CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

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Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

Title: Biomass Based Thermal Energy Generation Project in Palm Oil Refinery

Version: 01

Date: 13/04/2011

A.2. Description of the small-scale project activity:

Purpose of the Project Activity
PT. Multimas Nabati Asahan ("MNA"), a subsidiary of Wilmar International Limited, operates palm oil refinery and palm kernel oil production and processing facility in Kuala Tanjung, Batu Bara district, North Sumatra, Indonesia. In the oil refining processes, steam is generated by existing boilers and supplied to the onsite facilities for their processes.

Prior to the project activity, MNA operates two (2) Medium Fuel Oil ("MFO") boilers with capacity of 4.17 MT[1]/hour and 6.39 MT/hour, respectively, to produce high pressure saturated steam at 75 bars for the oil refining processes. The purpose of the project activity is to displace the use of high carbon-intensive MFO with renewable biomass materials as fuel for combustion in a steam boiler to generate thermal energy (i.e. steam).

How the Proposed Project Activity Reduces Greenhouse Gas Emissions
The project scenario is to install a new biomass boiler, in replacement of the existing MFO boilers, which is designed to combust different biomass materials (e.g., palm oil mill related wastes such as palm kernel shell or PKS, and rice husks if PKS is not adequate) to generate 10 MT/hour of saturated steam at 70 bars. The existing MFO boilers will be retained as back-up boilers during crediting period and the quantity of MFO, if combusted during the crediting period, will be monitored *ex-post*.

The project activity comprises of two alternatives:

Alternative 1: Combust only PKS
PKS to be combusted in the project activity will be supplied internally by the existing on-site palm oil mill and purchased from external suppliers when necessary. PKS is a solid waste generated during production of palm oil from the fresh fruit bunches (FFB). The PKS will be sun-dried prior to transfer to on-site silos located adjacent to the HP boiler. The PKS quantity to be fed to this boiler will be monitored through a 'Rotary Air Lock'. The PKS has a net calorific value (NCV) of 17.35 GJ/tonne. The actual NCV for PKS will be monitored *ex-post* during the crediting period.

[1] MT = metric tonnes


Figure 1. Palm Kernels from fresh fruit bunches (left) and Palm Kernel Shells from palm kernels (right)

Alternative 2: Combust PKS together with rice husk

The second alternative of this project is implemented when the amount of PKS generated from existing palm oil mill is not sufficient to produce the required quantity of steam to the onsite facilities. In such a case, rice husk will be procured from nearby regions to co-fire with PKS. Rice husk ("RH") is the by-product in rice milling operations with a net calorific value of 13.79 GJ/tonne[2].

Figure 3. Rice husk from rice milling process

The project activity displaces the use of high carbon-intensive MFO with renewable biomass materials (i.e. PKS and/or rice husk) as fuel for combustion and avoids carbon dioxide emission from the combustion of the fossil fuel (i.e. MFO). Therefore, this project activity contributes to GHG emission reduction.

Project Activity's Contributions to Sustainable Development

Environmental Sustainability:

1. The project activity will displace the use of MFO with biomass (i.e. PKS and rice husk) as fuel to generate thermal energy in the boiler. Thus, this will avoid the emission of greenhouse gases (GHG) associated to the combustion of MFO to the atmosphere.

2. The biomass material burned in the project activity is by-product waste (i.e. PKS) generated by existing palm oil mill. By burning such material for energy generation, the waste volume which will be discharged to the environment is reduced.

3. The project activity involves the installation of a new biomass boiler on the same site, therefore, no extra land excavation is required. This project activity will not bring any negative impact on the local ecological environment.

[2] http://www.pustaka-deptan.go.id/bppi/lengkap/sekampadi.pdf

4. The project activity utilises natural renewable biomass to generate thermal energy in a well managed manner, therefore it does not generate any health or safety risks during the operation.

Economic Sustainability:

1. The project activity will promote the use of locally generated biomass (i.e. PKS and rice husk) as fuel to generate thermal energy and thus reduces the region's dependency on fossil fuel (i.e. MFO).

2. The project activity requires more skilful manpower in operation from diverse background (i.e. engineering, science and finance). The implementation of this project will promote more job opportunity in the region and therefore, help increasing local community's income.

3. The use of foreign imported technology will stimulate and promote the development and transfer of more renewable energy technologies. This will in turn bring about more job opportunities in Indonesia.

Social Sustainability:

The project activity involves a 10 MT/hour biomass boiler which has more complex operation and maintenance requirement as compared to the existing MFO boilers. The implementation of this project enables training of local manpower to support the employed technology. Thus, this project allows improvements in local technical knowledge.

A.3. Project participants:

Name of the party involved ((host) indicates a host party)	Private and/or public entity(ies) Project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Indonesia (Host)	PT. Multimas Nabati Asahan, Kuala Tanjung, North Sumatra, Indonesia	No

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

A.4.1.1. Host Party(ies):

Indonesia.

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

Batu Bara District, North Sumatra.

A.4.1.3. City/Town/Community etc:

Desa Kuala Tanjung.

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

The project activity will be implemented at PT. Multimas Nabati Asahan palm kernel oil mill and palm oil refinery. This mill is located at Access Road Inalum, Desa Kuala Tanjung, Kecamatan Sei Suka, Kabupaten Batu Bara (21257), North Sumatra, Indonesia.

The coordinates of this site are N 3° 22.2549' E 99° 26.3839'

Figure 4. The location of North Sumatra Province, Indonesia
(Source: Google Map 2010)

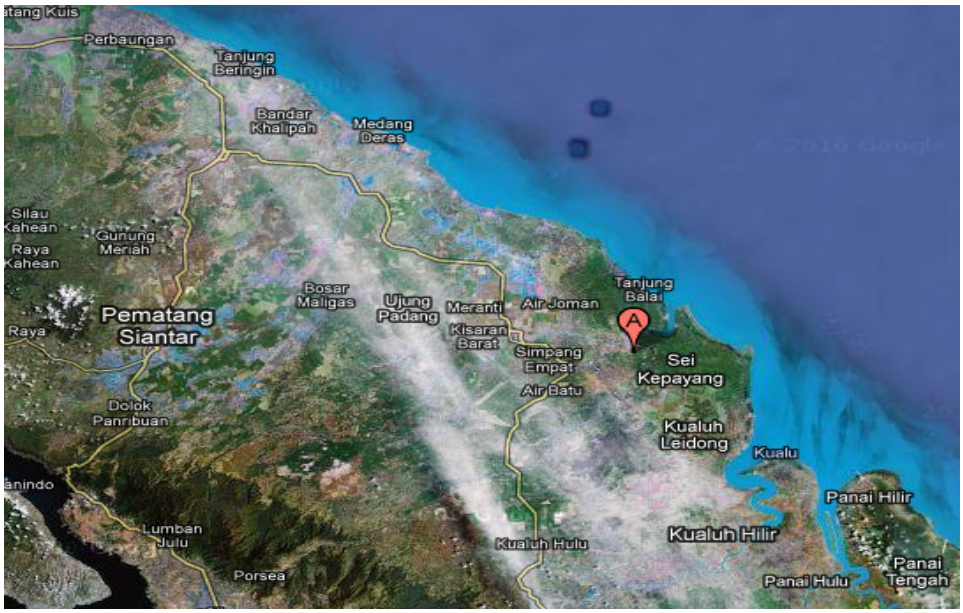

Figure 5. The location of PT. MNA Palm Oil Refinery and Palm Oil Mill
(Source: Google Map 2010)

A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

In accordance with Appendix B of the simplified modalities and procedures for small-scale CDM project activities (SSC M&P), the proposed project activity falls under the following category:

Type I: Renewable energy projects
Category C: AMS I.C Thermal energy production with or without electricity (version 18)
This project activity involves the generation of thermal energy (i.e. steam) in a 10 MT/hour biomass boiler with total thermal energy generation capacity of 6.5 MW_{th} which is less than the allowable capacity limit of 45 MW_{th}.

Existing MFO boilers

The installed capacity of the existing fossil fuel based thermal energy generating units (i.e. MFO boilers) is 4.17 MT[3]/hour and 6.39 MT/hour respectively and generates high pressure saturated steam at 75 bars for captive processes. The boiler design efficiency of the MFO boilers is 86%.

