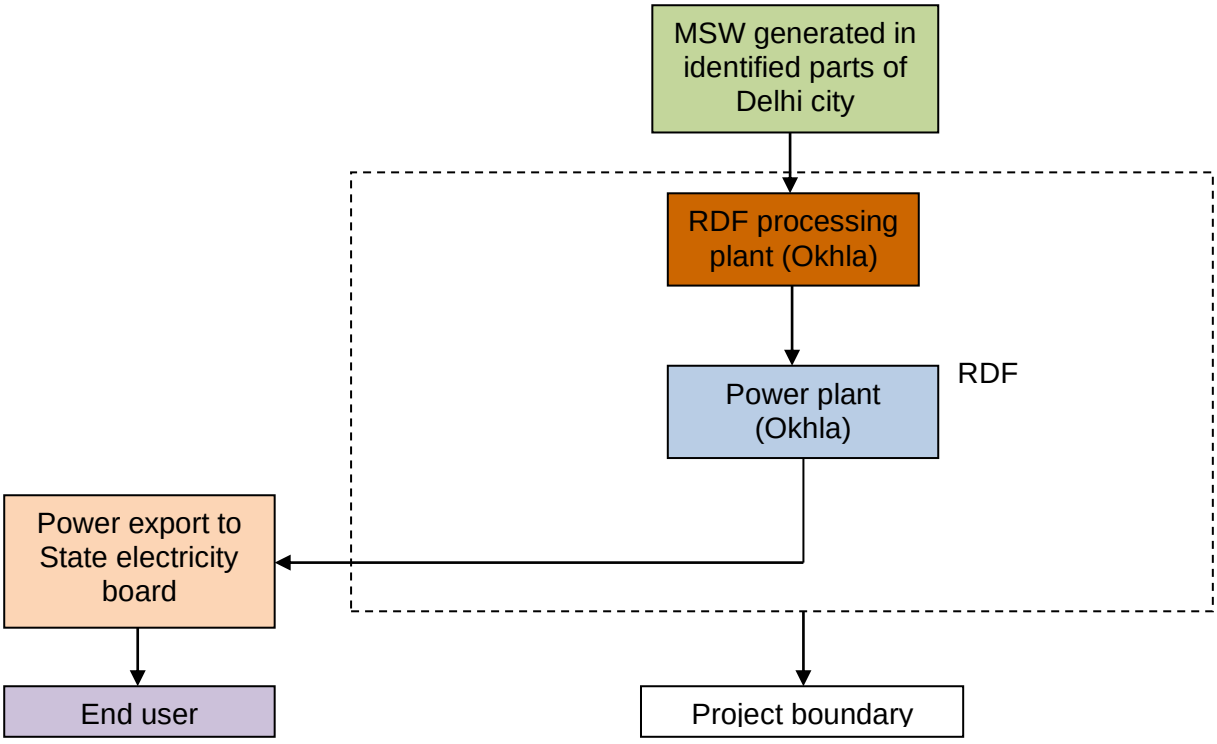
[2] http://www.cpcb.nic.in/divisionsofheadoffice/pams/Status_Municipal.pdf

	Source	GHG	Included?	Justification/Explanation
Baseline	Emissions From decomposition of waste at the landfill site Emissions From decomposition of waste at the landfill site	CO_2	Excluded	CO_2 emissions from the decomposition of organic waste are not accounted.
		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.
	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.
	Emission from thermal energy generation	CO_2	Included	If thermal energy generation is included in the project activity
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
Project activity	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	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.
		CH_4	Included	CH_4 may emitted from stacks of the gasification process and the 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. Establishment and description of baseline scenario

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As per the guideline provided in applied approved methodology AM0025 the Step 1 of the latest version of "Tool for the demonstration and assessment of additionality (version 03)," has been applied to identify the most plausible and realistic baseline scenario. Which is further described below:

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

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

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

Although, apart from one all the alternatives in Indian waste management sector faces prohibitive barriers to implementation, their relative feasibility with respect to the project activity is discussed below.

Alternative 1: Conventional incineration of the waste without RDF processing

In Indian scenario, mass incineration is not found to be a suitable technology since in Indian context the waste is usually not segregated. Therefore, it will be essential to refine MSW through moisture reduction followed by separation of combustibles before feeding the same to the combustion chamber. Otherwise, it may be an easy way of handling waste (financially attractive) but shall lead to higher environmental pollution. The segregation and moisture reduction process increases the NCV of the fuel and thus makes it more suitable as a fuel in the boiler. Thus the project activity which processes the MSW to produce RDF which in turn is burnt in the boiler is a superior technology than mass incineration of MSW involving greater financial commitment.

Alternative 2: 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 a relatively simple technology which does not require setting up of MSW processing plant and hence require less capital and operational expenditure than the project activity. The day to day operation and maintenance requirement for this technology is almost negligible as compared to a full-fledged RDF processing plant cum power plant.

Alternative 3: Disposal of the waste on a landfill with delivery of landfill gas captured from the landfill site to nearby industry for heat generation

The mechanism of biogas generation is same as explained in alternative 2. This is further simpler technology at it would involve only boring of gas wells and laying of pipeline for supplying the same to the consumer. The project activity in comparison to this alternative faces higher technological and financial barrier for its implementation.

Alternative 4: Disposal of the waste at a landfill where landfill gas captured is flared

The mechanism of biogas generation for this alternative option is same as explained in Alternative 2. This is unlikely to be implemented in Indian scenario, since there is no legal requirement for destruction of methane. Thus this alternative is not likely to be implemented unless there is a statutory requirement for the same.

Alternative 5: Disposal of the waste on a landfill without the capture of landfill gas.

As per CPCB disposal of solid waste through open dumping still continues. 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 biomethanation and pellettisation. 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. This is the most likely baseline scenario.

Alternative 6: The project activity (i.e. RDF processing of organic waste with energy generation) not implemented as a CDM project.

Among all other alternative the project activity which aims at achieving an optimum MSW management cum renewable energy generation is the more advanced than other alternatives. It does not depend on standalone technologies but integrate RDF processing and power generation within one single integrated waste management complex. Considering the waste management scenario within India, where waste is not segregated and the moisture content is high suppressing the NCV value, one can understand project promoter have taken higher risks in going ahead with this advanced integrated waste management technology involving higher technological and financial risks. Further the fact that so far all similar projects from India have applied to UNFCCC for CDM benefit proves the long term financial un-sustainability of this kind of projects without CDM benefit.

Sub-step1b- Enforcement of applicable laws and regulations

The applicable law in the waste management sector in India is 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 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.

The step 3 of latest "Tool for the demonstration and assessment of additionality (version 02), 28th November 2005" has been adopted to identify the most plausible baseline scenario.

Step 3: Barrier analysis

The project is coming up in Delhi where the compliance of the MSW rules is very poor. 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 (open dumping on land) 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. The barrier analysis is given in detail in section B.5.

B.5. Demonstration of additionality

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As per the decision 17/cp.7 para 43, a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in absence of the registered CDM project activity. The methodology requires the project proponent to determine its additionality based on the latest version of the "Tool for the demonstration and assessment of additionality", agreed by the CDM Executive Board.

The additionality of the project activity has been described below:

As per the selected methodology, the project proponent is required to establish that the GHG reductions due to project activity are additional to those that would have occurred in absence of the project activity as per the 'Tool for the demonstration and assessment of additionality'.

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

In sub-step 1a and 1b, TOWMCL is required to identify the realistic and credible alternative(s) that were available to them and that would provide output or services comparable with the project activity. These alternatives are required to be in compliance with all applicable legal and regulatory requirements.

Sub-step1a- Define alternatives to the project activity

TOWMCL identified the following alternatives to the project activity:

Alternative 1: Conventional incineration of the waste to extract energy without RDF processing

Alternative 2: Disposal of the waste on a landfill with electricity generation using landfill gas captured from the landfill site.

Alternative 3: Disposal of the waste on a landfill with delivery of landfill gas captured from the landfill site to nearby industry for heat generation

Alternative 4: Disposal of the waste at a landfill where landfill gas captured is flared

Alternative 5: Disposal of the waste on a landfill without the capture of landfill gas.

Alternative 6: The project activity (i.e. composting, anaerobic digestion and RDF processing of organic waste with energy generation) not implemented as a CDM project

Please refer to Section B.4 for details on the alternatives

Sub-step1b- Enforcement of applicable laws and regulations

The applicable law in the waste management sector in India is 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 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. 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 the most superior form of waste management technology among other alternatives as it involves integration of more than one technology. Thus 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

TOWMCL 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 investment barrier has been presented by conducting a benchmark analysis. Here IRR, as a financial indicator, has been compared with the benchmark return estimated for the project activity. The benchmark has been calculated as Weighted Average Cost of Capital (WACC). The WACC has been calculated as 11.2%.

The summary of financial details considered for calculation of the IRR is presented below.

