The Ministry of the Environment
consignment work in 2006 fiscal year

**CDM/JI Work Investigation in 2006 Fiscal Year**

**In Central Java Province of Indonesia**

# Wood Biomass
# Power Generation Project Investigation

# Final Report

**Outline Version**

**March, 2007**

**Sumitomo Forestry Co., Ltd.**

**Contents**

## 1. Outline of proposed project

### 1.1. Purpose of the project

The project will be conducted by PT. Rimba Partikel Indonesia (hereinafter “PT.RPI”) in the Kendal district of Central Java Province in the Republic of Indonesia.PT.RPI was founded in 1990 through the merger of companies based in Japan and Indonesia and has established a particle board plant in the Kendal district. This plant is the only large-scale particle board plant on the island of Java.

PT.RPI is generating electricity with the diesel generator for its own factory and facilities. However, because earnings of PT.RPI had deteriorated by the sudden rise in the prices of the petroleum products, alternative energy use was considered compulsorily. When the power supply was reconsidered, from a strictly monetary point of view, power-generating coal boilers were advantageous. PT. RPI, however, understood that the introduction of the wood biomass power generator is possible through acquiring credit as CDM activity.

PT.RPI currently operates generators, for an output of about 2.4MW of power. The annual generation of power is about 19GWh. The power generated provides all of the electricity used in the plant and the facilities on the grounds, so there is no connection to the power grid, nor any need to purchase power from outside sources. The project likewise will not be connected to the external power grid nor will power be purchased from outside sources. The equipment introduced under this project will include power (2.4MW) supplied to the currently existing equipment and facilities, plus the power necessary for running the generators themselves (0.7MW).

The purpose of this project is to replace the coal boiler power generating, which is the lowest cost unless CDM, to the 4MW biomass power generation to reduce the greenhouse gas (hereafter, GHG) about 30,000 ton every year.

Fig.-1: Sander dust generated in the PT.RPI factory

Fig.-2: Lumber waste and sawdust (left upper side) generated in sawmill factory outside of PT.RPI

### 1.2. Contribution to sustainable development by project activity

Contribution to economical sustainability

- Reduction of petroleum product consumption by use of biomass as energy source
- Improvement of regional social life level by selling wood waste to PT.RPI.

Contribution to environmental sustainability

- Load reduction to environment through wood biomass combustion

### 1.3. Woody fuel used for the project activities

The wood waste which can not be used for particle board such as sander dust is abandoned. This waste shall be used for the fuel of the introduced wood biomass boiler as thermal recycle.(Fig-1) However, most of the fuel is the lumber waste, sawdust and veneer waste bought from wood mills in peripheral area.

### 1.4. Location of project site

PT.RPI is located 30 km west of Semarang city, the capitol city of the Central Java Province. The factory is located in S 6°56'10.02", E 110°17'23.24" according to the Global Positioning System.


Fig.-3: Location of particle board factory of PT.RPI
Source:http://www.lib.utexas.edu/maps/indonesia.html

About one kilometer north of the plant is the Java Sea. The plant is surrounded by ponds where fish (Bandeng) and shrimp are bred. The nearest settlement, with a population of about 5,000, is approximately 500 meters away. The center of Kaliwungu County (population 91,783 as of January 2007) is located about seven kilometers from the plant.

### 1.5. Content of project execution

The project will utilize renewable energy with a maximum power generating capacity of 15MW or less, and it is not connected to external power grids and will only be utilized by the users so it qualifies as the small-scale CDM category, Type I.A. listed in Appendix B. The project will be PT.RPI's first CDM project and is not a debundled component of a large project activities.

Fig-4 is an outline of the equipment to be introduced. Project plans call for about 3,723 tons of a mixture consisting of undried wood scraps and dust (offcuts and sawdust from sawmills as well as chipped lumber wastes and sawdust) to be used every month as fuel. The boilers will have a steam generating capacity of 20 tons per hour, and a power generation capacity of 4MW, but plans call for 3.1MW to be actually generated. The exhaust gases from the boilers will pass through a drop-out chamber, followed by an electrostatic precipitator, after which they will be released through a smokestack. This will eliminate fly ash from the exhaust gases, so the plan is expected to meet the atmospheric environmental standards stipulated for the region.