Technology of the project activity

The project activity involves the utilisation of biomass boiler using primarily palm kernel oil mill and refinery based biomass wastes and with provision for rice husk if required. The biomass boiler will have steam generation capacity of 10 MT/hour. The feed water of the boiler has temperature of 105^{o}C and pressure of 1.03 bars (1.05 kg/cm^2). The generated steam is saturated with pressure of 70 bars (74.1 kg/cm^2).

The boiler system, which is manufactured by Wuxi Taihu Boiler Co. Ltd., includes one set of DHL 10-7.0 AII. This single-drum high pressure field erected steam boiler will be arranged indoor. The scope for main steam system is from the MSSV (main steam stop valve) of boiler to the valves of steam header which is arranged in the boiler house, including steam pipelines, valves, supports or hangers and the accessories. The fuel (i.e. PKS and / or rice husk) supply system comprises of a fuel crusher and steel made fuel bunkers. The biomass will be crushed by the fuel crusher and transferred to the fuel bunkers in front of the boiler before it is sent into the boiler furnace through fuel scuttle, fuel grate and by the moving of travelling grate of boiler.

The boiler system is also equipped with a cinder removing system where slag from the travelling grate goes down into slag extractor (i.e. drag conveyor) and will subsequently be conveyed to the slag tank by belt conveyers. The flue gas from the outlet of the boiler goes into the inlet of stack through dust collector of water-film type and ID fans.

The biomass boiler will have the following specification:

Model : DHL 10-7.0 A II
Design : Single drum biomass fired, high pressure, field erected steam boiler
Total capacity : 10,000 kg/hour (10 MT/hour)
Rated steam pressure : 70 bar
Rated steam temperature : Saturation

[3] MT = metric tonnes

Feed water temperature : 105°C
Gas temperature at boiler outlet : 162°C
Boiler design efficiency : 79.3%

List of the Equipment Used Prior to Project and in the Project and the Operational Lifetime

No.	Equipment	Operational lifetime
Prior to Project		
1	MFO boilers	25 years[4]
Project Scenario[5]		
2	10 MT/hour biomass fired boiler	20 years
3	Fuel and ash handling system	20 years

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

The estimated amount of emission reductions during the first crediting period is as follows.

Year	Estimation of annual emission reductions (tCO_{2e})
2011	17,546
2012	17,546
2013	17,546
2014	17,546
2015	17,546
2016	17,546
2017	17,546
Total estimated emission reduction (tCO_{2e})	122,822
Total number of crediting years	7
Annual average of the estimated reductions over the crediting period (tCO_{2e})	17,546

A.4.4. Public funding of the small-scale project activity:

There is no public funding for this project activity.

[4] Default technical lifetime of equipments as per CDM tool, "Tool to determine the remaining lifetime of equipment" (version 1).

[5] Specification in the quotation from the boiler supplier Wuxi Yahua Boiler Import and Export Co. Ltd., dated on 01/05/2010.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

In accordance to the appendix C of the simplified modalities and procedures for the small-scale CDM project activities, a small scale project activity shall be deemed to be a de-bundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale project activity:

- With the same project participants
- In the same project category and technology/measure
- Registered within the previous 2 years
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point

This project activity is not a de-bundled component of a large scale project activity as it does not satisfy any of the above.

SECTION B. Application of a baseline and monitoring methodology

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

The baseline and monitoring methodology are based on the approved methodology as follow:

AMS I.C (version 18): "Thermal energy generation with or without electricity"

B.2 Justification of the choice of the project category:

Table 1. Justification of the project activity according to AMS I.C (version 18)

Paragraph	AMS I.C applicability	Justification
1	This category comprises renewable energy technologies that supply users with thermal energy that displaces fossil fuel use. These units include technology such as solar thermal water heaters and dryers, solar cookers, energy derived from renewable biomass and other technologies that provide thermal energy that displaces fossil fuel.	This project activity involves the generation of thermal energy (i.e. steam) by a 10 MT/hour biomass boiler using renewable biomass (i.e. PKS) and rice husk, if required.
2,3,6	Biomass-based cogeneration systems consisting of steam generator(s) and steam turbine(s) are included in this category.	This project activity generates only steam and thus does not involve any cogeneration system. Hence, this is not

Paragraph	AMS I.C applicability	Justification
		applicable.
4	The total installed/rated thermal energy generation capacity of the project equipment is equal or less than 45 MW_{th}.	This proposed boiler will have total installed capacity of 6.5 MW_{th}[6] which is less than limit of 45 MW_{th}.
5	For co-fired systems, the total installed thermal energy generation capacity of the project equipment, when using both fossil fuel and renewable fuel shall not exceed 45 MW_{th}.	The proposed biomass boiler does not involve the use of fossil fuel. Thus, this is not applicable.
7	In case electricity and/or steam/heat produced by the project activity is delivered to another facility or facilities within the project boundary, a contract between the supplier and customer(s) of the energy will have to be entered into specifying that only the facility generating the energy can claim emission reductions from the energy displaced.	The steam generated in the project activity is for captive use and will not be delivered to other facilities. Thus, this is not applicable.
8	Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category.	This project activity does not retrofit or modify the existing facility. Thus, this is not applicable
9	The capacity limits specified in the above apply to both new facilities and retrofit process. In the case of project activities that involve the addition of renewable energy units at an existing renewable energy facility, the total capacity of the units added by the project should comply with capacity limits in paragraph 4 and 6 of AMS I.C version 18 and should be physically distinct from the existing units.	The project activity does not involve addition of renewable energy units at an existing renewable energy facility. Thus this is not applicable.
10	Charcoal based biomass energy generation project activities are eligible to apply the methodology only if charcoal is produced from renewable biomass sources	This project activity does not use charcoal based biomass. Thus, this is not applicable.
11	If solid biomass fuel (e.g. briquette) is used, it shall be demonstrated that it has been produced using solely renewable biomass and all project or leakage emissions with its production shall be taken into account in emissions reduction calculation	This project activity does not use solid biomass fuel. Thus, this is not applicable.

[6] [(195 TJ * 1000 GJ/TJ) / 3.6 GJ/MWh] / (345 * 24) hours = 6.5 MW_{th}. See section B.6.3.

B.3. Description of the project boundary:

According to paragraph 12 of AMS I.C version 18, project boundary is the physical, geographical site of the project equipment producing the renewable energy delineates the project boundary. The boundary also extends to the industrial, commercial or residential facility, or facilities, consuming energy generated by the system and the processes or equipment that is affected by the project activity.

The project boundary of this project activity is described in the following diagram:

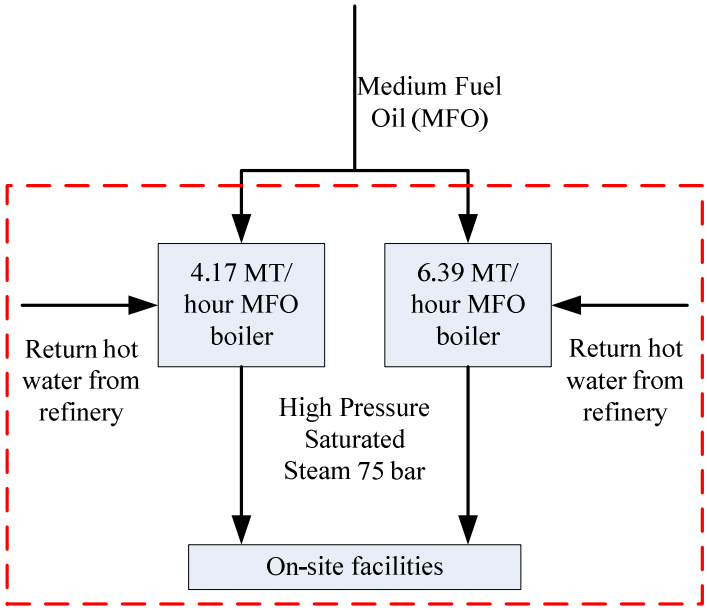

Figure 6. Delineation of baseline scenario

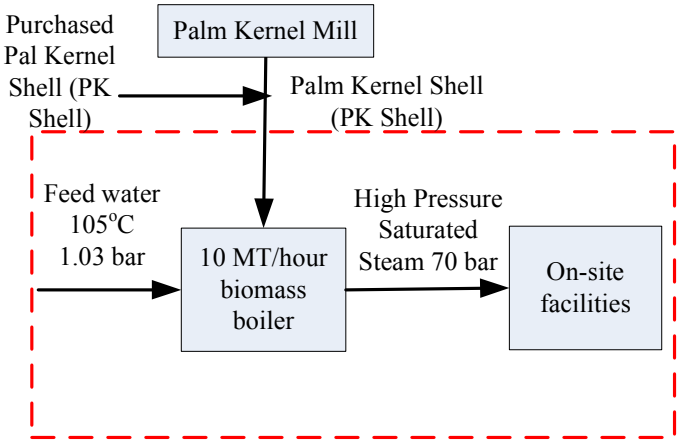

Figure 7a. Delineation of project activity (Alternative 1)