Description	Unit	Value	Reference
Project cost			
Land	million INR	0	As per DPR
Site development and civil work	million INR	286.7	As per DPR
Indigenous Plant and Machinery	million INR	2125.6	As per DPR
Engineering and consultancy	million INR	129.6	As per DPR

Miscellaneous Fixed Assets	million INR	52.2	As per DPR
Pre- operative Expenses	million INR	25	As per DPR
Capital cost of the project (sub- total)	million INR	**2619.10**	As per DPR
Contingencies	million INR	65.5	As per DPR
Total capital cost of the project	Million INR	**2684.60**	As per DPR
Interest during construction	million INR	162	As per DPR
Working capital margin	million INR	0.4	As per DPR
Total Project Cost (Rs. Lakhs)	million INR	**2847.00**	As per DPR
Project financials			
Promoters equity (Rs. Lakhs)	million INR	854.10	As per DPR
Grant from MNRE (Rs. Lakhs)	million INR	100.00	As per DPR
Loan (Rs. Lakhs)	million INR	1892.90	As per DPR
Rate of Interest	%	10.35%	As per DPR
Tax components			
Corporate Tax (%)	%	33.33%	
MAT (%)	%	**18.50%**	

The Post-tax IRR for the project activity has been calculated as 6.96%. A sensitivity analysis was carried out for components that contribute significantly in the project activity. The summary of the sensitivity analysis is provided below:

Parameter	IRR after (-10%) variation	Base IRR	IRR after (+10%) variation
Capital Cost	8.40%	6.96%	5.72%
Selling price	4.85%	6.96%	8.83%
Energy Generation	4.22%	6.96%	9.32%
Increase in Aux Consumption	7.50%	6.96%	6.40%

The IRR becomes equal to the benchmark in the following cases:

Parameter	Variation	Justification

Capital Cost	(-) 25.50%	A negative variation of such high magnitude is not envisaged. Moreover, PP has already made expenditure towards the project activity which is even higher than the envisaged cost.
Selling price	23.95%	The selling price for the project activity has been fixed as per the PPA which already includes an escalation factor. Also, the merchant rate considered for 50% of the saleable energy is already high at 4.5 INR per unit. Apart from this, it is highly unlikely to witness an increase of 23.95% in both merchant power rate and the rate pre-fixed in the PPA and therefore, it is highly unlikely that IRR will cross benchmark due to increase of selling price of power..
Energy Generation	18.80%	The capacity of the project activity is fixed and a plant load factor of 90% is already considered for estimating total electricity generation. A further increase in the energy generation and that too of a magnitude of 18.80 % is not envisaged.
Aux Consumption	(-) 85.5%	PP is using one of the best technologies available in the market to produce electricity from MSW. Though, continuous efforts are made to reduce the auxiliary consumption but to achieve a reduction of 85.5% is not plausible.

Therefore, it is quite evident that project still faces investment barrier as envisaged in the first place.

(ii)Technological Barrier: The MSW rule 2000 specifies three options for MSW treatment in India. (a) Land filling with inertization (b) Composting and land filling and (c) Biomethanation and pelletisation. Since, Biomethanation and pelletisation involve two different technologies to be implemented at the same project site to process the MSW, they are one of the most technologically advanced options of the three project (baseline) options considered. Land filling with inertization and the option of composting and land filling are not so technologically advanced alternative to pelletisation/RDF processing as the process for the options is quite simple and does not involve setting up of complex infrastructure as in case of biomethanation and pelletization and hence involves lower risks. Municipalities across India are facing challenge to overcome financial as well as technological resource crunch to implement modern MSW treatment technology. The unsegregated waste, the high cost, technological know-how and uncertain financial viability are the key barriers for these projects in India.

PP envisaged implementing a pelletisation/RDF processing plant along with biomethanation plant but after doing a due diligence across India PP found that the technology envisaged was not workable and hence went for a better technology. This better technology, though still nascent,

required higher amount of investment and carried higher uncertainty and hence the risk. Also, the biomethanation plant has been dropped from the project activity.

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

In India, landfill (open land dumping) 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 biomethanation and pellettisation. 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 pelletisation/RDF processing of MSW 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 identifying a suitable technology for treating solid wastes, identification of project finance sources, collection, sorting and fine segregation of wastes after removing contaminants and other refuse (glass, stones, metals), setting up the equipment for pelletisation plant, operation and maintenance of the plant, training personnel, availability of resources (land, water, fuel) to run the plant effectively and related. Further, the project to convert waste to RDF and then consuming the RDF to produce power is one of the rare initiatives in India.

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 (accepted the proposed project activity):

Implementation of alternative 5 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 report published by CPCB only 5.18% of the MSW generated in the country is treated and rest goes to landfill untreated.

The above identified barriers do not affect the alternative of continuation of the current situation, dumping of waste in open landfill. It faces no barriers in respect to technology, market and so on. Therefore, it is the economically feasible option for the project proponent.

Step 4. Common practice analysis:

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

For the purpose of common practice analysis, similar project are defined as MSW processing plants operating in the country and producing either compost / RDF and/ segregating and reusing other recyclable material like plastic, metals, etc.

Currently there are only 3 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 in India land filling is the common practice of MSW disposal in India. Municipalities are forced to resort to this method of waste disposal because lack of fund and technology. Lack of interest from private developer in this type of project due poor return and longer payback period further aggravates the situation. The project activity with its integrated waste management complex is not common practice and 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.

It has been clearly demonstrated how the approval and registration of the project as a CDM activity, and the attendant benefits and incentives derived from the project activity, will alleviate the barriers showed in Step 3 and thus enable the project to be undertaken. Thus, the project passes successfully the additionality tests and thus can be considered as additional and not a business as usual scenario.

B.6. Estimation of 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:

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

Where:

PE_y is the project emissions during the year y ($t_{CO2}e$)

$PE_{elec,y}$ is the emissions from electricity consumption on-site due to the project activity in year y ($t_{CO2}e$)

$PE_{fuel,onsite,y}$ is the emissions on-site due to fuel consumption on-site in year y ($t_{CO2}e$)

$PE_{a,y}$ is the emissions from the anaerobic digestion process in year y ($t_{CO2}e$)

$PE_{r,y}$ is the emissions from the combustion of RDF in year y ($t_{CO2}e$)

Emission from electricity use:

Where the project activity involves electricity consumption, CO_2 emissions are calculated as follows:

$$PE_{elec,y} = MWH_{e,y} * CEF_{elec} \quad \textbf{(2)}$$

Where:

$MWH_{e,y}$ is the amount of electricity generated in an on-site fossil fuel fired power plant or consumed from the grid in the project activity, measured using an electricity meter (MWh)

CEF_{elec} is the carbon emissions factor for electricity generation in the project activity (t_{CO2}/MWh)

Since the net electricity consumption by the project activity is less than the small scale threshold. CEF_{elec} has been calculated as per AMS I.D.

Note: $MWH_{e,y}$ is same as $EG_{PJ,FF,y}$ as per the methodology.

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 gasifier, etc.). Emissions are calculated from the quantity of fuel used and the specific CO_2-emission factor of the fuel, as follows:

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

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 CO_2 emissions factor of the fuel (t_{CO2}/MJ)

Project participants shall use IPCC default values for the net calorific values for CO_2 emission factors.

Emission from anaerobic digestion:

$$PE_{a,y} = PE_{a,l,y} + PE_{a,s,y} \quad \textbf{(4)}$$

Where:

$PE_{a,l,y}$ is the CH4 leakage emissions from the anaerobic digesters in year y ($t_{CO2}e$)

$PE_{a,s,y}$ is the total emissions of N2O and CH4 from stacks of the anaerobic digestion process in year y ($t_{CO2}e$)

Since, there is no anaerobic digestion taking place in the project activity, emissions are not expected under this parameter.

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 CO_2 emissions from the combustion of RDF should be accounted for.

$$PE_{r,y} = PE_{r,f,y} + PE_{r,s,y} \quad \textbf{(7)}$$

Where:

$PE_{r,f,y}$ is the fossil-based waste CO_2 emissions from RDF-combustion in year y ($t_{CO2}e$)

$PE_{r,s,y}$ is the emissions from the final stacks from RDF-combustion in year y ($t_{CO2}e$)

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

The CO_2 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 CO_2 derived from gasification of waste of fossil origin and combusting RDF including waste of fossil origin, is estimated as follows:

$$PE_{r,f,y} = \sum_i A_i \times CCW_i \times FCF_i \times EF_i \times \frac{44}{12} \quad \textbf{(8)}$$

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 (t_{CO2}/tC)

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

Option 1:

$$PE_{r,s,y} = SG_{r,y} * MC_{N2O,r,y} * GWP_{N2O} + SG_{r,y} * MC_{CH4,r,y} * GWP_{CH4} \quad \textbf{(9)}$$

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 (t_{CO2}e /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 (t_{CO2}e /tCH4)

Option 2:

$$PE_{r,y} = Q_{biomass} \bullet \left(EF_{N2O} \bullet GWP_{N2O} + EF_{CH4} \bullet GWP_{CH4}\right) \bullet 10^{-3} \quad \textbf{(9.1)}$$

Where:

$Q_{biomass}$ 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 (t_{CO2}e /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 (t_{CO2}e /tCH4)

PP has decided to opt for option 1 for the calculation of the project emissions from the combustion of the RDF in the project activity.

