Feasibility Studies on Climate Change Mitigation Projects for CDM and JI
Municipal Solid Waste to Energy Project in Sidoarjo, Indonesia

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Pacific Consultants International

(1) Project Information

■Project Summary and Background Information

1. Objectives

The Municipal Solid Waste to Energy Project in Sidoarjo, Indonesia (hereinafter referred to as the "Project") is a Clean Development Mechanism (CDM) project activity that contributes to the reduction of two of the main greenhouse gases, namely carbon dioxide (CO_2) and methane (CH_4), and thus contributes to the mitigation of global warming and also enables sustainable development in the host country.

The project reduces CH_4 emissions from the municipal solid waste (MSW) disposal sites, where currently MSW is landfilled in an unmanaged manner. The thermal converter technology to be introduced incinerates MSW at a high temperature and its super-heated steam generates electricity. The electricity is supplied to the national grid, and it alleviates the use of fossil fuels burned at the power plants connected to the grid.

2. Project Summary

MSW in Sidoarjo in East Java province is currently open-dumped, causing various environmental and social problems. The Project is to construct a new waste incineration plant that treats those MSW (target amount is 360 dry-tons) and the plant also generates electricity (rated capacity is 18.9 MW) by heated steam. It is expected that the power plant will generate about 140 GWh of electricity every year, which is to be connected to the national grid called the JAMALI grid.

The waste-to-energy system for the Project incinerates the shredded flammable MSW and uses the heat energy contained in hot steam to generate electricity. Generated electricity is supplied to the national grid outside of the waste-to-energy system. About 5% of the generated power, or 0.9 MW, is used for internal uses such as shredders and conveyers.

The plant does not consume any fossil fuels as its energy source except after the completion of the plant's maintenance activity, which is performed once a month, when diesel oil is used for the start-up of the plant. Although the incineration process produces some solid wastes, namely clinkers, their amount is considerably small (about 2 to 3% of the MSW input) and they do not produce any hazardous materials or emissions including dioxins.

3. Contribution to Sustainable Development

The Project contributes to the sustainable development in Sidoarjo and Indonesia in the following ways:

- Improvement of energy security
- Improvement of waste management system
- Improvement of local environment

- Creation of employment opportunities
- Dissemination of technology

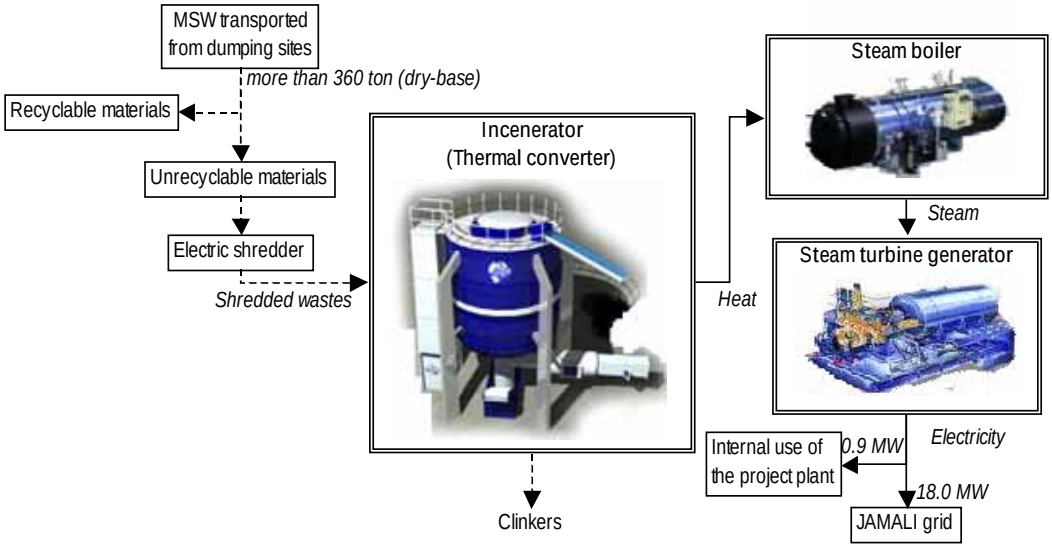

Figure 1 System Diagram

■General Information about Host Country

Sidoarjo regency belongs to East Java province of the Republic of Indonesia, and is located about 25 km south of provincial capital, Surabaya. Population of Sidoarjo is about 1.6 million and its population growth rate in 2003 is 2.87%. Sidoarjo is one of the smallest regencies in the province with its land area about 635 km^2, yielding the population density 2,320 per km^2.