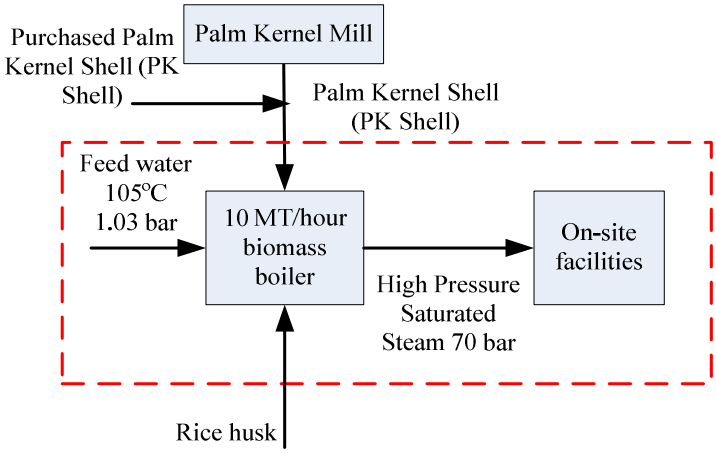

Figure 7b. Delineation of project activity (Alternative 2)

Table 2. The list potential GHG emission

	Source	Gas	Included?	Justification
Baseline	Emission from combustion of medium fuel oil (MFO) in existing boilers	CO_2	Yes	CO_2 is the major gas emitted from combusting medium fuel oil (MFO).
		CH_4	No	Excluded for simplification. This emission source is assumed to be negligible.
		N_2O	No	Excluded for simplification. This emission source is assumed to be negligible.
Project activity	Emission from combustion of MFO when existing MFO boilers are used to back up the proposed 10 MT/hour biomass boiler.	CO_2	Yes	Accountable GHG emissions in the project due to combustion of MFO.
		CH_4	No	Excluded for simplification. This emissions source is assumed to be negligible.
		N_2O	No	Excluded for simplification. This emissions source is assumed to be negligible.
Leakage	Leakage emission from collection and transportation of purchased PKS and/or rice husk in project activity	CO_2	Yes	CO_2 is the major gas emitted from combustion of fossil fuel in trucks used in transportation of purchased PKS and/or rice husk
		CH_4	No	Excluded for simplification. This emissions source is assumed to be negligible.
		N_2O	No	Excluded for simplification. This

	Source	Gas	Included?	Justification
				emissions source is assumed to be negligible.

B.4. Description of baseline and its development:

The baseline scenario that would have otherwise been implemented (most likely) in the absence of the project has been provided in paragraph 13 in the AMS I.C (version 18). With reference to this paragraph, the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity times an emission factor for the fossil fuel (i.e. MFO) displaced.

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 small-scale CDM project activity:

Prior consideration of CDM

Prior to the decision to implement this project activity, project developer had considered CDM to be established in the project. The following sequence gives the important events during the consideration of CDM project.

Table 3. List of events prior to consideration of CDM project

Date	Event
17 April 2010	AFCE final approval
7 May 2010	Supply agreement for boiler
6 October 2010	Prior consideration form submission to the UNFCCC Secretariat
12 October 2010	Prior consideration form submission to the DNA
27 August 2010	Start date of project construction
30 April 2011	Expected project commissioning and start-up

Demonstration of additionality

The additionality demonstration is elaborated below in accordance with Attachment A to Appendix B of the simplified modalities and procedures for small scale CDM project activities.

Financial barrier

Prior to the implementation of the project activity, the project proponent had considered two (2) alternatives: (1) the use of a 10 MT/hour coal-fired boiler; and (2) a 10 MT/hour biomass based boiler. Both alternatives required investments but would have resulted in cost savings in comparison with continuation of the existing MFO boilers.

For the alternative of using a coal-fired boiler, the payback period for the investment would have been:

Capital investment = USD 2,447,000
Annual fuel cost savings = USD 749,293
Payback period = USD 2,447,000 / USD 749,293 = 3.27 years

For the alternative of using a biomass based boiler, the payback period of for the investment would have been:

Capital investment = USD 2,447,000
Annual fuel cost savings = USD 518,279
Payback period = USD 2,447,000 / USD 518,279 = 4.72 years

In view of the above, it is more attractive to implement the coal-fired boiler. However, this alternative would have resulted in a higher greenhouse gas emissions compared to the biomass based boiler.

It was also noted that implementation of the biomass based boiler could qualify for CDM revenues as estimated below.

Annual CER revenues = USD $19 * 17,546 = USD 333,374

With this additional revenue, the payback period for the biomass based boiler gets reduced to 2.87 years, as shown below.

Payback period (with CER revenue) = USD 2,447,000 / (USD 518,279 + 333,374) = 2.87 years

Therefore, the significance of the CER revenue on the project is that it has resulted in removing the financial barrier to the implementation of the project activity.

Technological barrier

The technology, imported from China, is based on modification of the coal fired boiler technology to biomass boiler using PKS and RH. Being a new technological concept, the operational performance of the technology is not established and there exist significant risks associated with commissioning, and operation and maintenance of the newly developed technology. In addition, the technology development phase will require significant engineering efforts in the design of the biomass feeding system, combustion system and temperature control system. The new technology thus entails the need for developing in-house technical expertise which would not be required if a MFO-fired system was implemented.

One key problem that the PP is likely to expect is the handling and removal of clinkers from burnt PKS, which is more difficult to remove than ash/clinkers formed if coal were used. This is due to the physical and chemical properties of the biomass (i.e. PKS), specifically the low ash melting point and high alkaline content of biomass[7]. This requires the operation team to constantly ensure and maintain sufficient air supply to the boiler for complete combustion. Any negligence in the monitoring of the air supply will result in temperature drop in the boiler and consequently caused the formation of ash/clinkers in the boiler. In addition, the high alkaline content of this biomass causes the generated ash to be sticky and eventually deposit on the grate. This ash deposition on the grate chamber will undesirably reduce the heat transfer rate and therefore reduce the efficiency of the boiler[8]. In this regard, the boiler grate would

[7] http://www.uniten.edu.my/newhome/uploaded/coe/icee%202006/proceedings/combustion%20technology/UNITEN%20ICEE%202006%20Combustion%20Characteristics%20of%20Palm%20Kernel%20Shells%20Using%20an%20Inclined%20Grate%20Combustor.pdf

[8] http://www.ipttech.net/PoweringAsia.pdf

require more maintenance than a conventional coal boiler, so as to maintain the optimal level of efficiency.

In addition, the body (i.e. boiler chamber) of a biomass based boiler is more elongated than a conventional coal or MFO boiler chamber. Hence, additional process control skills would be required to control flames within such larger size boiler chambers. However, as the project activity is the first to be implemented in the region, the level of impact due to the technological difficulties (i.e. regular maintenance and cleaning, controlling and monitoring of flames) and the successful operation of the proposed biomass based boiler are highly uncertain. This therefore brings about much apprehension on the potential operational and financial risks to the project proponent(s).

Due to the lack of prior experience in handling a biomass based boiler and with such high level of operational and technical difficulties; training will be necessary to ensure skilled manpower for the operations. Also, more frequent downtimes due to maintenance is expected, hence productive hours will be impacted and may result in loss of revenue to the PP. As a back up for the 10 MT/hour biomass boiler during these downtimes, the existing MFO boilers will be retained as standby.

The abovementioned challenges thus pose as technological barriers which deter the PP from implementing the new technology. The project proponent (PP) could have continued the use of existing MFO boilers (total capacity 10.56 MT/hour), whereby the operation team has more knowledge and experience in handling and operating, so that technological barriers as a result of the use of biomass boiler will not be encountered during the implementation. However, the continuation of the baseline technology (i.e. MFO boiler) will lead to higher GHG emissions. Upon the success implementation of the CDM project activity, the CDM revenues would provide the funds required for skills upgrading and trainings to overcome the operational barriers, as well as to mitigate the financial risk due to expected loss of productivity. This will in turn results in development of technical skills for this new technology in the region and achieves emission reductions.