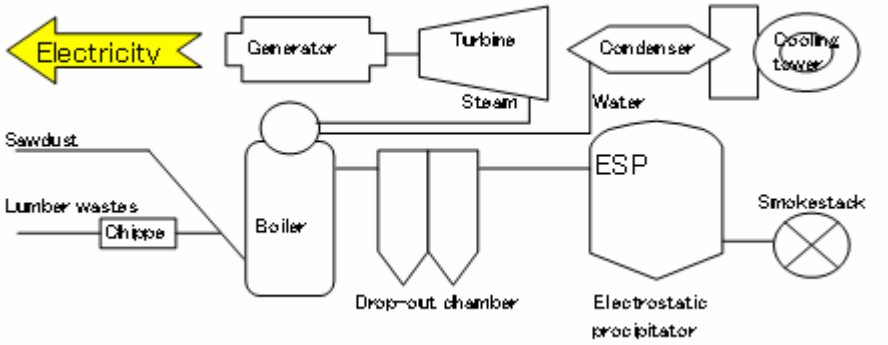

Fig.-4: Project scheme

## 2. Outline of Indonesia that relates to this CDM project

### 2.1. General situation for the energy and electricity sector in Indonesia

#### 2.1.1. National energy policy

The Indonesia energy policy is stated in Presidential Decree No 5/2006. This energy policy document contains information on policy objectives, targets, measures, pricing policy, and incentives. As stated in the Presidential Decree, the objective of National Energy Policy is to direct efforts to achieve domestic energy supply security. By implementing the National Energy Policy the following policy targets are expected to be achieved:

a) energy elasticity below 1 in 2025

b) primary energy mix as indicated in Fig-5:

#### 2.1.2. National renewable energy policy

Government policy concerning renewable energy is covered by the National Energy Policy (Presidential Decree No 5/2006) and is also mentioned in the Green Energy Policy document (Ministry of Energy and Mineral Resources Decree No. 02/2004 concerning Development of Green Energy). As stated in the National Energy Policy, the government will increase the share of renewable energy sources within the national energy supply mix from the existing ± 5% to ± 15% by 2025. The 15% renewable share consists of 5% geothermal, 5% bio-fuel, and 5% other renewable energy sources (biomass, hydro, wind, solar), and nuclear power. To encourage the development of renewable energy, the government will provide incentives.

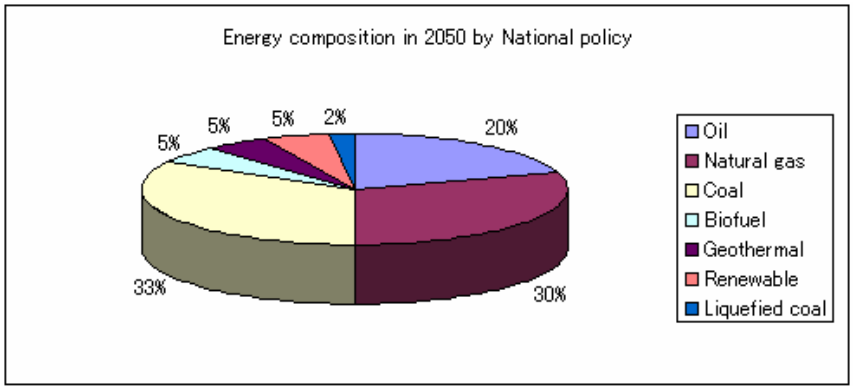

Fig.-5: Energy composition in 2025 according to the national policy

**2.2. Overview of electricity sector in JAMALI grid**

JAMALI (Java,Madura,and Bali) grid is the largest electricity interconnection system in Indonesia. The capacity of this generating system makes up approximately 80% of installed national capacity. Therefore, the existence of the JAMALI system has strategic value for the national energy system.