Nearly half of the area in Sidoarjo is used as an agricultural land. The regency notably accommodates rice fields, sugarcane plantations, and fishponds. Other main industries include clothing, arts and crafts, and furniture manufacturing.

Currently about 1,600 m^3 of MSW is disposed in Sidoarjo everyday and the amount is expected to increase by 5% every year along with Sidoarjo's population and economic growth. And therefore, improvement of waste management system in Sidoarjo is urgently required.

Figure 2 Sidoarjo Map

■**CDM-Related Authorities in Host Country**

Indonesia has signed the Kyoto Protocol in July 1998 and ratified it in December 2004.

The nation established the National Commission for Climate Change in April 2003, which mainly provides an advice on the climate change policies. A subordinate agency of this commission, called National Commission for Clean Development Mechanism (NC-CDM), is expected to become the official designated national authority (DNA) of Indonesia upon government approval. NC-CDM consists of Members (10 government representatives from different ministries and agencies), Secretariat, and Technical Team, and also expert groups and stakeholder forum provide supporting functions when necessary.

Sustainable Development Criteria and Indicators for CDM project activities are summarized below.

Table 1 Sustainable Development Criteria and Indicators

Sector	Scope of Evaluation	Criteria	Indicators
Environmental Sustainability	Area having direct ecological impacts from the project	Natural resource conservation or diversification	- Maintain sustainability of local ecological functions - Not exceeding the threshold of existing national, as well as local, environmental standards (not causing air, water and/or soil pollution) - Maintaining genetic, species, and ecosystem biodiversity and not permitting any genetic pollution - Complying with existing land use planning
		Local community health and safety	- Not imposing any health risk - Complying with occupational health and safety regulation - There is a documented procedure of adequate actions to be taken in order to prevent and manage possible accidents
Economic Sustainability	Administrative border of regency	Local community welfare	- Not lowering local community's income - There are adequate measures to overcome the possible impact of lowered income of community members - Not lowering local public services - An agreement among conflicting parties is reached, conforming to existing regulation, dealing with any lay-off problems
Social Sustainability	Administrative border of regency	Local community participation in the project	- Local community has been consulted - Comments and complaints from local communities are taken into consideration and responded to
		Local community social integrity	- Not triggering any conflicts among local communities
Technological Sustainability	National border	Technology transfer	- Not causing dependencies on foreign parties in knowledge and appliance operation (transfer of know-how) - Not using experimental or obsolete technologies - Enhancing the capacity and utilization of local technology

■Project Participants and Functions

Following table shows the project participants from Japanese side and Indonesian side, and their functions for the Project.

Table 2 Project Participants and Functions

Japanese side	- PCI: Project implementing entity from the Japanese side (feasibility study, PDD preparation) - DNV: Responsible for pre-validation of PDD and desk review - PCKK: Assist in baseline and monitoring preparation
Indonesian side	- IMW (PT Imam Manunggal Wijaya) : Project implementing entity from the host country (feasibility study, information collection and analysis) - YBUL（Yayasan BINA USAHA LINGKUNGAN）: Responsible for data collection on Indonesia's general information and power grid system - PT Surveyor Indonesia: Responsible for analysis on MSW compositions

