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

CONTENTS

SECTION A. General description of project activity

A.1 Title of the project activity:

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Resource recovery centre (RRC)/ Refuse-Derived Fuel (RDF)-Waste to energy (WtE) plant project in Selangor Darul Ehsan, Malaysia (hereinafter referred to as "the Project")
Version 1.2, completed 22/3/2007

A.2. Description of the project activity:

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The Project proposed by Recycle Energy Sdn. Bhd., involves the construction and operation of Refuse-Derived Fuel (hereinafter referred to as "RDF") processing plant, RDF power plant and composting facility in Semenyih, Selangor Darul Ehsan. The Project is to implement the following major activities in operation stage:
- Recover a proportion of recyclable, reusable and recoverable resources from mixed, Municipal Solid Waste (hereinafter referred to as MSW)
- Produce RDF with combustible materials remaining in the processed MSW and utilize low pressure steam in cogeneration as thermal energy to condition the RDF by removing moisture,
- Compost organic wastes removed in the screening process, and
- Generate electricity with an engineered RDF combustion grate system with steam generator system for supply to the grid.

The heat energy released from combustion of RDF, which will be transformed into electricity to replace electricity generated by fossil fuel power plants of the grid, derives from the MSW, which would emit biogas including methane through anaerobic digestion in the managed landfill of Bukit Tagar without methane decomposition system in the absence of the Project. In addition, the composting facility operated by electricity generated from combustion of RDF will treat the MSW in aerobic condition instead of anaerobic condition observed in the landfill. Therefore, the Project will reduce greenhouse gas (GHG) emissions through both supplying electricity to the grid, and avoiding methane from MSW to be combusted in the form of RDF and composted in aerobic conditions.

The Project will contribute to the sustainable development of Malaysia in the following aspects:
Economy:
- The Project will improve local economy by providing job opportunity to local people for the construction, and contribute social security of scavengers, who might otherwise continue to work at existing solid waste disposal sites (SWDSs), by hiring them directly for the operation,
- The Project will contribute energy security stated in the Government 5th Fuel Strategy by providing renewable energy from previously wasted MSW.

Environment:
- The Project will extend operational lifetime of the SWDS, which in the absence of the Project would treat the MSW to be processed and incinerated by the Project,
- The Project will reduce current environmental and health impacts deriving from SWDSs in the region of the Project site as the result of reducing the load of MSW, particularly the contained organics disposed at SWDSs.

Technology:

- The Project will transfer the technologies required for the construction, operation and maintenance of the Project, especially ash disposal and post-processing of recyclables, through capacity building assistance to Core Competencies Sdn. Bhd., the Malaysian technology developer and, Malaysian Institute for Nuclear Technology Research (MINT), since the Project is "first of its kind" in Malaysia.

A.3. Project participants:

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Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participants (Yes/No)
Malaysia (host)	Recycle Energy Sdn. Bhd. (Private entity) (hereinafter referred to as "RESB")	No
Japan	Japan Carbon Finance, Ltd. (Private entity) (hereinafter referred to as "JCF")	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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Malaysia

A.4.1.1. Host Party(ies):

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Malaysia

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

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Selangor Darul Ehsan

A.4.1.3. City/Town/Community etc:

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Hulu Langat

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

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The Project plant is located between longitude 101° 52' East and 101° 53' East, and latitude 3° 0' North and on the land at Lot 3041 and 3042, Mukim Ulu Semenyih, of the above mentioned district.

http://www.lib.utexas.edu/maps/cia06/malaysia_sm_2006.gif
http://www.malaysia.or.kr/media/map-selangor.jpg

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

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Sectoral scope 1: Energy sector
Sectoral scope 13: Waste handling and disposal

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

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The Project proposed by RESB accepts mixed MSW from the Kajang Municipality (MPKj) and/or nearby Municipalities, for mechanical process to produce RDF and composting as an alternative to landfill disposal.

Mechanical process to produce RDF and its use:
Design is for the recovery of the maximum proportion of recyclable, reusable and recoverable resources from the mixed municipal solid waste. The recovery of recyclable, reusable and recoverable resources is largely by mechanical process and part of the mechanical process separates, dries and shreds combustible

materials before they are combusted in a RDF combustion grate system with steam cogeneration for power production and thermal energy for drying MSW on site.
The MSW is processed such that above 76% of the total by mass (and a higher percentage by volume) will be recovered as either recyclables or fuel. The component that is used for fuel is pre-dried and combusted. The heat energy released from combustion will be transformed into electricity with the use of a boiler and turbine steam generator system. Electricity is produced of about 7.5 MW, of which about 5.5 MW is exported to the National Grid with the remainder being used to operate the plant machinery.
The Project plant consists of two processing units. The Resource Recovery Centre (RRC) plant comprises of solid waste receiving area (8 tipping bays), grab crane and conveyor transfer, waste recovery, shredding, drying and, air separation units for the fuel preparation. The second unit (WtE Plant) is the Power Plant Unit comprising of a combustion furnace with flue gas treatment and, a steam turbine system that will produce 7.35 MW power. Flue gas after heating up the waste heat boiler and being treated to remove pollutants will exit through a 44-metre high stack.
The RRC is designed to operate as a modular system with 4 trains in parallel at the inlet end where waste is received and where resource recovery takes place. Each train is designed to operate independently including possessing independent receiving hoppers, conveyors and processing machinery per train. The resource recovery centre removes recyclables and sorts the recovered materials by stages as it simultaneously prepares the residual waste as fuel for combustion.
Firstly, overhead cranes permit removal of oversize materials before the waste enters a storage hopper. A bag-splitter opens up the bags while the water trapped in the plastic bags is transferred to the leachate collection tank. The waste is treated for odour before it is subjected to a screening process in a rotary screen. Mid-size material is taken for further processing and oversize material which mainly constitutes large plastics is taken for recycling. Small-size thin plastics are air-separated and taken for recycling. Other plastics are removed manually by workers stationed at conveyors in each train. Tramp iron is removed by a magnetic separator before the waste enters a first stage rotary drier with counter current hot air flow where, the waste is dried and sterilized. The waste is then subjected to a size reduction process in a shredder before it passes through a similar, second, drying operation. A second shredding operation is then performed on the waste to make it suitable for air separation and conveying. The light density product is a combustible fuel in the desired form and density.

The above discrete processes are integrated in the desired sequence to form a continuous process to receive waste at one end, discharge recyclables and, deliver fuel at the other end with a minimum of residual material requiring landfilling. The produced fuel has high-volatile-content, easy burning characteristics and reasonably high, low calorific value (LCV) as a bio-fuel and the moisture is kept within limit at 20 to 30%.
Technology transfer is included from Annex I countries in the form of specific technology for RDF furnace and, advanced power turbines.

Composting process in aerobic conditions:
The technology proposed for the composting plant can be regarded as proven technology but new to Malaysia. Technological or technical constraints are not expected. The chosen process can be characterized as follows:

- the composting plant is designed for a processing capacity of 50 tons of organic waste and 20 tons of structural, shredded yard waste input per day;
- composting process in three stages: blending / seeding followed by composting followed by maturing curing;
- the seeding and blending area will be a mechanical unit, composting will be undertaken in composting windrows. The maturing area will be open;

- frequent turning by use of dedicated windrow turning machine;
- windrow in first stage will be less than 2 meter at peak and less than 3 meters wide for maximum control of the process, turning will be every 2 days;
- windrow second stage will be in larger windrow with less frequent turning at the maturing area;

Semai Alam Sdn.Bhd. (SASB) has extensive knowledge of composting. SASB has developed many and operates several small-scale composting plants in Malaysia and manufactures a range of compost processing equipment in Malaysia that includes mobile shredders, windrow and triangle turners and bio-reactor used to develop compost inoculate and reduce odours while improving performance. SASB has extensive knowledge in managing waste projects in Malaysia.
While the technology from SASB originates in Austria, the company owners and technical experts reside in Malaysia and ensure ongoing support for all their projects in Malaysia.

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

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The following table shows the estimated amount of emission reductions for 7 years:

Years	Annual estimation of emission reductions in tonnes of CO_2e
Year 1	33,382
Year 2	72,419
Year 3	100,550
Year 4	121,213
Year 5	136,730
Year 6	148,666
Year 7	158,085
Total estimated reductions (tonnes of CO_2e)	771,045
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	110,149

A.4.5. Public funding of the project activity:

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No public funding is received from Annex I Party

SECTION B. Application of a baseline and monitoring methodology

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

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"Avoided emissions from organic waste through alternative waste treatment processes" (AM0025 Vers. 6)

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

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The methodology is applicable to the Project since the Project meets the applicability conditions of the methodology as follows:

1. The Project involves a combination of "mechanical process to produce RDF and its use" and "a composting process in aerobic conditions" as a waste treatment option for the fresh waste that in a given year would have otherwise been disposed of in a landfill. The thermal treatment process (dehydration) occurs under controlled conditions (up to 300 degrees Celsius)" and "the physical and chemical properties of the proposed RDF shall be homogenous and constant over time.

2. The residual wastes from "mechanical process to produce RDF and its use" are delivered to a landfill.

3. 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.

4. The Project includes electricity generation for exports to the grid and internal use, and thermal energy generation from the combustion of RDF produced from MSW.

5. The Project does not store the produced RDF in a manner that may result in anaerobic conditions before its use. In addition, the handling and processing of the RDF does not produce liquid wastes.

6. Waste handling baseline scenario shows a continuation of current practice of disposing the waste in a landfill, even if any environmental regulations will be enforced to mandate the waste treatment options as determined in the methodology.

7. Even though any environmental regulations will mandate one or a combination of the waste treatment options as determined in the methodology, the compliance rate of the environmental regulations during the crediting period will be below 50%.

8. The Project **does not** involve capture and flaring of methane from existing waste in the landfill.

9. The produced RDF is not disposed of in a landfill.

10. Local regulations do not constrain the establishment of RDF production plants nor the use of RDF as fuel nor raw material.