Renewable energy adopted by Government of Indonesia, basically, includes all types of renewable energy sources, including hydropower, geothermal, biomass, wind, and solar. However, under the current conditions, renewable sources that have been utilized for electricity, especially by PLN (Perusahaan Listerik Negara: National Electricity Utility Company) and IPP (Independent Power Producer), are hydropower and geothermal energy. Current share of renewable power in JAMALI is around 17% of total installed capacity. To meet its increasing demand for electricity, Indonesia needs to add new capacity.

**2.3. Process for getting CDM project approval from Indonesian government**

This section provides description of the steps required to obtain CERs.

**2.3.1. Project Design Document (PDD)**

This document that describes the prospective CDM project and how it meets the validation requirements spelt out in the Marrakech Accords. The PDD is the main document assessed by the validator and is made available during the 30 days public comment period.

**2.3.2. Step1: Design**

The first step of the CDM project is to design the project, which includes due diligent or assessment and documentation. Under this step, project participants create a PIN (Project Idea Note) and PCN (Project Concept Note).

The PIN concerning this project accepted to DNA in the Republic of Indonesia can be seen with following URL. http://dna-cdm.menlh.go.id/id/projects/?pg=potential

The document required by the EB for the proposed CDM project is PDD (Project Development Design). The purpose of a PDD is to prepare project information for relevant stakeholders; i.e. the investment community, the DOE performing validation of the project, the EB, the DNA of host countries and the local population.

The PDD is available on: http://cdm.unfccc.int/Reference/Documents/index.html

**2.3.3. Step2: Validation and Registration**

Before the project participants can submit a project for validation, and the following three items are required:

a) Project Design Document (PDD)

b) Approved methodologies for the baseline and the plan to monitor the emission reductions.

c) Approval of voluntary participation by involved Parties and host country confirmation that the project contributes to sustainable development (National Approval).
National approval:

An overview of the complete approval process can be found under:
http://dna-cdm.menlh.go.id/en/approval/

**2.3.4. Step3: Monitoring**

The reduction in emissions achieved by a CDM project must be monitored by the project operator consistent with the monitoring plan outlined in the Project Design Document (PDD). The monitoring data is then verified by a DOE, who then certifies that the reductions have taken place and recommends the Executive Board to issues carbon credits.

**2.3.5. Step4: Verification & Certification**

Once a project is registered the project participants begins to monitor the reduction of emissions according to the plan they presented in the PDD and they compiles a monitoring report. Periodically a DOE must verify that the reductions are taking place and compile a verification report, which must be made public, as must the monitoring report.

**2.3.6. Step5: CERs Issuance**

Below are the items regarding to issuance of CERs:
a)EB issues CERs on the basis of the certification report; within 15 days after the date of receipt of the request for issuance (*an automatic step unless a review requested)*

b)CERs issued for the CDM registry.

c)CERs on the share of proceeds for administration and adaptation withheld.

d) Remaining CERs forwarded to Parties and project participants.

**3. Baseline methodology**

**3.1. Additionality on this project activity**

Because the introduction of wood biomass boiler power generation has an investment barrier, the power plant selected in the absence of this project is for coal boiler power generation. Therefore, there is an addition1ality on this project activity.

Table-1 Additionality on this project activity

| Source of electricity used | Barriers on the source of electricity used |
|---|---|
| Existing diesel power generation | Sudden rise in price of petroleum products.<br>National policy. |
| Purchase from public electric power | The price is uptrend though earnings are on the profit side. A fire and a productivity decrease might be caused due to the power failure. |
| Natural gas engine power generation | Infrastructure unfinished |
| Coal boiler power generation | The use of the abundant coals in Indonesia shows the tendency to increase as alternative power sources because of the sudden rise of the price of the petroleum product. |
| Wood biomass boiler power generation | The price of an initial investment rises by 15~25% compared with the coal boiler. But it becomes nearly equal to the coal boiler in terms of the profit because of the credit acquisition by the CDM project activity. |

**3.2. Baseline Methodology**

In calculating the energy baseline, the AMS-1A (version 09) methodology will be applied.

The amount of power generated by the existing diesel-powered generators is set as the energy baseline, and for the formula, which is applied to an extremely limited area, Option 2 will be utilized.