(2) Project Description

■Technical Description of the Project

1. Summary of waste-to-energy system

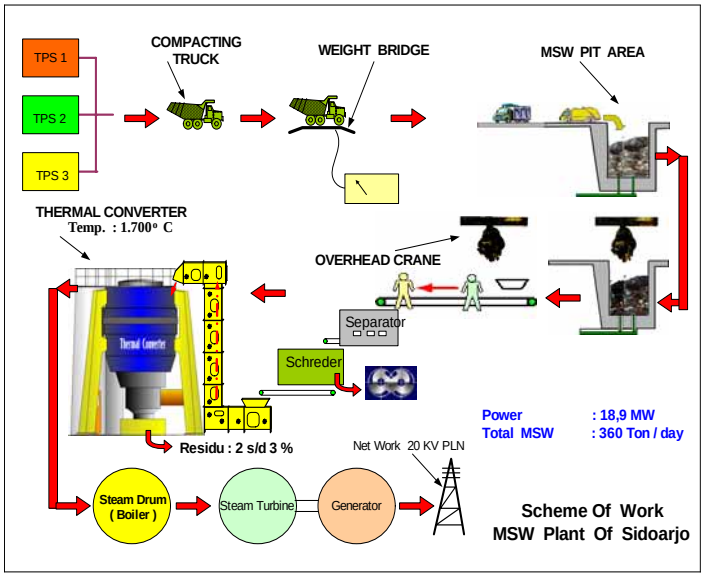

Figure 3 Simplified diagram of waste-to-energy system

According to the project plan, the system will work in the following process:

A. Collection, Transportation, Sorting

(i) The Sidoarjo government collects MSW from the temporary MSW disposal sites

(ii) MSW is separated into the flammables and nonflammables, and recyclable materials such as bottles, plastic bottles, and metals are collected by scavengers

(iii) Flammable MSW is compacted and transported to the Project site by trucks

(iv) Weight of MSW are measured

(v) Flammable MSW is temporarily stored in the pit hole

B. Shredding, Incineration

(i) MSW is transferred to a conveyor belt by a overhead crane

(ii) MSW is sorted manually on the belt

(iii) MSW is shredded by an automatic shredding machine

(iv) Shredded MSW is transferred to the incinerator (thermal converter) and combusted at a high temperature, about 1,700 degrees Celsius

C. Power generation

(i) Incineration process generates hot steam and it is used for the steam turbine generator

(ii) Power voltage is transformed inside the Project site and supplied to the national grid PT PLN owns

2. Thermal Converter Technology

The Project introduces the high-temperature MSW incineration system called the thermal converter technology. Selection of the technology is mainly based on the following two reasons:

- Small environmental impact

The thermal converter technology can reduce the volume of MSW by 1/10 and processes about 97% of the initial input. Residues from the process, about 2 to 3% of the initial input amount, are totally recyclable, and their applications are widely ranged from roadbeds and pathways to building materials.

As the plant incinerates MSW at a very high temperature and also the plant is equipped with bug filters and other emission control systems, emission of any hazardous materials is prevented. Needless to say, the technology can stop the methane emissions and odor problems the project area is currently facing.

- Easy operation and maintenance

The plant is expected to operate at least 7,776 hours annually (24 hrs. * 27 days * 12 mo.) and maintenance activity is performed once a month for three days.

Daily operation of the plant does not require much manpower. Current operation plan allocates 3 shifts in the 24-hour operation time and 9 workers for each shift. Three-shift schedule assigns total of 27 workers; 3 foremen, 3 fitters, 9 semi-skilled workers, and 9 general workers.

The plant supplier from UK, Waste Energy Systems, Ltd., has made a contract with IMW over the provision of training program for the local operators and dispatch of technical staff for the maintenance activity.

3. Plant Specifications

Table 3 Summary of Waste-to-Energy Plant Specifications

350S Thermal Converter type		
1. Incineration Temperature	:	1,700 degrees Celsius
2. Fuels (for general operation)	:	Waste
3. Fuels (for plant start-up)	:	Diesel oil
4. Waste Treatment Capacity	:	204 tons/ day * 2 units
5. Planned Treatment Amount	:	360 dry tons/ day
6. Boiler Capacity	:	38 tons / hour at 40 bar * 2 units
7. Rated Power Output	:	18.9 MW (0.9 MW for internal uses)

■Project Boundary, Baseline, Additionality

1. Baseline scenario for the MSW management

The baseline scenario for the MSW management is defined as "no MSW management facility is established in Sidoarjo that avoids methane emissions and MSW in Sidoarjo continues to be open-dumped at landfill sites as being done currently." Baseline scenario is selected and justified as follows:

(i) There is no law/ regulation or agreement requiring the effective utilization of MSW to be landfilled and/or landfill gases in the country/area.

Sidoarjo does not have any law or regulation requiring the MSW incineration or methane recovery from the landfill site. And there is currently no plan to establish such legal framework in the near future.