Prevailing practice barrier

The imported boiler technology, which allows co-firing of different type of biomass (PKS and rice husk) to generate high pressure steam output, used in this project activity (i.e. biomass boiler) is considered as the first of its kind to be employed in the region. This is supported by the letter (No. 234/ADM/MNA/SKE/X/10, 21 October 2010) from the local authority (Dinas Tenaga Kerja) Batu Bara, North Sumatra Indonesia. In this letter it is stated that the biomass boiler which is used in this project has never been used in any companies in the Batu Bara region before.

As the performance of this new technology is not well-established, project developers are not motivated to implement new projects using such an uncommon and foreign technology, i.e. biomass based technology used in the project activity. In overcoming this barrier due to prevailing practice, CDM revenue which can be achieved through implementation of this project has provided a form of incentive to the PP to invest in the use the biomass for energy generation and also to mitigate the potential risks.

Institutional barrier

Biomass is one of the renewable energy sources, which has the potential to be developed and utilised more intensively over the next few years in Indonesia. In this aspect, palm oil residues (e.g. PKS) as a

form of energy source, has energy potential of 67 GJ/year[9]. This can be used for supplying both thermal and electricity for the nation.

The biomass potential has been considered by the government through its national energy policy (Kebijakan Energi Nasional) 2003-2020[10] and was restated in the decree by Ministry of Energy and Mineral Resources (Number 0002, Year 2004)[11]. The government has set a target to increase the energy consumption from renewable source (i.e. biomass) up to 15% by 2025. However, the utilisation rate of biomass as renewable energy source has been very low (0.89%) and thus reflective of the efforts for promoting this energy source has been very slow. Statistic from Directorate General for Electricity and Energy Utilisation Ministry of Energy and Mineral Resources (provided in the table below) shows the low utilisation rate of biomass as a renewable energy source in Indonesia.

Table 4. Renewable energy utilisation in Indonesia[12]

Renewable Energy Source	% Utilisation
Large hydro	5.6
Geothermal	3.0
Mini/micro hydro	41.4
Biomass	0.89

Up to now, fossil fuel (e.g. MFO) is still utilised very extensively in Indonesia. Based on the study by the U.S. Department of Commerce International Trade Administration, fossil fuel contributes to total of 93% of national energy source in Indonesia[13] while biomass energy source has an undeveloped potential of 99%. This statistic indicates that even though utilisation of biomass as renewable energy source had been encouraged by the government since 2003, there lacks incentives from the government to significantly increase utilisation rate of biomass.

In addition, the study by the U.S. Department of Commerce International Trade Administration also indicated that heavy subsidies for energy consumers have become a financial burden on the government and is thus one of the reasons which have deterred the investment for cleaner and renewable energy sources. The institutional barrier is therefore the low incentive from government in this renewable energy sector, specifically for biomass-based energy, and the presence of financial burden faced by the government which have resulted in challenges faced in the implementation of renewable energy projects.

With the implementation of the CDM project, the cash-flow from CERs ensures the stability of revenue stream to the Project and thus mitigates potential risks and lack of incentives from the Governent for biomass-based energy. This will also allow sustainable future investment and alleviate the existing institutional barrier.

[9] http://www.energiterbarukan.net/index.php?option=com_content&task=view&id=35

[10] http://shony123.files.wordpress.com/2009/09/kebijakan-energi-nasional-2003-2020.pdf

[11] http://portal.djmbp.esdm.go.id/sijh/kepmen-0002-2004.pdf

[12] http://electricitygovernance.wri.org/files/egi/Hutapea%20DGEEU%20Indonesia%20.ppt.

[13] http://ita.doc.gov/td/energy/Indonesia%20Renewable%20Energy%20Assessment%20(FINAL).pdf

The benefits of implementing the CDM project activity

The approval and registration of this CDM project activity will alleviate the abovementioned barriers as the additional revenue to this project will be an incentive to the project proponent(s) in implementing the project. In addition, the CER revenue will also mitigate the risk which might occur during the project implementation (i.e. unexpected downtime of the biomass boiler) due to lack of skilled manpower. Therefore, the approval and registration of this proposed CDM project will help the project proponent(s) in maintaining the sustainability of this project and thus, successfully achieve the emission reduction.

B.6. Emission reductions

B.6.1. Explanation of methodological choices:

Baseline emission

As explained in Section B.4, the baseline of this project activity is the generation of steam by two existing MFO boilers. According to paragraph 18 of AMS I.C version 18, the baseline emission for steam/heat produced using fossil fuel (in this case MFO) is calculated as follow:

$$BE_{thermal,CO2,y} = (EG_{thermal,y} / \eta_{BL,thermal}) * EF_{MFO,CO2}$$

Where:

$BE_{thermal,CO2,y}$	The baseline emissions from steam / heat displaced by the project activity during the year y (tCO_{2e}).
$EG_{thermal,y}$	The net quantity of steam / heat supplied by the project activity during the year y (TJ).
$\eta_{BL,thermal}$	The efficiency of the boiler using MFO that would have been used in the absence of project activity.
$EF_{MFO,CO2}$	The CO_2 emission factor of the medium fuel oil (MFO) that would have been used in the baseline boilers (tCO_2 / TJ).

Table 5. Parameters for calculation of baseline emission

Parameters	Value	Source
$EG_{thermal,y}$	195 TJ	Thermal energy generation is determined by the difference of the enthalpy of the steam generated by boiler and the enthalpy of the feed water times the quantity of steam generated. The respective enthalpy is derived from the steam table based on the temperature and/or pressure.
$\eta_{BL,thermal}$	86 %	As per paragraph 26 b) of AMS I.C version 18
$EF_{MFO,CO2}$	77.4 tCO_2/TJ	Table 2.2 Volume 2 Chapter 2 IPCC guidelines 2006. The value of residual oil is used.

Project emission

As explained in paragraph 43 of AMS I.C version 18, project emissions include:

Table 6. Project activity emissions

Project activity emission	Justification
a) CO_2 emissions from on-site consumption of fossil fuel (i.e. MFO) due to the project	Applicable. In case where the existing MFO boilers are used for back up purposes, as a result of potential

Project activity emission	Justification
activity.	operational difficulties that might be encountered when operating the new technology, there will be CO_2 emissions as a result of the combustion of MFO will also be accounted *ex-post.*
b) CO_2 emissions from electricity consumption by the project activity	Not applicable. The biomass boiler is expected to use the electricity generated from other renewable sources in the existing facility.
c) Any other significant emissions associated with project activity within the project boundary	Not applicable. There is no other significant emission.
d) For geothermal project activities, project participants shall account for the following emissions sources where applicable: • Fugitive emissions of carbon dioxide and methane due to release of non-condensable gases from produced steam • Carbon dioxide emissions resulting from combustion of fossil fuels related to the operation of the geothermal power plant	Not applicable. This is not a geothermal project activity.

Based on table 6 above, the project activity emissions is zero for *ex-ante* calculations.

Whenever existing MFO boilers will be used in project activity, the emission due to combustion of MFO is also accounted as per equation 1 and 4 "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" as follow:

$$PE_{MFO,y} = FC_{MFO,y} * COEF_{MFO,y}$$

$$PE_{MFO,y} = FC_{MFO,y} * NCV_{MFO,y} * EF_{CO2MFO,y}$$

Where:

$PE_{MFO,y}$	Project emission due to combustion of MFO in year *y* (tCO_{2e})
$FC_{MFO,y}$	Quantity of MFO combusted in year *y* (tonne)
$COEF_{MFO,y}$	CO_2 emission coefficient of MFO in year *y* (tCO_2/tonne)
$NCV_{MFO,y}$	Weighted average net calorific value of MFO in year *y* (GJ/tonne)
$EF_{CO2MFO,y}$	Weighted average CO_2 emission factor of MFO in year *y* (tCO_{2e}/GJ)

Leakage:
As explained under paragraph 45 and 46 of AMS I.C (version 18), leakage is accounted in the following conditions:

Table 7. Leakage of project activity

Leakage	Justification
If the energy generating equipment currently being utilised is transferred from outside the boundary to the project activity, leakage is to be considered	This project activity does not involve any transfer of equipment from outside the project boundary. Thus, this is not applicable.
If biomass residues are transported over a distance of more than 200 kilometres due to the implementation of the project activity then this leakage source attributed to transportation shall be considered, otherwise it can be neglected.	In the case where PKS and/or rice husk is required to be purchased from sources which are more than 200 kilometres away from the project activity; the leakage emissions will be taken into account. For *ex-ante* calculation, this leakage is assumed zero. However, any such transportation of the biomass materials required will be monitored *ex-post*.
Leakage from biomass project activities (as per "General Guidance on Leakage in biomass project activities Attachment C to Appendix B of 4/CMP.1 Annex II)	The project activity will potentially use PKS and/or rice husk which are procured from nearby sources within 50 km radius of the project. PKS and/or rice husk availability survey will be conducted to ensure that supplies are available significantly in excess of 25% of the demand in the region. Otherwise this leakage will be accounted.