11. It is demonstrated by the project proponent that no GHG emissions occur, other than biogenic CO2, due to chemical reactions during the thermal treatment process.

12. The Project activity does not involve thermal treatment process of neither industrial nor hospital waste.

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

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According to the methodology, the project boundary includes the following activities/facilities as the material/energy flow diagram shows in Figure 1:

- the facilities for mechanical processing of MSW to produce RDF,
- RDF combustor with steam cogeneration for on-site power generation,
- composting facility to treat MSW in aerobic conditions
- fossil fuel power plants/boiler connected to the energy system of the plant , and
- the landfill site of Bukit Tagar.

In addition, the project boundary does not include facilities for waste collection, sorting and transport to the project site according to the methodology.

The **greenhouse gases** included in or excluded from the project boundary are shown in Table 1.

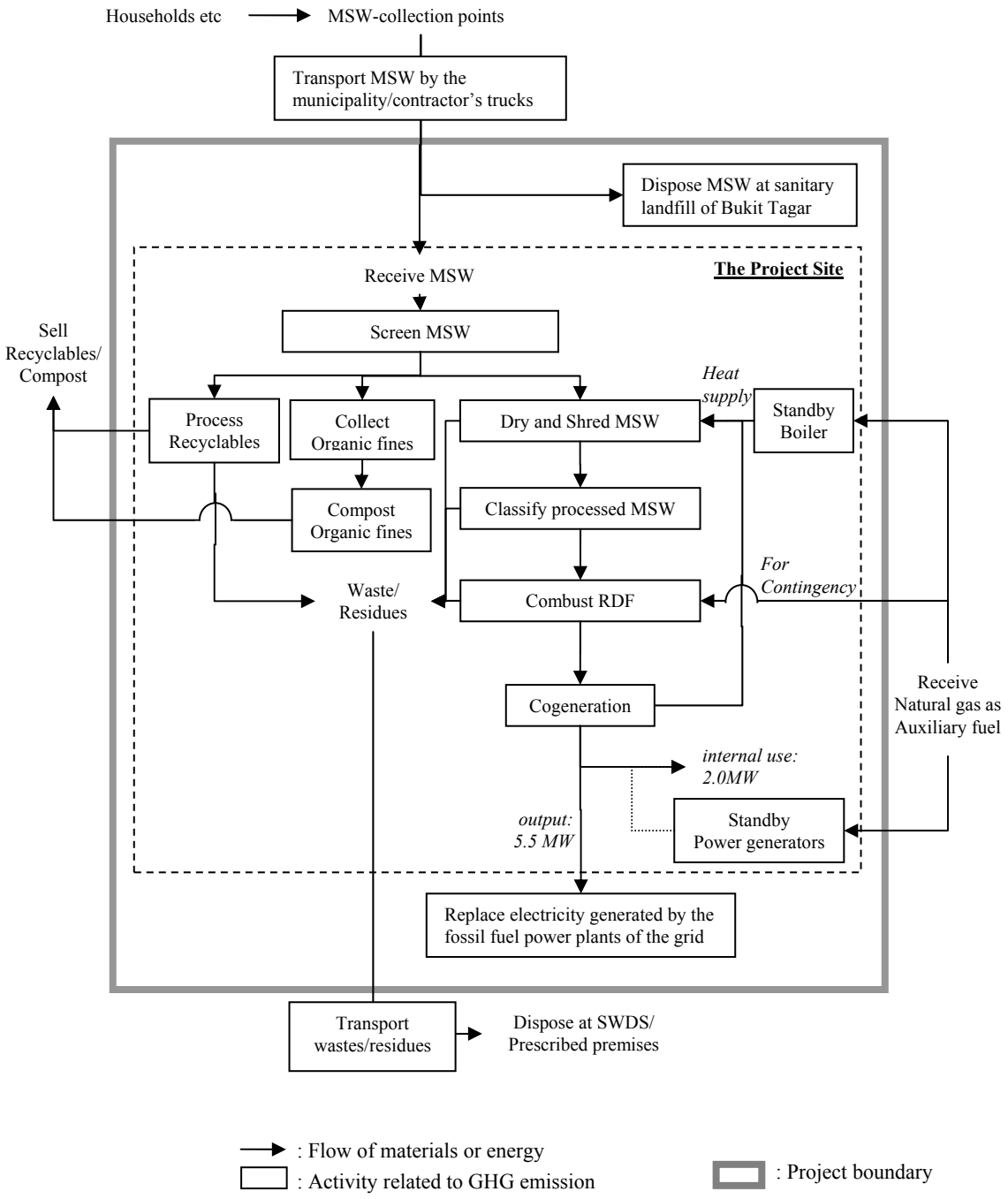

Figure 1: Schematic diagram of the project boundary

Table 1: Overview of emissions sources included in or excluded from the project boundary and baseline

	Source	Gas	Included?	Justification / Explanation
Baseline	Emissions from decomposition of waste at the landfill site	CH_4	Included	The major source of emissions in the baseline.
		N_2O	Excluded	N_2O emissions are small compared to CH_4 emissions from landfills. Exclusion of this gas is conservative.
		CO_2	Excluded	CO_2 emissions from the decomposition of organic waste are not accounted. [a]
	Emissions from electricity consumption	CO_2	Included	Electricity may be consumed from the grid in the baseline scenario
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Emissions from thermal energy generation	CO_2	Excluded	Thermal energy will be generated is only for internal use.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
Project Activity	On-site fossil fuel consumption due to the project activity other than for electricity generation	CO_2	Included	An important emission source. It includes vehicles used on-site and auxiliary fuel.
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small as described in the methodology.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small as described in the methodology.
	Emissions from on-site electricity use	CO_2	Included	CO_2 emission, (i) from fossil based waste from RDF combustion to generate electricity and (ii) from natural gas combustion to generate contingent electricity, are accounted for. Whole emissions from RDF combustion whether it is for electricity to the grid, internal use and thermal energy are included as it take place at one co-generation facility.
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small as described in the methodology..
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small as described in the methodology..
	Direct emissions from the waste treatment processes [b]	N_2O	Included	N_2O can be emitted from combustion of RDF and composting activities.
		CO_2	Included	The CO_2 emissions from fossil based waste from RDF combustion are totally accounted in "Emissions from on-site electricity use".
		CH_4	Included	CH_4 can be emitted from combustion of RDF and composting activities.

a: CO_2 emissions from the combustion or decomposition of *biomass* (see definition by the EB in Annex 8 of the EB's 20th meeting report) are not accounted as GHG emissions. Where the combustion or decomposition of biomass under a CDM project activity results in a decrease of carbon pools, such stock changes should be considered in the calculation of emission reductions. This is not the case for waste treatment projects.
b: Methane emission from effluent/leachate treatment plant of the Project is demonstrated to be negligible through the installation of an enclosed methane flaring system, which will be demonstrated by justification paper to DOE at the validation.

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

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As required by the methodology, Step 1 of the latest version of the "Tool for the demonstration and assessment of additionality" is utilized to identify the following realistic and credible baseline alternatives.

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

Sub-step 1a. Define alternatives to the project activity:

Alternative 1: The proposed activity of the Project, such as mechanical process to produce RDF and its use and composting, not implemented as a CDM project
Alternative 2: Conventional incineration of the waste without RDF processing
Alternative 3: Disposal of the waste on a landfill with electricity generation using landfill gas captured from the landfill site
Alternative 4: Disposal of the waste on a landfill with delivery of landfill gas captured from the landfill site to nearby industry for heat generation
Alternative 5: Disposal of the waste at a landfill where landfill gas captured is flared
Alternative 6: Disposal of the waste on a landfill without the capture of landfill gas

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

All the alternatives comply with the laws and regulations covering the Project activity and site. In addition, the Project is not the only alternative that is in compliance with all regulations.

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

As required by the methodology for assessment and demonstration of additionality, the latest version of the "Tool for the determination and assessment of additionality" and step 3 "Barrier analysis" of the tool onward are used to assess the additionality of the Project.

Step 3. Barrier analysis

Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed CDM project activity:
The following barriers prevent the implementation of the following alternatives:

Alternative 1:
Investment barrier
- There are significant investment barriers for local developers of MSW related projects since they have no access to equity and debt in the local and international market due to the high risk of investments related to MSW in Malaysia.

Technological barrier
- The Project is the "first of its kind", no project activity of this type is currently operational in Malaysia, which requires to install and operate the equipments for RDF processing and RDF combustion. Therefore the skilled and/or properly trained labour to operate and maintain the technology is not readily available. The same applies for the application of advanced MSW composting technology.

Barriers due to prevailing practice
- Since the Project is the "first of its kind", as explained in "Technological barrier", no project activity of this type is currently operational in Malaysia, and thus landfilling of MSW without methane flaring is prevailing practice in Malaysia.

Alternative 2:
Investment /Technological barrier
- The conventional incineration is/will not be efficient due to the high moisture content in Tropical Malaysia and the low calorific value of raw/fresh MSW requiring too much auxiliary fuel for enough incineration to be economically viable.

Alternative 3:
Investment barrier
- There is no regulation to enforce landfill gas capturing and its use for power generation, and this kind of activity has not been implemented due to low financial viability.

Alternative 4:
Investment barrier
- There is no regulation to enforce landfill gas capturing and its use for heat generation, and this kind of activity has not been implemented due to low financial viability.

Alternative 5:
Investment barrier
- There is no regulation to enforce landfill gas capturing and flaring even for safety and odour concerns, and this kind of activity has not been implemented without any revenue for the activity.

Sub-step 3b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):
The identified barriers would not prevent the implementation of the alternative, which is "Alternative 6: Disposal of the waste on a landfill without the capture of landfill gas" since MSW has been generally disposed at landfills, solid waste disposal sites (SWDSs), where organic carbon contained in MSW has been and will be degraded in anaerobic condition and emit methane into the atmosphere as the result.