(ii) There is no alternative plan for the effective utilization of MSW to be landfilled and/or landfill gases, in case the proposed Project, which is electricity generation by incineration of MSW to be land-filled, was not implemented.

According to the waste management department of the Sidoarjo government, no plan exists for the utilization of MSW or landfill gases in the near future. Partly because the local government has budget limitations and only a little investment to the new technology such as the thermal converter technology can be expected.

(iii) There is no possibility of the implementation of the proposed Project, considering barriers such as investment barrier, technological barrier, barrier due to the prevailing practice.

(Investment barrier) According to IMW, the project developer, at least 16% of IRR is necessary to invest for the project. In the absence of the CDM (meaning no additional revenue besides electricity sales to PLN), the Project IRR is 13.4%; however, additional revenue from the sales of CER (certified emission reduction) would increase the rate up to 16.4%. Therefore, there is an investment barrier for the Project implementation.

(Technological barrier) The Project plant has a thermal converter that recovers heat by MSW incineration and generates steam for power generation. This thermal converter requires highly-advanced technology imported from UK and it is the first time to introduce this technology in Indonesia. Therefore, the Project contains a technological barrier.

(Barrier due to the prevailing practice) As explained above, there is no similar case to the

Project and open-dumping is the prevailing practice in Indonesia. Therefore, there is a barrier due to the prevailing practice for the project implementation.

(iv) It is still possible to continue the MSW landfill without proper treatment.

The Sidoarjo government can continue the open-dumping because there is enough space to construct new MSW dumping sites. Also, they do/will not have any option but to continue the current open-dumping due to the budget limitation.

2. Baseline scenario for electricity

The baseline scenario for electricity is defined as "the existing power plants continue the current operation" and the power generated at the Project plant is negligible compared to the total power supplied to the grid.

Comparing to the electricity generated by the grid, it is possible to logically prove that the electricity generated by the Project is small enough to be ignored. Total power supply in the JAMALI grid is 83,576 GWh in 2002, while the Project will supply only 140 GWh of electricity every year to the grid. Due to the continuous trend of rapid increase in energy supply on the grid and future power development plan, the Project is expected to supply electricity far less than 1 % of total generation in the grid. Therefore, the electricity generated by the Project is small enough to be ignored.

Justification of Project Additionality

Additionality of the Project is assessed and justified by proving the following points, according to the CDM Modalities and Procedures, paragraph 43:

- Project scenario is not same as baseline scenario, and
- Project emission is less than baseline emission

From the "tool for the demonstration and assessment of additionality" agreed by the CDM Executive Board, two assessment methods are also analyzed for the justification:

- Common practice analysis
- Impact of CDM registration

1. Project scenario is not same as baseline scenario

Baseline scenario of the Project is that "no MSW management facility is established in Sidoarjo that avoids methane emissions, and MSW in Sidoarjo continues to be open-dumped at landfill sites as being done currently" and "the existing power plants continue the current operation." This baseline scenario is different from the Project scenario, "a new MSW incineration facility that does not emit methane gas is established" and "the generated electricity is supplied to the power grid." Therefore, it is reasonably proved that the Project is implemented additionally.

2. Project emission is less than baseline emission

Annual GHG emission reduction by the Project during the crediting period is 102,031 (for the 1st year) to 159,377 ton-CO_2e/ year (for the 14th year), which equals the baseline emissions minus the Project emissions.

3. Common practice analysis and Impact of CDM registration

The Project is the first case to introduce the thermal converter technology in Indonesia. In addition, there is not any activity similar to the proposed Project activity in the country, and no similar activities are previously or currently underway in Indonesia.

The impact of CDM registration will be the financial benefit to the Project: additional revenue from sales of CER can improve the Project IRR from 13 % to 17 %.

