

**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	<ul style="list-style-type: none">● 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	<ul style="list-style-type: none">● 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.

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SECTION A. General description of small-scale project activity**A.1 Title of the small-scale project activity:**

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Triple Benefits of Jatropha Oil as Renewable Energy Source

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

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This project utilizes oleaginous plant, *Jatropha curcus* as biofuel to reduce greenhouse gas emissions. Through joint efforts with the A/R CDM project in the Province of Quirino, the project hopes to maximize the benefits of both projects and contribute to the sustainable economic development of the regional community.

There has never been any large-scale cultivation of *Jatropha curcus* in the Province of Quirino where the project is planned to take place. However, this tree specie is familiar to the residents as it is commonly used as hedge around houses and pastures. Also in the recent years, the Philippine government has endorsed its cultivation, and the local communities see it as a means for potential increase in their income.

This project will produce Jatropha oil from *Jatropha curcus*, and without esterification, replace diesel fuel as energy for off-grid or independent electricity generation and agricultural machinery operation.

The project hopes to contribute to the host country and region in the following aspects:

- Sustainable conservation of the important biodiversity area, ‘Sierra Madre Biodiversity Corridor’ through the afforestation and biomass energy projects
- Achieve ‘Triple Benefits’ by addressing climate changes, sustainable development of local communities and biodiversity conservation
- Provide long-term means of livelihood through cultivation of *Jatropha curcus* as biomass energy source
- Achieve sustainable development and poverty reduction through community participation

A.3. Project participants:

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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)	Indicate if the Party involved wishes to be considered as a project participant (Yes/No)
Republic of the Philippines	• PEDAI	Yes
	•	
	•	

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

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A.4.1.1. Host Party(ies):

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Philippines

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

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Quirino

A.4.1.3. City/Town/Community etc:

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AGLIPAY, MADDELA and NAGTIPUNAN

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

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

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This project, which utilizes bioenergy for off-grid electricity generation, is a joint project between Type I.B. and I.C. As methodology, we will use Version 10 of AMS-I.B and Version 13 of AMS-I.C (referred here on as AMS-I.B and AMS-I.C).

Source of biofuel, *Jatropha curcus* is planned to be cultivated outside of the concurrent AR CDM project boundary. The cultivation area was selected through several meetings and consultations with the local government leaders, communities and DENR representative for Quirino. For the A/R CDM project, land designated for reforestation, agroforestry and short rotation coppice needed to be at a certain size, but for this project, cultivation areas were chosen per farm units according to landowners interests in the project. At the moment, about 500ha of land is designated for cultivation of *Jatropha curcus*.

The below is how we estimated the amount of *Jatropha* oil that can be extracted from 500ha of planted forest.

- *Tree density per ha:* 2,500 trees/ha

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- *Planting area:* first year 100ha, second year 150ha, third year 250ha (total 500ha)
- *Seed production per tree:* first year 2kg/tree, second year 4kg/tree
- *Oil percentage per seed:* 30%
- *Yeild rate after degumming:* 74%
- *Jatropha Oil specific gravity:* 0.92kg/l

From the above assumptions, the Jatropha oil yield from 500ha of planted forest is estimated as below:

Year	Jatropha oil production						
	Plantation		Seed prodction			Oil production	
	(ha)		(ton)			(ton)	(litter)
	Year 1	from Y2	Year 1	from Y2	Total		
Year 1	100		500	0	500	111	120,652
Year 2	150	100	750	1000	1750	388.5	422,283
Year 3	250	250	1250	2500	3750	832.5	904,891
Year 4	0	500	0	5000	5000	1110	1,206,522
Year 5		500	0	5000	5000	1110	1,206,522
Year 6		500	0	5000	5000	1110	1,206,522
Year 7		500	0	5000	5000	1110	1,206,522
Year 8		500	0	5000	5000	1110	1,206,522
Year 9		500	0	5000	5000	1110	1,206,522
Year 10		500	0	5000	5000	1110	1,206,522
Total					41000	12300	9,893,478

In this project, we produce Jatropha oil, and without esterification, utilize it for agricultural facilities such as grain drier and rice mill replacing diesel fuel. If the Jatropha oil yield is more than the project demand, we plan to sell it outside of the project area.

Jatropha oil as an alternative for diesel fuel is still a new concept and is in the early stages of testing among biofuel producers and engine manufacturers. Therefore, there are not many research and test results as reference.