The project will continue under the current condition of no connection with external power grids and no purchase of power from outside sources. The estimated annual output of power produced using renewable energy technology will be the same as that produced by the current diesel-powered generators.

The baseline emissions volume will be the amount of emissions that would have been produced by using coal to supply the above-mentioned energy baseline (calculated using the coefficient for $CO_2$ emissions from coal as $E_B$)

**3.3. Project Boundary**

Regarding the boundary of the project, “The physical, geographical site of the renewable energy generating unit and the equipment that used the electricity produced delineates the project boundary” of the methodology AMS-1.A to be applied. Fig-6 shows the boundary of the project.

**3.4. Leakage**

The AMS-1.A. methodology specifies that leakage must be considered in the following circumstances.

“ If the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered.”

The wood biomass power generators being introduced though the project activities will be newly built, and previously built equipment will be maintained so that it can be used when necessary, and the generators are expected to be operated when the new equipment is undergoing inspections, so there will be no leakage resulting from transference of power

generators. However, concerns regarding increased GHG emissions resulting from the CDM project activities need to be studied beforehand, so the existence of the leakage was investigated in the following two cases for this project activity.

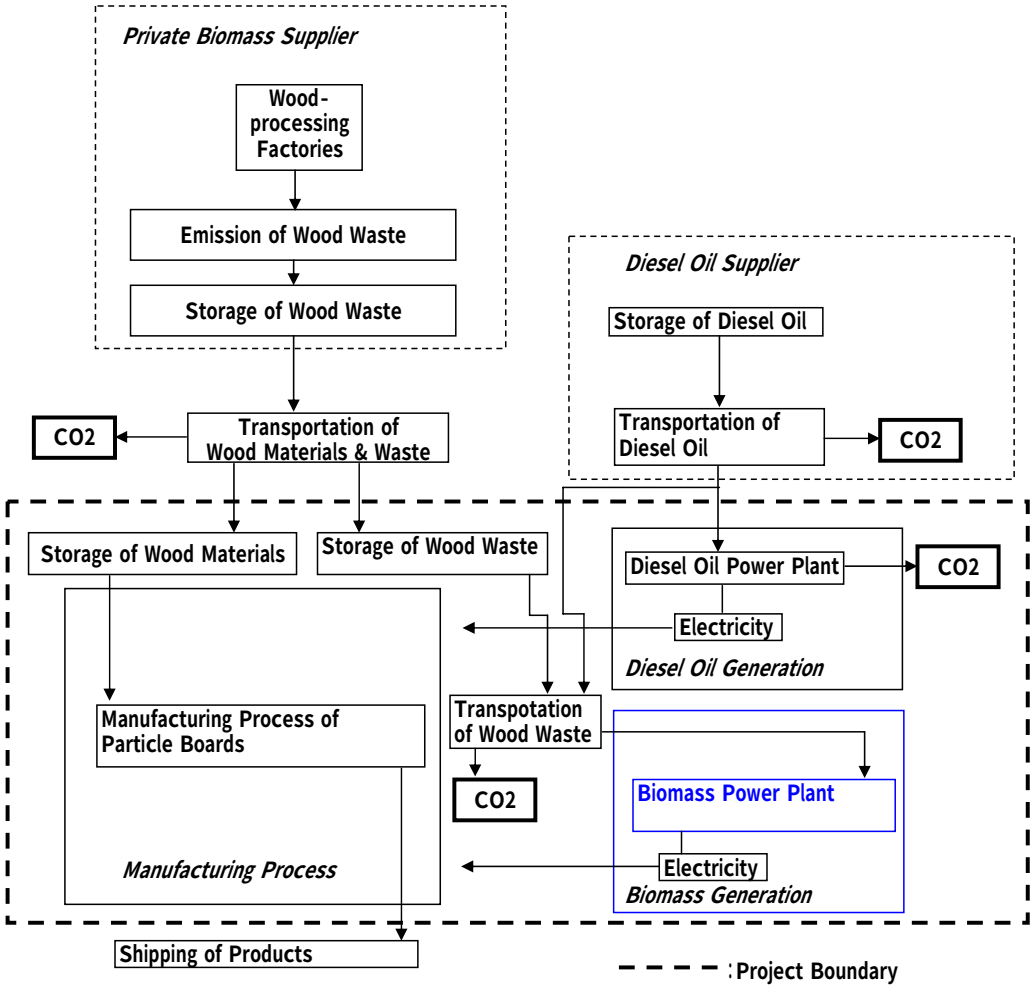


Fig.-6: Project boundary

a.) **Consideration of leakage resulting from the transport of fuel**

The range of transportation for a wooden biomass fuel is more extensive than the range for present diesel oil or coal, so the increased GHG emissions from consumption of fuel by vehicles transporting wood biomass for the project activities are considered as leakage.