Baseline Emission[3]:

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

$$BE_y = (MB_y - MD_{reg,y}) * GWP_{CH4} + EG_y * CEF_{Baseline,elec,y} + EG_{d,y} * CEF_d + HG_y * CEF_{baseline,therm,y} \quad \textbf{(10)}$$

Where:

BE_y	is the baseline emissions in year y ($t_{CO2}e$)
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)
GWP_{CH4}	is the Global Warming Potential of methane ($t_{CO2}e$/tCH4)
EG_y	is the amount of electricity in the year y that would be consumed at the project site in the absence of the project activity and which is not consumed anymore due to the implementation of the project activity, (MWh).
$CEF_{baseline,elec,y}$	is the carbon emissions factor for electricity consumed at the project site in the absence of the project activity (t_{CO2}/MWh)
$EG_{d,y}$	is the amount of electricity generated utilizing the biogas/syngas collected or RDF produced, and exported to the grid in the project activity during the year y (MWh)
CEF_d	is the carbon emissions factor for the displaced electricity source in the project scenario (t_{CO2}/MWh)
HG_y	is the quantity of thermal energy that would be consumed in year y at the project site in the absence of the project activity and which is not consumed anymore due to the implementation of the project activity (MWh).
$CEF_{baseline,therm,y}$	is the CO_2 emissions intensity for thermal energy generation ($t_{CO2}e$/MJ)

Since, the project activity is a green field project the EG_y and HG_y are zero.

Determination of CEF_d:

In the project activity the generated electricity from the RDF displaces electricity that would have been generated in other power plants in the grid in the baseline, CEF_d has been calculated according to methodology ACM 0002, since electricity generated is greater than small scale threshold (15 GWh/yr).

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

[3] In case monthly estimation of emission reductions are required we will follow the approach provided in the Methodological Tool (Emissions from solid waste disposal sites)-(Version 06.0.1) - EB 66-Annex 46.

period of time to comply with the MSW Management Rules. The adjusted baseline emissions ($BE_{y,a}$) are calculated as follows:

$$BE_{y,a} = BE_y * \left(1 - RATE_y^{Compliance}\right) \quad \textbf{(11)}$$

Where:

BE_y Is the CO_2-equivalent emission as determined from equation 10.

$RATE_y^{Compliance}$ 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.

$$MB_y = BE_{CH4,SWDS,y} \quad (12)$$

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".

$A_{j,x}$ is the amount of organic waste type j prevented from disposal in the landfill in the year x (tonnes/year), this is the value to be used for variable Wj,x in the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site".

Leakage (L_y):

Sources of leakage considered in the methodology are CO_2 emissions from processing/combustion of RDF. Leakage emissions should be estimated from the following equation:

$$L_y = L_{t,y} + L_{r,y} \quad \textbf{(14)}$$

Where:

$L_{t, y}$ is the leakage emissions from increased transport in year y ($t_{CO2}e$)

$L_{r, y}$ is the leakage emissions from the residual waste from the anaerobic digester, the processing/combustion of RDF in year y ($t_{CO2}e$)

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, the treatment facility or the project site

is same as the landfill where waste was dumped prior to the implementation of the project. Therefore, there will not be any emission from transportation of waste. However, residual waste after processing MSW and the ash is transported to a site 20 km from the project site for disposal. The emission generated due to this transportation of the residual waste shall be taken into account as leakage.

For calculations of the emissions, IPCC default values for fuel consumption and emission factors may be used. The CO_2 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:

$$L_{t,y} = \sum_{i}^{n} NO_{vehicles,i,y} * km_{i,y} * VF_{cons,i} * CV_{fuel} * D_{fuel} * EF_{fuel} \qquad \textbf{(15)}$$

Where:

$NO_{vehicles, i, y}$ is the number of vehicles for transport with similar loading capacity

$Km_{i, y}$ is the average additional distance traveled by vehicle type i

$VF_{cons, i}$ is the vehicle fuel consumption in litres per kilometer for vehicle type i (l/km)

CV_{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 (t_{CO2}/MJ)

In case the residual waste is delivered to a landfill, CH4 emissions are estimated through equation 12 using estimated weights of each waste type (A_{ci}). However, in the project activity only inert material is envisaged to be the only residual waste. Therefore, no emissions are expected out of the same.

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 ($t_{CO2}e$)
BE_y	is the emissions in the baseline scenario in year y ($t_{CO2}e$)
PE_y	is the emissions in the project scenario in year y ($t_{CO2}e$)
L_y	is the leakage in year y ($t_{CO2}e$)

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 fixed ex ante

Data/Parameter	CEF_d
Data unit	t CO2 e/MWh
Description	Emission factor of the grid electricity displaced by the project activity
Source of data	Publicly available data as published Central Electric Authority (CEA) of India
Value(s) applied	0.75
Choice of data or measurement methods and procedures	This data is taken from publicly available "Central Electric Authority: CO2 Baseline Database". No calculation was being carried out; the data has been directly taken from the above document. At present this is the most authentic and reliable data available.
Purpose of data	Calculation of the baseline emissions
Additional comment	Calculated as per appropriate methodology at start of crediting period. The same shall be applicable for the electricity exported to the grid

Data/Parameter	NCV_{fuel}
Data unit	MJ/ kg /(TJ/Gg)
Description	Net Calorific Value of diesel
Source of data	IPCC
Value(s) applied	43.3
Choice of data or measurement methods and procedures	IPCC upper limit value of the 95% confidence intervals
Purpose of data	Calculation of the baseline emissions
Additional comment	-

Data/Parameter	EF_{fuel}
Data unit	Ton CO2/TJ
Description	CO2 emission factor of fuel of diesel
Source of data	IPCC default values
Value(s) applied	74.1
Choice of data or measurement methods and procedures	IPCC default value has been chosen for conservative estimation
Purpose of data	Calculation of the baseline emissions
Additional comment	-

Data/Parameter	CCW_i
Data unit	%
Description	Fraction of carbon content in waste type i
Source of data	IPCC
Value(s) applied	
Choice of data or measurement methods and procedures	IPCC default value has been chosen for conservative estimation.
Purpose of data	Calculation of the baseline emissions
Additional comment	-

Waste type	Fraction of carbon content
Paper/cardboard	46
Textiles	50
Food Waste	38
Wood	50
Garden and park waste	49
Rubber and leather	67
Plastics	75
other, inert waste	3

Data/Parameter	D_{fuel}
Data unit	Kg/ l
Description	Density of diesel
Source of data	High Speed Diesel/ Gas Oil specification of Indian oil Corporation
Value(s) applied	0.84
Choice of data or measurement methods and procedures	The value chosen is country specific and publicly available. This is realistic assumption of the density of diesel in India.
Purpose of data	Calculation of the baseline emissions
Additional comment	The monitoring of this data will be done annually or ex-ante.

Data/Parameter	ϕ
Data unit	-
Description	Model correction factor to account for model uncertainties
Source of data	Methodological tool “Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site”(Annex 14, EB26)
Value(s) applied	0.9
Choice of data or measurement methods and procedures	Fixed parameter from applied methodological tool
Purpose of data	Calculation of Baseline emissions
Additional comment	Oonk et el. (1994) have validated several landfill gas models based on 17 realized landfill gas projects. The mean relative error of multi-phase models was assessed to be 18%. Given the uncertainties associated with the model and in order to estimate emission reductions in a conservative manner, a discount of 10% is applied to the model results. The same shall be applicable for the electricity exported to the grid

Data/Parameter	OX
Data unit	-
Description	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source of data	Methodological tool “Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site”(Annex 14, EB26)
Value(s) applied	0
Choice of data or measurement methods and procedures	Fixed parameter from applied methodological tool
Purpose of data	Calculation of Baseline emissions
Additional comment	-

Data/Parameter	F
Data unit	-
Description	Fraction of methane in the SWDS gas (volume fraction)
Source of data	Methodological tool “Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site”(Annex 14, EB26)
Value(s) applied	0.5
Choice of data or measurement methods and procedures	Fixed parameter from applied methodological tool
Purpose of data	Calculation of Baseline emissions
Additional comment	This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, under anaerobic conditions in the SWDS. A default value of 0.5 is recommended by IPCC.

Data/Parameter	DOC_f
Data unit	-
Description	Fraction of degradable organic carbon (DOC) that can decompose
Source of data	Methodological tool "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site"(Annex 14, EB26)
Value(s) applied	0.5
Choice of data or measurement methods and procedures	Fixed parameter from applied methodological tool
Purpose of data	Calculation of Baseline emissions
Additional comment	-

Data/Parameter	MCF
Data unit	-
Description	Methane correction factor
Source of data	Methodological tool "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site"(Annex 14, EB26)
Value(s) applied	0.8
Choice of data or measurement methods and procedures	Fixed parameter from applied methodological tool
Purpose of data	Calculation of Baseline emissions
Additional comment	The methane correction factor (MCF) accounts for the fact that unmanaged SWDS produce less methane from a given amount of waste than managed SWDS, because a larger fraction of waste decomposes aerobically in the top layers of unmanaged SWDS.