From the few available test data, 100% Jatropha oil was confirmed to work on diesel fuel run electricity generators. When 10-15% was mixed to diesel oil, 100 hours of continuous operation was observed, and 1.5% Jatropha oil mixture after degum process operated 500 hours nonstop. These results would vary according to the type of facility, oil components or refinery degree used, but they can be a benchmark for any further development in the transition away from diesel fuel. Also these tests show that one of the obstacles for continuous operation with Jatropha oil is its gum component. Through an appropriate degum process, it might be possible to increase the Jatropha oil mixture percentage.

From the above assumptions, we will mix Jatropha oil after simplified degum process to diesel oil for consumption within the PEDAI operated areas. As for the redundant oil that is not consumed within the area, we will sell it to interested parties, i.e. D1, who can utilize it within or outside of Philippines.

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

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Please indicate the chosen crediting period and provide the estimation of total emission reductions as well as annual estimates for the chosen crediting period. Information on the emission reductions shall be indicated using the following tabular format.	
Year	Estimation of annual emission reductions In tonnes of CO ₂ e
Year 1	251
Year 2	835
Year 3	824
Year 4	824
Year 5	824
Year 6	824
Year 7	824
Year 8	824
Year 9	824
Year 10	824
Total estimated reductions (tonnes of CO ₂ e)	7,680
Total number of crediting years	10 years

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

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This project will not be publicly funded.

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

This project meets the requirements for small-scale CDM project activity procedure as follows:

- (a) Meet the eligibility criteria for small-scale CDM set out in paragraph 6 (c) of decision 17/CP8

⇒ This project targets facilities with maximum capacity is less than 15MW of maximum electricity generation for a renewable energy project.

- (b) Conforms to any of the project categories listed in appendix II of decision 21/CP8.

⇒ This project replaces fossil fuel with Jatropha oil in electricity generation and agricultural machinery operations. The former is project category (i) renewable energy project, subcategory I.B. mechanical energy for user/enterprise and subcategory I.C thermal energy for the user with or without electricity.

- (c) The project shall not be a debundled component of a larger project activity.

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⇒ In the province of Quirino where the project will take place, there is no other project registered or in application. Furthermore, PEDAI, who will carry out the project, has never participated in other CDM projects.

Therefore, this project qualifies for small-scale CDM project activity.

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:

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This project is a combination of type I.B. and I.C. As methodology, we will use Version 10 of AMS-I.B and Version 13 of AMS-I.C (referred here on as AMS-I.B and AMS-I.C).

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

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B.3. Description of the project boundary:

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The project boundary is set by the independent electricity generators and agricultural machineries owned by PEDAI that will replace fossil fuel with Jatropha oil as energy source. There are independent electric generators installed within the PEDAI property. The water pumps are used within the property and also lent to farmers. The tractors are solely for the purpose of lease to farmers. The boundary is shown in the table below with leakage activities. Immediately below are the activities that may induce leakage such as GHG emission increase or carbon stock reduction:

- Displacement of activities or people prior to new Jatropha afforestation project activity
- Use of fertilizers in the Jatropha forest
- Fossil fuel consumption during the process of extracting Jatropha oil

B.4. Description of baseline and its development:

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The baseline for the project will be the fossil fuel consumption in the absence of proposed project, according to Paragraph 7 of AMS-I.B and paragraph 6 of AMS-I.C. The energy baseline will be the fossil fuel consumption results prior to the project as stated in the paragraph 7 (b) of AMS-I.B and paragraph 10 of AMS-I.C.

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:

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In the absence of the proposed CDM project activity due to the barriers listed below, there would not be any transition from fossil fuels to Jatropha oil, and the local community would continue to rely on high GHG emission fossil fuel for their electricity generation and agricultural machinery operations.

(a) Investment barriers: Currently in the subject area, there is no production facility for Jatropha oil, and it is estimated to cost around \$240k for its construction. Without the revenue from CER, it would not be possible to finance the initial installation costs (currently analysing the financials).

(b) Technical barriers: At the present, the use of Jatropha oil for electricity generation and agricultural machinery operation is not common. In order to shift from fossil fuel to Jatropha oil, it may be necessary to make alterations or increase maintenance on existing generators. Without any economic incentives, the local community will continue to rely on fossil fuel for their energy.

