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

CONTENTS

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:

Sunquest Biomass Project
Version 1
28th March 2008

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

The Sunquest Biomass Project (the "Project") developed by Sunquest Sdn Bhd (the "Project Developer") is a biomass fired electricity generation project located in Port Dickson, Negeri Sembilan, Malaysia (the Host Country) that will supply electricity to the Malaysian grid. The project will have a total installed capacity of 6.5 MW, of which 1.5 MW will be utilised for captive consumption, and 5 MW will be supplied to the grid.

The project will use Empty Fruit Bunches (EFB), a waste-product in the production of palm oil, to generate electricity. The project will collect 120,765 tonnes of EFB per annum from several nearby local palm oil mills purchased through a local supplier. All EFB are sourced from various mills within a 50 km radius of the plant. Currently EFB poses a waste disposal problem for many mills. There is a ban on open air burning in Malaysia and sites built after 1992[1] are not allowed by law to use incineration as a waste management option. Many mills do not own plantations where they can use the EFB for mulching or composting, therefore EFB is usually disposed of in mills' undersized dumping sites, then degrades anaerobically, releasing methane emissions into the atmosphere. Current waste management options for the mills supplying EFB to the project are limited; hence the EFB is dumped in unmanaged shallow solid waste disposal sites, and left to decay under the present conditions. Therefore in addition to its attendant benefits, this project presents a unique option for EFB waste management in the project area.

The project will reduce emissions through (1) the displacement of more carbon intensive grid connected electricity, and (2) avoidance of methane production from biomass decay through controlled combustion.

By utilizing biomass to displace fossil fuel in power generation, the Project will greatly contribute to the development of Malaysia's renewable energy sources. The controlled combustion of EFB in the plant's boiler offers a more environmentally sound manner of disposal of biomass waste residues. In addition, the use of domestically available biomass as an energy resource helps conserve foreign exchange by reducing the reliance on imported fossil fuels to meet the country's expanding energy requirements.

The sustainable development benefits of the project include:

- The multiplier effect of this investment is likely to bring additional benefits such as increased employment opportunities in the area where the project is located. Approximately 28 new jobs will be created for the operation of the plant and approximately 20 (2 drivers in each truck, 10 trucks used) others for EFB transportation ;
- It increases diversity and security of electricity supply;
- It contributes towards a decrease in fossil fuel consumption;

[1] Subsidiary Regulation under the Environmental Quality Act, 1974

- The project will act as a clean technology demonstration project, encouraging development of biomass facilities throughout Malaysia which could be replicated across the region;
- It contributes towards meeting the Government's fifth fuel policy, renewable energy target of 5% of power output in Malaysia to be from renewable sources.

A.3. Project participants:

Please list project participants and Party(ies) involved and provide contact information in Annex 1. Information shall be indicated using the following tabular format.

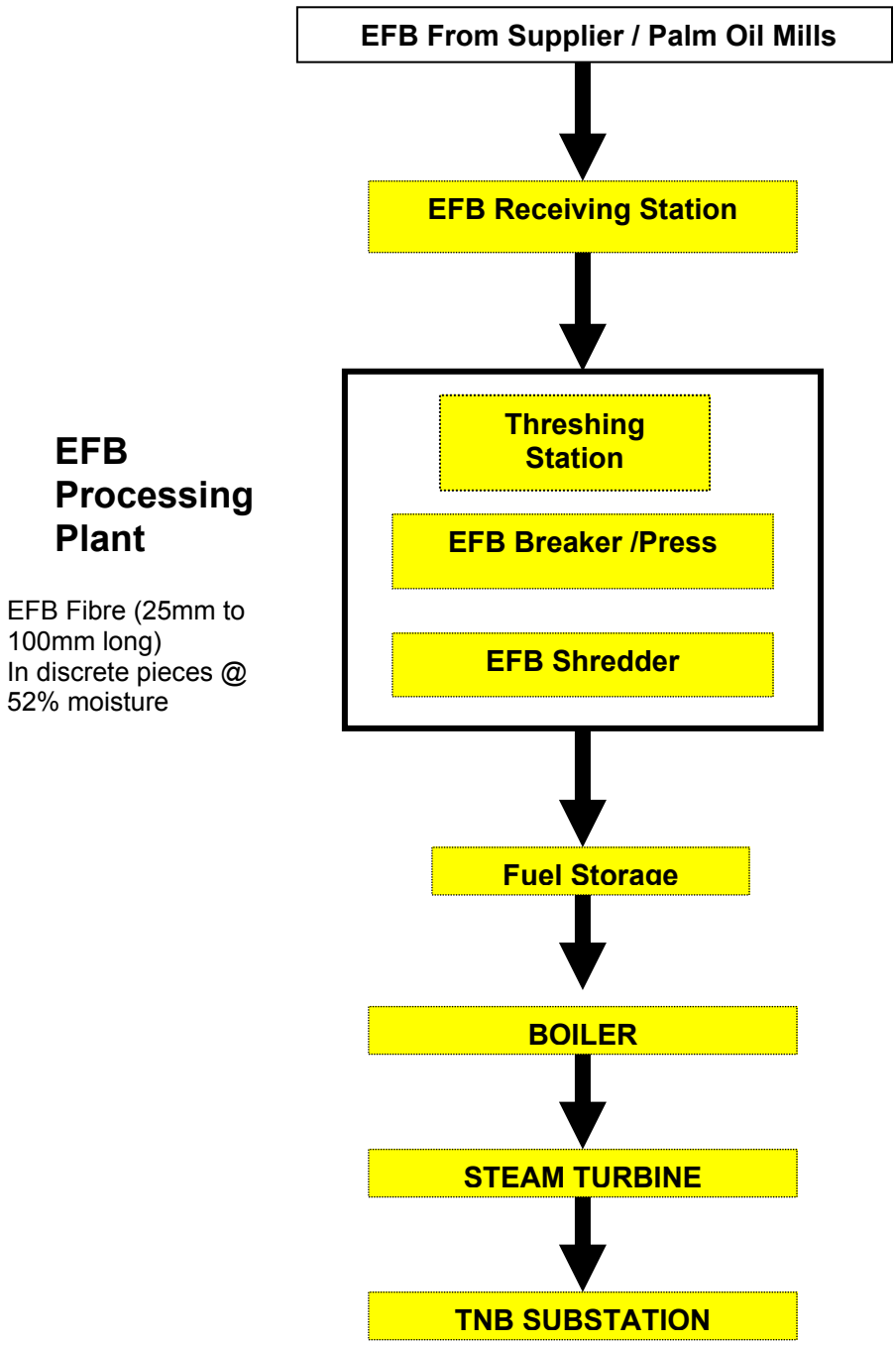
Name of Party involved (*) ((host) indicates a host Party)	**Private and/or public entity(ies) Project participants (*) (as applicable)**	**Kindly indicate if the Party involved wished to be considers as project participant**
Malaysia (host)	Sunquest Sdn. Bhd.	No
United Kingdom of Great Britain and Northern Ireland	EcoSecurities Group PLC.	No

(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.

Note: *When the PDD is filled in support of a proposed new methodology (forms CDM-NBM and CDM-NMM),* at least the host Party(ies) and any known project participant (e.g. those proposing a new methodology) shall be identified.

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

The project consists of the installation of the following equipment to generate a net capacity of 5 MW of electricity that will be sold to the TNB (Tenaga Nasional Berhad, Peninsular Malaysia's national electricity utility company) grid under a Power Purchase Agreement. The diagram below illustrates the process:



After delivery from the suppliers, the EFB is first received in the yard and subsequently moved into the EFB Receiving Station. From the receiving station it is channelled into the EFB Processing Plant. In the Processing Plant, EFB is channelled into a drum separator where sand, stone, and other foreign material are separated from it. The EFB is then processed through the Fibre Shredder and Agitator Breaker where its moisture content will be reduced to accommodate combustion in the boiler. After being pressed and shredded, the EFB (in discreet strips of 20 to 100mm long, and with a 52% moisture content) is briefly stored in a storage yard, prior to combustion in the single boiler unit

The single boiler unit is of a water tube type using reciprocating travel grate combustion technology. It is reliable and highly efficient and has been designed to meet the Biomass Power Plant requirements and specifications. It has also been designed and constructed in accordance with ASME or JIS standards. The boiler has an efficiency rate of 84% for low calorific value fuel. The steam pressure at the boiler outlet valve is 45 bar, with a corresponding temperature of 440^{o}C, and the boiler is capable of producing 35 tonnes per hour of steam. The boiler will consume approximately 16 tonnes/hr of EFB, operating at approximately 8,060 hours/year (92% availability) to fulfil Sunquest's Power Purchase Agreement (PPA). CSM-Takuma of Japan is the Boiler provider. The technology will be transferred from Japan and the fabrication of minor parts will take place in Malaysia through the equipment supplier Kematek Sdn Bhd.