Data/Parameter	DOC_j
Data unit	-
Description	Fraction of degradable organic carbon (by weight) in the waste type j
Source of data	Methodological tool "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site"(Annex 14, EB26)
Value(s) applied	Apply the following values for the different waste types j:
Choice of data or measurement methods and procedures	Fixed parameter from applied methodological tool
Purpose of data	Calculation of Baseline emissions
Additional comment	-

Waste type j	DOC_j (% wet waste)
Wood and wood products	43
Pulp, paper and cardboard (other than sludge)	40
Food, food waste, beverages and tobacco (other than sludge)	15
Textiles	24
Garden, yard and park waste	20
Glass, plastic, metal, other inert waste	0

Data/Parameter	K_j
Data unit	-
Description	Decay rate for the waste type j
Source of data	Methodological tool "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site"(Annex 14, EB26)
Value(s) applied	Apply the following default values for the different waste types j: **Decay rate for the waste type j (Tropical (MAT>20°C) and Dry (MAP<1000mm))**
Choice of data or measurement methods and procedures	Fixed parameter from applied methodological tool
Purpose of data	Calculation of Baseline emissions
Additional comment	-

Waste type j	K_j
Wood and wood products	0.025
Pulp, paper and cardboard (other than sludge)	0.045
Food, food waste, beverages and tobacco (other than sludge)	0.085
Textiles	0.045
Garden, yard and park waste	0.065

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 (10) to (12) 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)	2623309	Tonnes of CO_2 e	Equation 10, 11 and 12 of B.6.1	The value given is cumulative value for the entire 10-year crediting period
EG_y	121.53	MU/annum	Equation 10 of B.6.1	
$CEF_{baseline, y}$	751	tonnes of CO_2/ MU	Equation 10 of B.6.1	
BE_y	3448498	tonnes of CO_2 e	Equation 12 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 (9.1) 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

Parameter	Values	Unit	Reference	Remarks
$PE_{r, y}$	41537.19	Ton CO_2/year	Equation 7 of B.6.1	This is estimation. During the crediting period this value will be calculated using monitored parameters.
$PE_{a, y}$	0	Ton CO_2/year	Equation 4 of B.6.1	
$PE_{fuel, onsite, y}$	1940.52	Ton CO_2/ year	Equation 3 of B.6.1	
$PE_{elec, y}$	648	Ton CO_2/year	Equation 2 of B.6.1	
PE_y	44900.03	Ton CO_2/year	Equation 1 of B.6.1	

Ex-ante estimation of Leakage Emission:

Leakage emission has been estimated using equations (14) to (17) 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
$L_{r, y}$	0	Ton CO_2	Equation 14 of B.6.1	The value given is the cumulative value for the entire 10-year crediting period.
$L_{t, y,}$	498.5	Ton CO_2/annum	Equation 14 of B.6.1	The value given is the cumulative value for the entire 10-year crediting period.
L_y	498.5	Ton CO_2	Equation 14 of B.6.1	The value given is the cumulative value for the entire 10-year crediting period.

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	3448498	Ton CO_2	Equation 10 and 18 of B.6.1	The value given is the cumulative value for the entire 10-year crediting period.
PE_y	449000	Ton CO_2	Equation 1 and 18 of B.6.1	The value given is the cumulative value for the entire 10-year crediting period.

Parameter	Values	Unit	Reference	Remarks
L_y	4985	Ton CO_2	Equation 14 and 18 of B.6.1	The value given is the cumulative value for the entire 10-year crediting period.
ER_y	3082627	Ton CO_2	Equation 18 of B.6.1	The value given is the cumulative value for the entire 10-year crediting period.

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
30/03/2011 – 29/03/2012	160110	44900	498.5	114711
30/03/2012 – 29/03/2013	224168	44900	498.5	178768
30/03/2013 – 29/03/2014	283837	44900	498.5	238438
30/03/2014 – 29/03/2015	339430	44900	498.5	294031
30/03/2015 – 29/03/2016	391232	44900	498.5	345833
30/03/2016 – 29/03/2017	362138	44900	498.5	316739
30/03/2017 – 29/03/2018	397141	44900	498.5	351741
30/03/2018 – 29/03/2019	429774	44900	498.5	384375
30/03/2019 – 29/03/2020	460205	44900	498.5	414805

30/03/2020 – 29/03/2021	488585	44900	498.5	443186
Total	**3536619**	**449000**	**4985**	**3082627**
Total number of crediting years	10			
Annual average over the crediting period	353662	44900	498.5	308262

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data/Parameter	**$EG_{PJ,FF,y}$**
Data unit	MWh
Description	Amount of electricity consumed from grid in the project activity
Source of data	Logbook readings of the electricity import
Value(s) applied	680
Measurement methods and procedures	The data shall be measured by the energy meter with accuracy class of 0.2.
Monitoring frequency	Measuring Frequency- Daily basis Recording Frequency- Daily basis Reporting Frequency- Daily basis in ER spread sheet
QA/QC procedures	All Meters are calibrated by accredited external third party, as per standard procedures, on annual basis. The readings shall be cross checked with the bills received from the State load dispatch centre.
Purpose of data	Calculation of the baseline emissions
Additional comment	Data will be archived till 2 years after the end of crediting period

Data/Parameter	**CEF_{elec}**
Data unit	tCO2/MWh
Description	Emission factor for the electricity consumed in the project activity (import)
Source of data	CEA database version 8.0
Value(s) applied	0.95284
Measurement methods and procedures	-
Monitoring frequency	Measuring Frequency- Annually Recording Frequency- Annually Reporting Frequency- Annually The same has been calculated referring the latest “tool to calculate the emission factor for an electricity system”
QA/QC procedures	-
Purpose of data	Calculation of the project emissions
Additional comment	Data will be archived till 2 years after the end of crediting period

Data/Parameter	F_{cons}
Data unit	Litres
Description	Diesel consumption on-site during year 'y' of the crediting period
Source of data	Logbook data
Value(s) applied	7,20,000
Measurement methods and procedures	The fuel consumption shall be captured by meter having accuracy level of 0.5.
Monitoring frequency	Measuring Frequency- Daily basis Recording Frequency- Daily basis Reporting Frequency- Daily basis in EY spread sheet
QA/QC procedures	All Meters are calibrated by accredited external third party, as per standard procedures, on annual basis. The quantity of diesel consumed shall be cross checked with inventory and purchase invoice during the monitoring period.
Purpose of data	Calculation of the project emissions
Additional comment	Data will be archived till 2 years after the end of crediting period

Data/Parameter	R_c
Data unit	Ton/year
Description	Amount of RDF combusted in year y
Source of data	Logbooks prepared using Load cell data
Value(s) applied	618075
Measurement methods and procedures	-
Monitoring frequency	Measuring Frequency- Daily basis Recording Frequency- Daily basis Reporting Frequency- Daily basis in ER spread sheet
QA/QC procedures	The load cells of the grab crane are calibrated by accredited external third party, as per standard procedures, on annual basis.
Purpose of data	Calculation of the project emissions
Additional comment	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 fed into the RDF combustor
Source of data	Logbook data for incoming waste and third party report for physical characterization of waste
Value(s) applied	

Waste type	Quantity (MT)
Paper/cardboard	40175
Textiles	12980
Food Waste	177264
Wood	12362
Garden and park waste	228811
Other, inert waste	16317
Rubber and leather	6861
Plastics	11249

Measurement methods and procedures	***Incoming MSW*** The same shall be measured using weighbridge at the project site. The weighbridge shall have a range of 100 kg – 40 MT and have an accuracy level of 5 kg. Three weighbridges shall be installed at the project site.
Monitoring frequency	Monitoring frequency: Daily basis Recording frequency: Daily basis

QA/QC procedures	All weighbridge/load cells are calibrated by accredited external third party, as per standard procedures, on annual basis.
Purpose of data	Calculation of the baseline emissions
Additional comment	Data will be archived till 2 years after the end of crediting period

Data/Parameter	**$SG_{r,y}$**
Data unit	m^3/hr
Description	Total volume of stack gas from RDF combustion in year y
Source of data	Online monitoring records
Value(s) applied	22,175,655
Measurement methods and procedures	The same shall be measured using flow meters (Model: ANB0.6-1800C) with accuracy level of + 0.51 of FSR. Individual meters are installed on all the three boilers for measurement.
Monitoring frequency	Monitoring frequency: Daily basis Recording frequency: Daily basis
QA/QC procedures	Maintenance of the equipment shall be carried out on regular basis. Also, the calibration of the equipment shall be undertaken on annual basis.
Purpose of data	Calculation of the project emissions
Additional comment	Data will be archived till 2 years after the end of crediting period

Data/Parameter	**$MC_{N2O,r,y}$**
Data unit	tN_2O/m^3
Description	Monitored content of nitrous oxide in the stack gas from RDF combustion in year y
Source of data	Third party certificates
Value(s) applied	0.00000000270
Measurement methods and procedures	Third party monitoring is carried out and hence no monitoring equipment are maintained at the site.
Monitoring frequency	Monitoring frequency: Quarterly basis Recording frequency: Quarterly basis
QA/QC procedures	The data obtained is compared with previous values and the same is found to be in the same range. Also, calibration records of the equipment used by third parties shall be checked. Calculation of the project emissions
Purpose of data	Calculation of the project emissions
Additional comment	Data will be archived till 2 years after the end of crediting period

Data/Parameter	**$VF_{consumption}$**
Data unit	Litre/km
Description	Vehicle fuel consumption in litres per kilometre for vehicle type i
Source of data	Literature available by World Bank (http://siteresources.worldbank.org/INTSARREGTOPTRANSPORT/PublicationsandReports/20747263/Final_version03NOV2005.pdf)
Value(s) applied	0.25
Measurement methods and procedures	Credible publicly available data source shall be referred.
Monitoring frequency	Monitoring frequency: Annual basis Recording frequency: Annual basis
QA/QC procedures	The same shall be crossed checked with latest publicly available data (If available) and the conservative value shall be considered for calculation.