Philippines encourages transition from conventional energy to bio energy. However, this policy is targeted toward vehicle fuels, and this project, which targets electricity generators and agricultural machineries, is outside of the Philippine government's scope and will not have any incremental effect.

B.6. Emission reductions:**B.6.1. Explanation of methodological choices:**

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AMS-I.B and AMS-I.C

B.6.2. Data and parameters that are available at validation:*(Copy this table for each data and parameter)*

Data / Parameter:	<i>E_B_machinery</i>
Data unit:	litter/year
Description:	The energy baselines for agricultural machineries
Source of data used:	PEDAI
Value applied:	366,9900
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

Data / Parameter:	<i>CEF</i>
Data unit:	Kg CO ₂ / kg Diesel Oil
Description:	carbon emission coefficient
Source of data used:	AMS-I.B
Value applied:	3.2
Justification of the	

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choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

Data / Parameter:	EF_1
Data unit:	tonnes N ₂ O-N (tonnes N input) ⁻¹
Description:	Emission factor
Source of data used:	IPCC Guidelines for National Greenhouse Gas Inventories (2006)
Value applied:	0.01
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

Data / Parameter:	$N_{SN-fert}$
Data unit:	tonnes N yr ⁻¹ ha ⁻¹
Description:	Amount of applied synthetic fertilizer
Source of data used:	Philippines Forest Corp
Value applied:	0.0375
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

Data / Parameter:	$N_{ON-fert}$
Data unit:	tonnes N yr ⁻¹ ha ⁻¹
Description:	Amount of applied organic fertilizer
Source of data used:	Philippines Forest Corp
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied:	

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Any comment:	
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Data / Parameter:	$Frac_{GASS}$
Data unit:	dimensionless
Description:	Volatility ratio of synthetic fertilizers
Source of data used:	IPCC Guidelines for National Greenhouse Gas Inventories (2006)
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

Data / Parameter:	$Frac_{GASO}$
Data unit:	dimensionless
Description:	Volatility ratio of organic fertilizers
Source of data used:	IPCC Guidelines for National Greenhouse Gas Inventories (2006)
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

Data / Parameter:	GWP_{N2O}
Data unit:	$kg\ CO_2-e\ (kg\ N_2O)^{-1}$
Description:	Global Warming Potential of N ₂ O
Source of data used:	IPCC(Only for 1 st commitment period)
Value applied:	310
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:
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The energy baselines for electricity generators ($E_{B_electricity}$, litter/year) and agricultural machineries ($E_{B_machinary}$, litter/year) will be calculated from fossil fuel consumption prior to the project implementation as stated in Option 3.

Baseline for emissions (E_{em} , ton CO₂/year) is estimated from the below formula using the carbon emission coefficient (CEF, kgCO₂/kg diesel fuel).

$$E_{em} = (E_{B_electricity} + E_{B_machinary}) \cdot CEF$$

Figures from Table XX were applied.

With regard to projects that obtain renewable energy from afforestation, we need to consider the displacement of activities or people prior to the project and emissions from biomass energy production as source for leakage.

If there were any activities, i.e. agricultural, in the area proposed for afforestation for biomass energy, the displacement of these activities for the project implementation may result in reduction of carbon storage. We use the following indicators to calculate leakage for small-scale CDM projects.

- Among all the households effected by the project, percentage of those who will be displaced
- Main crop production rate of people and activities displaced

There will not be any household that will be relocated with the implementation of the project. Also the production rate reduction will be less than 10% (in the process of gathering more detailed data) due to the fact that afforestation will mainly be carried out in areas around farms. As a result, it is possible to ignore the leakage from displacement of activities or people prior to the project.

Project activities that may induce GHG emissions are use of fertilizers and decrease in existing biomass¹.

We will use the formula in 11.2.1 of IPCC Guidelines for National Greenhouse Gas Inventories (2006) to calculate the GHG emissions from fertilizer use.

$$N_2O_{direct-N_{fertilizer}} = [(F_{SN} + F_{ON}) \cdot EF_1] \cdot 44/28 \cdot GWP_{N_2O}$$

$$F_{SN} = N_{SN-fert} \cdot (1 - Frac_{GASS})$$

$$F_{ON} = N_{ON-fert} \cdot (1 - Frac_{GASO})$$

However,

$N_2O_{direct-N_{fertilizer}}$ N₂O emission from fertilizer use, tonnes CO₂-e yr⁻¹