b.) **An ample amount of wood biomass to be used as fuel in the project**

By using wood biomass as a power-generating fuel, the project comprises a plan to reduce all emissions to below the baseline level, which is the volume that would have been emitted by traditional power generators using coal-fueled boilers if it had not been for the CDM scheme.

Project plans call for the purchase of about 2,601 tons of wood biomass per month from outside businesses for fuel. In implementing the project, it is important to ensure an ample amount of wood biomass to use as fuel in the power generators. A survey was conducted to ensure that implementing the project activity would not cause other businesses that have been using wood

biomass fuel to have to switch to fossil fuels on account of scarcity of wood biomass.

### 3.4.1. Survey of fuel generation volume

Along about 200km of relatively wide roads in the vicinity of PT.RPI, where the project will be implemented, there are 431 sawmills surveyed to check the amount of wood scraps they generated. (Conducted from August to December 2006.)

The survey's results indicated that the amount of offcuts and sawdust generated came to 46,148 tons per month, so the amount of fuel the project is expected to use per month, 2,601 tons, accounts for about 6% of the total produced, and by collecting fuel from a wide area, it is considered that the impact on other businesses using wood biomass as fuel will be small.

### 3.4.2. Questionnaire to the sawmills

In order not to diminish the current supply of offcuts and sawdust to businesses using them and to keep prices stable at current levels, we asked the sawmills generating wood biomass fuel how much they would be able to provide for the project. The results of surveying 121 sawmills in Central Java Province confirmed that they could supply PT.RPI 60.3% of their offcuts and 58.4% of their sawdust, under the above conditions, without putting any pressure on the supply and demand situation.