Therefore, Alternative 6 is identified as the most plausible baseline scenario to the Project activity in accordance with the methodology. In addition, the applicability of the methodology is confirmed since "The methodology is only applicable if the most plausible baseline scenario is identified as either the disposal of the waste in a landfill without capture of landfill gas or the disposal of the waste in a landfill where the landfill gas is partially captured and subsequently flared".

Step 4. Common practice analysis

Sub-step 4a. Analyze other activities similar to the proposed project activity:
There was/is not any other activity similar to the Project in Malaysia.

Sub-step 4b. Discuss any similar options that are occurring:
This step is not applicable since no similar activity to the Project is identified above.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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The following equations are used in calculating project emissions, baseline emissions, leakage and emission reductions:

Project emissions

$PE_y = PE_{elec,y} + PE_{fuel,\ on\text{-}site,y} + PE_{c,y} + PE_{r,y}$

where:

PE_y	is the project emissions during the year y (tCO_{2e})
$PE_{elec,y}$	is the emissions from electricity consumption on-site due to the Project in year y (tCO_{2e})
$PE_{fuel,\ on\text{-}site,y}$	is the emissions on-site due to fuel consumption on-site in thermal (process steam) boiler (stand-by) in year y (tCO_{2e})
$PE_{c,y}$	is the emissions during the composting process in year y (tCO_{2e})
$PE_{r,y}$	is the emissions from the combustion of RDF in year y (tCO_{2e})

$PE_{elec,y} = EG_{PJ,FF,y} * CEF_{elec}$

where:

$EG_{PJ,FF,y}$	is the amount of electricity generated in an on-site natural gas power plants (stand-by) due to the project activity (MWh)
CEF_{elec}	is the carbon emissions factor for electricity generation in the project activity (tCO_2e/MWh)

The emission from RDF combustion for electricity and/or thermal energy generation is estimated in $PE_{elec,y}$ as per the equation for $PE_{r,f,y}$ and $PE_{r,s,y}$.

$PE_{fuel,\ on\text{-}site,y} = F_{cons,y} * NCV_{fuel} * EF_{fuel}$

where:

$PE_{fuel, on\text{-}site,y}$ is the CO_2 emissions due to on-site fuel (natural gas) combustion in thermal (process steam) boiler (stand-by) in year y (tCO_2)

$F_{cons,y}$ is the fuel (natural gas) consumption on-site in year y (sm^3)

NCV_{fuel} is the net caloric value of the fuel (natural gas) (MJ/sm^3)

EF_{fuel} is the CO_2 emissions factor of the fuel (natural gas) (tCO_2/MJ)

$PE_{c,y} = PE_{c,N2O,y} + PE_{c,CH4,y}$

where:

$PE_{c,N2O,y}$ is the N_2O emissions during the composting process in year y (tCO_2e)

$PE_{c,CH4,y}$ is the emissions during the composting process due to methane production through anaerobic conditions in year y (tCO_2e)

$PE_{c,N2Oy} = M_{compost,y} * EF_{c,N2O} * GWP_{N2O}$

where:

$M_{compost,y}$ is the total quantity of compost produced in year y (tonnes/year)

$EF_{c,N2O}$ is the emission factor for N_2O emissions from the composting process (tN_2O/t compost)

GWP_{N2O} is the Global Warming Potential of nitrous oxide, (tCO_2/tN_2O)

$PE_{c,\ CH4,\ y} = MB_{compost} * GWP_{CH4} * S_{a,y}$

where:

$PE_{c,CH4,y}$ is the project methane emissions due to anaerobic conditions in the composting process in year y (tCO_2e)

$S_{a,y}$ is the share of the waste that degrades under anaerobic conditions in the composting plant during year y (%), calculated as follows:

$S_a = S_{OD} / S_{total}$

where:

S_{OD} is the number of samples per year with an oxygen deficiency (i.e. oxygen content below 10%)

S_{total} is the total number of samples taken per year, where S_{total} should be chosen in a manner that ensures the estimation of S_a with 20% uncertainty at a 95% confidence level.

$MB_{compost,y}$ is the quantity of methane that would be produced in the landfill in the absence of the composting activity in year y (tCH_4). $MB_{compost,y}$ is estimated by multiplying MB_y estimated from equation for MB_y by the fraction of waste diverted, from the landfill, to the composting activity relative to the total waste diverted from the landfill to the Project.

GWP_{CH4} is the Global Warming Potential of methane (tCO_2e/tCH_4)

$PE_{r,y} = PE_{r,f,y} + PE_{r,s,y}$

where:

$PE_{r,f,y}$ is the fossil-based waste CO_2 emissions from the combustion of RDF in year y (tCO_{2e})

$PE_{r,s,y}$ is the N_2O and CH_4emissions from the final stacks from RDF combustor in year y (tCO_{2e})

$PE_{r,f,y} = \Sigma\ A_i * CCW_i * FCF_i * EF_i * 44/12$

where:

A_i	is the amount of fossil carbon wastes fed (t/yr)
CCW_i	is the fraction of carbon content in fossil carbon wastes (fraction)
FCF_i	is the fraction of fossil carbon in fossil carbon wastes (fraction)
EF_i	is the combustion efficiency for fossil carbon wastes (fraction)
44/12	is the conversion factor (tCO_2/tC)

$$PE_{r,s,y} = SG_{r,y} * MC_{N2O,r,y} * GWP_{N2O} + SG_{r,y} * MC_{CH4,r,y} * GWP_{CH4}$$

where:

$SG_{r,y}$	is the total volume of stack gas from RDF combustion in year y (Nm^3/yr)
$MC_{N2O,r,y}$	is the monitored content of nitrous oxide in the stack gas from RDF combustion in year y (tN_2O/Nm^3)
GWP_{N2O}	is the Global Warming Potential of nitrous oxide (tCO_2e/tN_2O)
$MC_{CH4,r,y}$	is the monitored content of methane in the stack gas from RDF combustion in year y (tCH_4/Nm^3)
GWP_{CH4}	is the Global Warming Potential of nitrous oxide (tCO_2e/tCH_4)

Baseline emissions

$$BE_y = (MB_y - MD_{reg,y}) * GWP_{CH4} + EG_{d,y} * CEF_d$$

where:

BE_y	is the baseline emissions in year y (tCO_2e)
MB_y	is the methane emissions avoided during the year y from preventing waste disposal at the solid waste disposal site (SWDS) during the period from the start of the project activity to the y (tCH_4)
$MD_{reg,y}$	is methane that would be destroyed in the absence of the project activity in year y (tCH_4), calculated as follows: $MD_{reg,y} = MB_y * AF$ where: AF is the adjustment factor for MB_y (%)
GWP_{CH4}	is the Global Warming Potential of methane (21 tCO_2e/tCH_4)
$EG_{d,y}$	is the amount of electricity generated, by combusting RDF to be processed, 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 (tCO_2e/MWh)

$$MB_y = \varphi * (1-f) * (1-OX) * \frac{16}{12} * F * DOC_f * MCF * \sum_{x=1}^{y} \sum_{j} A_{j,x} * DOC_j * e^{-k_j*(y-x)} * \left(1 - e^{-k_j}\right)$$

where:

φ	is the model correction factor to account for the model uncertainties
f	is the fraction of methane captured at the SWDS and flared, combusted or used in another manner
OX	is oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)
F	is the fraction of methane in the SWDS gas

DOC_f is the fraction of DOC that can decompose
MCF is the methane correction factor (fraction)
DOC_j is the fraction of degradable organic carbon (by weight) in the waste type j
$A_{j,x}$ is the amount of organic waste type j prevented from disposal in the SWDS in the year x(tonnes/year)
Where different waste types j are prevented from disposal, determine the amount of different waste types ($A_{j,x}$) through sampling and calculate the mean from the samples, as follows:

$$A_{j,x} = A_x \frac{\sum_{n=1}^{z} p_{n,j,x}}{z}$$

where:
$A_{j,x}$ is the amount of organic waste type j prevented from disposal in the SWDS in the year x (tons)
A_x is the total amount of organic waste prevented from disposal in year x (tons)
$p_{n,j,x}$ is the weight fraction of the waste type j in the sample n collected during the year x
z is the number of samples collected during the year x
k_j is the decay rate for the waste type j
j is the waste type category (index)
x is the year during the crediting period: x runs from the first year of the first crediting period (x=1) to the year for which emissions are calculated (x=y)
y is the year for which methane emissions are calculated

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

$BE_{y,a} = BE_y * (1 - RATE^{Compliance}{}_y)$
where:
$RATE^{Compliance}{}_y$ 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.

Leakage

$L_y = L_{t,y} + L_{r,y}$

where:
$L_{t,y}$ is the leakage emissions from increased transport in year y (tCO_2e)
$L_{r,y}$ is the leakage emissions from residual waste from the processing/combustion of RDF in year y (tCO_2e)

$$L_{r,y} = S_{LE} * \varphi * (1-f) * (1-OX) * \frac{16}{12} * F * DOC_f * MCF * \sum_{x=1}^{y} \sum_{j} A_{ci,x} * DOC_j * e^{-k_j*(y-x)} * \left(1 - e^{-k_j}\right)$$

where:

S_{LE}	is the share of samples anaerobic, calculated as follows: $S_{LE} = S_{OD,LE} / S_{LE,total}$ where: $S_{OD,LE}$ is the number of samples per year with an oxygen deficiency (i.e. oxygen content below 10%) $S_{LE,total}$ is the total number of samples taken per year, where S_{total} should be chosen in a manner that ensures the estimation of S_a with 20% uncertainty at a 95% confidence level.
φ	is the model correction factor to account for the model uncertainties
f	is the fraction of methane captured at the SWDS and flared, combusted or used in another manner
OX	is oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)
F	is the fraction of methane in the SWDS gas
DOC_f	is the fraction of DOC that can decompose
MCF	is the methane correction factor (fraction)
DOC_j	is the fraction of degradable organic carbon (by weight) in the waste type j
$A_{ci,x}$	is the amount of organic waste type j prevented from disposal in the SWDS in the year x(tonnes/year)
k_j	is the decay rate for the waste type j
j	is the waste type category (index)
x	is the year during the crediting period: x runs from the first year of the first crediting period (x=1) to the year for which emissions are calculated (x=y)
y	is the year for which methane emissions are calculated

Emission Reductions

$ER_y = BE_y – PE_y – L_y$

where:

ER_y	is the emissions reductions in year y (t CO_2e)
BE_y	is the emissions in the baseline scenario in year y (t CO_2e)
PE_y	is the emissions in the project scenario in year y (t CO_2e)
L_y	is the leakage in year y (t CO_2e)

The methodology provides different default values for the following parameters and the following value is chosen for the following reasons:

Parameter:	Oxidation factor (OX)
Value chosen:	0.1
Reason:	The proposed default value for OX of managed SWDS, 0.1, is applied since the SWDS, which would treat the MSW to be processed and incinerated by the Project, is "Managed SWDS" accompanied with the controlled placement of waste (i.e. waste directed to

specific deposition areas, a degree of control of scavenging and a degree of control of fires) as well as cover material, mechanical compacting and levelling of waste.