Purpose of data	Calculation of the project and leakage emissions
Additional comment	Data will be archived till 2 years after the end of crediting period

Data/Parameter	**$MC_{CH4,r,y}$**
Data unit	tCH_4/m^3
Description	Monitored content of methane in the stack gas from RDF combustion in year y
Source of data	Third party certificates
Value(s) applied	0.00000000056
Measurement methods and procedures	Third party monitoring is carried out and hence no monitoring equipment are maintained at the site.
Monitoring frequency	Monitoring frequency: Quarterly basis Recording frequency: Quarterly basis
QA/QC procedures	The data obtained is compared with previous values and the same is found to be in the same range. Also, calibration records of the equipment used by third parties shall be checked.
Purpose of data	Calculation of the project emissions
Additional comment	Data will be archived till 2 years after the end of crediting period

Data/Parameter	**MB_y**
Data unit	t CH_4
Description	Methane produced in the landfill in the absence of the project activity in year 'y'.
Source of data	Calculated values as per the tool "Emission from solid waste disposal site"
Value(s) applied	706.36
Measurement methods and procedures	-
Monitoring frequency	Monitoring frequency: Annual Basis Recording frequency: Annual Basis
QA/QC procedures	
Purpose of data	Calculation of the baseline emissions
Additional comment	Data will be archived till 2 years after the end of crediting period.

Data/Parameter	**EG_d**
Data unit	MWh
Description	Amount of electricity generated utilizing the RDF produced and exported to grid in the project activity during the year y
Source of data	Metering Records
Value(s) applied	121,53035841
Measurement methods and procedures	The data for the electricity exported shall be monitored using energy the following meters of accuracy of 0.2. Also, the Gross generation at site shall be monitored using meter with accuracy of 0.2 Energy meter of accuracy 0.5 shall be used to monitor Auxiliary consumption at the project site. There are three meters monitoring the auxiliary consumption at the project site.
Monitoring frequency	Measuring Frequency- Continuous Recording Frequency- Daily basis Reporting Frequency- Daily basis in ER spread sheet
QA/QC procedures	The electricity exported to the state grid may be cross checked from the invoices raised by the state load dispatch centre. It may be equal or lesser than the electricity injected in the grid based on accounting done for actual scenario.
Purpose of data	Calculation of the baseline emissions
Additional comment	Data will be archived till 2 years after the end of crediting period

Data/Parameter	**$RATE^{Compliance}_y$**

Data unit	%
Description	Rate of Compliance
Source of data	Latest publicly available information
Value(s) applied	10%
Measurement methods and procedures	-
Monitoring frequency	Monitoring Frequency- Annually Recording Frequency- Annually
QA/QC procedures	The source of the information shall be an authentic government source
Purpose of data	Calculation of the baseline emissions
Additional comment	In the ex-post emission reduction calculation, the most recent $RATE^{Compliance}_{y}$ 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.

Data/Parameter	**$NO_{vehicles}$**
Data unit	Number
Description	Vehicles per carrying capacity per year
Source of data	Logbook records
Value(s) applied	4681
Measurement methods and procedures	-
Monitoring frequency	Measuring Frequency- Daily basis Recording Frequency- Daily basis Reporting Frequency- Daily basis in ER spread sheet
QA/QC procedures	The number of vehicles will be cross checked with the amount of ash and inert material transported and the carrying capacity of the truck. Measure of full truck load consignment and consignment not sent on full truck load shall be assessed separately.
Purpose of data	Calculation of the project emissions
Additional comment	Data will be archived till 2 years after the end of crediting period

Data/Parameter	**DT_y**
Data unit	Km
Description	Average additional distance travelled by vehicle for ash and inert disposal to the baseline in year y
Source of data	Logbook records
Value(s) applied	20
Measurement methods and procedures	-
Monitoring frequency	Monitoring Frequency- Annually Recording Frequency- Annually Reporting Frequency- Annually
QA/QC procedures	-
Purpose of data	Calculation of the project emissions
Additional comment	Data will be archived till 2 years after the end of crediting period

Data/Parameter	**Amount of RDF used outside the project boundary**
Data unit	Tons

Description	Project proponent shall monitor the amount of RDF sold for use outside of the project boundary
Source of data	Sale invoices, if any
Value(s) applied	0 (The PP is using the produced RDF to generate electricity at the project site. Therefore, the RDF is not envisaged to be sold outside the project boundary as per the project design)
Measurement methods and procedures	-
Monitoring frequency	Measuring Frequency- Weekly basis Recording Frequency- Weekly basis
QA/QC procedures	The records of RDF production, RDF consumption and available inventory shall be checked to ascertain that there is no RDF sold outside the project boundary. Also, weighbridge shall be calibrated on annual basis.
Purpose of data	Calculation of the project emissions
Additional comment	Data will be archived till 2 years after the end of crediting period

Data/Parameter	**$A_{j,x}$**
Data unit	tonnes/year
Description	Amount of organic waste type j prevented from disposal in the landfill in the year x (tonnes/year)
Source of data	Records of incoming waste and physical characterization certificate from third party
Value(s) applied	**Waste type** / **Quantity (MT)** Paper/cardboard: 40175 Textiles: 12980 Food Waste: 177264 Wood: 12362 Garden and park waste: 228811
Measurement methods and procedures	The total amount of the waste received in the plant shall be segregated according to the physical characterization, carried out by the third party on a quarterly basis.
Monitoring frequency	Measuring Frequency- Daily basis Recording Frequency- Daily basis, consolidated on annual basis
QA/QC procedures	The composition of waste shall be determined quarterly by a third party and weighbridge shall be calibrated on annual basis.
Purpose of data	Calculation of the baseline emissions
Additional comment	Data will be archived till 2 years after the end of crediting period

Data/Parameter	**$A_{ci,y}$**
Data unit	Tones/year
Description	Amount of residual waste type 'ci' from combustion of RDF
Source of data	weighbridge records and the physical characterization of the ash (conducted on annual basis)
Value(s) applied	0 (The amount of residual waste coming out of RDF combustion is only inert material which could not be separated in the pre-processing stage)
Measurement methods and procedures	-
Monitoring frequency	Measuring Frequency- Daily basis Recording Frequency- Daily basis Reporting Frequency- Daily basis in ER spread sheet

QA/QC procedures	Weighbridge will be subject to periodic calibration (in accordance with stipulation of the weighbridge supplier) by a third party.
Purpose of data	Calculation of the project emissions
Additional comment	Data will be archived till 2 years after the end of crediting period

Data/Parameter	**R_n**
Data unit	Ton
Description	Weight of RDF sold offsite for which no sale invoices can be provided
Source of data	Weighbridge records
Value(s) applied	0 (The PP is using the produced RDF to generate electricity at the project site. Therefore, the RDF is not envisaged to be sold outside the project boundary as per the project design)
Measurement methods and procedures	The weighbridge details may be referred from data provided in previous parameters
Monitoring frequency	Measuring Frequency- Daily basis Recording Frequency- Daily basis
QA/QC procedures	Weighbridge will be subject to periodic calibration (in accordance with stipulation of the weighbridge supplier) by a third party.
Purpose of data	Calculation of the project emissions
Additional comment	Data will be archived till 2 years after the end of crediting period

Data/Parameter	**R_t**
Data unit	Ton
Description	Total weight of RDF produced
Source of data	Logbooks prepared using Load cell data
Value(s) applied	618075
Measurement methods and procedures	-
Monitoring frequency	Measuring Frequency- Daily basis Recording Frequency- Daily basis, consolidated on monthly basis Reporting Frequency- Monthly basis in ER spread sheet
QA/QC procedures	The load cells of the grab crane are calibrated by accredited external third party, as per standard procedures, on annual basis.
Purpose of data	-
Additional comment	Data will be archived till 2 years after the end of crediting period

Data/Parameter	**$p_{n,j,x}$**
Data unit	%
Description	Weight fraction of the waste type in the sample collected during the year
Source of data	Sample measurements
Value(s) applied	