As explained in table 7, there is therefore no leakage to be accounted *ex-ante*. In the case where PKS and/or rice husk is required to be purchased from sources which are more than 200 kilometres away from the project activity, the emission due to collection and transportation of these biomass materials will be accounted *ex-post* and calculated as per equation 40, 41, and 42 of ACM0006 (version 11.1) "Consolidated methodology for electricity and thermal energy generation from biomass residues". The calculation procedures for the leakage emissions are as follow:

Calculation of the leakage emissions associated to the transportation of PKS and/or rice husk from procurement sources

The leakage estimation from transportation of purchased PKS and/or rice husk is calculated separately using one of the following options:

Option 1
If the data of distance travelled by truck(s) is available, the following equations will be used:

$$PE_{TR,y} = N_y * AVD_y * EF_{km,y}$$

or,

$$PE_{TR,y} = BR_{TR,y} / TL_y * AVD_y * EF_{km,y}$$

Where:

$PE_{TR,y}$	Emissions during year *y* due to transport of the biomass residues to the project plant (tCO_2)
N_y	Number of truck trips for the transportation of biomass residues (i.e. PKS and/or rice husk) during year *y*
AVD_y	Average round trip distance (from and to) between the biomass residues (i.e PKS and/or rice husk) supply sites and the site of project plant during year *y*
$EF_{km,y}$	Average CO_2 emission factor for the trucks measured during year *y* (tCO_2/km)
$BR_{TR,y}$	Quantity of biomass residues (i.e. PKS and/or rice husk) that will be transported to the project site during the year *y* (tonnes of dry matter)
TL_y	Average truck load of the trucks used during the year *y* (tonnes of dry matter)

Option 2
If the data of fuel consumed for transportation is available, the following equation shall be used:

$$PE_{TR,y} = \sum_{f} FC_{TR,f,y} * NCV_{FF,f,y} * EF_{FF,f,y}$$

where:

$PE_{TR,y}$	Emissions during year *y* due to transport of the biomass residues (i.e. PKS and/or rice husk) to the project plant (tCO_2)
$FC_{TR,f,y}$	Fuel consumption of fuel type *f* in trucks for transportation of biomass residues (i.e PKS and/or rice husk) during the year *y* (mass or volume unit)
$NCV_{FF,f,y}$	Net calorific value of fossil fuel type *f* in year *y* (GJ/mass or volume unit)
$EF_{FF,f,y}$	CO_2 emission factor for fossil fuel type *f* in year *y* (tCO_2/GJ)

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

Data / Parameter:	$\eta_{BL,thermal}$
Data unit:	%
Description:	Efficiency of the baseline MFO boilers
Source of data used:	Quotation for a new MFO boiler
Value applied:	86
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per paragraph 26 b) of AMS I.C version 18.
Any comment:	-

Data / Parameter:	Q_{steam}
Data unit:	MT/hour
Description:	Hourly flow rate of steam generated from biomass boiler in project activity
Source of data used:	Design value from the boiler supplier
Value applied:	10

Justification of the choice of data or description of measurement methods and procedures actually applied :	Design flow rate value is used in the *ex-ante* calculation of the annual steam quantity.
Any comment:	Actual quantity of steam (in MT) generated during the monitoring period will be measured *ex-post* using calibrated meters. Calibration is per the relevant paragraphs of the "General guidelines to SSC CDM Methodologies".

Data / Parameter:	**HR**
Data unit:	Hours
Description:	Number of operating hours for the 10 MT/hour biomass boiler in project activity
Source of data used:	Project proponent
Value applied:	8,280
Justification of the choice of data or description of measurement methods and procedures actually applied :	The number of operating hours, together with the steam flow rate, is used in the *ex-ante* calculation of the annual steam quantity.
Any comment:	Actual quantity of steam generated during the monitoring period will be measured *ex-post* using calibrated meters. Hence, the number of operating hours need not be monitored during the monitoring period.

Data / Parameter:	**P_{steam}**
Data unit:	kg/cm^2
Description:	Pressure of generated saturated steam from biomass boiler
Source of data used:	Design value from the boiler supplier
Value applied:	71.4
Justification of the choice of data or description of measurement methods and procedures actually applied :	Design steam pressure value is used in the *ex-ante* derivation of the steam enthalpy.
Any comment:	The design value is 70 bar, which is equivalent to 71.4 kg/cm^2

Data / Parameter:	**T_{steam}**
Data unit:	^oC
Description:	Temperature of the generated saturated steam from biomass boiler
Source of data used:	Design value from the boiler supplier
Value applied:	286

Justification of the choice of data or description of measurement methods and procedures actually applied :	Design steam temperature value is used in the *ex-ante* derivation of the steam enthalpy.
Any comment:	-

Data / Parameter:	**$T_{feed\ water}$**
Data unit:	^oC
Description:	Temperature of feed water used in the biomass boiler
Source of data used:	Design value from the boiler supplier
Value applied:	105
Justification of the choice of data or description of measurement methods and procedures actually applied :	Design feed water temperature value is used in the *ex-ante* calculation of the water enthalpy.
Any comment:	-

Data / Parameter:	**$P_{feed\ water}$**
Data unit:	kg/cm^2
Description:	Pressure of feed water used in the biomass boiler
Source of data used:	Design value from the boiler supplier
Value applied:	1.05 (1.03 bar)
Justification of the choice of data or description of measurement methods and procedures actually applied :	Design feed water pressure value is used in the *ex-ante* calculation of the water enthalpy.
Any comment:	The design value is 1.03 bar, which is equivalent to 1.05 kg/cm^2

Data / Parameter:	**NCV_{MFO}**
Data unit:	GJ/tonne
Description:	Net calorific value of MFO
Source of data used:	Table 1.2, Volume 2 Chapter 1, IPCC guideline 2006. The value for residual oil has been used
Value applied	40.4
Justification of the choice of data or description of measurement methods and procedures	Reliable local or national data is not available, hence IPCC default emission factors is used.

actually applied :	
Any comment:	Any future revision of the IPCC guidelines will be taken into account *ex-post*.

Data / Parameter:	**$EF_{MFO,CO2}$**
Data unit:	tCO_{2e}/GJ
Description:	CO_2 emission factor of MFO
Source of data used:	Table 2.2, Volume 2 Chapter 2, IPCC guideline 2006. The value for residual oil has been used
Value applied:	0.0774
Justification of the choice of data or description of measurement methods and procedures actually applied :	Reliable local or national data is not available, hence IPCC default emission factors is used.
Any comment:	Any future revision of the IPCC guidelines will be taken into account *ex-post*.

B.6.3 Ex-ante calculation of emission reductions:

Baseline emission:
As explained in Section B.6.1, the baseline emission of this project activity is as follow:

$BE_{thermal,CO2,y} = (EG_{thermal,y} / \eta_{BL,thermal}) * EF_{FF,CO2}$

Quantity of steam generated in boiler (Q_{steam}) = 10 MT/hour (As a conservative approach, boiler capacity in the project activity is used as it is smaller as compared to that of baseline)

Number of operation day in a year = 345 days

Quantity of steam generated in boiler (Q_{steam})
= 10 MT/hour * 345 days * 24 hours/day
= 82,800 MT/year = 82,800,000 kg/year

Enthalpy of generated saturated steam at 70 bar (H_{steam})
= 2,772.1 kJ/kg (http://www.efunda.com/materials/water/steamtable_sat.cfm)

Enthalpy of feed water at 105^{o}C and 1.03 bar ($H_{feed\ water}$) = 417.46 kJ/kg

$EG_{thermal,y} = Q_{steam} * (H_{steam} - H_{feed\ water})$
= 82,800,000 kg/year * (2,772.1 – 417.46) kJ/kg
= $1.95 * 10^{11}$ kJ = 194.96 TJ
= (194.96 / 3.6) * 1,000 = 54,156 MWh_{th}

Thermal energy generation capacity
= $EG_{thermal,y}$ / number of hours of operation per year

= 54,156 MWh / (345 days * 24 hours)
= 6.54 MW_{th}

$BE_{thermal,CO2,y}$ = (194.96 / 86 %) TJ * 77.4 tCO_2/TJ = 17,546 tCO_{2e}

Baseline emission = 17,546 tCO_{2e}

Project emission:
As explained in Table 7 (Section B.6.1), there is no project emission to be accounted *ex-ante*.