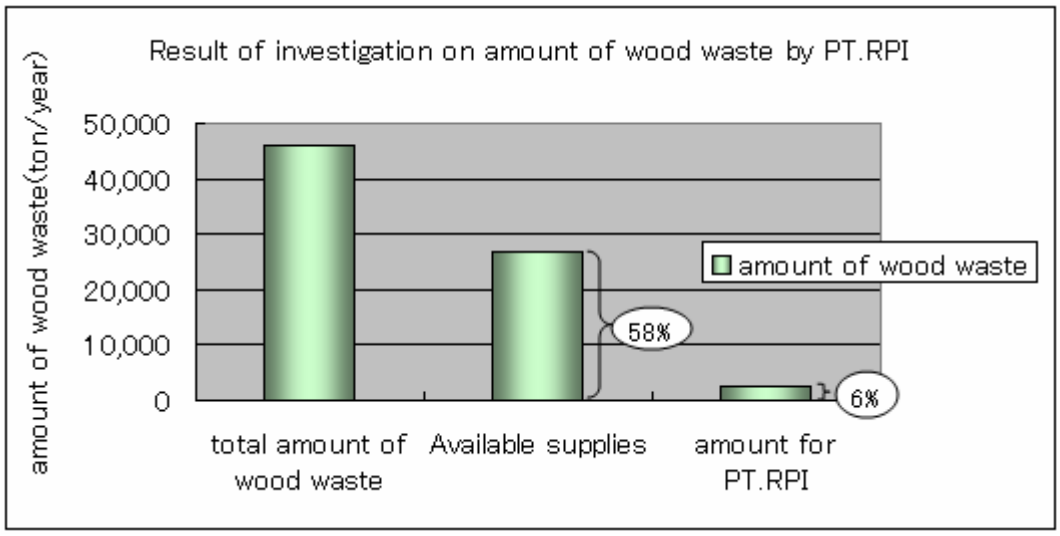


Fig.-7: Supply-demand situation of wood biomass fuel

### 3.4.3. Usage of wood biomass fuel

The results of an interview survey of sawmill businesses showed that wood biomass generated by sawmills in Central Java Province is used mostly by manufacturers of bricks or tiles in order to fire the bricks or tiles in kilns. There are diverse supply sources of wood biomass in Central Java Province, and at present, even considering the amount of demand by other wood biomass users, such as brick and tile manufacturers, it is considered possible to sufficiently ensure the wood biomass be used for the project, so demand puts no pressure on supply, and it is thought that there is no need to take into account leakage resulting from a tight supply and demand situation (by using biomass which would have been used elsewhere).

Therefore, it is not necessary to consider the leakage resulting from a tight supply and demand situation which is mentioned in Attachment C to Appendix B of indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories.

**4. Business scheme**

**4.1. Duration of the project activity**

As for this project, the foundation work has been planned since June, 2007. In the same year, the machine plant will be set up and tried for the plan of the real operation on January, 2008. It is thought that the plan will have a life of at least 25 year or more if regular maintenance is carried out once a year.

**4.2. Schedule of project execution**

Until March, 2007 : Specification fixation and order for the main machines
In March, 2007 : Start of foundation work
In December, 2007 : Start of trial run
In January, 2008 : Start of commercial operation

**4.3. Capital plan**

5 million US$ in 6.4 million US$ for capital investment is a financing from the bank.

**4.4. Capital collecting plan**

The 6.4 million US$ for capital investment is scheduled to be collected by the power generating cost reduction and the CER credit acquisition in about four years or less.

**5. Amount of emissions by project activity**

**5.1. Amount of greenhouse gas emission reduction by project activity**

**5.1.1. Baseline emissions**

In calculating the energy baseline, the AMS-1A (version 09) methodology will be applied.
The emissions baseline is the energy baseline calculated in accordance with paragraphs above time the $CO_2$ emission coefficient for the fuel displaced IPCC default values for emission coefficients may be used.
The project will continue under the current condition of no connection with external power grids and no purchase of power from outside. The estimated annual output of power generated using renewable energy technology will be the same as that generated by the current diesel-powered generators. Because the current amount of the diesel power generation ($\boldsymbol{E_B}$) is 18,663 MWh/year, the amount of the baseline emission after the project activity is estimated at 34,350 ton-CO2/year.

**5.1.2. Project emissions**

The biomass to be used in the project will be wood scraps, so it constitutes renewable biomass.
Accordingly, the GHG emissions resulting from burning wood biomass can be considered zero.

#### 5.1.2.1. Emissions within the boundaries resulting from the project

Within the boundaries of the CDM project, sources of GHG resulting from project activities include fuel for the wheel loaders (diesel oil) used in transferring the wood biomass fuel unloaded from the trucks on the plant grounds and feeding it into the boilers.

The amount of fuel used by the wheel loaders will be calculated by recording from the flow meter readings when refueling them.

The GHG emissions will be calculated from the amount of fuel consumed using the $CO_2$ emissions coefficient.

The amount of the GHG emission can be estimated at 72 ton-CO2/year from the driving situation of an existing wheel loader.

#### 5.1.2.2. Emissions within the boundaries resulting from existing power generators

The existing diesel-powered generators will be operated as supplementary equipment when the CDM project equipment is undergoing inspection, if problems occur, or when there are shortages of wood biomass fuel.

Maintaining or checking will be not calculated as an emission reduction for emissions from the operation of existing diesel power generation when the biomass power generator is abnormal, because it is thought that existing power generator will be similarly operated when the coal power generator is introduced.

The amount of emissions will be calculated as emissions from project activity when existing diesel power generation will be operated during a wood biomass fuel shortage. At present, the amount of emissions from diesel power generation is assumed to be zero, because the wood biomass fuel is enough for this CDM project activity.