Steam produced from the boiler is subsequently fed to the steam turbine via a steam pipe. The steam turbine is of a multistage, nozzle governed, horizontal spindle, two bearings, impulse bleed cum condensing type. The rated power of the steam turbine is 6.5MW complete with auxiliaries and accessories such as lubrication system, governing system, safety devices, gearbox, condensing system, A/C generator, auxiliaries for generator protection and control, and control & instrumentations. The steam turbine requires 45 bars steam pressure, 440^{o}C of steam temperature and approximately 30.85 tonnes per hour of steam flow, at the steam turbine inlet valve to generate 6.5MW of electricity. Subsequently, the AC generator converts the shaft horsepower of the steam turbine into electrical energy at a voltage of 11kV.

The electrical power generated from the steam turbine generator will be transmitted from the plant via an underground transmission cable which will be connected to TNB's substation and existing switchyard. 5MW of electricity will be transmitted to the grid, and the remaining 1.5MW will be used for captive consumption.

The Power House (Steam Turbine and Generator) will be supplied by Triveni, manufacturers of Industrial Steam Turbines from India, with more than 10 years of outstanding experience in the most varied industrial sectors.

The plant will also have periodic downtimes annually. The downtimes are inevitable due to the need for scheduled and unscheduled maintenance corresponding to 92% availability. "Scheduled Maintenance" refers to hours of unavailability of the plant due to planned maintenance and inspection per year. "Unscheduled Maintenance" refers to hours of unavailability of the plant which is not planned maintenance and inspection per year due to sudden failure or breakdown of the plant component and affects the performance of the plant. To re-start the boilers, it is anticipated that a small amount of electricity from the grid will be used. This electricity used will be captured within the monitoring plan and taken into account.

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

A.4.1.1. Host Party(ies):

Malaysia is the host party for this project.

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

The project is located in the vicinity of 19 palm oil mills (within 90km radius) in the state of Negeri Sembilan, Malaysia

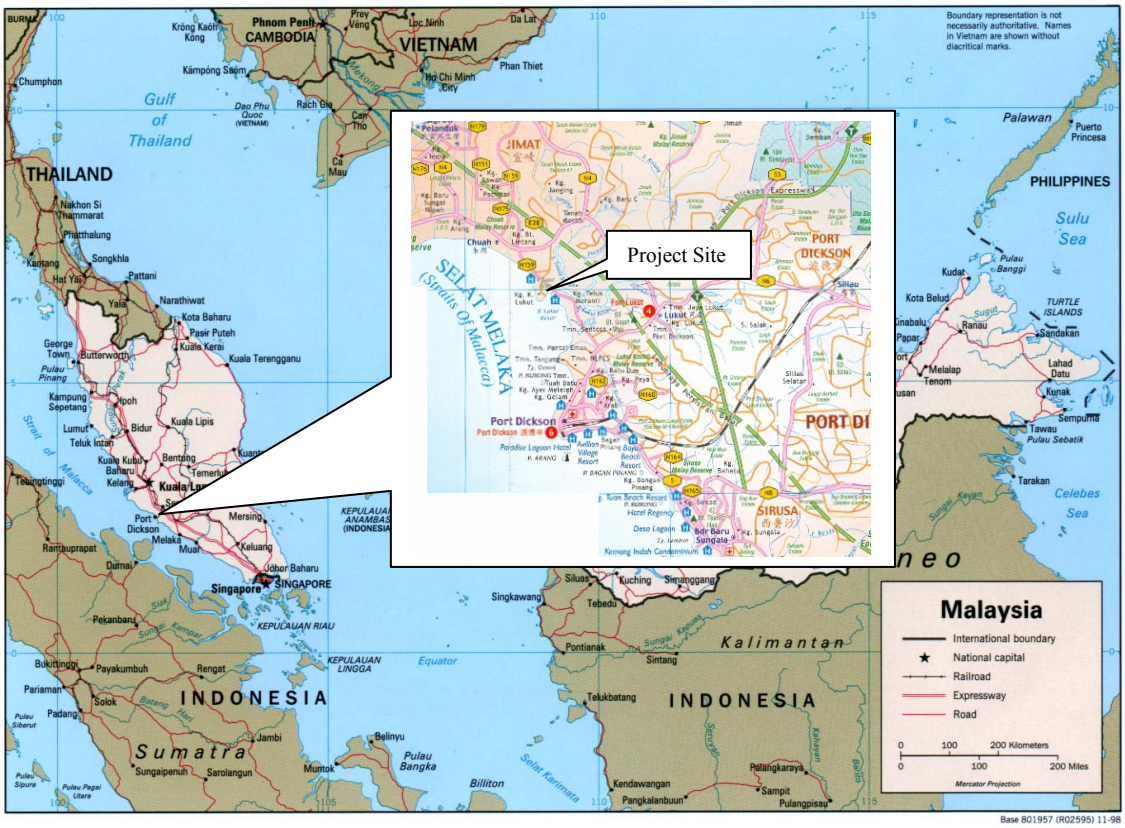
A.4.1.3. City/Town/Community etc:

Please refer address and location in Section A.4.1

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

The project has the following address: LOT 227, Mukim Jimah, Daerah (District) Port Dickson, Negeri Sembilan, Malaysia.The project is located at a site that was previously a brick making factory. There are no residential areas nearby and site is surrounded by rubber and palm oil plantations. To the east of the site is the adjacent Straits of Malacca, and to the south the Lukut River. It can be said that the site is directly adjacent to the Lukut River Estuary.

Figure 1: Map of Malaysia depicting Project Location



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

The project falls under UNFCCC sectoral scope 1, Energy industries (renewable - / non-renewable sources); and 13 (waste handling and disposal)

The project conforms to the Type I small-scale definition because the project reduces anthropogenic emissions by sources while maintaining an installed capacity below 15 MW. The Project Developer is not intending to increase the installed capacity of an existing project.

The project conforms to the Type III small-scale definition. since the project comprises measures that avoid the production of methane from biomass or other organic matter that would have otherwise been left to decay as a result of anthropogenic activity, and this component reduces less than 60 kilotons of carbon dioxide equivalent annually.

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

Years	Annual estimation of emission reductions in tonnes of CO2e
October to December 2009	4,441
2010	27,372
2011	31,693
2012	35,866
2013	39,895
2014	43,785
2015	47,542
January to September 2016	42,152
*After the initial 7-year crediting period, the baseline will be reassessed, generating a new estimate of emissions reductions yet to be determined.	
Total estimated reductions (tonnes of CO2e)	272,746
Total number of crediting years	21
ANNUAL AVERAGE OVER THE CREDITING PERIOD OF ESTIMATED REDUCTIONS **(TONNES OF CO_2E)**	38,964

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

There is no public funding for this project.

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

Based on the information provided in Appendix C of the Simplified modalities and procedures for small-scale clean development mechanism project activities, this Project is not a debundled component of a larger project activity since the project participants have not registered nor operated another project in the region surrounding the project boundary.

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 following approved baseline methodologies are applicable to the project activity:

For the electricity generation component of the project:

- AMS-I.D. version 13 – *Grid connected renewable electricity generation*

For the methane avoidance component of the project:

- AMS-III.E. version 15.1 – *Avoidance of methane production from biomass decay through controlled combustion, gasification or mechanical/thermal treatment*
  This methodology refers to the following : " *Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site (Version 2)*"

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

The project conforms to the project category I.D. since the project is a renewable energy facility (using biomass) that reduces anthropogenic emissions by sources while maintaining an installed capacity below 15MW.

The project conforms to the Type III small-scale definition. since the project comprises measures that avoid the production of methane from biomass or other organic matter that would have otherwise been left to decay as a result of anthropogenic activity, and reduces less than 60 kilotonnes of carbon dioxide equivalent annually.

B.3. Description of the project boundary:

Guided by the stipulated project boundary for Type I and Type III activities in Appendix B for small-scale project activities, the boundary for this project activity encompasses the physical, geographical site of the biomass power plant, as well as the following sites:

- Where the EFB would have been disposed or is already deposited and the avoided methane emission occurs in absence of the biomass power plant
- Where the treatment of EFB through controlled combustion takes place
- Where the final residues of the combustion process will be deposited
- And in the itineraries between them, where the transportation of wastes and combustion residues occurs

B.4. Description of baseline and its development:

The following alternative baseline scenarios are considered:

Alternative 1: Continuation of current practice: dumping of EFB in unmanaged solid waste disposal sites without capture and use/flaring of methane.