Project emission = 0 tCO_2

Leakage:
As explained in Table 8 (Section B.6.1), the PKS and rice husk needed to be collected and transported into the project boundary is assumed zero, hence the project leakage will be neglected for *ex-ante* estimations.

Leakage = 0 tCO_2

Emission reduction (ER) = Baseline emission – Project emission – Leakage
= 17,546 – 0 – 0 = 17,546 tCO_{2e}

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

Year	Baseline emission (tCO_{2e})	Project emission (tCO_{2e})	Leakage (tCO_{2e})	Emission reduction (tCO_{2e})
2011	17,546	0	0	17,546
2012	17,546	0	0	17,546
2013	17,546	0	0	17,546
2014	17,546	0	0	17,546
2015	17,546	0	0	17,546
2016	17,546	0	0	17,546
2017	17,546	0	0	17,546
2018	17,546	0	0	17,546
2019	17,546	0	0	17,546
2020	17,546	0	0	17,546
2021	17,546	0	0	17,546
2022	17,546	0	0	17,546
2023	17,546	0	0	17,546
2024	17,546	0	0	17,546
2025	17,546	0	0	17,546
2026	17,546	0	0	17,546
2027	17,546	0	0	17,546
2028	17,546	0	0	17,546
2029	17,546	0	0	17,546
2030	17,546	0	0	17,546
Total	**350,920**	**0**	**0**	**350,920**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**Q_{steam}**
Data unit:	MT
Description:	Quantity of steam generated from biomass boiler in project activity during the year *y*
Source of data to be used:	Measurement by project proponent(s)
Value of data	-
Description of measurement methods and procedures to be applied:	Measured using calibrated meters. Calibration is per the relevant paragraphs of the "General guidelines to SSC CDM Methodologies".
Monitoring frequency:	Continuous monitoring, integrated hourly and at least monthly recording
QA/QC procedures to be applied:	Flow meter will be calibrated as per available national regulation or standard. In the case when national regulation or standard is not available, the calibration will follow the recommendation by the manufacturer.
Any comment:	-

Data / Parameter:	**P_{steam}**
Data unit:	kg/cm^2
Description:	Pressure of generated saturated steam from biomass boiler
Source of data to be used:	Measurement by project proponent(s)
Value of data	-
Description of measurement methods and procedures to be applied:	Measured using calibrated meters. Calibration is per the relevant paragraphs of the "General guidelines to SSC CDM methodologies"
Monitoring frequency:	Continuous monitoring, integrated hourly and at least monthly recording
QA/QC procedures to be applied:	Pressure meter will be calibrated as per national regulation or standard. In the case when national regulation or standard is not available, the calibration will follow the recommendation by manufacturer.
Any comment:	The unit of the actual pressure value, which will be recorded in the operations logbook, is in bars and will be converted to kg/cm^2.

Data / Parameter:	**T_{steam}**
Data unit:	^oC
Description:	Temperature of the generated saturated steam from biomass boiler
Source of data to be used:	Measurement by project proponent(s)
Value of data	-

Description of measurement methods and procedures to be applied:	Measured using calibrated meters. Calibration is per the relevant paragraphs of the "General guidelines to SSC CDM methodologies"
Monitoring frequency:	Continuous monitoring, integrated hourly and at least monthly recording
QA/QC procedures to be applied:	The temperature meter will be calibrated as per national regulation or standard. In the case when national regulation or standard is not available, the calibration will follow the recommendation by manufacturer.
Any comment:	-

Data / Parameter:	$\mathbf{T_{feed\ water}}$
Data unit:	^{o}C
Description:	Temperature of feed water used in the biomass boiler
Source of data to be used:	Measurement by project proponent(s)
Value of data	-
Description of measurement methods and procedures to be applied:	Measured using calibrated meters. Calibration is per the relevant paragraphs of the "General guidelines to SSC CDM methodologies"
Monitoring frequency:	Continuous monitoring, integrated hourly and at least monthly recording
QA/QC procedures to be applied:	Temperature meter will be calibrated as per national regulation or standard. In the case when national regulation or standard is not available, the calibration will follow the recommendation by manufacturer.
Any comment:	-

Data / Parameter:	$\mathbf{P_{feed\ water}}$
Data unit:	kg/cm^2
Description:	Pressure of feed water used in the biomass boiler
Source of data to be used:	Measurement by project proponent(s)
Value of data	-
Description of measurement methods and procedures to be applied:	Measured using calibrated meters. Calibration is per the relevant paragraphs of the "General guidelines to SSC CDM methodologies"
Monitoring frequency:	Continuous monitoring, integrated hourly and at least monthly recording
QA/QC procedures to be applied:	The pressure meter will calibrated as per national regulation or standard. In the case when national regulation or standard is not available, the calibration will follow the recommendation by manufacturer.
Any comment:	The unit of the actual pressure value, which will be recorded in the operations logbook, is in bars and will be converted to kg/cm^2.

Data / Parameter:	$\mathbf{B_{PKS}}$
Data unit:	Tonnes

Description:	Annual quantity of palm kernel shell (PKS) consumed in the biomass boiler
Source of data to be used:	Measurement by project proponent(s)
Value of data	-
Description of measurement methods and procedures to be applied:	PKS supplied by the palm oil mill and any additional PKS procured externally is stored in on-site silos and drawn for use to the boiler when required. The quantity of PKS generated by the palm oil mill and consumed in the project activity will be measured by a calibrated mass balance, while the quantity of PKS procured externally will be measured by a calibrated weighing bridge.
Monitoring frequency:	Continuously monitored using a mass balance for the PKS generated from on-site palm oil mill and a weighing bridge for the purchased PKS. The monitoring is recorded on daily basis.
QA/QC procedures to be applied:	Any national regulation or standard on calibration of requirement for mass balance and weighing bridge will be followed.
Any comment:	The quantity of PKS consumed is monitored to ensure that supplies are available significantly in excess of 25% of the demand in the region.

Data / Parameter:	$\mathbf{B_{rice\ husk}}$
Data unit:	Tonnes
Description:	Annual quantity of rice husk consumed in the biomass boiler
Source of data to be used:	Measurement by project proponent(s)
Value of data	-
Description of measurement methods and procedures to be applied:	Calibrated mass based measurement will be used, i.e. weighing bridge.
Monitoring frequency:	The quantity of any externally procured rice husk will be monitored continuously using the weighing bridge. The monitored quantity will be recorded on daily basis.
QA/QC procedures to be applied:	The quantity used is measured on a calibrated weighing bridge and will be cross-checked against the purchase receipt from the supplier. Any national regulation or standard on calibration of requirement for mass balance will be followed.
Any comment:	The quantity of rice husk consumed is monitored to ensure that supplies are available significantly in excess of 25% of the demand in the region.

Data / Parameter:	$\mathbf{MC_{biomass}}$
Data unit:	% water
Description:	Moisture content of the biomass (PKS and/or rice husk) residues
Source of data to be used:	Measurement by project proponent(s)
Value of data	-

Description of measurement methods and procedures to be applied:	On-site measurement will be conducted. The measurement will follow the international or national standard.
Monitoring frequency:	The moisture content of biomass of homogenous quality will be monitored at least on a monthly basis. The weighted average will be calculated for each monitoring period and used in the calculations
QA/QC procedures to be applied:	-
Any comment:	In the case of dry biomass, this monitoring is not necessary

Data / Parameter:	**FC_{MFO}**
Data unit:	Tonne
Description:	Quantity of MFO consumed in project activity
Source of data to be used:	Measurement by project proponent(s)
Value of data	-
Description of measurement methods and procedures to be applied:	Fuel volume meters will be used
Monitoring frequency:	-
QA/QC procedures to be applied:	The consistency of measurement by fuel volume meters will be cross checked with the purchased quantity.
Any comment:	-

Data / Parameter:	**NCV_{MFO}**
Data unit:	GJ/tonne
Description:	Net calorific value of MFO
Source of data to be used:	Table 1.2, Volume 2 Chapter 1, IPCC guideline 2006. The value for residual oil has been used
Value of data	-
Description of measurement methods and procedures to be applied:	Not relevant
Monitoring frequency:	Monitoring will be conducted at least annually
QA/QC procedures to be applied:	Not relevant
Any comment:	Any future revision of the IPCC guidelines will be taken into account *ex-post*.