■GHG Emission Reductions by the Project, Leakage

1. Emission Reductions by the Project

Reductions are calculated using the following formula:

Emission Reductions by the Project

= Baseline Emissions (I) – Project Emissions (II)

= 121,906 – 19,875

= **102,031 (t-CO_{2e}/yr)** (1st year)

Table 4 Emission Reductions

unit: t-CO_{2e}

Year	Baseline emissions	Project emissions	Emission reductions
2007	121,906	19,875	102,031
2008	127,757	19,875	107,882
2009	133,323	19,875	113,449
2010	138,618	19,875	118,743
2011	143,655	19,875	123,780
2012	148,446	19,875	128,571
2013	153,003	19,875	133,128
2014	157,338	19,875	137,463
2015	161,461	19,875	141,587
2016	165,384	19,875	145,509
2017	169,115	19,875	149,240
2018	172,664	19,875	152,789
2019	176,040	19,875	156,165
2020	179,252	19,875	159,377
		Total	1,869,714

(I) Baseline emissions

Baseline emissions

= "Baseline emissions from avoided MSW disposal (i)"

+"Baseline emissions from grid-connected power plants (ii)"

= 6,152 + 115,754

= **121,906 (t-CO_{2e} /yr)**

(i) Baseline emissions from avoided MSW disposal

The Project uses the First Order Decay (FOD) model for the calculation of methane emissions from landfill sites. Selection of the FOD method is based on the fact that, 1. IPCC recommends the use of the FOD method in its "Good Practice Guidance and Uncertainty

Management in National Greenhouse Inventories," and 2. The CDM Executive Board recommends the use of the conservative FOD method if the methane emissions can only be measured before the project implementation (Ex-ante), such as the case for the methane avoidance project, and 3. Methodologies approved so far basically use the FOD method even the project deals with methane capture activity, where emissions can be measured after the project implementation (Ex-post).

Following formula and variables are used for the calculation of baseline emissions:

Baseline Emissions from avoided MSW disposal

$$= k \times L_0 \times \sum_{t=1,y} MSW_t \times e^{-k(y-t)} \times (16/12) \times (1-OX) \times GWP\_CH_4$$

$$= 0.05 * (0.19 * 0.88 * 0.4 * 0.5 * 16/12) * 131,400 * e^{(0)} * (1-0) * 21$$

$$= 6,152 \text{ (t-}CO_{2e}\text{ /yr)} \quad (1^{st} \text{ year})$$

Table 5 Emissions from avoided MSW disposal

unit: t-CO_{2e}

	inventory year y														total
waste of year t	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1	6,152	5,852	5,566	5,295	5,037	4,791	4,557	4,335	4,124	3,922	3,731	3,549	3,376	3,211	63,498
2		6,152	5,852	5,566	5,295	5,037	4,791	4,557	4,335	4,124	3,922	3,731	3,549	3,376	60,286
3			6,152	5,852	5,566	5,295	5,037	4,791	4,557	4,335	4,124	3,922	3,731	3,549	56,910
4				6,152	5,852	5,566	5,295	5,037	4,791	4,557	4,335	4,124	3,922	3,731	53,361
5					6,152	5,852	5,566	5,295	5,037	4,791	4,557	4,335	4,124	3,922	49,630
6						6,152	5,852	5,566	5,295	5,037	4,791	4,557	4,335	4,124	45,707
7							6,152	5,852	5,566	5,295	5,037	4,791	4,557	4,335	41,584
8								6,152	5,852	5,566	5,295	5,037	4,791	4,557	37,249
9									6,152	5,852	5,566	5,295	5,037	4,791	32,692
10										6,152	5,852	5,566	5,295	5,037	27,901
11											6,152	5,852	5,566	5,295	22,864
12												6,152	5,852	5,566	17,569
13													6,152	5,852	12,003
14														6,152	6,152
total	6,152	12,003	17,569	22,864	27,901	32,692	37,249	41,584	45,707	49,630	53,361	56,910	60,286	63,498	527,406

Table 6 Variables and Data Source

Variables	Value	Data Source and Notes
MSW_t	131,400	Total dry amount of MSW burned in the Power Plant (ton/yr) MSW input (dry-base) 360 ton/day * 365 days/yr
DOC_y	0.19	Degradable carbon fraction in the MSW (%) Weighted average of carbon content in MSW components including paper and
DOC_F	0.88	Fraction of DOC that actually degrades (%) IPCC equation, DOCF = 0.014 × T + 0.28, is used.
MCF	0.4	Methane correction factor for landfill Most conservative value from the IPCC Good Practice Guidance Background
F_y	0.5	Fraction of methane in the project's landfill gas IPCC default value is used.