> This alternative would not require any additional investment, and there are no laws or regulations preventing the continuation of this practice. This alternative is therefore selected as the most realistic and credible baseline scenario, and will be compared with the project activity (implemented without CDM financing) in section B.5 below.

Alternative 2: Dumping of EFB in solid waste disposal sites with the capture and flaring and/or utilisation of methane for energy purposes.

Currently no EFB disposal sites in the area surrounding the project activity capture and flare or utilise methane. These sites are all unmanaged or semi-unmanaged solid waste disposal sites. Furthermore, installing a gas collection system (including compacting, dividing and covering the waste, installing a leachate collection system, installing gas collection wells, pipes, pumps, knock-out wells, control systems and other associated equipment represents a significant investment, and faces a number of technological challenges since this activity has not been undertaken on EFB disposal sites in the host country. Capture and flaring of methane gas would not generate any additional revenues, therefore this is not considered to be realistic and credible. Use of the captured methane for energy may generate revenues, assuming a Power Purchase Agreement could be signed with the grid company (power from landfill gas can be intermittent), however, electricity generation equipment could only be installed once landfill gas flows were stabilised, and sufficient in size to support a generator/gas engine. Due to the relatively small size of the solid waste disposal sites from which the EFB will be sourced, this is not considered to be a realistic and credible alternative for the project developer. Therefore alternative 2 is not considered further.

Alternative 3: Incineration of the EFB

Incineration is currently the cheapest waste management option, but since the ban on open air burning in Malaysia entered in force, sites built after 1992 are not allowed by law to use incineration as a waste management option. Incineration is no longer used at the locations supplying EFB to the proposed project. This alternative is therefore not considered further.

Alternative 4: Mulching of EFB on plantation land

At some sites in Malaysia, EFB is transported back to the plantations for mulching;. However, the cost of removal and management of EFB on flat land (i.e. where bulldozers can be used to spread EFB) is on the order of RM14/tonne[2] (approx. US $4 per tonne). If the terrain does not allow for this kind of treatment then it must be spread manually, incurring higher costs. Further problems arise in areas where the available workforce is limited and therefore there is limited labour available for mulching. This can increase the cost of labour and therefore encourage dumping or landfilling of the EFB.

Furthermore, some plant operators assert that mulching is only beneficial during the first three to five years of palm oil trees growth. Considering the fact that trees are only replanted every twenty-five years this means there can be limited demand for mulching in the palm oil plantations. Due to the limited attractiveness of applying EFB as a mulch, and the significant additional costs involved in doing so, this alternative is not considered to be an attractive baseline alternative, and therefore is not considered further.

Alternative 5: Use of EFB for thermal energy – construction of a boiler and associated equipment to generate steam to meet local thermal energy demands.

[2] Page 16 of the Sahabat Empty Fruit Bunch Biomass Project registered PDD, see: http://cdm.unfccc.int/UserManagement/FileStorage/TRIRK6LJSOZKL1TWDQQ5TTM2QY856Y

There are no additional demands for thermal energy either at the project site, or in any nearby location, therefore this would not be a realistic and credible alternative for the project developer. This alternative is therefore not considered further.

Alternative 6: Use of EFB for electricity generation - construction of an electricity generation plant and associated equipment to generate electricity to be supplied to the grid (the project activity implemented without CDM revenues).

This alternative faces investment barriers, technological barriers, and barriers due to prevailing practice. These will be discussed in more detail in section B.5, below.

Therefore, there are 2 remaining baseline alternatives, which will be considered in more detail in section B.5: Alternative 1 (continuation of current practice) and alternative 6 (the project activity implemented without CDM revenues).

Date of completing the final draft of this baseline *(DD/MM/YYYY)*: 18/03/08

The baseline study was prepared by:
EcoSecurities – Tel: +603 22820612
(contact : Ramesh Nadarajah, ramesh@ecosecurities.com)

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:

ADDITIONALITY

There are 2 potential baseline alternatives remaining for consideration:

Alternative 1: Continuation of current practice: dumping of EFB in unmanaged solid waste disposal sites without capture and use/flaring of methane, and

Alternative 6: Use of EFB for electricity generation - construction of an electricity generation plant and associated equipment to generate electricity to be supplied to the grid (the project activity implemented without CDM revenues).

According to Attachment A of Appendix B of the simplified modalities and procedures for CDM small-scale project activities, evidence as to why the proposed project is additional can be produced by conducting an analysis of the following: (a) investment barriers, (b) technological barriers, and (c) prevailing practice. The result is a matrix that summarizes the analysis, providing an indication of the barriers faced by each scenario. The most plausible scenario will be the one with the fewest barriers.

a)Investment Barriers

Since the project will be generating financial and economic benefits other than CDM related income, but as there are no comparable investment choices for the project developer, a benchmark analysis approach will be used. The likelihood of development of this project will be determined by comparing the project IRR (with and without carbon credit revenues) with a reasonable benchmark for waste management projects. Here it is chosen to use 14%[3] as a conservative benchmark. This is in line with different policy studies[4].

The tables below illustrates the financial analysis for the project activity with and without carbon finance. As shown, the project IRR without CDM related incomes is much lower than the IRR considered as a benchmark. This therefore indicates that the project without carbon revenues is not financially attractive.

Table B.1– Summary of key parameters used for financial analysis

FINANCIAL PARAMETERS	
Electricity tariff (US$/MWh)	**53.45**
Rate of increase of tariff (%/yr)	**0.0%**
Income Taxes	**28%**
VAT on electricity	**0%**
Depreciation	**10%**
COSTS AND EQUIPMENT (US$)	
Pre-operational Costs (US$)	**0**
Total Investment (US$)	**13,836,478**
Operating Costs (US$/MWh)	**11.69**
Contingencies	**0.5%**
Insurance (Operational)	**0.5%**

Table B.2– Summary of project financial analysis

	without carbon	**with carbon**
IRR	8.4 %	13.8 %

A sensitivity analysis was conducted by altering the following parameters:

- Revenues (electricity tariffs)
- Operational Costs

[3] Bloomberg EQRP Database for Malaysia. Accessed on the 26th March 2008

[4] Ministry of Water, Energy and Communication / Malaysia Energy Centre / DANIDA. 2005. Study on the CDM Potential in Waste Sectors in Malaysia (Unpublished).

Variations of ±10% have been considered in the critical assumptions. Table B.3 summarizes the results of the sensitivity analysis.

Table B.3. Results of the sensitivity analysis

Sensitivity Analysis			
IRR	**-10%**	**0%**	**10%**
Revenue	-	8.4%	10.16%
Operating Costs	9.98%	8.4%	-

These results show that even under very favourable circumstances the Project IRR is still lower than the benchmark. Therefore we can conclude that the Best Case IRR is not financially attractive, and therefore the project is not financially attractive.

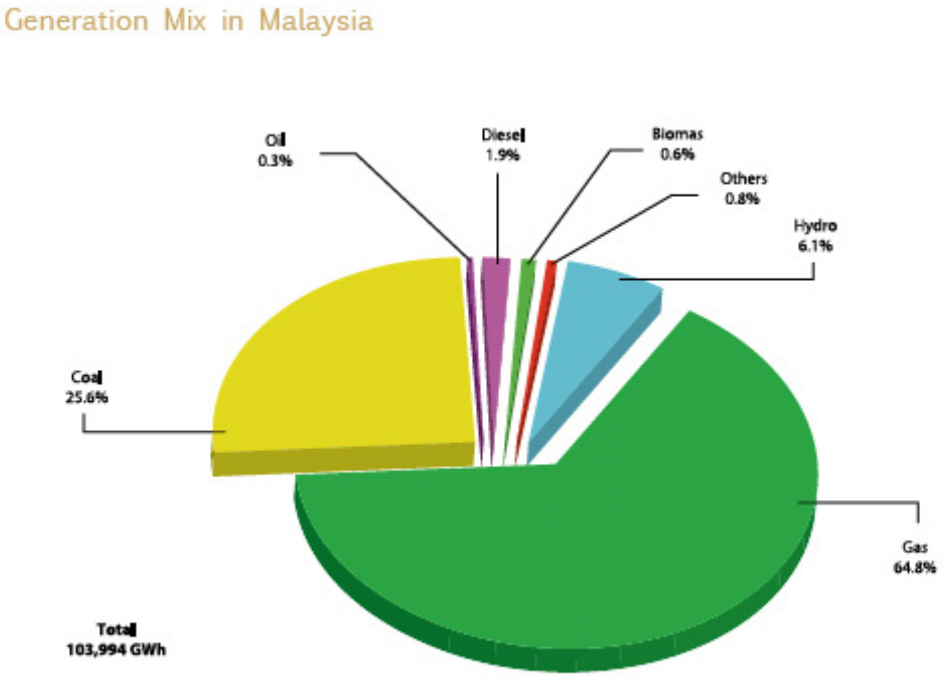
b) Technological Barrier

Technical Performance Risks Due to Nature of Fuel
The use of EFB for biomass projects is relatively novel, particularly in Southeast Asia. Historically projects related to the palm oil industry have utilised the palm kernel shells, which have a higher calorific value and lower moisture content. However, new technology means that the higher moisture content of the EFB is less of an impediment to using the waste product as a biomass fuel. Due to its physical nature and high moisture content (60-70%), the EFB does need to undergo some pre-treatment, or drying, in order to enhance flame stability in the combustion chamber when burnt on its own without assistance from high calorific value fuels such as palm shells. In terms of pre-treatment, the EFB also has components such as potassium and chloride that need to be addressed in the design of the furnace such that the temperature profile of the furnace does not exceed the fusion temperature of the ashes. This means there is higher performance risk for EFB biomass projects.