Data / Parameter:	**$EF_{MFO,CO2}$**
Data unit:	tCO_{2e}/GJ
Description:	CO_2 emission factor of MFO

Source of data to be used:	Table 2.2, Volume 2 Chapter 2, IPCC guideline 2006. The value for residual oil has been used
Value of data	-
Description of measurement methods and procedures to be applied:	Not relevant
Monitoring frequency:	Monitoring will be conducted at least annually
QA/QC procedures to be applied:	Not relevant
Any comment:	Any future revision of the IPCC guidelines will be taken into account *ex-post*.

Data / Parameter:	$\mathbf{BR_{TR,y,rice\ husk}}$
Data unit:	Tonne on dry basis
Description:	Quantity of rice husk to be transported to the project site during the year *y*
Source of data to be used:	On site measurements
Value of data	-
Description of measurement methods and procedures to be applied:	Calibrated weight meters will be used. Moisture content will be adjusted in order to determine the quantity of dry rice husk.
Monitoring frequency:	Data will be monitored continuously and aggregated as appropriate to calculate emission reductions
QA/QC procedures to be applied:	Weighing bridge will be used to measure the quantity of externally procured rice husk transported to the project site. This value will be cross-checked against the purchase receipt from the suppliers.
Any comment:	-

Data / Parameter:	$\mathbf{BR_{TR,y,PKS}}$
Data unit:	Tonne on dry basis
Description:	Quantity of purchased PKS to be transported to the project site during the year *y*
Source of data to be used:	On site measurements
Value of data	-
Description of measurement methods and procedures to be applied:	Calibrated weight meters will be used. Moisture content will be adjusted in order to determine the quantity of dry PKS.
Monitoring frequency:	Data will be monitored continuously and aggregated as appropriate to calculate emission reductions
QA/QC procedures to be applied:	Weighing bridge will used to measure the quantity of externally procured PKS transported to the project site This value will be cross-checked against the purchase receipt from the suppliers.
Any comment:	-

Data / Parameter:	$FC_{TR,f,y,rice\ husk}$
Data unit:	Mass or volume unit
Description:	Fuel consumption of fuel type *f* (e.g., diesel) in trucks for transportation of the externally procured rice husk during the year *y*
Source of data to be used:	Fuel purchase receipts or fuel consumptions meters in the trucks
Value of data	-
Description of measurement methods and procedures to be applied:	-
Monitoring frequency:	Data will be monitored continuously and aggregated as appropriate to calculate emission reductions
QA/QC procedures to be applied:	The resulting CO_2 emission will be cross checked with a simple calculation based on distance approach.
Any comment:	-

Data / Parameter:	$FC_{TR,f,y,PKS}$
Data unit:	Mass or volume unit
Description:	Fuel consumption of fuel type *f* (e.g., diesel) in trucks for transportation of the externally procured PKS during the year *y*
Source of data to be used:	Fuel purchase receipts or fuel consumptions meters in the trucks
Value of data	-
Description of measurement methods and procedures to be applied:	-
Monitoring frequency:	Data will be monitored continuously and aggregated as appropriate to calculate emission reductions
QA/QC procedures to be applied:	The resulting CO_2 emission will be cross checked with a simple calculation based on distance approach.
Any comment:	-

Data / Parameter:	$EF_{km,y,rice\ husk}$
Data unit:	tCO_2/km
Description:	Annual average CO_2 emission factor for the trucks used to transport externally procured rice husk.
Source of data to be used:	Reliable data from publicly available literature
Value of data	-

Description of measurement methods and procedures to be applied:	Emission factor applicable for the truck types used from the literature will be chosen in a conservative manner.
Monitoring frequency:	Monitoring will be conducted at least annually
QA/QC procedures to be applied:	Not relevant
Any comment:	Any future revision of the reliable data source will be taken into account *ex-post*.

Data / Parameter:	**$EF_{km,y,PKS}$**
Data unit:	tCO_2/km
Description:	Annual average CO_2 emission factor for the trucks used to transport externally procured PKS.
Source of data to be used:	Reliable data from publicly available literature
Value of data	-
Description of measurement methods and procedures to be applied:	Emission factor applicable for the truck types used from the literature will be chosen in a conservative manner.
Monitoring frequency:	Monitoring will be conducted at least annually
QA/QC procedures to be applied:	Not relevant
Any comment:	Any future revision of the reliable data source will be taken into account *ex-post*.

Data / Parameter:	**$EF_{FF,f,y,rice\ husk}$**
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of fuel type *f* used in trucks to transport procured rice husk
Source of data to be used:	Reliable local or national data will be used where applicable or measurements will be conducted. If local or national data is not available, IPCC default emission factors (country specific, if available) will be used.
Value of data	-
Description of measurement methods and procedures to be applied:	Measurements will be carried out at accredited laboratories and according to relevant international standards
Monitoring frequency:	In case of measurements: measurements will be conducted at least every six months and taking at least three samples for each measurement. In case of other data sources: Appropriateness of the data will be reviewed annually.
QA/QC procedures to be applied:	The consistency of measurement results and local/national data will be checked with default values by the IPCC. Additional information and measurements will be collected if the values differ significantly from IPCC default values.

Any comment:	If IPCC default value is used, any future provision will be taken into account *ex-post*.

Data / Parameter:	**$EF_{FF,f,y,PKS}$**
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of fuel type *f* used in trucks to transport purchased PKS.
Source of data to be used:	Reliable local or national data will be used where applicable or measurements will be conducted. If local or national data is not available, IPCC default emission factors (country specific, if available) will be used.
Value of data	-
Description of measurement methods and procedures to be applied:	Measurements will be carried out at accredited laboratories and according to relevant international standards
Monitoring frequency:	In case of measurements: measurements will be conducted at least every six months and taking at least three samples for each measurement. In case of other data sources: Appropriateness of the data will be reviewed annually.
QA/QC procedures to be applied:	The consistency of measurement results and local/national data will be checked with default values by the IPCC. Additional information and measurements will be collected if the values differ significantly from IPCC default values.
Any comment:	If IPCC default value is used, any future provision will be taken into account *ex-post*.

Data / Parameter:	**$NCV_{FF,f,y,rice\ husk}$**
Data unit:	GJ/mass or volume unit
Description:	Net calorific value of fuel type *f* used in trucks to transport procured rice husk.
Source of data to be used:	Reliable local or national data will be used where applicable or measurements will be conducted. If local or national data is not available, IPCC default emission factors (country specific, if available) will be used.
Value of data	-
Description of measurement methods and procedures to be applied:	Measurements will be carried out at accredited laboratories and according to relevant international standards.
Monitoring frequency:	In case of measurements: measurements will be conducted at least every six months and taking at least three samples for each measurement. In case of other data sources: Appropriateness of the data will be reviewed annually.
QA/QC procedures to be applied:	The consistency of measurement results and local/national data will be checked with default values by the IPCC. Additional information and measurements will be collected if the values differ significantly from IPCC default values.
Any comment:	If IPCC default value is used, any future provision will be taken into account *ex-post*.

Data / Parameter:	$NCV_{FF,f,y,PKS}$
Data unit:	GJ/mass or volume unit
Description:	Net calorific value of fuel type *f* used in trucks to transport purchased PKS.
Source of data to be used:	Reliable local or national data will be used where applicable or measurements will be conducted. If local or national data is not available, IPCC default emission factors (country specific, if available) will be used.
Value of data	-
Description of measurement methods and procedures to be applied:	Measurements will be carried out at accredited laboratories and according to relevant international standards.
Monitoring frequency:	In case of measurements: measurements will be conducted at least every six months and taking at least three samples for each measurement. In case of other data sources: Appropriateness of the data will be reviewed annually.
QA/QC procedures to be applied:	The consistency of measurement results and local/national data will be checked with default values by the IPCC. Additional information and measurements will be collected if the values differ significantly from IPCC default values.
Any comment:	If IPCC default value is used, any future provision will be taken into account *ex-post*.

