Revised Monitoring Plan for:

Project Title:	Sahabat Empty Fruit Bunch Biomass Project
Project Participants:	Felda Palm Industries Sdn. Bhd.; EcoSecurities Ltd.
UNFCCC Ref No.:	0288
Date:	09/12/2008

SECTION D. Application of a monitoring methodology and plan:

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D.1. Name and reference of approved monitoring methodology applied to the small-scale project activity:

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Appendix B of the simplified modalities and procedures, I.C. Version 7 "Thermal Energy for the User": "Monitoring shall consist of metering the thermal and electrical energy generated for co-generation projects".

The thermal energy generated by the EFB cogeneration plant will displace thermal energy generated by fossil fuels in the absence of the project activity. In such cases, baseline emissions are calculated by multiplying the savings of fossil fuels with the emissions factor of these fuels. This project uses parameters set forth in ACM006, paragraph "Emission reductions…due to the displacement of heat" as guidance, in which savings of fossil fuels are determined by dividing the generated thermal energy by the net calorific value of the fuel displaced and the efficiency of the boiler that would be used in the absence of the project activity.

D.2. Justification of the choice of the methodology and why it is applicable to the small-scale project activity:

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The chosen methodology is to be used in conjunction with baseline methodology I.C. Version 7. The proposed activity meets all the applicability requirements as described in Appendix B. The Monitoring Plan (MP) provides a roadmap of the necessary methodology, data collection, and auditing needs and procedures for the project variables.

This methodology has been selected due to its simplicity, reliability and compatibility with the standard procedures and equipment used in thermal energy projects. It is based on the continuous measurements and analysis of real time records, which are stored on a regular basis to comply with regulations. These records offer a high degree of reliability (low margin error, easy validation and quality assurance) and enable us to compute and measure the emissions reduction with great accuracy.

D.3 Data to be monitored:

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ID number *(Please use numbers to ease cross-referencing to table D.6)*	Data type	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
D3-1	Net electricity generation (E_{NG})	MWh	c	Daily	100%	Electronic (spreadsheet)	2 years past the ending of the crediting period	
D3-1-1	Electricity generated (E_{TG})	kWh	m	Daily	100%	Electronic (spreadsheet)	2 years past the ending of the crediting period	
D3-1-2	Electricity consumed ($E_{Parasitic}$)	kWh	m	Daily	100%	Electronic (spreadsheet)	2 years past the ending of the crediting period	
D3-2	Steam delivered (Q_y)	GJ/day	c	Daily	100%	Electronic (spreadsheet)	2 years past the ending of the crediting period	
D3-3	Steam generated (S)	tonnes	m	Daily	100%	Electronic (spreadsheet)	2 years past the ending of the crediting period	

D3-4	Steam temperature (T)	^{o}C	m	daily	100%	Electronic (spreadsheet)	2 years past the ending of the crediting period	
D3-5	Steam pressure (P)	barg	m	daily	100%	Electronic (spreadsheet)	2 years past the ending of the crediting period	
D3-6	Project diesel consumption during maintenance ($FF_{maintenance}$)	L	m	daily	100%	Electronic (spreadsheet)	2 years past the ending of the crediting period	
D3-10	Energy content of steam (Qs)	GJ/tonne	e	daily	100%	Electronic (spreadsheet)	2 years past the ending of the crediting period	*The energy content of steam can be looked up in a steam table when the temperature and pressure values are known (steam tables can be found at* http://www.x-eng.com)
D3-11	Quantity of available EFB in the region ($\mathbf{L_{efb)}}$	tonnes	c	annually	100%	Annual Survey	2 years past the ending of the crediting period	*Calculation from FFB to EFB ratio based on official statitics*
D3-12	Quantity of available EFB utilised in the region ($\mathbf{LU_{efb)}}$	tonnes	C	annually	100%	Annual Survey	2 years past the ending of the crediting period	*EFB projected utilisation based on information from the PDDs of registered projects in the region*