Parameter: Fraction of degradable organic carbon (by weight) in the waste type j (DOC_j)
Value chosen: Values in the bold frame of the following table are chosen:

Waste type *j*	**DOC_j (% wet waste)**	**DOC_j (% dry waste)**
Wood and wood products	43	50
Pulp, paper and cardboard (other than sludge)	40	44
Food, food waste, beverages and tobacco (other than sludge)	15	38
Textiles	24	30
Garden, yard and park waste	20	49
Glass, plastic, metal, other inert waste	0	0

Reason: The proposed default fraction for DOC_j of wet waste, shown above, is applied since the fraction of the waste at SWDS, which would treat the MSW to be processed and incinerated by the Project, was measured in wet condition.

Parameter: Methane correction factor (MCF)
Value chosen: 1.0
Reason: The proposed default value for MCF of "Managed site", 1.0, is applied since the SWDS, which would treat the MSW to be processed and incinerated by the Project, is "Managed SWDS" accompanied with the controlled placement of waste (i.e. waste directed to specific deposition areas, a degree of control of scavenging and a degree of control of fires) as well as cover material, mechanical compacting and levelling of waste.

Parameter: Decay rate for the waste type j (k_j)
Value chosen: Values in the bold frame of the following table are chosen:

Waste type *j*		**Boreal and Temperate (MAT≤20°C)**		**Tropical (MAT>20°C)**	
		Dry (MAP/PET <1)	Wet (MAP/PET >1)	Dry (MAP< 1000mm)	Wet (MAP> 1000mm)
Slowly degrading	Pulp, paper, cardboard (other than sludge), textiles	0.04	0.06	0.045	0.07
Slowly degrading	Wood, wood products and straw	0.02	0.03	0.025	0.035
Moderately degrading	Other (non-food) organic putrescible garden and park waste	0.05	0.10	0.065	0.17
Rapidly degrading	Food, food waste, beverages and tobacco (other than sludge)	0.06	0.185	0.085	0.40

NB: MAT – mean annual temperature, MAP – Mean annual precipitation, PET – potential evapotranspiration. MAP/PET is the ratio between the mean annual precipitation and the potential evapotranspiration.

Reason: The proposed default value for k_j for the tropical region (MAT>20°C) with wet climate (MAP>1000mm), is applied since Malaysia is located in the tropical region (MAT>20°C) with wet climate (MAP>1000mm).

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

Project emissions parameters

Data / Parameter:	CEF_{elec}
Data unit:	tCO_2e/MWh
Description:	Carbon emissions factor for electricity generation
Source of data to be used:	Table AMS 1.D.1
Value applied:	0.8
Justification of the choice of data or description of measurement methods and procedures actually applied:	Since the electricity is partly generated in standby natural gas power generator, as an on-site fossil fuel power plant, CEF_{elec} is 0.8 tCO_2e/MWh, as required in the methodology.
Any comment:	n.a.

Data / Parameter:	EF_{fuel}
Data unit:	$t\text{-}CO_2/MJ$
Description:	CO_2 emissions factor of fuel (natural gas)
Source of data to be used:	IPCC
Value applied:	0.0000561
Justification of the choice of data or description of measurement methods and procedures actually applied:	0.0000561 $t\text{-}CO_2/MJ$ is 15.3 t-C/TJ, which is IPCC default data.
Any comment:	-

Data / Parameter:	$EF_{c, N2O}$
Data unit:	$t\ N_2O/t$ compost
Description:	Emission factor for N_2O emissions from the composting process
Source of data to be used:	Default
Value applied	0.000043
Justification of the choice of data or description of measurement methods and procedures actually	According to the methodology, default value of 0.043 kg N_2O/t compost derives from Schenk et al, 1997.

applied:	
Any comment:	-

Baseline emissions parameters

Data / Parameter:	CEF_d
Data unit:	tCO_2e/MWh
Description:	Carbon emissions factor for the displaced electricity source in the project scenario
Source of data to be used:	AMS 1.D. (Study on Grid Connected Electricity Baselines in Malaysia, April 2006)
Value applied	0.655
Justification of the choice of data or description of measurement methods and procedures actually applied:	Since the generated electricity from the combustion of RDF displaces electricity that would have been generated in other power plants in the grid in the baseline and the generation capacity of the Project (5.5MW) is less than small scale threshold (15MW), CEF_d is specified at 0.655, which is indicated by the abovementioned study implemented by Malaysia Energy Centre (PTM) and DANIDA.
Any comment:	The abovementioned source of data estimates emission factor of the grid in Peninsula Malaysia in accordance with AMS 1.D.

Data / Parameter:	φ
Data unit:	-
Description:	Model correction factor to account for model uncertainties
Source of data to be used:	Methodological tool "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site"
Value applied	0.9
Justification of the choice of data or description of measurement methods and procedures actually applied:	The default value is used.
Any comment:	-

Data / Parameter:	OX
Data unit:	-
Description:	Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)
Source of data to be used:	Conduct a site visit at the SWDS in order to assess the type of cover of the SWDS. Use the IPCC 2006 Guidelines for National Greenhouse Gas Inventories for the choice of the value to be applied.
Value applied	0.1
Justification of the choice of data or description of measurement methods and procedures actually	See section **B.6.1.**

applied:	
Any comment:	-

Data / Parameter:	DOC_f
Data unit:	-
Description:	Fraction of DOC that can decompose
Source of data to be used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied:	The default value is used.
Any comment:	-

Data / Parameter:	MCF
Data unit:	-
Description:	Methane correction factor
Source of data to be used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied	1.0
Justification of the choice of data or description of measurement methods and procedures actually applied:	See section **B.6.1.**
Any comment:	IPCC default values will be used

Data / Parameter:	DOC_j
Data unit:	-
Description:	Fraction of degradable organic carbon (by weight) in the waste type j
Source of data to be used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied	

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

Justification of the choice of data or description of measurement methods and procedures actually applied:	See section **B.6.1.**
Any comment:	IPCC default values will be used

Data / Parameter:	k
Data unit:	-
Description:	Decay rate for the waste type j
Source of data to be used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied	

Waste type j	k
Wood and wood products	0.035
Pulp, paper and cardboard (other than sludge)	0.07
Food, food waste, beverages and tobacco (other than sludge)	0.40
Textiles	0.07
Garden, yard and park waste	0.17

Justification of the choice of data or description of measurement methods and procedures actually applied:	See section **B.6.1.**
Any comment:	-

B.6.3 Ex-ante calculation of emission reductions:

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Project emissions

The project emissions in year y are:

$PE_y = PE_{elec,y} + PE_{fuel,\ on\text{-}site,y} + PE_{c,y} + PE_{r,y}$

where:

PE_y	is the project emissions during the year y (tCO_{2e})
$PE_{elec,y}$	is the emissions from electricity consumption on-site due to the Project in year y (tCO_{2e})
$PE_{fuel,\ on\text{-}site,y}$	is the emissions on-site due to fuel consumption on-site in year y (tCO_{2e})
$PE_{c,y}$	is the emissions during the composting process in year y (tCO_{2e})
$PE_{r,y}$	is the emissions from the processing and the combustion of RDF in year y (tCO_{2e})

Emissions from electricity use ($PE_{elec,y}$)

The Project consumes electricity to be generated on-site with natural gas generators (1 MW x 2, providing 100% of site power supply) only when the steam turbine generators of the Project plant are not operated due to their maintenance. CO_2 emissions from electricity use are calculated as follows:

$PE_{elec,y} = EG_{PJ,FF,,y} * CEF_{elec} + PE_{r,f,y} + PE_{r,s,y}$

where,

$EG_{PJ,FF,y} * CEF_{ele}$ = 1,120 (MWh/year) * 0.8 (tCO2e/MWh)
= 896 (t-CO2/year)

$PE_{r,f,y}$ = 38,690 (t/year) * 46 (%) * 1 (%) * 100 (%) * 44/12
+ 6,278 (t/year) * 50 (%) * 20 (%) * 100 (%) * 44/12
+ 14,965 (t/year) * 75 (%) * 100 (%) * 100 (%) * 44/12
= 44,108 (tCO_2e/year)

$PE_{r,s,y}$ = 469,861,920 (Nm3/year) * 20 (mgN2O/Nm3) * 310 (tCO2e/tN2O)
= 2,913 (tCO_2e/year)

Therefore,

$PE_{elec,y}$ = 896 (t-CO2/year) + 44,108 (t-CO2/year) + 2,913 (t-CO2/year)
= 47,917 (t-CO2/year)

Emissions from fuel use on-site ($PE_{fuel, on-site,y}$)

The Project consumes natural gas as auxiliary fuel for auxiliary thermal (process steam) boiler for shutdown of cogeneration. Emissions are calculated from the quantity of natural gas and the specific CO_2-emission factor of natural gas, as follows:

$PE_{fuel, on-site,y} = F_{cons,y} * NCV_{fuel} * EF_{fuel}$

where,

$PE_{fuel,on-site,y}$ = 912,800 (sm^3/year) * 39.87 (MJ/sm^3) * 0.0000561 (t-CO_2/MJ)
= 2,042 (t-CO_2/year)

It is demonstrated by justification paper to DOE at the validation stage that "the emission from fuel use on-site" due to vehicle use on-site will be a negligible since all emissions from incremental transportation (on-site and off-site) are less than the reduction of the emission from the trucks operated by the municipal council in the project scenario, as described in "Emissions from transportation" of "Leakage".