Data / Parameter:	$N_{y,rice\ husk}$
Data unit:	-
Description:	Number of truck trips for the transportation of rice husk during the year *y*
Source of data to be used:	On-site measurements
Value of data	-
Description of measurement methods and procedures to be applied:	Purchase receipt from the suppliers
Measurement frequency:	Data will be monitored continuously and aggregated as appropriate.
QA/QC procedures to be applied:	The consistency of number of truck trips will be checked with the quantity of rice husk.
Any comment:	-

Data / Parameter:	$N_{y,PKS}$
Data unit:	-
Description:	Number of truck trips for the transportation of purchased PKS during the year *y*
Source of data to be used:	On-site measurements
Value of data	-

Description of measurement methods and procedures to be applied:	Purchase receipt from the suppliers
Measurement frequency:	Data will be monitored continuously and aggregated as appropriate.
QA/QC procedures to be applied:	The consistency of number of truck trips will be checked with the quantity of PKS.
Any comment:	-

Data / Parameter:	$\mathbf{AVD_{y,rice\ husk}}$
Data unit:	km
Description:	Average round trip distance (from and to) between the rice husk supply sites and the site of the project plant during the year *y*
Source of data to be used:	Records by project participant(s) on the origin of the rice husk
Value of data	-
Description of measurement methods and procedures to be applied:	-
Monitoring frequency:	Data will be monitored continuously and aggregated as appropriate
QA/QC procedures to be applied:	The consistency of distance records provided by the truckers will be checked by comparing recorded distances with other information from other sources (e.g. maps)
Any comment:	This parameter corresponds to the mean value of km travelled by trucks that supply the rice husk

Data / Parameter:	$\mathbf{AVD_{y,PKS}}$
Data unit:	km
Description:	Average round trip distance (from and to) between the PKS supply sites and the site of the project plant during the year *y*.
Source of data to be used:	Records by project participant(s) on the origin of the purchased PKS.
Value of data	-
Description of measurement methods and procedures to be applied:	-
Monitoring frequency:	Data will be monitored continuously and aggregated as appropriate

QA/QC procedures to be applied:	The consistency of distance records provided by the truckers will be checked by comparing recorded distances with other information from other sources (e.g. maps)
Any comment:	This parameter corresponds to the mean value of km travelled by trucks that supply the PKS.

Data / Parameter:	$TL_{y,rice\ husk}$
Data unit:	Tonne (based on dry mass)
Description:	Average truck load of the trucks used to transport procured rice husk during the year *y*
Source of data to be used:	On site measurement
Value of data	-
Description of measurement methods and procedures to be applied:	The parameter is determined by averaging the weights of each truck carrying rice husk to the project site
Monitoring frequency	Data will be monitored continuously and aggregated as appropriate to calculate emission reduction
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	$TL_{y,PKS}$
Data unit:	Tonne (based on dry mass)
Description:	Average truck load of the trucks used to transport purchased PKS during the year *y*
Source of data to be used:	On site measurement
Value of data	-
Description of measurement methods and procedures to be applied:	The parameter is determined by averaging the weights of each truck carrying PKS to the project site
Monitoring frequency	Data will be monitored continuously and aggregated as appropriate to calculate emission reduction
QA/QC procedures to be applied:	-
Any comment:	-

B.7.2 Description of the monitoring plan:

The project proponent(s) will monitor the parameters as set out in Section B.7.1 during the monitoring period. Please refer to Section B.7.1 for more detailed information on the monitoring plan.

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

The baseline and monitoring study was completed on 28-12-2010 by:

PT. Multimas Nabati Asahan (MNA).
Jalan Imam Bonjol No. 7 (20112)
Gedung Bank Mandiri Lantai 5
Medan, North Sumatra
Tel: (62) 61 4147 524 (responsible person: Mr Erik Tjia)

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:

07/05/2010[14]

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

20 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:

30/09/2011 (Indicative Date, shall be updated with revised date as date of registration, when project will be registered)

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

[14] As per the Guidelines for Completing the Simplified Project Design Document (version 5), the starting date of a CDM project activity is the earliest date of the (1) implementation; or (2) construction; or (3) real action of a project activity. Using this definition, the start date of the project activity is the date where real action starts, i.e. the supply agreement date of the boiler, which is 07/05/2010.

C.2.2.2. Length:

Not applicable

SECTION D. Environmental impacts

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

The project activity is located adjacent to an existing palm oil mill and refining facility. The facility operates under approval from "Kantor Lingkungan Hidup Dan Pariwisata"[15]. The air pollutants addressed in the environment impact assessment study referred in this approval are: NO_x, SO_x, O_3, hydrocarbon, dust, and H_2S. The project replaces use of MFO with biomass as fuel in the HP steam producing boilers. As per local regulations, such changes do not require additional environmental clearances because there are no additional air pollutants added as a result of the project activity.

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:

No significant environmental impacts have been identified as a result of implementation of the project activity.

SECTION E. Stakeholders' comments

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

The public consultation meeting was held on 18th December 2010 at the Sport House in PT. Multimas Nabati Asahan. The invitation to the Stakeholder's Consultation Meeting was advertised in the local newspapers dated 4th December 2010. The total of 102 persons attended the meeting and the breakdown of the participants is provided in below.

Table 8. Summary of participants

Affiliation/Relationship to Project	No. of Attendees
1. Local Representatives (Village Head)	2
2. Balai Lingkungan Hidup	1
3. Villages	79
4. MNA Employees	20

During the public consultation meeting, the following was carried out:

- Registration of participants
- Opening remark

[15] EIA Report approval reference: 002/VI/AS/UKL/UPL/2005, dated 16 June 2005

- Project brief and introduction of management team
- Q&A session
- Closing remark

E.2. Summary of the comments received:

No negative comments were received during the public consultation meeting. The summary of comments received and response to all the comments is provided in table as follows:

Table 9. Summary of Questions and Answers Session

Questions/Comments from Participants	Response
1. What is the negative impact of the new Boiler?	1. The main purpose of this project is to reduce CO2 emission into the air and the usage of renewable energy.
2. Please modify other Boilers into clean environment as this CDM project	2. We will submit the request to our management. All boilers in MNA have followed government regulation. Government will check the boilers regularly.
3. Please review the negative impact of the usage of Rice Husk in old Boiler	3. The transportation of Rice Husk will be in bag. This will reduce the rice husk dust to the people houses. The Boiler is also equipped with a wet scrubber to capture the dust from the flue gas. Other boilers do not use Rice Husk.
4. What is the percentage of dust emission to the air for this project?	4. PT. MNA will follow government regulation regarding boiler emission. Flue gas will be inspected by government every 6 months. PT. MNA also has ISO, OHSAS, and Proper certification.
5. Request for health check-up for villagers around the area who has the direct impact of the boiler emission.	5. PT. MNA has a City Development which will give free medication to local people.
6. What will be done by management if the project failed?	6. Management will try to reduce the negative impact to the environment. The Biomass HP Boiler has been designed very well.

Questions/Comments from Participants	Response
7. Suggestion for the possibility of the villagers becoming the Rice Husk suppliers	7. This suggestion will be submitted to the management. Management supports this suggestion.
8. Suggestion to do such stakeholder meeting for PT. MNA project which will have an aspect to the environment and local people.	8. This suggestion will be submitted to the management. Meanwhile, for Biomass HP Boiler has been socialized through newspaper and stakeholder meeting.

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

Due account was taken to all comments and PT. Multimas Nabati Asahan had given thorough explanation of all issues raised during the meeting.

MNA will comply with all the environment aspects and safety aspects as outlined in the regulated standard set by the Department of Environment and Department of Safety and Health in Indonesia.

Based on the feedback received after the meeting, the majority of participants expressed their satisfaction with MNA's detailed explanation and gave their full support for the Project's implementation.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	PT. Multimas Nabati Asahan (MNA)
Street/P.O.Box:	Jalan Imam Bonjol No.7 (20112)
Building:	Gedung Bank Mandiri Lantai 5
City:	Medan
State/Region:	North Sumatra
Postfix/ZIP:	
Country:	
Telephone:	(62) 61 4147 524
FAX:	(62) 61 4145 346
E-Mail:	
URL:	
Represented by:	
Title:	Director
Salutation:	Mr.
Last Name:	Tjia
Middle Name:	-
First Name:	Erik
Department:	Project
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding available for this project activity.

Annex 3

BASELINE INFORMATION

The baseline information is included in Sections B.6.1, B.6.2 and B.6.3 in this PDD.

Annex 4

MONITORING INFORMATION

The monitoring information is included in Section B.7 of this PDD