c) Barrier Due to Prevailing Practice

The prevailing practice for power application entails utilizing fossil fuels that Malaysia is naturally well endowed in. Content with a steady supply of readily available fuel, power producers are reluctant to switch to a power supply that has yet to prove itself. This underlines that the technology is considered new and barriers exist to its acceptance in Malaysia.

According to the Statistics of Electricity Supply Industry in Malaysia 2006 Report, the proportion of biomass to fossil based electricity generation is almost negligible.



Source:http:// http://www.st.gov.my/images/stories/upload/st/st_files/public/st_esim_bi.pdf

Switching to EFB-based power generation, specifically the transformation of a waste product (currently viewed as a waste management problem for palm oil mills both in Malaysia and across the wider South East Asian region) into an energy source is a new solution to the existing waste management problem. This clearly suggests that there is still significant inertia against the common usage of this type of biomass fuel for energy generation, and thus this demonstrates that barriers exist for its usage in most industrial sectors in Malaysia.

SUMMARY:

The approval and registration of the project activity as a CDM activity, and the attendant benefits and incentives derived from the project activity as a CDM project will help alleviate the previous barriers and thus enable the project activity to be undertaken. Firstly, the revenues coming from the CDM will increase the IRR of the project from 8.4% to 13.8%. This will increase its financial attractiveness of the project. In addition, undertaking this project as a CDM project will promote the usage of EFB as a fuel. This will subsequently assist other projects to overcome technological barriers and barriers due to prevailing practice because the plant will be in operation and the technology proven.

In summary, the Clean Development Mechanism will foster the gradual transition from fossil fuel use to use of a fuel that is abundant, renewable, and clean by:

- Demonstrating to local banks and financial institutions the value of RE projects.

- Providing additional income from the sale of Certified Emission Reductions (CERs) which will provide additional security against higher project risks e.g. longer downtime because of a lack of qualified maintenance personnel domestically, or problems with the high moisture content of the fuel.
- Providing an incentive for mill owners to move away from the prevailing practice of dumping EFB, and instead using it as clean renewable fuel source.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

The project will claim emission reductions through the following two components:

- Displacement of fossil fuel intensive grid electricity through biomass based electricity generation.
- Avoidance of methane production from biomass decay through controlled combustion.

The project is a renewable energy facility (using biomass) that reduces anthropogenic emissions by sources while maintaining an installed capacity below 15MW. In fact it will be supplying in total 5MW of electricity to the grid, hence the project is clearly eligible under small scale methodology AMS-I D.

In addition, the emission reductions estimations from the methane avoidance component are annually below 60,000 tCO_2/yr throughout the crediting period. Hence, the project conforms to small scale methodology AMS-III.E applicability conditions ad this methodology will then be used to claim the emission reductions from the methane avoidance component.

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

(Copy this table for each data and parameter)

Data / Parameter:	**EF_y**
Data unit:	$kgCO_2equ/kWh$
Description:	CO_2 emission factor of the grid
Source of data used:	"Study on Grid connected Electricity Baselines in Malaysia", a study prepared by Pusat Tenaga Malaysia.
Value applied:	0.614
Justification of the choice of data or description of measurement methods and procedures actually applied :	See Section B.6.3
Any comment:	

Data / Parameter:	**$Cons_{EFB}$**
Data unit:	Tonnes of EFB per $MWh_{thermal}$

Description:	Specific fuel consumption: Tonnes of EFB per 1 MWh of electricity generated
Source of data used:	Project Developer and Technology Provider
Value applied:	2.68 tonnes EFB/ 1 MWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculation is based on technology provider's assertions
Any comment:	-

Data / Parameter:	**$E_{y,fuel}$**
Data unit:	tCO_2/tonnes of fuel
Description:	CO2 emission factor for the combustion of the auxiliary fuel.
Source of data used:	IPCC (2006)
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied :	The latest IPCC value of this parameter will be used.
Any comment:	The project won't be using auxiliary fossil fuel

Data / Parameter:	**EF_{CO2}**
Data unit:	t CO2/km
Description:	CO2 emission factor from fuel use due to transportation
Source of data to be used:	Calculated based on IPCC 2006 value on fuel use
Value of data	0.0013377
Justification of the choice of data or description of measurement methods and procedures actually applied	the value used will be calculated based on the IPCC default emission factor for diesel (fuel for transportation)
Any comment:	

Data / Parameter:	**$CT_{y,w}$**
Data unit:	Tonnes/truck
Description:	Average truck capacity for waste transportation.
Source of data used:	Estimated
Value applied:	20
Justification of the choice of data or	Based on information from the project developer.

description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	**D_{fuel}**
Data unit:	Kg/l
Description:	Density of fuel used.
Source of data used:	Oak Ridge National Laboratory http://bioenergy.ornl.gov/papers/misc/energy_conv.html
Value applied:	0.84
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value used is for diesel since this is the type of fuel being used for waste and ash transportation in the project. In case other types of fuel are used, the value will be modified accordingly.
Any comment:	

Data / Parameter:	**EF_{fuel}**
Data unit:	tCO_2/tonnes of fuel
Description:	CO_2 emission factor for fuel use
Source of data used:	2006 IPCC Guidelines
Value applied:	3.185
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value used is for diesel since this is the type of fuel being used for waste and ash transportation in the project. In case other types of fuel are used, the latest IPCC value will be applied.
Any comment:	

Data / Parameter:	**F**
Data unit:	-
Description:	Fraction of methane in the SWDS gas (volume fraction).
Source of data used:	EB 35, version 2 of the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site".
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually	The value used is the default value recommended by IPCC.

applied :	
Any comment:	This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, under anaerobic conditions in the SWDS. A default value of 0.5 is recommended by IPCC.

Data / Parameter:	**DOCj**
Data unit:	-
Description:	Fraction of degradable organic carbon (by weight) in the waste type *j*
Source of data used:	EB 35, version 2 of the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site".
Value applied:	0.43
Justification of the choice of data or description of measurement methods and procedures actually applied :	The biomass waste used by the project is EFB and has to be classified under the "Wood & wodd products" as per EB 35, version 2 of the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site". The wet value for DOCj was chosen due to the prevailing climatic conditions in Malaysia
Any comment:	

Data / Parameter:	**DOCf**
Data unit:	-
Description:	Fraction of degradable organic carbon (DOC) that can decompose.
Source of data used:	EB 35, version 2 of the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site".
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value is stated in the tool.
Any comment:	

Data / Parameter:	**MCF**
Data unit:	-
Description:	Methane correction factor.
Source of data used:	EB 35, version 2 of the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site".
Value applied:	0.4
Justification of the choice of data or description of measurement methods and procedures actually applied :	0.4 was selected because EFB supplied to project are disposed of in shallow unmanaged disposal sites that have mostly depths of less than 5m.
Any comment:	

Data / Parameter:	k_j
Data unit:	-
Description:	Decay rate for the waste type *j*.
Source of data used:	EB 35, version 2 of the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site".
Value applied:	0.035
Justification of the choice of data or description of measurement methods and procedures actually applied :	Reviewing meteorological data for Malaysia, the climatic conditions that best reflect are: MAT>20◦C and MAP>1000mm per annum.
Any comment:	Source: http://www.weatheronline.co.uk

Data / Parameter:	φ
Data unit:	-
Description:	Model correction factor to account for model uncertainties.
Source of data used:	EB 35, version 2 of the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site".
Value applied:	0.9
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value is stated in the tool.
Any comment:	

Data / Parameter:	OX
Data unit:	-
Description:	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste).
Source of data used:	EB 35, version 2 of the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site".
Value applied:	0.0
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value is stated in the tool.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

For the renewable energy technologies that supply electricity to the grid, paragraph 9 from methodology AMS- I.D states:

"the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO2 equ/kWh) calculated in a transparent and conservative manner as:

a) A combined magin (CM), consisting of the combination of operating margin (OM) and Build Margin (BM) according prescribed in the "Tool to calculate the emission factor for and electricity system". Any of the four procedures to use the simple OM and the Average OM calculations must be considered

OR

b) The weighted average emissions (in kg CO_2e/kWh) of the current generation mix."