Type of waste	**Average**
Food waste	36.32%
Garden waste	19.08%
Wood pieces	3.80%
Paper/Cardboard	6.50%
Textile/cotton/Jute	6.34%
Rubber/Leather/Tyre	0.75%
Polythene/plastic	5.60%
Inert and other	4.39%

Measurement methods and procedures	Measuring Frequency- Thrice in a quarterly Recording Frequency- Thrice in a quarterly basis, consolidated on annual basis
Monitoring frequency	A minimum of three samples shall be undertaken every three months with the mean value valid for year y
QA/QC procedures	The characterization of Municipal Solid Waste (MSW) are conducted by the accredited 3rd party agency/laboratory at least three times in a quarter.
Purpose of data	To calculate the amount of particular waste from the total waste received at site
Additional comment	Data will be archived till 2 years after the end of crediting period. This parameter is introduced as per the requirement of the tool: Emission from solid waste disposal sites version 7

Data/Parameter	**Z**
Data unit	-
Description	Number of samples collected during the year y
Source of data	Third party reports
Value(s) applied	12
Measurement methods and procedures	Measuring Frequency- Thrice in a quarter Recording Frequency- Thrice in a quarter
Monitoring frequency	A minimum of three samples shall be undertaken every three months
QA/QC procedures	The sampling will be conducted by the accredited 3rd party agency/laboratory at least three times in a quarter In case there is a wide variation in the samples we will apply the correction estimates as per the tool "Sampling and surveys for CDM project activities and programmes of activities"
Purpose of data	To calculate the amount of particular waste from the total waste received at site
Additional comment	Data will be archived till 2 years after the end of crediting period. This parameter is introduced as per the requirement of the tool: Emission from solid waste disposal sites version 7

Data/Parameter	**FCF_i**
Data unit	Fraction
Description	Fraction of fossil carbon in waste type i
Source of data	Third party reports

Value(s) applied	<table><tr><th>Waste type</th><th>Fraction of carbon content</th></tr><tr><td>Paper/cardboard</td><td>1</td></tr><tr><td>Textiles</td><td>20</td></tr><tr><td>Food Waste</td><td>0</td></tr><tr><td>Wood</td><td>0</td></tr><tr><td>Garden and park waste</td><td>0</td></tr><tr><td>Rubber and leather</td><td>20</td></tr><tr><td>Plastics</td><td>100</td></tr><tr><td>other, inert waste</td><td>100</td></tr></table>
Measurement methods and procedures	The parameter to be determined through sampling where the samples shall be chosen in a manner that ensures estimation with 20% uncertainty at 95% confidence level.
Monitoring frequency	A minimum of three samples shall be undertaken every three months.
QA/QC procedures	The sampling will be conducted by the accredited 3rd party agency/laboratory at least three times in a quarter.
Purpose of data	Calculation of the baseline emissions
Additional comment	The parameter FCFi has to be monitored annually through sampling where samples shall be chosen in a manner that ensures estimation with 20% uncertainty at 95% confidence level. However, the PP failed to comply with the above requirement. A temporary deviation is proposed for the period 10th March 2017 to 31st March 2020 for the monitoring parameter. During this period, the IPCC default values for the parameter will be used.

Data/Parameter	**EF_i**
Data unit	Fraction
Description	Combustion efficiency for waste type i
Source of data	IPCC
Value(s) applied	1
Measurement methods and procedures	As per IPCC the combustion efficiency for incineration can be considered as 100%. IPCC factors have been considered here since country or project specific data is not available.
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	Calculation of the baseline emissions

Additional comment	-

B.7.2. Sampling plan

>>

Waste characterization assessment for the Municipal Solid Waste (MSW) received from MCD/ NDMC will be done on quarterly basis. The characterization process will be conducted by a NABL accredited laboratory in line with the applicable IS standards laid down for the municipal solid waste.

Sampling procedure for collecting a representative sample at Okhla plant is as follows:

MSW is received through roughly 250 trucks. MSW in each vehicle is weighted at the weighbridge station and weight is noted. Subsequently, about 10 kgs of MSW is collected from the truck from different locations and depths within the truck quantity. This procedure is carried out for collecting samples from all the trucks for the day. The collected samples are heaped up under a roof so that moisture loss does not occur.

The MSW heap is thoroughly turned repeatedly (for about 5-6 times) for mixing the contents. The MSW is then spread on concrete floor and one final sample of about 10 kg is collected. This sample is then segregated into 15 parts according to the requirements of the physical characterization. The sample thus collected is taken for analysis for the following physio-chemical parameters. Test protocols adopted for waste analysis are in accordance with standards prescribed by IS/ USEPS/ AISTM.

B.7.3. Other elements of monitoring plan

>>

All the monitoring equipment shall be calibrated by an independent agency, which is accredited with National Accreditation Board for Testing & Calibration Laboratories (NABL), Department of Science & Technology, and Government of India on an annual basis. If during the yearly test check, any meter is found to be beyond permissible limits of error, it would be calibrated immediately.

As per the Power Purchase Agreement (PPA), the energy exported to the state Grid is recorded from two independent meters viz., Main Meter and Check Meter and reading of main meter is used for billing. In the event of main meter not in operation / fails, the reading of the check meter shall be used for billing. Power Generation, Export & Auxiliary Consumption, fuel consumption are being recorded on regular interval, as defined in section D.7.2, and the same is being verified and approved by Manager (O&M).

Emergency Procedure

Though, all the measures are taken to avoid erroneous recording of the monitoring parameters, there might be certain situations which may include failure of various metering devices. To minimize the risk of data discrepancy a set of spare for different meters are maintained at the plant site. Further, regular checking and maintenance of all metering devices is carried out by plant personals at TOWMCL to maintain highest level of accuracy.

Roles and responsibilities

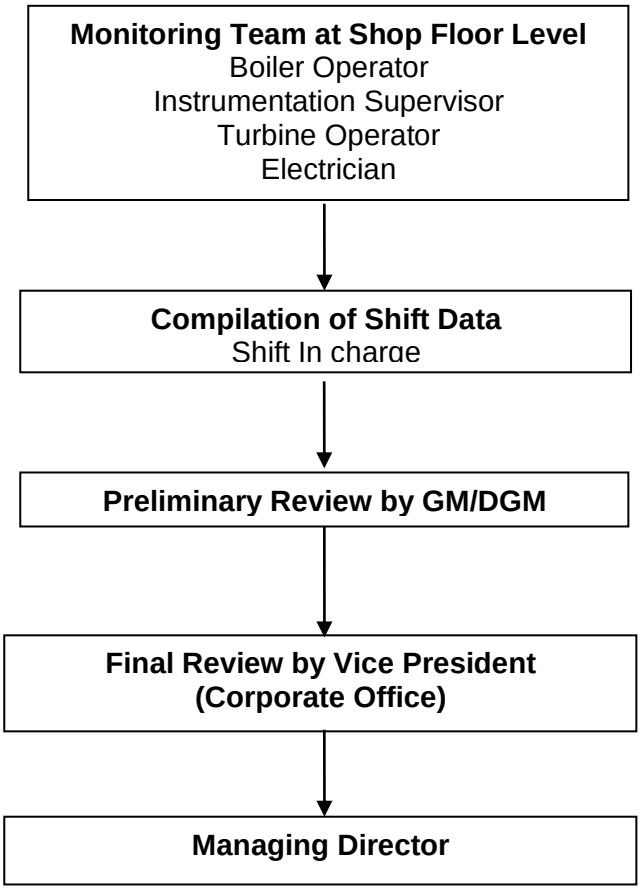
Different operators are responsible for monitoring of daily data of the waste received, RDF produced, RDF combusted, steam generated from boiler, steam fed to turbine, electricity generated, etc. The report is then sent to the Shift in-charge for the review.

Shift Electrician (Electrical) is responsible for taking meter readings for electricity generation daily.

Shift In charge is responsible for compilation of data which is then sent to GM for preliminary review.

GM is responsible for reviewing the monitored parameters report on a daily basis and presenting a daily executive summary report to the Vice President Corporate office which is finally reported to Managing Director (MD), TOWMCL.

Organization structure responsible for monitoring and reporting of parameters involved in CDM project activity has been presented in the following flow chart.



SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity

>>
27/11/2009 (Date of first purchase order to buy Boiler)

C.2. Expected operational lifetime of project activity

>>
Expected operational lifetime of the project: 25 years

C.3. Crediting period of project activity

C.3.1. Type of crediting period

>>
Fixed

C.3.2. Start date of crediting period

>>

C.3.3. Duration of crediting period

>>
10 years

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>
The project promoter has conducted an 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. Environmental impact assessment

>>

Report on Environmental Impact

The proposed project will be generating 20.9 MW power using Refuse Derived Fuel (RDF) from RDF production plant. The proposed project is an environment improvement project which treats MSW and converts waste to energy.

The environmental impacts can be either categorized as primary or secondary impacts. Primary impacts are those that can be attributed directly to the project itself while secondary impacts are those, which are induced indirectly because of the development activity which may be triggered by the primary impact. The secondary impacts typically include the associated investment and changed patterns of social and economic activity by the project activity.