Emissions from composting ($PE_{c,y}$)

$PE_{c,y} = PE_{c,N2O,y} + PE_{c,CH4,y}$

where:

$PE_{c,N2Oy} = M_{compost,y} * EF_{c,N2O} * GWP_{N2O}$

where:

$PE_{c,N2O,y}$ = 18,250 (t-compost/year) * 0.000043 (tN_2O/t compost) * 310 (tCO_2/tN_2O)

= 243 (t-CO_2/year)

$PE_{c, CH4, y} = MB_{compost} * GWP_{CH4} * S_{a,y}$

Where the value of $S_{a,y}$ is estimated as zero since composting activity will be conducted in totally aerobic conditions, $PE_{c,CH4,y}$ is estimated as zero.

Emissions from the processing and the combustion of RDF ($PE_{r,y}$)

The emission from RDF combustion for electricity generation is estimated in $PE_{elec,y}$ as per the equation for $PE_{r,f,y}$ and $PE_{r,s,y}$. $PE_{r, y}$ is estimated zero since whole emissions from RDF combustion whether it is for electricity to the grid, internal use and thermal energy are included as it take place at one co-generation facility.

Therefore, the Project emissions are calculated below:

Years	Estimation of $PE_{elec,y}$ (tonnes of CO_2e)	Estimation of $PE_{fuel,on-site,y}$ (tonnes of CO_2e)	Estimation of $PE_{c,y}$ (tonnes of CO_2e)	Estimation of $PE_{r,y}$ (tonnes of CO_2e)	Estimation of PE_y (tonnes of CO_2e)
Year 1	47,917	2,042	243	0	50,202
Year 2	47,917	2,042	243	0	50,202
Year 3	47,917	2,042	243	0	50,202
Year 4	47,917	2,042	243	0	50,202
Year 5	47,917	2,042	243	0	50,202
Year 6	47,917	2,042	243	0	50,202
Year 7	47,917	2,042	243	0	50,202
Total (tonnes of CO_2e)	335,419	14,294	1,701	0	351,414

Note: $PE_{r, y}$ is estimated zero since whole emissions from RDF combustion whether it is for electricity to the grid, internal use and thermal energy are included as it take place at one co-generation facility.

Baseline emissions

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

$BE_y = (MB_y - MD_{reg,y}) * GWP_{CH4} + EG_{d,y} * CEF_d$

Methane generation from the landfill in the absence of the project activity
The amount of methane that is generated each year (MB_y) is calculated for each year with a multi-phase model, which is specified in the methodological tool "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site".

$$MB_y = \varphi * (1-f) * (1-OX) * \frac{16}{12} * F * DOC_f * MCF * \sum_{x=1}^{y} \sum_{j} A_{j,x} * DOC_j * e^{-k_j*(y-x)} * \left(1 - e^{-k_j}\right)$$

Therefore, the baseline emissions are calculated below:

Years	Estimation of $(MD_y - MD_{reg,y}) * GWP_{CH4}$ (tonnes of CO_2e)	Estimation of $EG_{d,y} * CEF_d$ (tonnes of CO_2e)	Estimation of BE_y (tonnes of CO_2e)
Year 1	58,197	28,532	86,729
Year 2	100,012	28,532	128,543
Year 3	130,604	28,532	159,136
Year 4	153,459	28,532	181,991
Year 5	170,935	28,532	199,467
Year 6	184,633	28,532	213,165
Year 7	195,641	28,532	224,172
Total (tonnes of CO_2e)	993,481	199,723	1,193,203

Leakage

According to the applied methodology, leakage emissions should be estimated from the following equation:

$L_y = L_{t,y} + L_{r,y}$

Emissions from transportation ($L_{t,y}$)

It is demonstrated by justification paper to DOE at the validation stage that there will be a negative leakage from transportation saving overall by the municipal council in the project scenario and no leakage will be considered in terms of the conservatism.

Emissions from residual waste from processing/combusting RDF ($L_{r,y}$)

Residual wastes from mechanical process to produce RDF will consist of (i) plastics and metals, to be recycled and (ii) organic materials included in classified inert materials to be disposed at the SWDS. Residual wastes from combusting RDF will consist of (iii) bottom ash and (iv) fly ash to be disposed in the SWDS and the prescribed premises respectively, which are considered completely inert to generate no GHG emission

Through effluent treatment system for residual liquid waste, leachate will generate (v) scheduled waste sludge. No GHG emission from (v) is considered since it will be inactivated as a toxic material in the prescribed premises.

As the result summarized below, the $L_{r,y}$, which consists of CH_4 emission from (ii), is estimated as follows:

Summary of Type of residual waste, its treatment method and GHG emission from the Project

Process	Type of residual waste	Treatment method	GHG emission/source
RDF processing	(i) plastics and metals	Recycled off-site	No
	(ii) residues from air-classification inclusive both organic and inert fractions	Landfilled at the SWDS	CH_4
RDF combustion	(iii) bottom ash (inert)	Landfilled at the SWDS	No
	(iv) fly ash (inert)	Disposed at the prescribed premises	No
Effluent treatment system	(v) scheduled waste sludge	Inactivated for final disposal at the prescribed premises	No

Therefore, the leakage emissions are calculated below:

Years	Estimation of $L_{t,y}$ (tonnes of CO_2e)	Estimation of $L_{r,y}$ (tonnes of CO_2e)	Estimation of L_y (tonnes of CO_2e)
Year 1	0	3,145	3,145
Year 2	0	5,922	5,922
Year 3	0	8,384	8,384
Year 4	0	10,576	10,576
Year 5	0	12,536	12,536
Year 6	0	14,296	14,296
Year 7	0	15,885	15,885
Total (tonnes of CO_2e)	0	70,744	70,744

Emission Reductions

According to the applied methodology, the following equation is applied to calculate emission reductions:

$ER_y = BE_y – PE_y – L_y$

where:

ER_y	is the emissions reductions in year y (t CO_2e)
BE_y	is the emissions in the baseline scenario in year y (t CO_2e)
PE_y	is the emissions in the project scenario in year y (t CO_2e)
L_y	is the leakage in year y (t CO_2e)

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

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Years	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage emissions (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
Year 1	50,202	86,729	3,145	33,382
Year 2	50,202	128,543	5,922	72,419
Year 3	50,202	159,136	8,384	100,550
Year 4	50,202	181,991	10,576	121,213
Year 5	50,202	199,467	12,536	136,730
Year 6	50,202	213,165	14,296	148,666
Year 7	50,202	224,172	15,885	158,085
Total (tonnes of CO_2e)	351,414	1,193,203	70,744	771,045

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

B.7.1 Data and parameters monitored:

Project emissions parameters

Data / Parameter:	1. $EG_{PJ,FF,y}$
Data unit:	MWh
Description:	Electricity generated in an on-site natural gas power plants (stand-by) due to the project activity
Source of data to be used:	Electricity meter
Value of data applied for the purpose of calculating expected	1,120 (= 2.0 MW * 16h/day * 35 day/year)

emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Measured continuously and archived in Electronic files.
QA/QC procedures to be applied:	Electricity meter will be subject to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy. The readings will be double checked by the electricity distribution company.
Any comment:	Measured from the difference between total produced amount to be measured and total sold amount to be measured

Data / Parameter:	2. $F_{cons,y}$
Data unit:	sm^3/year
Description:	The fuel (natural gas) consumption on-site
Source of data to be used:	Purchase invoices and/or metering
Value of data applied for the purpose of calculating expected emission reductions in section B.5	912,800 (= 1,630 sm3/h * 16 h/day * 35 days/year)
Description of measurement methods and procedures to be applied:	Calculated annually and archived in Electronic files.
QA/QC procedures to be applied:	The amount of natural gas will be derived from the paid invoices and/or metering (administrative obligation).
Any comment:	F_{cons} includes the amount of natural gas consumed by standby (auxiliary) natural gas boiler, and exclude the amount consumed by standby power generators.

Data / Parameter:	3. NCV_{fuel}
Data unit:	MJ/sm^3
Description:	Net calorific value of the fuel (natural gas)
Source of data to be used:	Country-specific data (Local gas supplier)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	39.87 (= 9,523 kcal/sm3)
Description of measurement methods and procedures to be applied:	Estimated annually and archived in Electronic files.
QA/QC procedures to be applied:	Country-specific data cited in authentic literature will be applied, resulting in no error due to measurement.

Any comment:	The specific data cited in authentic literature, such as official web-site of local natural gas supplier, will be applied.

Data / Parameter:	4. $M_{compost, y}$
Data unit:	Tonnes
Description:	Total quantity of compost produced in a year
Source of data to be used:	Plant record
Value of data applied for the purpose of calculating expected emission reductions in section B.5	18,250 (= 1,000 t/day * 5% * 365 day/year)
Description of measurement methods and procedures to be applied:	Measured annually and archived in Electronic files.
QA/QC procedures to be applied:	Weighed on calibrated scale; also cross check with sales of compost.
Any comment:	The produced compost will be trucked off from site. All trucks leaving site will be weighed. Possible temporary storage of compost will be weighed as well or not taken into account for calculated carbon credits.