The chosen method for the calculation of an emission coefficient for the Peninsular Malaysia is the Combined Margin Method utilising the simple OM. The data for this analysis is publicly available in a study that was conducted by the Malaysian Energy Center (Pusat Tenaga Malaysia); published to aid the development of renewable energy based CDM projects in Malaysia.

Hence for AMS I.D, the baseline will the operating hours of the facility in MWh/year multiplied by the Grid Emissions factor calculated by the method described.

The project activity will supply 5 MW of electricity to the TNB grid. The plant will have periodic downtimes annually corresponding to 92% availability, and this translates to 8060 hours per annum of plant operation time. The baseline electricity generation per annum is thus: 40,300 MWh/yr.

The calculation of "Operation Margin" is based on the generation-weighted emissions per electricity unit of all power plant generating units serving the grid system in Peninsular Malaysia. This excludes the generation from "Hydro" as a must-run/ low-costs fuel source. The data available for the most recent 3 years are from the years 2003, 2004 and 2005. These 3 years of historical data are illustrated in Table 5 below:

Table 5: Simple Operation Margin for Peninsular Malaysia

Years	Generation (GWh)	CO_2 Emission (tonnes)	Baselines (kg CO2equ/kWh)
2005	89,338	52,489,299	0.588
2004	77,566	48,808,151	0.629
2003	67,511	37,833,007	0.560
Average Operation Margin for 3 years			0.592

Sources : Energy Commission (2005)

The "Simple Operation Margin" has been calculated based on the average of 3 years of historical data and is (0.588+0.629+0.592)/3 or 0.592 kg CO_2/kWh.

Table 6: Build Margin for Peninsular Malaysia

Name of Projects / Fuel Types	Year Operation	Capacity, MW	Total Generation, MWh	CO2 Emission (t CO_2)
1. Tuanku Jaafar Power Station/Gas	June-05	714	2,840,870	1,167,523
1. Janamanjung Power Plant/Coal	September-03	2100	11,638,010	10,385,486
3. SKS Prai Power Station	June-03	350	2,202,040	885,846
4. Perlis Power Station/Gas	April-03	650	11,638,010	6,714,452
5. Panglima Power Station/Gas	March-03	720	4,972,300	2,024,377
Total			33,291,230	21,177,684

Source: Energy Commission (2005)

The calculations of "Build Margin" are based on the weighted average emissions of the 5 most recently installed power plants in Peninsular Malaysia.. The Build Margin for Peninsular Malaysia is calculated as follows

CO_2 Emissions divided by the total generation = 21,177,684 ton CO_2 / 33,291,230 MWh or 0.636 kg CO_2/kWh.

Finally the "Combined Margin" is calculated by averaging the "Simple Operation Margin" with the "Build Margin". Therefore the "Combined Margin" is (0.592 + 0.636)/2 or 0.614 kg of CO_2/kWh.[5]

The baseline emissions for AMS-III.E were calculated using equations listed in paragraphs 3 and 5 Appendix B of the simplified modalities and procedures for small-scale CDM project activities.

The Yearly Methane Generation Potential was calculated using the first order decay model based on the discrete time estimates method from the IPCC Guidelines, as described in the "*Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site*". The baseline emissions were:

$$BE_y = BE_{,CH4,SWDS,y} - MD_{y,reg} * GWP\_CH_4$$

Where:

$BE_{,CH4,SWDS,y}$: methane emissions avoided during the year y from preventing waste disposal at the solid waste disposal site (SWDS) during the period from the start of the project activity to the end of the year y (tCO2e).

$MD_{y,reg}$: methane that would be destroyed or removed in the year "y" for safety or legal regulation

CH_4_GWP: Global Warming Power for CH_4 (value of 21 is used for the first commitment period)

[5] Source: "Study on Grid connected Electricity Baselines in Malaysia", a study prepared by Pusat Tenaga Malaysia and as of March 2008 data from 2003, 2004 and 2005 is the latest data available.

For this project, no methane will be destroyed or removed for safety or legal regulations. There are no regulations in Malaysia requiring the capture and utilisation or destruction of methane from EFB disposal sites, nor is such an activity common practice in the host country, nor is it carried out at any of the EFB disposal sites associated with this project activity.

To calculate the methane generation potential, the following formula was used:

$$BE_{CH4,SWDS,y} = \varphi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot \frac{16}{12} \cdot F \cdot DOC_f \cdot MCF \cdot \sum_{x=1}^{y} \sum_{j} W_{j,x} \cdot DOC_j \cdot e^{-k_j \cdot (y-x)} \cdot \left(1-e^{-k_j}\right)$$

where:

φ: Model correction factor to account for uncertainties (0.9).
f: Fraction of methane captured at the SWDS and flared, combusted or used in another manner.
GWP_{CH4}: Global Warming Power for CH_4 (value of 21 is used for the first commitment period)
OX: Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste).
F: Fraction of methane in the SWDS gas (volume fraction) (0.5).
DOC_f : Fraction of degradable organic carbon (DOC) that can decompose.
MCF : Methane Correction Factor
$W_{j,x}$: Amount of organic waste type j prevented from disposal in the SWDS in the year x (tons).
DOC_j : Fraction of degradable organic carbon (by weight) in the waste type j
k_j : Decay rate for the waste type j
j : Waste type category (index)
x : Year during the crediting period: x runs from the first year of the first crediting period (x=1) to the year y for which avoided emissions are calculated (x=y).
y : is year for which methane emission are calculated.

Reviewing meteorological data for Malaysia, the following parameters in the "*Tool to determine methane emissions avoided from dumping wastes at a solid waste disposal site*" best reflect the climatic conditions of EFB decomposition: MAT>20◦C and MAP>1000mm per annum.[6]

In addition, for conservativeness; zero baseline emissions were assumed for the transport of EFB.

. The following table illustrates the values used:

Parameter	Value	Source/Calculation
Model correction factor to account for model uncertainties (φ)	0.9	Tool to determine methane emissions avoided from dumping waste at a solid disposal site
Fraction of methane captured in the SWD and flared, combusted or used in another manner (f)	0	Client

[6] Source: http://www.kjc.gov.my/people/klim649.htm

Oxidation factor (OX)	0	Tool to determine methane emissions avoided from dumping waste at a solid disposal site
Fraction of methane in the landfill gas (F)	0.5	Tool to determine methane emissions avoided from dumping waste at a solid disposal site
Fraction of DOC_f	0.5	Tool to determine methane emissions avoided from dumping waste at a solid disposal site
Methane Concentration Factor(MCF)	0.4	Tool to determine methane emissions avoided from dumping waste at a solid disposal site. 0.4 selected because EFB supplied to project are disposed of in shallow unmanaged disposal sites.

For the both AMS III.E and I.D, the project emission reductions are:

$$ER_y = BE_y - (PE_y + Leakage)$$

Where:

ER_y: Emission reduction in the year "y" (tonnes of CO_2 equivalent)

For the AMS-I.D, since no standby fossil fuel generated will be used, no project emissions are to be calculated.

For the AMS-III.E, the project emissions formulae are:

$$PE_y = PE_{y,comb} + PE_{y,transp} + PE_{y,power}$$

where:

PE_y : project activity direct emissions in the year "y" (tonnes of CO_2 equivalent)
$PE_{y,comb}$: emissions through combustion of non-biomass carbon in the year "y"
$PE_{y,transp}$: emissions through incremental transportation in the year "y"
$PE_{y,power}$: emissions through electricity or diesel consumption in the year "y"

CO_2 emissions from the combustion of the non-biomass carbon content of the wastes and from the auxiliary fuel consumed will be estimated assuming the complete oxidation of carbon to CO_2 in the combustion.

$$PE_{y,comb} = Q_{y,,non\text{-}biomass} * 44/12 + Q_{y,fuel} * E_{y,fuel}$$

where:

$Q_{y,,non\text{-}biomass}$: Non-biomass carbon of the waste combusted in the year "y" (tonnes of Carbon)
$Q_{y,fuel}$:Quantity of auxiliary fuel used in the year "y" (tonnes)
$E_{y,fuel}$:CO_2 emission factor for the combustion of the auxiliary fuel (tonnes CO2 per tonne fuel, according to IPCC Guidelines)

Include expected annual amount and composition of the waste combusted.