F_y	0.5	Fraction of methane in the project's landfill gas IPCC default value is used.
OX	0	Oxidization factor Recommended value for activity in developing countries by IPCC Good Practice Guidance is used.
GWP_CH_4	21	Global Warming Potential of methane Potential constant provided by IPCC Second Assessment Report is used.
k	0.05	Methane generation rate IPCC default value is used.

(ii) Baseline emissions from grid-connected power plants

Baseline emissions of grid-electricity

= Electricity supplied to the grid * Emission factor for OM

= 139,968 (MWh/yr) * 0.827 (t-CO_{2e} /MWh)

= <u>115,754 t-CO_{2e} /yr</u>

The Project generates electricity by using hot steam recovered from MSW incineration and supplies it to the JAMALI grid. As the Project involves similar activities as a renewable power generation and grid connection project, an approved consolidated methodology, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (ACM0002), is referred. ACM0002 is used only for reference, as the methodology does not cover power generation by solid waste.

Operating Margin is used for the carbon emission factor (CEF) of the baseline scenario, since the electricity generated by the project (140 GWh) is negligible compared to the total power generation on the JAMALI grid (83,576 GWh), according to the reliable recent data from PT. PLN. CEF is shown in the Table 7 below.

Table 7 Power Generation and Carbon Emission Factor

2001-2003

Fuel Type	Electricity Generation*1 from 2001-2003 (GWh)	Fuel Consumption*1 from 2001-2003 (TJ)	CEF*2 (t-C/TJ)	CO2 emission (t-CO2)	Operating Margin (t-CO2e/MWh)
Coal	116,833	1,247,669	26.2	119,859,416	0.827
Natural Gas	60,386	508,558	15.3	28,530,105	
Oil	40,880	420,854	-	-	
HSD	-	208,288	20.2	15,427,200	
MFO	-	211,516	21.1	16,364,283	
IDO	-	1,050	20.9	80,443	
Total	218,098	2,177,081	-	180,261,447	

Source*1 PT. PLN Statistics from 2001 to 2003

Source*2 Carbon emission factor: Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories : Workbook/TABLE I-2 CARBON EMISSION FACTORS(CEF)

(II) Project emissions

Project emissions = "Project emissions from burning fossil-fuel origin product in the Project plant (iii)" + "Project emissions from fossil-fuel consumption for the Project (iv)"

= 19,461 ＋ 414

= **<u>19,875 (t-CO_{2e} /yr)</u>**

(iii) Project emissions from burning fossil-fuel origin product in the Project plant

About 4.8% of the131,400 tons of collected MSW is plastic-origin wastes. Based on the value of carbon content in the plastics (85%; IPCC values), emissions from incineration of those plastics are calculated, which yields 19,461 (t-CO_{2e} /yr).

(iv) Project emissions from fossil-fuel consumption for the Project

Project activity involves the use of diesel oil fuels. Total fuels used for such purposes as transportation of MSW, clinkers and fly ash, and thermal converter start-up, are 154,460Lt/yr, which generates GHG emissions of 414 (t-CO_{2e} /yr).

2. Leakage

Even for the emergency case where both of the two thermal converters stop their operation, no electricity is supplied from the grid. Under this circumstance, a diesel power generator installed inside the facility will supply electricity. Although this electricity generation process emits GHG by combusting diesel oil, as the fuel will be supplied from a diesel oil tank installed inside the Project site, the whole diesel consumption, including the consumption by the diesel generator, will be monitored and the emission will be counted as the Project emission, which is subject to be deducted from the emission reduction of the Project.

In addition, the fuel consumption of transporting MSW, clinkers and fly ash by local government trucks will be smaller than fuel consumption in the baseline scenario because the Project will establish new secondary MSW disposal sites, each of which accepts MSW from several existing primary disposal sites and therefore, the Project will reduce the total travel distance of the trucks.