To assess the extent of these impacts the project promoter has conducted a rapid Environmental Impact Assessment (EIA). In the rapid EIA the following potential environmental and social impacts of the projects were analyzed:

- General environmental impacts and benefits. The project promoter has conducted an 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 below.
- Land use impacts
- Air emission from biogas and energy generation and operation of the flare
- Waste water management and treatment
- Noise and odour management
- Solid waste management
- Socio economic impacts

The project promoter has developed specific environmental management plans to address all the environmental impacts during construction and operational phase to ensure that the proposed project on implementation will comply all the environmental norms as prescribed by various government agencies. The areas of concern as reflected from the rapid EIA are described below. The impacts during construction phase will be negligible considering the lifetime of the project as 25 years.

General environmental impacts and benefits: The project will be treating 1625 TPD of MSW in Phase – I and 2050 TPD of MSW in Phase - II at Okhla site. This will be beneficial to the general

environment of the Okhla and the surrounding area. In absence of the project activity this amount of MSW would have been dumped in unmanaged landfills in the Delhi city. Thus the project activity in general improves the environmental condition of the city by effectively managing MSW generated in the locality of Delhi.

Land Use Impacts: The proposed project will be implemented at Okhla. The area Okhla is 15 acres, which is sufficient for the entire project. The project does not propose any displacement of the local population. The land will house RDF production and power plant with all its auxiliary units. During the construction phase of the project activity there may be some temporary soil erosion because of removal of vegetation due to construction activity etc. considering the life time of the project activity these effects are negligible. Moreover all the waste storage areas are properly lined to ensure no leachate or hazardous chemical percolates to soil.

Air emissions from energy generation and combustion: Various activities proposed for the project will primarily emit suspended particulate matter (SPM), nitrogen oxides (NOx), carbon monoxide (CO), and sulphur dioxide (SO_2).

During the construction phase of the project following pollutant is anticipated.

- SPM from all construction activities

During operational phase of the project activity the following pollutants are anticipated.

- Fugitive emission from rotary trammel, dryer discharge chute of rotary trammel (secondary), coarse fluff discharge chute, secondary cyclone discharge duct of the RDF plant.
- Boiler flue gases containing SPM, NOx, SO_2, and other gases.
- Air emission from hot air generator comprising of SPM, CO and $_{CO2}$,
- Fugitive dust generation from material handling and processing.
- Emission from vehicular activities on site.

The project promoter has planned a specific environmental management system as well as proper air pollution control will be installed to ensure that all these possible emissions are within the limits as prescribed by National Ambient Air Quality Standards (NAAQS). Further the dioxin and furans emission is controlled in three stages in the entire project flow, as a result their emission will be negligible. However, considering chance emissions of dioxins and furans in future, a dioxin and furan emission control system will also be installed with injection of Activated carbon in the flue gases.

Wastewater management and treatment: The effluents generated from the project activity will be treated in the effluent treatment plant before final discharge. This is to ensure that there is no environmental deterioration. The effluent treatment takes care that the pH level, Biological Oxygen demand (BOD), Chemical Oxygen Demand (COD), total suspended solids (TSS), ammonical nitrogen and the dissolved phosphate contents are well within the prescribed norms as per Central Pollution Control Board. No fresh water shall be used for process water requirements, and fresh water shall be taken from Delhi Jal Board only for potable uses. Other requirements shall be met by treating sewage to the desired norms.

Noise and odour management: Major sources of noise pollution during the construction and operational stage of the project activity will be from construction equipment and diesel generator sets respectively. The project promoter will periodically check the noise level in around the site to ensure that the noise level is within the prescribed norms as per Ambient Air Quality Standard in Respect of Noise (AAQSRN). There will be no foul smell in the project activity as the UASB technology and RDF production plant treat municipal solid waste in closed chamber. At MSW

receiving site within the plant adequate doses of pesticides will be applied to avoid any foul smell that may potentially be generated from the MSW.

Solid waste management: As described above the project activity is a waste to energy project, which treats solids waste and sewage to produce electricity. In the plant when the solid waste will be received adequate amount of pesticides will be sprayed to avoid any possible contamination during manual segregation of recyclables. In all other processes the solid waste will be treated in a mechanised way where all environmental and health risks will be taken care of in the design of the process itself.

Socio Economic Impact: The project will enhance the socio economic scenario of the surrounding area by providing direct and indirect employment opportunity to the local people. Particularly the project will benefit the local rag pickers by providing them opportunity to collect recyclables during the manual segregation of the MSW received at the site in a hygienic condition as compared to unhealthy open dumping sites.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

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Stake Holders Involvement: The following stake holders are identified in the project activity.

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

IL&FS is the nodal organisation that is undertaking the entire development of the project activity. IL&FS has sound track record of developing infrastructure projects and is confident of successfully developing this project with help of additional revenue stream now available from CDM project.

The principal technology providers identified in the project activity are Andhra Pradesh Technology Development & Promotion Centre (APTDC) and Mailhem Engineers, Pune. 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). APTDC works by networking of expertise available anywhere in the globe to foster technology promotion in the country. APTDC has the main objective of technology development & promotion and is conceived as a one-stop shop for technology development & Promotion, technology up gradation and induction of new technologies as a unique model in the country. APTDC has collaborated with Technology Information, Forecasting and Assessment Council (TIFAC) for transfer of waste to energy technology from similar projects at Vijayawada and Hyderabad. TIFAC is an autonomous organisation set up under the aegis of Department of Science and Technology. Mailhem Engineers will provide the biomethanation technology. Mailhem Engineers, Pune have the experience of providing technological support to similar projects. They will be responsible for providing continuous operational and maintenance support to the biomethanation plant and will play a crucial part in success of the project in future.

For Municipal Corporation of Delhi and New Delhi Municipal Council, who are 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 wellbeing to the population of Delhi.

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, so it does not have any direct conflict with the people of the local region

E.2. Summary of comments received

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TOWMCL has conducted a stakeholder consultation process in an open and transparent manner on 25/03/2006 at Timarpur and on 10/06/2006 at Okhla site. They have invited all identified stakeholder explaining clearly about the project and sought their view on the project. The meeting was attended by the representatives of the identified stakeholders. The stake holder's appreciated TOWMCL for taking such a big initiative for the sustainable management and treatment of solid waste in the project area. The detailed report of stakeholder consultation will be made available to the validator on request. A brief description of the issues raised by the stakeholders and the corresponding explanation by the project participants are described in brief in section E.3.

E.3. Consideration of comments received

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Presented below in brief the issues raised by the stakeholders and the clarification provided by the Project Proponents.

Queries of Stakeholders	Clarification provided by TOWMCL
What are the measures taken by Company regarding the environmental aspects?	The Project Proponent has taken adequate measures regarding the environmental aspects and the SPM, SOx & NOx level will comply with the Delhi Pollution Control Committee (DPCC) norms. Further the Environmental Impact Assessment (EIA) study for the project has been completed. The Environment Management Plan (EMP), Risk assessment and Disaster Management Plan (DMP) in the EIA report takes care of the environmental issues.
What is the role of IL&FS and their stake in the project?	Infrastructure Leasing & Financial Services (IL&FS) is a leading institution of India, promoted by Public sector Financial Institutions and Banks of India including UTI, Central Bank of India and HDFC among others, with an objective, inter alia, of developing projects in the infrastructure sector on commercial basis. M/s IL&FS Ltd is involved only in project development activities and is not an operator of the plant. IL&FS is doing this project at no cost to MCD or NDMC and the final operator will be selected through an open bidding process. IL&FS has taken this initiative as a social cause. It has tied up with APTDC, an agency set up by Deptt. of Science & Technology, GOI, CII and Govt. of Andhra Pradesh for facilitating setting up of such projects. By way of implementing the Integrated Complex, the land filling requirement will drastically reduce resulting in huge savings to MCD & NDMC and pollution abatement. It will also serve the cause of India's support to Kyoto protocol by reducing Greenhouse gas emissions.
Who will give the	As per the agreements under finalisation with MCD and NDMC, it is the

Queries of Stakeholders	Clarification provided by TOWMCL
commitment for supply of garbage?	responsibility of MCD/NDMC or their private transporters, to deliver the garbage at the project site
What will be the height of the Chimney?	It was informed that the height of the Chimney at Okhla shall be 60 m and the SPM level will be better than desired norms.
What is GHG and how methane is reduced in the project?	GHG is Green House Gas covered under Kyoto Protocol for which Govt. of India is signatory. In absence of the project activity due to anaerobic decomposition of MSW lot of methane gets generated and goes to the atmosphere, which contributes to global warming. Because of this activity, the methane will be captured and used as fuel (few slides were presented on global warming).
What precautions will be taken to prevent smell of garbage from reaching the nearby residential areas?	The proposed plant will be of closed structure and slight negative pressure will also be maintained in MSW processing building to prevent smell from reaching the nearby residential areas. In addition, herbal liquids will be sprayed on the garbage to reduce the smell.
What are the measures taken by the Company regarding the environmental aspects?	The Project Proponents has taken adequate measures regarding the environmental aspects and the SPM, SO2 & NOX levels will comply with all the regulatory requirements. Further Environmental Impact Assessment (EIA) study for the project has also been carried out. The Environment Management Plan (EMP), Risk assessment and Disaster Management Plan (DMP) in the EIA report takes care of all the environmental issues.
Will garbage be spread all around the site before processing?	Garbage shall not be visible outside the plant premises and all operations will be controlled to the extent possible. Totally covered plant would also ensure that people residing nearby the Project do not get odour from the Project.