Data / Parameter:	5. $S_{a,y}$
Data unit:	%
Description:	Share of the waste that degrades under anaerobic conditions in the composting plant
Source of data to be used:	(Calculated from S_{OD} and S_{total})
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0 (S_{OD} is considered zero)
Description of measurement methods and procedures to be applied:	Calculated weekly and archived in Electronic files
QA/QC procedures to be applied:	O_2-measurement-instrument will be subject to periodic calibration (in accordance with stipulation of instrument-supplier). Measurement itself to be done by using a standardised mobile gas detection instrument. A statistically significant sampling procedure will be set up that consists of multiple measurements throughout the different stages of the composting process according to a predetermined pattern (depths and scatter) on a daily basis.
Any comment:	Used to determine percentage of compost material that behaves anaerobically.

Data / Parameter:	6. S_{OD}

Data unit:	Number
Description:	Number of samples per year with an oxygen deficiency
Source of data to be used:	Oxygen measurement device
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0 (The value of S_{OD} is estimated as zero, since composting activity will be conducted in totally aerobic conditions,)
Description of measurement methods and procedures to be applied:	Measured weekly and archived in Electronic files
QA/QC procedures to be applied:	O_2-measurement-instrument will be subject to periodic calibration (in accordance with stipulation of instrument-supplier). Measurement itself to be done by using a standardised mobile gas detection instrument. A statistically significant sampling procedure will be set up that consists of multiple measurements throughout the different stages of the composting process according to a predetermined pattern (depths and scatter) on a daily basis.
Any comment:	Samples with oxygen content <10%. Weekly measurements throughout the year but accumulated once per year only.

Data / Parameter:	7. S_{total}
Data unit:	Number
Description:	Total number of samples taken per year
Source of data to be used:	Oxygen measurement device
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Sufficient number of samples to ensures estimation of Sa with 20% uncertainty at 95% confidence level.
Description of measurement methods and procedures to be applied:	Measured weekly and archived in Electronic files
QA/QC procedures to be applied:	O_2-measurement-instrument will be subject to periodic calibration (in accordance with stipulation of instrument-supplier). Measurement itself to be done by using a standardised mobile gas detection instrument. A statistically significant sampling procedure will be set up that consists of multiple measurements throughout the different stages of the composting process according to a predetermined pattern (depths and scatter) on a daily basis.
Any comment:	Total number of samples taken per year, where S_{total} should be chosen in a manner that ensures estimation of S_a with 20% uncertainty at 95% confidence level.

Data / Parameter:	8. $MC_{N2O,r,y}$

Data unit:	mg N_2O / Nm^3
Description:	Monitored content of N_2O in the stack gas
Source of data to be used:	Project Participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	20 (Previous monitoring result for EIA)
Description of measurement methods and procedures to be applied:	Measured quarterly and archived in Electronic files.
QA/QC procedures to be applied:	Maintenance and calibration of equipment will be carried out according to internationally recognised procedures. Where laboratory work is outsourced, one which follows rigorous standards shall be selected.
Any comment:	n.a.

Data / Parameter:	9. $SG_{r,y}$
Data unit:	Nm^3/yr
Description:	Total volume of stack gas from RDF combustion
Source of data to be used:	Project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	469,861,920 (= 59,326 Nm3/h: Previous monitoring result for EIA)
Description of measurement methods and procedures to be applied:	Measured at least quarterly and archived in Electronic files.
QA/QC procedures to be applied:	Maintenance and calibration of equipment will be carried out according to internationally recognised procedures.
Any comment:	The stack gas flow rate is either directly measured or calculated from other variables where direct monitoring is not feasible.

Data / Parameter:	10. A_i
Data unit:	t/yr
Description:	Amount of fossil carbon waste fed into RDF combustor
Source of data to be used:	Project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	

	Amount (t/yr)	Remark
Paper/cardboard	38,690	1,000 t/day * 365 days/year * 10.6%
Textiles	6,278	1,000 t/day * 365 days/year * 1.72%

	Nappies	0	1,000 t/day * 365 days/year * 0%
	Rubber and Leather	0	1,000 t/day * 365 days/year * 0%
	Plastics	14,965	1,000 t/day * 365 days/year * 4.1%
	Other, inert waste	0	1,000 t/day * 365 days/year * 0%
Description of measurement methods and procedures to be applied:	Measured annually and archived in Electronic files.		
QA/QC procedures to be applied:	Weighbridge will be subject to periodic calibration (in accordance with stipulation of the weighbridge supplier).		
Any comment:	n.a.		

Data / Parameter:	11. CCW_i
Data unit:	Fraction (%)
Description:	Fraction of carbon content in fossil carbon waste
Source of data to be used:	2006 IPCC Guidelines for National Greenhouse Inventories
Value of data applied for the purpose of calculating expected emission reductions in section B.5	(Table 2.4 in Volume 5: Waste of "2006 IPCC Guidelines for National Greenhouse Inventories")
Description of measurement methods and procedures to be applied:	Measured annually and archived in Electronic files.
QA/QC procedures to be applied:	2006 IPCC default factor will be applied, resulting in no error due to measurement.
Any comment:	n.a.

	Total carbon content in % of dry weight
Paper/cardboard	46
Textiles	50
Nappies	70
Rubber and Leather	67
Plastics	75
Other, inert waste	3

Data / Parameter:	12. FCF_i
Data unit:	Fraction (%)
Description:	Fraction of fossil carbon in fossil carbon waste
Source of data to be used:	2006 IPCC Guidelines for National Greenhouse Inventories
Value of data applied for the purpose of calculating expected emission reductions in section B.5	

	Fossil carbon fraction in % of total carbon
Paper/cardboard	1

	<table><tr><td>Textiles</td><td>20</td></tr><tr><td>Nappies</td><td>10</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> (Table 2.4 in Volume 5: Waste of "2006 IPCC Guidelines for National Greenhouse Inventories")
Description of measurement methods and procedures to be applied:	Measured annually and archived in Electronic files.
QA/QC procedures to be applied:	2006 IPCC default factor will be applied, resulting in no error due to measurement.
Any comment:	n.a.

Data / Parameter:	13. EF_i
Data unit:	Fraction (%)
Description:	Combustion efficiency for fossil carbon wastes
Source of data to be used:	2006 IPCC Guidelines for National Greenhouse Inventories
Value of data applied for the purpose of calculating expected emission reductions in section B.5	100 (Section 5.4.1.3 of "2006 IPCC Guidelines for National Greenhouse Inventories")
Description of measurement methods and procedures to be applied:	Estimated annually and archived in Electronic files.
QA/QC procedures to be applied:	IPCC default factor will be applied, resulting in no error due to measurement.
Any comment:	n.a.

Baseline emissions parameters

Data / Parameter:	14. AF
Data unit:	%
Description:	Methane destroyed due to regulatory or other requirements (the adjustment factor for MB_y)
Source of data to be used:	Local and/or national authorities
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0 (As of the submission of PDD, there is neither regulatory nor contractual requirement to reduce methane at the SWDS, which would treat the MSW to be processed and incinerated by the Project in the absence of the Project.)
Description of	Estimated annually and archived in Electronic files.

measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	Based upon local or national guidelines, so QA/QC-procedures for these data are not applicable according to the methodology.
Any comment:	Changes in regulatory requirements, relating to the baseline landfill(s) need to be monitored in order to update the adjustment factor (AF). This is done at the beginning of each crediting period.

Data / Parameter:	15. $EG_{d,y}$
Data unit:	MWh
Description:	Amount of electricity generated, by combusting RDF to be processed, and exported to the grid in the project activity
Source of data to be used:	Electricity meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	43,560 (= 5.5 MW * 24 h/day * 330 days/year)
Description of measurement methods and procedures to be applied:	Measured continuously and archived in Electronic files.
QA/QC procedures to be applied:	Maintenance and calibration of equipment will be carried out according to internationally recognised procedures. Third parties will be able to verify.
Any comment:	Electricity generated from use of RDF and exported to the grid

Data / Parameter:	16. F
Data unit:	% by weight
Description:	Fraction of methane in the SWDS gas
Source of data to be used:	Calculated
Value of data applied for the purpose of calculating expected emission reductions in section B.5	55 (At a landfill in the proximity of the treatment plant receiving comparable waste as the Project will receive, the methane fraction of landfill gas was measured at 0.6 and, thus 0.55, within an estimated range of 2006 IPCC(see page 3.26), is applied for F.)
Description of measurement methods and procedures to be applied:	Measured “once prior to the start of the Project activity at a landfill in the proximity of the treatment plant receiving comparable waste as the treatment plant will receive” as described in option 2 for determination of F in the methodology
QA/QC procedures to be applied:	Analyser will be calibrated prior to the measurement (in accordance with stipulation of the meter supplier) by a certified institute.
Any comment:	Option 2 described in the methodology will be selected due to the difficult accessibility of this data coming from landfill in proximity of the treatment plant, on regular basis.