Key parameters	Data Acquisition Source
Steam delivered (Q_y)	Steam generated (S) is measured by a cumulative meter and a reading is taken once a day. Temperature (T) and pressure (P) are also taken once daily to establish the energy content of the steam (Qs). Steam delivered (Q_y) is then calculated on the basis of the amounts of steam generated multiplied by its energy content.
Net electricity generation (E_{NG})	Power generated (E_{TG}) is measured by a cumulative meter and a reading is taken once a day. Power consumed ($E_{Parasitic}$) is also measured by a cumulative meter and includes electricity consumed by the biomass fuelled co-gen unit as well as the diesel generators. The total value is taken once a day unless the biomass unit is not operating. Power consumed is subtracted from power generated and transformed from kWh to MWh to establish net electricity generation (E_{NG}).
Project diesel consumption during maintenance ($FF_{maintenance}$)	Diesel consumption by the different components on site including those relevant for the project activity shall be measured by the use of a meter. Total on-site diesel consumption shall be cross-checked with a ruler that is inserted into a diesel skid tank. *Please note that the type of meter used cannot be re calibrated. (as it is not for commercial sale of the fuel)
Biomass availability annual survey (L_{efb} & $L U_{efb}$)	The data that is applied in the annual survey will be based on published data from MPOB, UNFCC as well as reviewed journals & reports

D.4. Qualitative explanation of how quality control (QC) and quality assurance (QA) procedures are undertaken:

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Data	Uncertainty level of data (High/ Medium/ Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary
D.3.1-1 – D.3.1-2,D.3.3 – D.3.6	*Low*	*The data will be directly measured and monitored at the project site. All relevant records will be checked to ensure accuracy and consistency.*

D.5. Please describe briefly the operational and management structure that the project participant(s) will implement in order to monitor emission reductions and any leakage effects generated by the project activity:

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Operators will monitor the data on a daily basis and record appropriately. These daily recordings will be tabulated into weekly and monthly sheets, and then sent to management for record keeping. All data reporting and records will be endorsed and signed by the Plant Manager or Assistant Plant Manager (if Plant Manager is not available to do so). Copies of the report will be sent to Regional Office and Head Office (Technical Department).

Periodic calibration of all flow meters and totalisers will occur in accordance with industry standards or in line with EB guidance (EB35 Annex 35) where appropriate.

D.6. Name of person/entity determining the monitoring methodology:

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EcoSecurities

EcoSecurities are Felda Palm Industries CDM advisors for this project activity.

Sample Calculation of CERs

Emissions	Formula used
Baseline emissions	
BE (tCO_2/yr)	= $ES_{baseline}$ (tCO_2/yr) + $EP_{baseline}$ (tCO_2/yr)
$ES_{baseline}$ (tCO_2/yr)	= SFF (litre/year) * EF_{diesel} (tCO_2/litre) = (Qy (GJ/year) / (ε_{boiler} * NCV (GJ/litre)) * EF_{diesel} (tCO_2/litre) = (Qs (GJ/tonne) * S (tonnes)) / (ε_{boiler} * NCV (GJ/litre)) * EF_{diesel} (tCO_2/litre) = (Qs (GJ/tonne) * S (tonnes)) / (0.83 * 0.0364GJ/litre) * 0.0026 tCO_2/litre
$EP_{baseline}$ (tCO_2/yr)	= E_{NG} (MWh/yr) * EFelectricity (tCO2/MWh) = ((E_{TG} (kWh) - $E_{Parasitic}$ (kWh))/1000) * $EF_{electricity}$ (tCO_2/MWh) = ((E_{TG} (kWh) - $E_{Parasitic}$ (kWh))/1000) * 0.8tCO_2/MWh
Project emissions	
PE (tCO_2/yr)	= $FF_{maintenance}$ (L) * EF_{diesel} (tCO_2/litre) = $FF_{maintenance}$ (L) * 0.0026 tCO_2/litre
Emission reductions	
ER (tCO_2/yr)	= BE (tCO_2/yr) - PE (tCO_2/yr)