SECTION F. Approval and authorization

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The HCA for the project activity is already available as the project activity was registered with UNFCCC in 2007.

Appendix 1. Contact information of project participants

Organization name	TIMARPUR-OKHLA Waste Management Company Pvt Ltd
Country	India
Address	28, Shivaji Marg, Jindal ITF Centre, New Delhi, 110015
Telephone	+91-11-45021983/984
Fax	+91-11-45021982
E-mail	Neelesh.gupta@jindalecopolis.com
Website	www.towmcl.com
Contact person	Mr. Neelesh Gupta

Appendix 2. Affirmation regarding public funding

No public funding from Annex I countries are available in the project activity.

Appendix 3. Applicability of methodologies and standardized baselines

Please refer section B.2 of the PDD for justification of the applicability of the selected methodology.

Appendix 4. Further background information on ex ante calculation of emission reductions

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 (%)	Remarks
A	**Fuel**		There is wide variation in samples. However, average appears to be reasonable.
	Wooden Pieces	2	
	Paper/cardboard	6.5	
	Textiles/cotton	2.1	
	Thermocol	0.09	
	Straw/ Hay	0.18	
	Polythene & Plastic	1.82	
B	**Organics**		Kitchen waste will have about 15% sand and grit stuck to it.
	Green Matter	37.02	
	Kitchen Waste	23.38	
	Vegetable Chilka	5.30	
C	**Inerts**		Inert appears to be low. May be due to monsoon season.
	Concrete/Stone/bricks	3	
	Sand/Soil/Earth	11.02	
	Ceramic	2.74	
	Others	2.64	
D	**Recyclables**		Recyclables appears to be low as rag pickers at *Dhalaos* point segregate
	Glass	0.1	
	Rubber/Leather	1.11	

	Metal	1	these.
E	**Others**	0	It Includes Dead animals etc.
	Total	100	

Appendix 5. Further background information on monitoring plan

Refer section B.7.2

Appendix 6. Summary report of comments received from local stakeholders

NA

Appendix 7. Summary of post-registration changes

Table 1: Post registration modifications		
Sl. No	**Pre-registration scenario**	**Post-registration scenario**
1	The project was to be implemented at two sites namely Timarpur and Okhla	The project is now implemented at only one site, i.e. Okhla
2	Power generation capacity was 16 MW	Power generation capacity is 20.9 MW
3	100 MT of green waste earlier envisaged to be utilized in a Bio-methanation plant to produce biogas	The Bio-methanation plant has been discarded and the green waste shall now be processed with other MSW to produce RDF and shall be used for power generation.
4	Project cost was 1742.5 million	Project cost has increased to 2619.1 million due to implementation of better technology
5	The emission reductions envisaged from the project activity were 262,790 tCO_2e	Revised emission reduction expected from project activity on annual basis are 374,366 tCO_2e due to increased power generation and efficient technique to produce RDF from MSW.
6	a. The value of equation constants of first order decay (FOD) and fixed parameter (Methane correction factor) used for calculation of "The amount of methane that would in the absence of the project activity be generated from	a. The value of equation constants of first order decay (FOD) and fixed parameter (Methane correction factor) used for calculation of "The amount of methane that would in the absence of the project activity be generated from disposal of waste at the solid waste disposal site (*BECH4,SWDS,y*)"; as per the Methodological tool- "Tool to determine methane emissions avoided from dumping waste at a solid waste

	disposal of waste at the solid waste disposal site (*BECH4,SWDS,y*)"; as per the Methodological tool- "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site" (Annex 14, EB-26) were presented in the validated emission reduction calculation sheet however not reported in the registered PDD. b) Corrections in the frequency of the calculated parameter "Methane produced in the landfill in the absence of the project activity in year 'y' – MB_Y" from daily to monthly/annual in accordance with the methodology.	disposal site" (Annex 14, EB-26) have been included in the section B.6.2 of the PDD. PP would like to clarify that any corrections to project information of the registered clean development mechanism (CDM) project activity that does not affect the design of the project activity would not require the prior approval by the CDM Executive Board (Appendix1 – CDM Project standard V9). Further, if project participants make any corrections to project information or parameters fixed at validation as described in the registered PDD, project participants shall document these corrections in a revised PDD (Para 275 and 276 and project standard V9). Therefore, the inclusion of the ex-ante fixed parameter may be considered as corrections. b) The corrections to the typographical error in frequency of MB_Y is made.
7	**Data / Parameters ($p_{n,j,x}$) and (z_x)** were not part of monitoring plan in the PDD.	**Data / Parameters ($p_{n,j,x}$)** and **(z_x)** were being monitored by the PP however the same were not the part of monitoring plan. Reference of the methodological Tool "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site", (Annex 14, EB 26) which requires that the monitoring plan should contain an independent parameter, "Weight fraction of the waste type j in the sample n collected during the year x", $p_{n,j,x}$ was taken and the parameter is now included in the monitoring plan. The methodological tool also requires that the frequency of sampling of the above parameter shall be determined such that it becomes statistically significant with a maximum uncertainty range of 20% at a 95% confidence level. As a minimum, sampling should be undertaken four times per year. The PP has taken the sample four times in the year and the actual values have been used for the determination of the emission reductions. However the PP has not complied with the frequency of sampling statistically significant with a maximum uncertainty range of 20% at a 95% confidence level reason being the large population and the varied size of waste. PP hereby proposes to take a temporary deviation for

		the period 10th March 2015 to 9th March 2017 for the monitoring parameter. The following are the four scenarios (actual, average, minimum, maximum) for the calculation of emission reduction: 1. **Scenario 1** – The Project Emissions and Baseline Emissions are calculated based on actual $p_{n,j,x}$ of the 4 quarters. 2. **Scenario 2** - The Project Emissions and Baseline Emissions are calculated based on minimum value of the $p_{n,j,x}$ of the 4 quarters. 3. **Scenario 3** - The Project Emissions and Baseline Emissions are calculated based on average value of the $p_{n,j,x}$ of the 4 quarters. 4. **Scenario 4** - The Project Emissions and Baseline Emissions are calculated based on maximum value of the $p_{n,j,x}$ of the 4 quarters. For calculation of the CERs for the above scenarios, emissions from plastics, rubber & leather and other inert wastes have also been taken into account. The most conservative scenario i.e. minimum baseline emissions and maximum project emissions from the above four scenarios will be considered for estimating emission reductions. . Further as per the latest version of the methodology AM0025 / Version 14.0.0.(Pg. 38 of the methodology) The frequency of sampling should be "A minimum of three samples shall be undertaken every three months with the mean value valid for year y" Going forward the PP will following the same for the monitoring parameter.
8	Data/Parameter A_i	Editorial changes made under the **Value(s) applied** for the Parameter A_i

Table 2: Post registration modifications		
Sl. No	**Parameters**	**Post-registration scenario**
1	Data / Parameters FCF i	The parameter 'FCFi' had been fixed ex-ante in the PDD and IPCC default values were considered. Reference methodology AM0025 (version 06) "Avoided emissions from organic waste through alternative waste treatment processes" requires that the parameter FCFi

		be monitored annually and frequency of sampling of the above parameter shall be determined such that it becomes statistically significant with a maximum uncertainty range of 20% at a 95% confidence level. PP did not monitor the parameter as it was fixed in the PDD. PP hereby proposes to take a temporary deviation for the period 10th March 2017 to 31st March 2020 for the monitoring parameter. During this period, the IPCC value for the parameter will be used following a conservative approach. Further as per the methodology AM0025 / Version 06, the frequency of sampling should be "determined through sampling where the samples shall be chosen in a manner that ensures estimation with 20% uncertainty at 95% confidence level". Going forward, the PP will follow the same for the monitoring the parameter.
2	Data / Parameters EF i	The parameter 'EFi' is being included in the calculation of CERs but was not included in the PDD. The same has been added in the PDD in accordance with the methodology AM0025 (version 06) "Avoided emissions from organic waste through alternative waste treatment processes"

Document information

Version	*Date*	*Description*
11.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Make editorial improvements.
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for project activities" and with the PoA-DD and CPA-DD forms; • Make editorial improvement.
09.0	24 May 2017	Revision to: • Ensure consistency with the "CDM project standard for project activities" (CDM-EB93-A04-STAN) (version 01.0); • Incorporate the "Project design document form for small-scale CDM project activities" (CDM-SSC-PDD-FORM); • Make editorial improvement.
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revision to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.
05.0	25 June 2014	Revision to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from F-CDM-PDD to CDM-PDD-FORM; • Make editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.

Version	*Date*	*Description*
04.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the project design document form for CDM project activities" (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

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