### 5.1.3. Leakage

#### 5.1.3.1. Leakage resulting from transfer of existing power generators

The wood biomass power generators to be introduced for the project activities will be newly built, and plans also call for existing equipment to be utilized, so there will be no leakage resulting from the transfer of power generators.

#### 5.1.3.2. Leakage according to fuel transportation

The amount of the GHG emissions from fuel transportation was calculated in the present condition, the baseline and the project activity. As a result, the amount of the GHG emissions from project activities is estimated at 970 ton-$CO_2$/year.

Table-2: Leakage by fuel consumption of fuel transportation vehicle

| Type of fuel consumption | | Increase / decrease of amount of GHG emission (tCO2e/year) | |
|---|---|---|---|
| Existing plant | Diesel power generation | 0 | Increase |
| Baseline | Coal boiler power generation | 72 | Decrease |
| Project | Wheel loader | 0 | Increase |
| | Wood biomass power generation | 1,442 | Increase |
| Amount of leakage emission by project | | 970 | Increase |

### 5.2. Amount of GHG emission reduction during the credit period

During the first credit period (2008-2014), the amount of the emission reduction by the project activity is estimated at 233,156 $tCO_2e$/year (33,308 $tCO_2e$/year).

Table-3: Amount of GHG emission reduction

| Source of GHG | Emission during credit period ($tCO_2e$) | | Annual emission ($tCO_2e$) |
|---|---|---|---|
| Project activities | 504 | Increase | 72 |
| Baseline | 240,450 | Decrease | 34,350 |
| Leakage | 6,790 | Increase | 970 |
| Amount of emission by project | 233,156 | Decrease | 33,308 |

## 6. Monitoring methodology

### 6.1. Justification of the choice of the monitoring methodology

After the CDM project is carried out, the electric power consumed in the project boundary is made with a wood biomass boiler power generating machine newly set up and an existing diesel power generating machine.

Because the amount of power generation can be measured continuously by the wattmeter in each power generation, so methodology (b) " Metering the electricity generated by all systems of a sample thereof." in the monitor methodology simplification methodology and category I.A "Electricity generation by the user "concerning the small-scale CDM project activity is applied.

The fuel for the power generator introduced by this project activity is wood biomass 100%. It differs from co-fired or hybrid system.

### 6.2. Management system in monitoring

PT.RPI has been registered as an ISO 9001-certified plant since December 29, 1999 (Certification No. 191014, Komite Akreditasi Nasional), and plans call for documenting those procedures for monitoring in the ISO manual aiming to monitor the procedures autonomously and maintain continual control, thus achieving accurate measurement.

The monitoring management system is shown in Fig-7.

## 7. Environmental assessment concerning this project

### 7.1. Environmental assessment

The Republic of Indonesia has adopted a system for the Environmental Impact Assessment (EIA; Analisis Mengenai Dampak Lingkungan, AMDAL), requiring each place of business to have a management system in line with the magnitude of impact it has on the environment.

When biomass power generators with a capacity of 10MW or more are introduced, they are subject to EIA, but the capacity of the project is only 4MW, so EIA is not required.

### 7.2. Report to local administration

PT.RPI manufactures particle board, so it must submit, once every year, its plans to the government in the form of an Environmental Monitoring Plan (RPL) and an Environmental Management Plan (RKL).

PT.RPI obtained ISO 14001 certification (Certificate number 05/EM/023) on October 21, 2005.

## 8. Description of how comments by local stakeholders have been invited and compiled

### 8.1. Stakeholders meeting

On November 1, 2006, invitations to a stakeholders meeting were sent to representatives of the parties concerned in the vicinity of the plant and officials of environmental-related government bodies. The meeting was held on November 21 at the Kaliwungu sub-district offices with 19 stakeholders in attendance. After the explanation of the global warming mechanism, its influence, the purpose of the project, and the introduction of scheduled power generator, the question and the request about this project activity were claimed.

### 8.2. Summary of the comments received

Fig.-8: Stakeholders and project members

The following questions and demands concerning the project activity from the stakeholders were answered by PT.RPI and were understood.

a).The influence on well-water for stakeholders by the project activity.

b). Employment for project activities.

c). The devices to prevent air pollution.