Project activity emissions from trucks for incremental collection activities will be estimated and considered as project activity emissions.

$$PE_{y,transp} = (Q_y/CT_y) * DAF_w * EF_{CO2} + (Q_{y,ash}/CT_{y,ash}) * DAF_{ash} * EF_{CO2}$$

where:

Q_y :quantity of waste combusted in the year "y" (tonnes)
CT_y :average truck capacity for waste transportation (tonnes/truck)
DAF :average incremental distance for waste transportation (km/truck)
EF_{CO2} :CO_2 emission factor from fuel use due to transportation ($kgCO_2$/km, IPCC default values or local values can be used.
$Q_{y,ash}$:quantity of combustion residues produced in the year "y" (tonnes)
$CT_{y,ash}$:average truck capacity for combustion residues transportation (tonnes/truck)
DAF_{ash} :average distance for combustion residues transportation (km/truck)

Emissions from the biomass left to decay due to the inactivity of the Plant during its downtime period were NOT considered as project activity emissions.

Small-scale project activity emissions only consists of Project activity emissions from incremental collection activities within the Project boundary, and they amount to 618 tCO_2e / year.

Leakage calculations

For both AMS-I.C. and AMS-III.E a leakage calculation is required only if the generating equipment is transferred from another activity. As no generating equipment is being transferred, there is no leakage calculation required.

In addition, following the "General guidance on leakage in biomass project activities", there are three main sources of leakage for that type of project: shifts of pre-project activities, emission related to the production of the biomass, competing uses for the biomass. Since the project will be using EFB as fuel and this product is a biomass residue from Palm Oil Mills, only leakage from competing use of EFB applicable.

It is demonstrated in Annex 6 that, based on the quantity of waste available in the region, there is more than a 25% surplus after considering the amount of biomass needed by the project activity and other users. As a result, leakage effects therefore do not need to be accounted for.

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

Methane avoidance component for the AMS-III.E small scale methodology:

Years	Estimation of baseline emissions (tonnes of CO_2 e)	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2 e)	Estimation of emission reductions (tonnes of CO_2 e)
October to December	750	103	0	647

2007				
2008	5,225	618	0	4,607
2009	9,546	618	0	8,929
2010	13,719	618	0	13,101
2011	17,748	618	0	17,130
2012	21,639	618	0	21,021
2013	25,395	618	0	24,777
January to October 2014	23,696	515	0	23,181
Total (tonnes of CO_2)	117,719	4,325	0	113,393

Electricity generation component for the AMS-I.D small scale methodology:

Years	Estimation of baseline emissions (tonnes of CO_2 e)	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2 e)	Estimation of emission reductions (tonnes of CO_2 e)
October to December 2007	3,794	0	0	3,794
2008	22,765	0	0	22,765
2009	22,765	0	0	22,765
2010	22,765	0	0	22,765
2011	22,765	0	0	22,765
2012	22,765	0	0	22,765
2013	22,765	0	0	22,765
January to October 2014	18,971	0	0	18,971
Total (tonnes of CO_2)	159,353	0	0	159,353

Emission reductions estimations taken both methodologies into account:

Years	Annual estimation of emission reductions over the chosen crediting period
October to December 2007	4,441

2008	27,372
2009	31,693
2010	35,866
2011	39,895
2012	43,785
2013	47,542
January to September 2014	42,152
Total estimated reductions (tonnes of CO_2)	272,746
Total number of crediting years	21
Annual average over the crediting period of estimated reductions (tonnes of CO_2)	38,964

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

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)

Data / Parameter:	EG_y
Data unit:	MWh/year
Description:	Net electricity exported to the grid in the year
Source of data to be used:	Project Developer
Value of data	40,300
Description of measurement methods and procedures to be applied:	The values will be directly recorded from an analogue or electronic kWh meter; or (if applicable) estimated from sales invoices issued to Tenaga Nasional Berhad (TNB). This data will be monitored regularly and recorded on paper as well as electronically. Records will be maintained throughout the duration of the crediting period including the two years beyond it.
QA/QC procedures to be applied:	The electricity meter used will be maintained and calibrated regularly in line with manufacturer's recommendations
Any comment:	

Data / Parameter:	$\mathbf{Q_{y,non\text{-}biomass}}$
Data unit:	tC
Description:	Non-biomass carbon of the waste combusted in the year "y".
Source of data to be used:	Measured
Value of data	0

Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	Only biomass waste is expected to be combusted in the project. Hence, this is not applicable for the existing project activity. However, should non-biomass waste at any point in time be used, the quantity will be measured.

Data / Parameter:	$Q_{y,fuel,aux}$
Data unit:	Tonnes
Description:	Quantity of auxiliary fuel used in the year y.
Source of data to be used:	Measured
Value of data	0
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	Only biomass waste is expected to be combusted in the project. Hence, this is not applicable for the existing project activity. However, should fossil fuels be used at any point in time, the amount will be measured and recorded.

Data / Parameter:	$Q_{y,w}$
Data unit:	Tonnes
Description:	Quantity of waste combusted in the year "y".
Source of data to be used:	Measured
Value of data	120,765
Description of measurement methods and procedures to be applied:	Measured and recorded monthly. This parameter will be measured with a weighbridge.
QA/QC procedures to be applied:	Weighbridge be maintained and calibrated regularly in line with manufacturer's recommendations
Any comment:	This is the equivalent of the parameter from the first order decay model: Wj,x.

Data / Parameter:	$Q_{y,ash}$
Data unit:	Tonnes
Description:	Quantity of combustion residues produced in the year "y"
Source of data to be used:	Measured
Value of data	3,623
Description of	Measured monthly and recorded.

measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	Weighbridge be maintained and calibrated regularly in line with manufacturer's recommendations
Any comment:	

Data / Parameter:	$\mathbf{PQ_{biomass,\ disposed}}$
Data unit:	Tonnes
Description:	Percentage of biomass that would have been disposed annually in year "y".
Source of data to be used:	Data from the mills supplying EFB to the project
Value of data	-
Description of measurement methods and procedures to be applied:	The percentage of biomass that would have been disposed off annually in unmanaged shallow solid waste disposal sites; will be conducted by reviewing the common practices of EFB disposal at proximate waste disposal sites. This study will be conducted once a year, and records will stored onsite annually during the crediting period.
QA/QC procedures to be applied:	
Any comment:	This also reflects the monitoring parameter f (Fraction of methane captured at the SWDS and flared, combusted or used in another manner) in the 'tool to determine methane emissions avoided from dumping waste at a solid waste disposal site'.

Data / Parameter:	$\mathbf{AVD_{EFB}}$
Data unit:	km
Description:	Average round trip distance (from and to) between fuel supply sites and project site
Source of data to be used:	Measured
Value of data	150km round trip (conservative estimate)
Description of measurement methods and procedures to be applied:	Trips made for the transportation of biomass under the project activity will be recorded manually and transferred later to database
QA/QC procedures to be applied:	Consistency checks of the distance records provided by transporters with information from other sources (map)
Any comment:	

Data / Parameter:	$\mathbf{AVD_{ash}}$
Data unit:	km
Description:	Average round trip distance (from and to) between ash disposal sites and project site

Source of data to be used:	Measured
Value of data	100km round trip (conservative estimate)
Description of measurement methods and procedures to be applied:	Trips made for the transportation and ash disposal under the project activity will be recorded manually and transferred later to a database
QA/QC procedures to be applied:	Consistency checks of the distance records provided by transporters with information from other sources (map)
Any comment:	

Data / Parameter:	N_{EFB}
Data unit:	km
Description:	Number of truck trips for transportation of biomass
Source of data to be used:	To be Measured
Value of data	To be measured
Description of measurement methods and procedures to be applied:	The number of trips made for the transportation of biomass under the project activity will be recorded manually and later transfer to a database
QA/QC procedures to be applied:	The database will be part of the data control system that will be cross checked by the quality management team
Any comment:	

Data / Parameter:	N_{ash}
Data unit:	km
Description:	Number of truck trips for transportation and disposal of ash
Source of data to be used:	To be Measured
Value of data	To be measured
Description of measurement methods and procedures to be applied:	The number of trips made for the transportation of ash under the project activity will be recorded manually and later transfer to a database
QA/QC procedures to be applied:	The database will be part of the data control system that will be cross checked by the quality management team
Any comment:	

Data / Parameter:	$CT_{y,w}$
Data unit:	km
Description:	Average truck capacity for EFB transportation.
Source of data to be used:	To be Measured
Value of data	20
Description of measurement methods	The average truck load will be surveyed by the project developer on an annual basis. All the registered trucks (with particulars) used for transportation in the

and procedures to be applied:	project will be recorded in the database and will be updated yearly
QA/QC procedures to be applied:	The database will be part of the data control system that will be cross checked by the quality management team
Any comment:	

Data / Parameter:	$CT_{y,ash}$
Data unit:	km
Description:	Average truck capacity for ash transportation.
Source of data to be used:	To be Measured
Value of data	20
Description of measurement methods and procedures to be applied:	The average truck load will be surveyed by the project developer on an annual basis. All the registered trucks (with particulars) used for transportation in the project will be recorded in the database and the database will be updated yearly
QA/QC procedures to be applied:	The database will be part of the data control system that will be quality checked by the quality management team
Any comment:	

B.7.2 Description of the monitoring plan:

Quality control and quality assurance procedures will guarantee the quality of data collected. All meters and the weighbridge will undergo maintenance subject to manufacturer's requirements. Moreover, all monitoring equipment will be calibrated regularly by qualified personnel in line with manufacturer's specifications.