■Monitoring Plan

Table 8 Data/ Information to be Monitored for Project Emissions

ID	Abbrv.	Data	Data Source	Unit	Monitor Method	Monitor Freq.	Notes
ID1	MSWy	Amount of MSW to be incinerated	Project proponent (Power plant's procurement section)	ton	measured	Daily measured, monthly recorded	Conveyor scale installed at the thermal converter will monitor the weight of MSW to be incinerated and data recorded automatically.
ID2	FPFy	Fraction of plastics in MSW to be incinerated	Project proponent (Power plant's laboratory)	%	measured	Monthly	MSW sampled at the conveyor connecting to the thermal converter. Measuring method will follow local industrial standard.
ID3	FFy	Diesel oil used for the Project	Project proponent (Power plant's procurement section)	Litre	measured	Daily	All diesel oil used for the Project activities will be supplied from a diesel supply station installed in the Project site. The flow meter of the station will be monitored.
ID4	VEF_{CO2}	CO_2 emission factor for diesel oil	Statistics	t-CO_{2e} per kg	calculated	Yearly	Calculated by IPCC default value.

Table 9 Data/ Information to be Monitored for Baseline Emissions

ID	Abbrv.	Data	Data Source	Unit	Monitor Method	Monitor Freq.	Notes
ID5	BEgy	Baseline emissions of grid electricity		t-CO_{2e}/yr	calculated	Yearly	
ID6	EGy	Electricity supplied to the grid	Project proponent (Power plant's operational section)	MWh	measured	Daily	The parameter will be monitored with the meters of the substation installed in the Project plant. This figure will be checked with the commercial invoices.
ID7	EF_OMy	Emission factor for OM	Statistics	t-CO_{2e}/ MWh	calculated	Yearly	
ID9	F	Amount of fossil fuel consumed in each plant	Statistics	t, liter, m^3	measured	Yearly	
ID10	GEN	Electricity generation of each plant	Statistics	MWh	measured	Yearly	
ID11	COEF	CO_2e emission coefficient of each fuel	Statistics	t-CO_{2e}/t, liter, m^3	calculated	Yearly	Calculated by IPCC default values
ID12	-	Identification of power plant for the OM calc.	Statistics / energy development plans	text	estimated	Yearly	Identification of plants to calculate OM emission factor
ID14	BEdy	Baseline emissions from avoided MSW disposal		t-CO_{2e}/yr	calculated	Yearly	
ID15	DOCy	Degradable carbon fraction in the MSW	Project proponent (Power plant's laboratory)	%	estimated	Monthly	This value is estimated by weight percent of the following 4 types of waste to be measured, on the following formula: DOCy= 0.4*A+0.17*B+0.15*C+0.3*D where: A: Fraction of paper, textile, B: Fraction of garden waste, park waste or other non-food organic putrescibles, C: Fraction of food waste, D: Fraction of wood or straw.
ID16	L_0	Decay rate	Project proponent (Power plant's laboratory), IPCC 1996 guideline, IPCC Good Practice Guidance		calculated	yearly	This value is calculated by DOC_y, DOC_F, MCF, F_y
ID17	DOC_F	Fraction of DOC that actually degrades	Project proponent (Power plant's laboratory)	%	estimated	Once prior to the Project implementation	This value is estimated by temperature in anaerobic zone of MSW landfill, on the following formula: DOC_F=0.014*T + 0.28 where: T: Temperature in anaerobic zone of MSW landfill (°C)
ID18	-	Regulatory requirement relating to landfill gas	National/local regulation, law or agreement	Test	-	Yearly	Baseline scenario should be re-examined with taking its effective enforcement rate into account

■Environmental Impacts and other Indirect Impacts

The decree of the State Ministry of the Environment of Indonesia No.17 (2001) on "Types of business and/or activity plans that are required to be completed with the environmental impact assessment," requires a project activity to conduct an EIA (called AMDAL) if the Project belongs to one or more of the designated categories. AMDAL requires an activity involving the "Construction of electric centre of other types (Solar, Wind, Biomass and Turf)" with 10 MW or more power generation capacity to complete EIA.

The Project will complete AMDAL by June 2005 based on the understanding of the Sidoarjo environment office that MSW is one of biomass types and the plant's generation capacity will exceed the standard size.

■Stakeholders' Comments

For the Project, the socialization process with local government authority and local community took place through the special meeting held by local government at the Project site, Bluru Kidul area on August 8, 2003. About 200 people attended the meeting and attendants were informed of the Project and asked for comments. Local community commented on the Project and requested for the provision of the followings:

- A warranty guaranteeing that the Project will not cause any pollution (such as odor, leachate water, smoke and noise) and nuisance to their settlement area
- Security to the local community regarding the fire and explosion hazard
- High priority to local laborers to be employed in the Project
- Construction of a health clinic near the Project site
- Electricity for public utilities such as street lighting in the area

The Project developer and local government agreed with the above requests from the attendees.