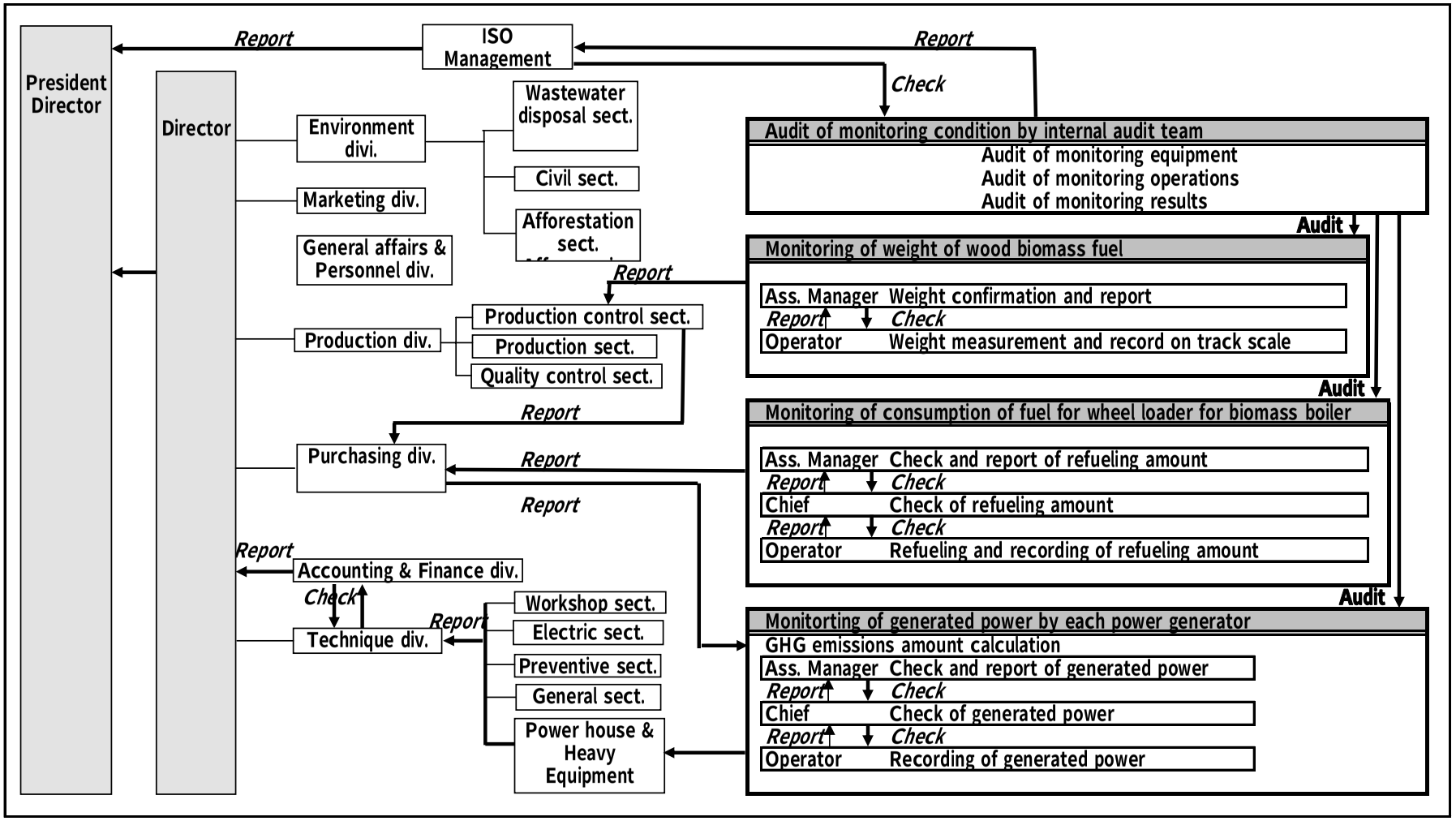


Fig.-9: Organization of PT.RPI for monitoring management system