Data from the weighbridge and electricity meters collected is also used for invoicing and hence measured with utmost care. Any auxiliary fuel and/or electricity consumed will also be measured and recorded.

With regards to quality control, project proponents will be providing relevant quality control and assurance procedures when plant operations start. The project site will use these systems to ensure that data collected for the project are subject to the most rigid quality control systems.

Site staff will be trained to operate relevant equipment and collect data required.

At the end of each month the monitoring data will be filed electronically. The electronic files will have regular back-up. The project developer will also retain/file the relevant sales and purchase invoices.

All the data will be kept until two years after the end of crediting period or after the last issuance of CERs, whichever occurs later.

Prior to the start of the crediting period, the organisation of the monitoring team will be established. Clear roles and responsibilities will be assigned to all staff involved in the CDM project

Data will be read off all CDM monitoring relevant equipment and collected on site by the site staff. This information will be transferred to EcoSecurities regularly in order to monitor emission reductions.

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

Date of completing the final draft of this baseline and monitoring section *(DD/MM/YYYY)*: 28/03/2008

The baseline and monitoring study was prepared by:
EcoSecurities Ltd. Tel: +603 22820612 (contact: Ramesh Nadarajah, ramesh@ecosecurities.com)

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:

14th August 2007 corresponding to the date of Project Financial Closure.

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

21 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:

1st October 2009 or on the date of registration of the CDM project activity, whichever is later.

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

C.2.2.2. Length:

SECTION D. Environmental impacts

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

Sunquest Sdn. Bhd. has informed the DOE of Negeri Sembilan about the proposed project activity. It has been indicated that there is no requirement for an Environmental Impact Assessment (EIA) as in accordance with Malaysian law because only 5 MW will be connected to the grid (Section 34A of the Environmental Quality Act 1974 (EQA, 1974), states that an EIA is required for all "prescribed activities" elaborated under the Environmental Quality (Prescribed Activities) (Environmental Impact Assesment Order), 1987; projects involving power generated from steam turbines below 10MW do not require an EIA). Sunquest Sdn,Bhd. has also received DOE approval stating that they have no objections to the construction of the project, provided that it complies with regulations stipulated in the EQA 1974.

Hence the proposed project activity will comply with the Malaysian Government regulations stated in the EQA 1974, in relation to noise emission limits, air pollution from the boiler stack, as well effluent discharge.

The plant systems will be designed in accordance with the Noise Limits stipulated. To facilitate this, EFB pre-treatment will mostly be conducted during the day to greatly minimise noise impacts. With regards to Boiler Stack emissions , highest standards will be applied during the operational phase of the project to minimise environmental impacts.

In conclusion, the environmental impacts of the project are expected to be minimal and not significant. Further, any impacts that are likely to occur during the construction and operational phase of the project; will be readily identified, and successfully mitigated.

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:

There are no foreseeable environmental impacts considered significant by the project participants.

SECTION E. Stakeholders' comments

>>

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

The process followed to collect stakeholders' comments was a public brief session organised by Sunquest Sdn. Bhd. and EcoSecurities. A meeting was advertised through the distribution of invitations to inform all potential stakeholders of the consultation event; and notices placed in 2 Malaysian dailies. The first notice was in English Language and placed in **The New Straits Times (Date: 24th August 2007)** and the second was in Malay Language and placed in **Berita Harian (Date: 24th August 2007** The event was held on the 4th of September 2007, at the Corus Paradise resort, Port Dickson, Malaysia.

The general outline of the presentation was:

- An introduction to the Kyoto Protocol and the CDM
- A presentation with regards to how the project fits within the CDM and its attendant benefits to sustainable development in Malaysia.
- A session of questions and answers with the participation of the audience.

Annex 5 contains additional information regarding the stakeholders' consultation, the list of participants, and a transcript of questions and answers.

E.2. Summary of the comments received:

Please see annex 5.

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

Please see annex 5.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Sunquest Sdn. Bhd.	
Street/P.O.Box:	17A Jalan Kenari 3, Bandar Puchong Jaya, Off Jalan Puchong	
Building:		
City:	Puchong	
State/Region:	Selangor Darul Ehsan	
Postcode/ZIP:	47100	
Country:	Malaysia	
Telephone:	603- 5891 6698	
FAX:	603-5891 6628	
E-Mail:		
URL:		
Represented by:		
Title:		
Salutation:	Mr.	Mr.
Last Name:	H. H. Juay	C.K Thang
Middle Name:		
First Name:		
Department:		
Mobile:		
Direct FAX:	603-5891 6698	603-5891 6698
Direct tel:	603-5891 6628	603-5891 6628
Personal E-Mail:	juay@repowergen.com	ckthang@repowergen.com

Organization:	EcoSecurities Group plc
Street/P.O.Box:	40 Dawson St
Building:	
City:	Dublin
State/Region:	
Postfix/ZIP:	2
Country:	Ireland
Telephone:	
FAX:	
E-Mail:	ireland@ecosecurities.com
URL:	www.ecosecurities.com
Represented by:	
Title:	Managing Director
Salutation:	Dr.
Last Name:	Moura Costa
Middle Name:	
First Name:	Pedro
Department:	

Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	cdm@ecosecurities.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The project received no public funding from any Annex 1 party.

Annex 3

BASELINE INFORMATION

See sections above.

Annex 4

MONITORING INFORMATION

See sections above.

Annex 5

PARTICIPANTS ATTENDING CDM STAKEHOLDER / PUBLIC CONSULTATION FOR SUNQUEST SDN. BHD.'S BIOMASS ENERGY PLANT, PORT DICKSON

Venue: Corus Paradise Hotel Resort, Date: 04th September 2007

No.	Name	Organisation	Designation
1	Aini Azmah Ahmad	Jabatan Alam Sekitar Negeri Sembilan (Negeri Sembilan State Department of Environment)	DOE Officer
2	Ramesh Nadarajah	EcoSecurities	Head of Regional Implementation – South East Asia
3	H.H. Juay	RE PowerGen Sdn Bhd (parent company of Sunquest)	Vice President
4	C.K. Thang	RE PowerGen Sdn Bhd (parent company of Sunquest	Vice President
5	Sebastian Chang	RE PowerGen Sdn Bhd (parent company of Sunquest	Finance Director
6	Ir Ho Keng Chai	Maunsell Malaysia Sdn Bhd	Principal Engineer
7	Ir Tan Say Yiam	Maunsell Malaysia Sdn Bhd	Principal Engineer
8	Chong Koon Hoi	Kematek	Project Engineer
9	Derek Khoo	Transturbo Engineering Sdn Bhd	Business Development Manager
10	K.H. Khoo	Transturbo Engineering Shn	Managing Director
11	Hasni Hassan	Majlis Perbandaran Port Dickson (Port Dickson Town Council	Urban Planning Officer
12	G.Nathan	Matrix Solutions	General Manager Operations
13	Terence Koh Eng Hean	Newasia Capital Sdn Bhd	Executive
14	HJ Mustapha Kamal B Mohamad	Resident of 150g, Tmn Bkt. Kaya, Jalan Labu, 70200 Seremban.	Resident

QUESTIONS RAISED AND ANSWERED DURING THE STAEKHOLDER CONSULTATION

EcoSecurities Stakeholder Consultation Meeting for the Sunquest Port Dickson Biomass Energy Generation Project

Attendees: Please view attendance list

EcoSecurities: Ramesh Nadarajah, (Head of Regional Implementation, South East Asia)

Venue : Chorus Paradise Resort Port Dickson
Date : 4th September 2007

CDM – Executive Board

Time : 2.30pm

Q1: *Mr. Hasni from the PD Town Council Planning Department:* How many similar Biomass Power Plants are there in Negeri Sembilan

A: *EcoSecurities*: There are currently none in operation. Besides our project, one is under construction in Bahau, and has applied for CDM project registration. It is the Bandar Baru Serting Biomass Project, currently being developed by MHES Asia Sdn. Bhd.