Data / Parameter:	17. f
Data unit:	-
Description:	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
Source of data to be used:	Written information from the operator of the solid waste disposal site and/or site visits at the solid waste disposal site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0 (There is/will be no activity to flare, combust or use the methane captured at the SWDS.)
Description of measurement methods and procedures to be applied:	Monitored annually
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	18. GWP_{CH4}
Data unit:	tCO_2e/tCH_4
Description:	Global Warming Potential (GWP) of methane, valid for the relevant commitment period
Source of data to be used:	Decisions under UNFCCC and the Kyoto Protocol (a value of 21 is to be applied for the first commitment period of the Kyoto Protocol)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	21
Description of measurement methods and procedures to be applied:	Monitored annually
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	19.A_x
Data unit:	Tonnes
Description:	Total quantity of waste supplied to waste treatment plant in the year x
Source of data to be used:	Weighbridge
Value of data applied for the purpose of calculating expected	365,000 (= 1,000 t/day * 365 days/year)

emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Measured annually and archived in Electronic files.
QA/QC procedures to be applied:	Weighbridge will be subject to periodic calibration (in accordance with stipulation of the weighbridge supplier).
Any comment:	A_x includes the quantity of organic waste prevented from disposal in year x (tonnes/year)

Data / Parameter:	20. $P_{n,j,x}$
Data unit:	-
Description:	Weight fraction of the waste type j in the sample n collected during the year x
Source of data to be used:	Sampling/ Sorting/ weighing by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	<table><tr><td>Waste stream</td><td>Per cent by weight</td></tr><tr><td>Wood and wood products</td><td>2.63</td></tr><tr><td>Pulp, paper and cardboard (other than sludge)</td><td>10.60</td></tr><tr><td>Food, food waste, beverages and tobacco (other than sludge)</td><td>49.14</td></tr><tr><td>Textiles</td><td>1.72</td></tr><tr><td>Garden, yard and park waste</td><td>5.39</td></tr></table> Source: Waste survey at the landfill which disposes the waste to be incinerated in RDF by the project
Description of measurement methods and procedures to be applied:	Measured quarterly and archived in Electronic files. Sample the waste prevented from disposal, using the waste categories *j*, as provided in the table for DOC_j and k_j, and weigh each waste fraction.
QA/QC procedures to be applied:	Regular sorting & weighing of waste (initially quarterly) by project proponent will be carried out. Procedures will be checked regularly by a certified institute/ DOE.
Any comment:	Determine fraction of each waste stream of total waste input to the treatment facility. The size and frequency of sampling should be 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.

Data / Parameter:	21. z
Data unit:	-
Description:	Number of samples collected during the year x
Source of data to be used:	Project participants
Value of data applied	($P_{j,x}$ above is directly applied for the calculation in section B.5)

for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Continuously, aggregated annually.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	22. $RATE^{compliance}$
Data unit:	-
Description:	Rate of compliance
Source of data to be used:	Municipal bodies
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0 (There is/will be no environmental regulations, which will mandate one or a combination of the waste treatment options as determined in the methodology.)
Description of measurement methods and procedures to be applied:	The compliance rate is based on the annual reporting of the municipal bodies issuing these reports. The state-level aggregation involves all landfill sites in the country. If the rate exceeds 50%, no CERs can be claimed.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	23. GWP_{N2O}
Data unit:	tCO_2e/tN_2O
Description:	Global Warming Potential (GWP) of N_2O, valid for the relevant commitment period
Source of data to be used:	Decisions under UNFCCC and the Kyoto Protocol (a value of 310 is to be applied for the first commitment period of the Kyoto Protocol)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	310
Description of measurement methods and procedures to be applied:	Monitored annually
QA/QC procedures to be applied:	-

Any comment:	-

Leakage emission parameter

Data / Parameter:	24. $A_{ci,y}$
Data unit:	Tonnes/yr
Description:	Quantity of residual waste type 'ci' from the processing/combustion of RDF
Source of data to be used:	Weighbridge
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Garden and park waste and other (non-food) putrescibles: 10,950 (= 1,000 t/day * 365 days/year * 3%) Wood and straw waste: 10,950 (= 1,000 t/day * 365 days/year * 3%)
Description of measurement methods and procedures to be applied:	Measured annually and archived in Electronic files.
QA/QC procedures to be applied:	Weighbridge will be subject to periodic calibration (in accordance with stipulation of the weighbridge supplier).
Any comment:	-

Data / Parameter:	25. S_{LE}
Data unit:	%
Description:	Share of samples anaerobic
Source of data to be used:	(Calculated from $S_{OD,LE}$ and $S_{LE,total}$)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	100
Description of measurement methods and procedures to be applied:	Weekly
QA/QC procedures to be applied:	O_2-measurement-instrument will be subject to periodic calibration (in accordance with stipulation of instrument-supplier). Measurement itself to be done by using a standardised mobile gas detection instrument. A statistically significant sampling procedure will be set up that consists of multiple measurements throughout the different stages of the composting process according to a predetermined pattern (depths and scatter) on a daily basis.
Any comment:	Used to determine percentage of compost material that behaves anaerobically.

Data / Parameter:	26. $S_{OD,LE}$
Data unit:	Number
Description:	Number of samples with oxygen deficiency
Source of data to be	Oxygen measurement device

used:	
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Weekly
QA/QC procedures to be applied:	O_2-measurement-instrument will be subject to periodic calibration (in accordance with stipulation of instrument-supplier). Measurement itself to be done by using a standardised mobile gas detection instrument. A statistically significant sampling procedure will be set up that consists of multiple measurements throughout the different stages of the composting process according to a predetermined pattern (depths and scatter) on a daily basis.
Any comment:	Samples with oxygen content <10%. Weekly measurements throughout the year but accumulated once per year only.

Data / Parameter:	27. $S_{LE,total}$
Data unit:	Number
Description:	Total number of samples
Source of data to be used:	Oxygen measurement device
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Statistically significant
Description of measurement methods and procedures to be applied:	Weekly
QA/QC procedures to be applied:	O_2-measurement-instrument will be subject to periodic calibration (in accordance with stipulation of instrument-supplier). Measurement itself to be done by using a standardised mobile gas detection instrument. A statistically significant sampling procedure will be set up that consists of multiple measurements throughout the different stages of the composting process according to a predetermined pattern (depths and scatter) on a daily basis.
Any comment:	Total number of samples taken per year, where $S_{LE,total}$ should be chosen in a manner that ensures estimation of S_{LE} with 20% uncertainty at 95% confidence level.

B.7.2 Description of the monitoring plan:

>>

The Project will be operated and managed by RESB who is also the project participant. The RESB will ensure safety in operation of the plant; a project manager will be allocated with the responsibility for ensuring that the safety issues are addressed and emissions are controlled.
The Project plant will comply with all regulatory and statutory requirements as prescribed under the state and central laws and regulations. RESB will monitor all its activities and performance related not only to GHG emission, but also the other issues, namely environment impacts. RESB will install meters to record, measure and calculate actual creditable emission reduction in most transparent and relevant manner. Installed meters will be calibrated according to the maintenance schedule programmed at the start of the operation and refreshed according to the plants performance requirement. All the monitoring data will be recorded and kept under safe custody of the project manager.

B.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

>>
Date of completion of the baseline study and monitoring methodology:
05/09/2006

Name of the responsible person(s)/entity(ies):
Pacific Consultants Co., Ltd.
Mr. Kenji Asakawa
Global Environment Department
Pacific Consultants Co., Ltd.
2-7-1 Nishi-Shinjuku, Shinjuku-ku, Tokyo 163-0370 Japan
Tel: +81-3-3344-1645 Fax: +81-3-3344-1713
Email: kenji.asakawa@tk.pacific.co.jp

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>
01/07/2007
The starting date of the project activity is determined as the date on which real action of the Project activity begins. Real action of the Project requires that all the functioning elements have completed testing and commissioning.

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

>>
30 years

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

C.2.1. Renewable crediting period

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

>>
01/06/2007

C.2.1.2. Length of the first crediting period:

>>
7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
Not applicable

C.2.2.2. Length:

>>
Not applicable

SECTION D. Environmental impacts

>>

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

>>
The Detailed EIA (DEIA) has been completed and the final document submitted to the Department of Environment, Malaysia. This document was approved in January, 2006.

The DEIA was completed by a Consultancy division of University Putra Malaysia. It contains major sections covering every aspect of the project. The contents include the following major sections which are described in brief:

Chapter 1. TITLE OF PROJECT describes the background to and objectives of the project with a summary project brief.

Chapter 2. PROJECT PROPONENT AND CONSULTANTS provides details of the proponent, EIA consultant, Project Management consultant and of the requisite environmental monitoring and testing.

Chapter 3. PURPOSE AND SCOPE OF DEIA REPORT provides purpose, scope and structure of the Detailed EIA report itself.

Chapter 4. PROJECT NEED describes the National context of the project using PESTEL approach.

Chapter 5. PROJECT DESCRIPTION provides details on location, layout, process, process control during all anticipated conditions, waste characterization, plant operation and management, material and energy flow, utilities, manpower and pollution control systems employed.

Chapter 6. PROJECT OPTIONS describes how the waste management technology and the site were selected and examines the options including the No Project option

Chapter 7. EXISTING ENVIRONMENT details the existing environment with reports generated by experts who conducted field investigation prior to the project start. The aspects reviewed include Geology and Geotechnical, Meteorology, Baseline air quality, hydrology and drainage, baseline water quality including surface and ground water, noise and vibration, land use up to a 10 kilometre radius, roads, utilities and other infrastructure aspects. The existing waste management system was examined and a details Socio-Economic survey and study conducted. Public health was also examined through assembly and analysis of existing medical records. The Terrestrial Flora, Fauna and, Aquatic Resources were studied and recorded in detail. Existing legislation was discussed in detail including the relevance of global standards to be applied to the project.

Chapter 8. ENVIRONMENTAL IMPACTS AND MITIGATING MEASURES provides further study by the experts evaluating the environmental impacts on each of the areas included in the existing environment or baseline studies. The focus was maintained on Air Pollution, Hydrology and Drainage, Noise Pollution and Vibration, Solid Residual Wastes, Geotechnical and Geological issues, Occupational Health and Safety, Quantitative Risk Assessment and, Environmental Health Risk, Flora / Fauna / Aquatic Impact and Mitigation. The Socio-Economic Impact assessment looked at both site preparation and construction and the occupation and maintenance stages as did other assessments. Land and Traffic impact assessments were included.

Chapter 9. RESIDUAL IMPACTS AND RECOMMENDATIONS provided expert recommendations on each of the assessed impacts, on operations management and, on monitoring and enforcement.

Chapter 10. ENVIRONMENTAL MANAGEMENT dealt with environmental monitoring and auditing and, emergency response management requirements.