(3) Project Implementation

■Project Participants and Functions

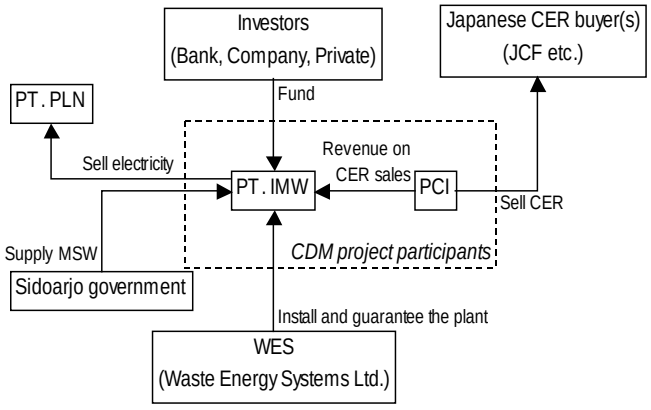

Figure 4 Project Organization

Indonesian side will take all the costs for Project implementation and IMW, the Project developer, is responsible for fund-raising. The firm is currently considering the application of the Belgium "Foundation Universal Connection" loan scheme.

Japanese side is responsible for all CDM-related activities of the Project as well as CER purchase from Indonesia.

IMW is the main and sole entity responsible for operation and management of the Project plant. IMW will sign the contract with the plant supplier from UK, WES, over plant maintenance and support programs for over ten years. Also, the firm receives MSW and the Project land from Sidoarjo government.

IMW and PLN are expected to sign the Power Purchase Agreement (PPA) by June 2005 over the electricity generated by the Project plant.

■Project Financing

IMW is currently under discussion with the above-mentioned Belgium program and the firm expects the program to finance all the initial investment costs of the Project, totaling more than 2.5 million dollars. It is expected that the talk between the two parties will be finalized by May 2005.
Expected payback period is 7 years (of which 2 years are grace period). Financial analysis on the Project assumes the interest rate to be 3% (flat) or Libor (London Interbank Offered Rate) + 1%.

■Cost-Benefit Performance of the Project

201,096 million Rp. / 1,869,714 tonCO_{2e}
＝107,554 Rp. /tonCO_2
＝USD 12 / tonCO_2

■Project Outlook and Expected Schedule

1. On Project implementation

IMW has already signed the MOU with PLN over electricity purchase and two parties are currently under discussion over PPA, which is expected to be concluded in April 2005. Upon completion of PPA with PLN, IMW will finalize the talk with Belgian side over the loan program by May 2005. And construction of the plant is expected to start in June 2005 and the completion is expected in May 2006.

EIA activity will be conducted for the Project before the construction starts.

2. On CDM-related activities

After the desk review on the proposed PDD, and upon completion of financing contract with the Belgium side, new methodologies will be submitted to the CDM Executive Board, and approval process from Indonesian and Japanese sides will start in July 2005.

3. Discussions with Indonesian side

On January 24, 2005, a meeting was held to present the summary of the Project activity as well as the PDD for the Project to the government officials in Indonesia, which include the representatives from the following:

- Ministry of Environment (Sudariyono deputy minister)
- Climate Change Division (Ministry of Environment)
- Domestic Waste Department (Mr. Antung deddy R. Assistant deputy)
- AMDAL department

Overall, officials showed a positive understanding on the Project. The waste department commented on a proper maintenance and sustainable operation of the plant, and the EIA office requested for a proper and sufficient completion of AMDAL for the Project.

(4) Validation/ Determination

■Validation Status

Desk review was executed by an assigned OE, DNV on February 2005. The 3 CARs and 4 CLs were presented.

CAR1: The project has not been approved formally by Indonesia and Japan.

CAR2: The project has not had a statement stipulating modalities of communication with the Executive Board in terms of CER issuance and allocation instruction.

CAR3: Baseline and monitoring methodologies have not been approved by the CDM Executive Board.