Q2: *Mr. Hasni from the PD Town Council Planning Department*: Where does the EFB Supply come from.

A: *EcoSecurities/ Sunquest*: EFB will be procured from a supplier. The supplier will get his EFB supply from any of the 19 mills surrounding the Power Plant in a 50km radius.

Q3: *Mr. Mustapha representing 5 residents from Mukim Jimah*: Can we take it that this is an IPP project ?

A: *EcoSecurities/ Sunquest*: Yes, we are an IPP, that is registered with the SREP programme

Q4: *Mr. Mustapha representing 5 residents from Mukim Jimah:* Where is the exact location of the project?

A: *EcoSecurities/ Sunquest*: Project is located at LOT 227, Mukim Jimah, Daerah (District) Port Dickson, Negeri Sembilan, Malaysia . Mr Juay then drew a brief map to sketch the location and also roughly depicting the nearest locations of the oil palm mills.

C1: *Mr. Mustapha representing 5 residents from Mukim Jimah:* It is definitely the first project in the area and we look favourably upon it.

Q5: *Mr. Mustapha representing 5 residents from Mukim Jimah:* Is there enough EFB ?

A: *EcoSecurities/ Sunquest*: There is definitely enough EFB, 19 mills in the surrounding area have enough supply. Further there are no competing uses for the excess EFB in the area.

Q6: *Mr. Mustapha representing 5 residents from Mukim Jimah:* Where will you tap into the national grid ?

A: *Sunquest*: There is a TNB substation 12 km from the Plant, and from this substation we will tap into the grid.

Q7: *Mr. Mustapha representing 5 residents from Mukim Jimah:* How big is the capacity?

A: *EcoSecurities/ Sunquest*: 6.5MW

Q8: *Mrs. Aini Azmah, Department of Environment Negeri Sembilan:* I understand the EFB used is fresh, can you please explain why it is still eligible for Methane Avoidance?

A: *EcoSecurities*: Explained the concept of baselines, and how under the BOE, EFB was dumped in unmanaged landfills and decayed. Hence this project provides an alternative waste management option for EFB. Thus its applicability under Methane Avoidance.

Q9: *Mrs. Aini Azmah, Department of Environment Negeri Sembilan:* What about the effluent from the pressing of EFB to prepare it for fuel burning.

A: *Sunquest*: We don't expect much effluent to be produced. We will store the effluents in Skid Tanks.

Q10: *Mr. Mustapha representing 5 residents from Mukim Jimah* : What in your opinion are the negative aspects of the projects ? , What about the Potash, ash from the burning ? Dust particles?

A: *Sunquest*: In our opinion we don't think there are any negative aspects of the project. The ash will be collected and sold as fertilizer. It will be transported by truck. With regards to the dust particles we will have more than adequate mitigation equipment, namely the ESP.

Q11: *Mrs. Aini Azmah, Department of Environment Negeri Sembilan:* What is the size/ specifications of the ESP ?

A: *Mr. Nathan (Matrix Solutions)* : Proceeded to explain the technical characteristics and ESP and described why it is adequate. DOE was satisfied with the reply.

C2: *Mrs. Aini Azmah, Department of Environment Negeri Sembilan:* Currently the Area surrounding the Power Plant is designated as plantation land; hence the problems affecting surrounding residents are negligible. But in future the surrounding areas might be developed as something else (residential areas maybe). If so please ensure that the best environmental technologies are used with regards to dust, noise, vibration and effluent management.

C3: *Sunquest*: Off course we will.

C4: *Mr. Nathan (Matrix Solutions)* : Proceeded to explain the technical characteristics of noise and vibration control equipment.

Q12: *Mr. Hasni from the PD Town Council Planning Department:* How many jobs will be created ?

A: *Sunquest*: Approximately 21-22 jobs

Q13: *Mr. Mustapha representing 5 residents from Mukim Jimah:* How many houses nearby?

A: *Sunquest*: In the immediate vicinity there are a couple (200m), and 500m down the road there is a fishing jetty with a food stall. Beyond that most residents are more than 1km away and are scattered because it is all plantations.

C5: *Mr. Mustapha representing 5 residents from Mukim Jimah:* It is know that in Power Plants vibrations are an issue for the nearby residents, please ensure that this issue is adequately addressed.

Q14: *Mr. Hasni from the PD Town Council Planning Department:* How far is the housing scheme from the site.

A: *Sunquest*: That particular housing scheme you are referring to is located near the junction at about 2km from the project site.

C6: *Mr. Hasni from the PD Town Council Planning Department:* The site for the power plant is 3 acres. The fishing jetty is slated for development in the future.

Q15: *Mr. Hasni from the PD Town Council Planning Department:* Can you get the 50m buffer zone for the site.

A: *Sunquest*: Yes, certainly.

Q16: *Mr. Hasni from the PD Town Council Planning Department:* Any future plans for expansion ?

A: *Sunquest*: The power plant and project lifetime is 21 years. There are no plans for expansion.

C7: *Mr.Khoo of Transturbo Engineering, EPC Contractor*: In my opinion, the plant and all its itineraries are a good plant environmental and sustainability wise. It enables the people of the area, to receive a "green" source of electricity. In future when the plant is operational we would like to host visitors to visit our successful plant, and hopefully this project can be replicated across Malaysia.

Q17: *Mrs. Aini Azmah, Department of Environment Negeri Sembilan:* What will happen to the Plant if the ESP malfunctions?

A: *Mr. Nathan (Matrix Solutions)*: This is crucial operational equipment; the plant will cease operations to facilitate its repair/replacement. Normally the ESP will not malfunction unless unburnt Carbon clogs it. We plan to get rid of all unburnt Carbon in the combustion process.

Q18: *Mrs. Aini Azmah, Department of Environment Negeri Sembilan:* What is he Voltage of the ESP, is it single plate of tubular ?

A: *Mr. Nathan (Matrix Solutions)*: This will depend on the manufacturer of equipment; as the construction of the plant has not begun yet.

Since there are no more questions and comments, we now declare the stakeholder consultation meeting over; please do help yourselves to refreshments just outside the room. Many thanks for the participation and keen interest of all parties involved.

Annex 6

Information on Biomass Availability

ASSESSMENT OF EMPTY FRUIT BUNCHES (EFB) AVAILABILITY

The availability of Biomass fuel from (EFB) from the palm oil industry for the project activity is assessed by using official data by the Malaysian Palm Oil Board; that produces annual statistics for the palm oil sector. There are no direct statistics on the amount of biomass fuel available in Negeri Semilan and therefore it must be calculated by using assumptions. Hence, we aim to provide a clear and transparent calculation of the current biomass availability. The calculation can be applied in the future operating years of the project to assess the biomass availability in any given year. The source of the data tabulated below is obtained from the officially published statistics of the Malaysian Palm Oil Board (2006).

Alternatively ; URL of Data Source: http://econ.mpob.gov.my/economy/listarea_05.htm

Table 1: Total Negeri Sembilan Land Usage for Palm Trees Plantation (Hectare)

Year	Mature	Immature	Total
2006	141,864	19,208	161,072

Table 2: Yield (Tonnes per hectare)

Year	Fresh Fruit Bunches, FFB	Crude Palm Oil	Palm Kernel
2006	16.73	3.19	0.92

Calculation on available EFB was based on the assumption tabulated below.
Table 3: Assumptions for EFB availability

Biomass	Biomass Produced of 100% FFB*	Biomass Availability
EFB (Empty Fruit Bunch)	22%	100%

* Environmental Management for Palm Oil Mill, A. H-Kittikun, P.Prasertsan, G. Srisuwan and A. Krause

It is assumed that EFB is available according to the percentage shown in Table 3, out of the total weight of FFB yield. EFB is assumed to be fully available as it is currently brought back to plantations for disposal, or dumped in unmanaged landfills near the mills.
The quantity of FFB can be calculated by multiplying the Mature planted hectares; with the yield in Table 2.

Table 4: EFB availability in Negeri Sembilan (Tonnes)

Year	FFB	EFB
2006	2, 373, 384	522,145

The number registered CDM projects in Negeri Sembilan/ Division that are using EFB (from the UNFCCC website)

Project Name	Location	Estimated annual EFB consumption (tonnes)
Bandar Baru Serting Biomass Project	Bahau	272,000
Total		272,000

It can be seen from Table 4 that the total EFB available in Negeri Sembilan after the implementation of the project will be; 522,145 – 272000 – 120, 765 = 129,380 tonnes. This figure is 100% more than the total amount required for this project; hence Leakage due to biomass availability will not be considered