The following major environmental impacts are analyzed as follows:

- Air pollutants:
  Emission gas and pollutants to air during production of RDF, combustion of produced RDF and, power generation are exhausted from chimneys at RRC plant and boiler at WtE plant.

- Waste water:
  Muddy water is discharged to the silt pond at construction stage, prior to release to the neighboring river/waterway, namely Sungai Lalang and Sungai Semenyih.
  Leachate, wastewater is generated by washing of waste receiving pit/floor/carrier vehicles/tools/machines, scrubber washing, enzyme preparation, cooling tower and others.

- Noise:
  The construction work and the plant operation generate noise impacts on the neighboring residents.

- Hazardous waste:
  The project operation generates hazardous wastes, namely slag and, fly ash.

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

>>

As per the above, the DEIA was approved in January, 2006, by Department of Environment after an advertisement being published in prominent newspapers and copies of the complete DEIA document being made available at all main DOE Branch offices. Comments were received and responded to via DOE, inclusive of description of any mitigation requirement. DOE also assembled a large panel of experts from around Malaysia including academics and professionals who also produced comments specific to their fields of interest. DOE then presented two sets of comments to the project proponent, namely the collected public comments and, the set of comments generated from the assembled panel of experts. The project proponent then issued a detailed response to all points.

DOE considered the project proponent's response to each comment both public and panel, together with the proponent's proposed mitigation. Meetings were held at DOE offices between the DOE, selected panel members, selected members of the public and, the project proponent.

Following the conclusion of meetings, DOE approved the DEIA in January, 2006 with binding conditions that must be followed under law which were essentially the actions and mitigations proposed by the proponent.

The following conditions are required by DOE for approval of DEIA to minimize/avoid the following impacts:

- Emission gas and pollutants to air
  Emission gas and pollutants to air from the chimneys at RRC plant must follow the standard C, Regulations of Environmental Quality (Clean Air) 1978, P.U (A) 280/1978. Sampling of the air quality must be done once in three months at project operation stage.
  Emission gas and pollutants to air from the chimneys of boilers at WtE plant must follow the following emission standard by sampling and analyzing at the following frequency:

Emission standard and sampling frequency
for
Emission gas and pollutants to air from the chimneys of boilers at WtE plant

No.	Parameter	Emission standard	Sample frequency
1	Smoke	Not over than Ringelmann Chart of No.1	-
2	Dust/Solid	0.015 g/Nm^3 or less	Continuous
3	Dioxin/Furan	0.1 ng-TEQ/Nm^3 or less	Once in a month
4	Hydrochloride acid gas (HCL)	0.1 g/Nm^3 or less	Continuous
5	Carbon Monoxide gas (CO)	0.125 g/Nm^3 or less	Continuous
6	Hydrofluoric acid gas	0.1 g/Nm^3 or less	Once in three months
7	Sulphur oxides (SO_X)	0.2 g/Nm^3 or less	Continuous
8	Nitrogen oxides (NO_X)	0.4 g/Nm^3 or less	Continuous

9	Cadmium (Cd)	0.015 g/Nm^3 or less	Once in three months
10	Mercury (Hg)	0.0002 g/Nm^3 or less	Once in three months
11	Plumbum (Pb)	0.0014 g/Nm^3 or less	Once in three months
12	Arcenic (As)	0.025 g/Nm^3 or less	Once in three months
13	Chromium (Cr^{3+})	0.05 g/Nm^3 or less	Once in three months
14	Total Organic Carbon (TOC)	20 g/Nm^3 or less	Once in three months

Note: Reference conditions for measurement of emission level: 273K, 1013kPa, 12% Oxygen, Dry gas

The Project plant must install the Continuous Emission Monitoring system (CEM) for parameters hydrochloric acid gas (HCl), carbon monoxide gas (CO), sulfur oxides (SO_X), nitrogen oxides (NO_X) and particulates, and this CEM must be directly connected to DOE Selangor.

- Water quality

  The muddy water discharged from the silt pond must be sampled and analyzed once in one month at earthwork stage to confirm it always contains suspended solid at 50 mg/l or less.
  The water sampled from Sungai Lalang and Sungai Semenyih must be analyzed once in three months at the project operation stage, to comply with the "Interim National Water Quality Standards" of DOE.
  The treated leachate/wastewater must comply with Discharge Standard A, the Third Schedule, Regulations of Environmental Quality (Industrial Sewages and Effluents) 1979, P.U.(A) 12, before discharge to any drainage or reuse in plant. It must be sampled and analyzed in terms of the following parameters once in a month at the project operation stage:
  - ✓ Chemical Oxygen Demand (COD),
  - ✓ Biochemical Oxygen Demand (BOD_5),
  - ✓ Total suspended solid (TSS),
  - ✓ Oil& grease (O&G),
  - ✓ Heavy metals(zinc, manganese, nickel, chromium, mercury, copper, plumbum and cadmium),
  - ✓ pH

- Noise

  Noise abatement plant must be submitted to DOE Selangor to control the noise level during construction works and plant operation must be controlled at 65 dB(A) or less during the daytime and 55 dB(A) or less during the nighttime, at the boundary of the Project site.

- Hazardous waste:

  Toxicity level of combustion waste such as slag must be analyzed through "Toxicity Characteristic Leaching Procedure" (TCLP) test for final disposal at sanitary landfill approved by Local Authorities.
  Ash from air pollution control equipment that have been categorized as schedule waste (SW 104) must be handled to follow specified steps in the Regulations of Environmental Quality (Schedule Waste) 2005, P.U. (A) 294 and disposed to secure landfill licensed by DOE.
  Schedule waste such as oily waste/used oil or other schedule waste that is produced at this plant must be handled following steps specified in the Regulation of Environmental Quality (Schedule Waste) 2005, P.U. (A) 294.

SECTION E. Stakeholders' comments

>>

As per the above, the DEIA process has been opened to National experts as well as to the public. Extensive comments had been received from both groups. DOE was satisfied to approve the DEIA with legally binding, stated conditions that the proponent has agreed to meet.

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

>>

Apart from the DEIA, comment and response period, there were earlier formal processes completed. These included:

- Door to door survey of over 50% of the population within a 5 km radius;
- Relevant Hospital records were compiled;
- Public Forum and Presentation held to give detailed review of the project and open the floor to questions. Local public were also made aware that the DEIA process would provide them an opportunity to read and comment on the DEIA document prior to its approval.

E.2. Summary of the comments received:

>>

The major comments were concerned with the following issues:

- Dioxin:
  Dioxin would be formed as unintended by products when chlorinated substances are burned at a temperature between 200 – 800 ^{o}C.

- Odor:
  The mechanical separation process of MSW would generate odor, from which the residents in immediate communities suffer.

- Contamination of water catchment area including the Project site:
  Any contamination of the area would lead to chronic exposure of toxic substances to the drinking water.

- Hazardous waste:
  Hazardous waste should not be treated in sanitary landfill.

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

>>

The project proponents take the following due accounts to respond the received comments:

- Dioxin:
  The direct impacts of air pollution on the surrounding area were simulated with an appropriate computer model and assessed to ensure local environmental regulations and international standards.
  Especially regarding dioxin, the operating temperature, 550 – 630 ^{o}C, is lower than the optimum level for dioxin precursor formation, 750 ^{o}C, and the project plant suppresses the formation of dioxin under oxygen deficient condition. In addition, the secondary combustion region is operated at 1,000 ^{o}C to decompose dioxin to a level below 1 ng TEQ/Nm^{3}.

Furthermore, in order to mitigate direct impact from the Project, buffer zone of the Project site are established to locate the project site over 500 meters from the nearest residential area.

- Odor:
In order to minimize odor, properly-mixed enzyme spray is applied to the collected waste at the outset to decompose the specific bacteria. In addition, the collected waste is dried before any intermediate storage and transported in hooded conveyors to minimize their multiplication with less moisture.

- Contamination of water in water catchment area:
The water catchment area including the Project site, Semenyih drainage area, is disproportionately large compared to the Project site. The predicted amount of wastewater is small and the project will treat the wastewater on Standard A, which is considered sufficient to avoid impacts on drinking water quality.

- Hazardous waste:
All hazardous waste, including fly ash, is treated at the prescribed disposal site for hazardous waste, while non-hazardous waste is treated at sanitary landfill only if the waste is classified as non-hazardous through Toxicity Characteristic Leaching Procedure (TCLP) test.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Recycle Energy Sdn. Bhd.
Street/P.O.Box:	Jalan Sg. Lalang, Kg Pasir
Building:	Lot 3041 & 3042
City:	Semenyith
State/Region:	Selangor Darul Ehsan
Postfix/ZIP:	43500
Country:	Malaysia
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	Chief executive Officer
Salutation:	Dr.
Last Name:	Ramly
Middle Name:	Hisham
First Name:	Noor
Department:	
Mobile:	
Direct FAX:	+603-8723-2627
Direct tel:	+603-8724-2628
Personal E-Mail:	noorhisham@recyclenergy.com

Organization:	Japan Carbon Finance, Ltd.
Street/P.O.Box:	1-3, Kudankita 4-Chome
Building:	Chiyoda-ku
City:	Tokyo
State/Region:	
Postfix/ZIP:	102-0073
Country:	Japan
Telephone:	+81 3 5212 8870
FAX:	+81 3 5212 8886
E-Mail:	jcf@jcarbon.co.jp
URL:	www.jcarbon.co.jp
Represented by:	Joichi Kimura
Title:	Deputy Director General
Salutation:	Mr.
Last Name:	Kimura
Middle Name:	
First Name:	Joichi
Department:	Carbon Finance Department
Mobile:	

Direct FAX:	+81 3 5212 8886
Direct tel:	+81 3 5212 8870
Personal E-Mail:	j-kimura@jcarbon.co.jp

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The Project will not receive any public funding.

Annex 3

BASELINE INFORMATION

Please refer to Section B.4, 5 and 6.

Annex 4

MONITORING INFORMATION

Please refer to Section B.7.

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