F_{SN} Synthetic fertilizer excluding the volatility share, tonnes N yr⁻¹

F_{ON} Organic fertilizer excluding volatility share, tonnes N yr⁻¹

EF_1 Emission factor, tonnes N₂O-N (tonnes N input)⁻¹

$N_{SN-fert}$ Amount of applied synthetic fertilizer, tonnes N yr⁻¹

¹ http://cdm.unfccc.int/Panels/ssc_wg/SSCWG08_repan17_Revisions_guidance_leakage.pdf

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$N_{ON-fert}$	Amount of applied organic fertilizer, tonnes N yr ⁻¹
$Frac_{GASS}$	Volatility ratio of synthetic fertilizers, dimensionless
$Frac_{GASO}$	Volatility ratio of organic fertilizers, dimensionless
44/28	Molecular weight ratio of N ₂ O and Nitrogen, dimensionless
GWP_{N_2O}	Global Warming Potential of N ₂ O, kg CO ₂ -e (kg N ₂ O) ⁻¹

We will not consider the decrease of existing biomass, since proposed afforestation site is not designated as forest and there has not been any deforestation activities in the past 10 years. The proposed site for this project has been confirmed as a non-forest as of 2003. Therefore, it is not necessary to calculate the GHG emission from a decrease in existing biomass.

Also, the energy necessary to refine Jatropha seeds to oil will be derived from Jatropha oil run independent electricity generator.

B.6.4 Summary of the ex-ante estimation of emission reductions:
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We calculated that the CO₂ emission would be reduced by 3,146.9 tons throughout the project.

Year	Estimation of project activity emissions (tCO ₂ e)	Estimation of baseline emissions (tCO ₂ e)	Estimation of leakage (tCO ₂ e)	Estimation of overall emission reductions (tCO ₂ e)
2008	0	301	49	251
2009	0	914	79	835
2010	0	914	90	824
2011	0	914	90	824
2012	0	914	90	824
2013	0	914	90	824
2014	0	914	90	824
2015	0	914	90	824
2016	0	914	90	824
2017	0	914	90	824
Total (tonnes of CO ₂ e)	0	8,528	848	7,680

B.7 Application of a monitoring methodology and description of the monitoring plan:
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B.7.1 Data and parameters monitored:

Data / Parameter:	$E_{B_machinery}$
Data unit:	litter/year

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Description:	The energy baselines for agricultural machineries
Source of data used:	PEDAI
Value applied:	366,9900
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

Data / Parameter:	<i>CEF</i>
Data unit:	Kg CO ₂ / kg Diesel Oil
Description:	carbon emission coefficient
Source of data used:	AMS-I.B
Value applied:	3.2
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

Data / Parameter:	<i>EF₁</i>
Data unit:	tonnes N ₂ O-N (tonnes N input) ⁻¹
Description:	Emission factor
Source of data used:	IPCC Guidelines for National Greenhouse Gas Inventories (2006)
Value applied:	0.01
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

Data / Parameter:	<i>N_{SN-fert}</i>
Data unit:	tonnes N yr ⁻¹ ha ⁻¹
Description:	Amount of applied synthetic fertilizer
Source of data used:	Measurement
Value applied:	0.0375
Justification of the	

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choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

Data / Parameter:	$N_{ON-fert}$
Data unit:	tonnes N yr ⁻¹ ha ⁻¹
Description:	Amount of applied organic fertilizer
Source of data used:	Measurement
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

Data / Parameter:	$Frac_{GASS}$
Data unit:	dimensionless
Description:	Volatility ratio of synthetic fertilizers
Source of data used:	IPCC Guidelines for National Greenhouse Gas Inventories (2006)
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

Data / Parameter:	$Frac_{GASO}$
Data unit:	dimensionless
Description:	Volatility ratio of organic fertilizers
Source of data used:	IPCC Guidelines for National Greenhouse Gas Inventories (2006)
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied:	

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Any comment:	
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Data / Parameter:	GWP_{N2O}
Data unit:	kg CO ₂ -e (kg N ₂ O) ⁻¹
Description:	Global Warming Potential of N ₂ O
Source of data used:	IPCC(Only for 1 st commitment period)
Value applied:	310
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

B.7.2 Description of the monitoring plan:
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Monitoring will be conducted according to Paragraph 11,13,14,17 of Methodology AMS-I.B and Paragraph 18 (a) and 19 of Methodology AMS-I.C.

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

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SECTION C. Duration of the <u>project activity</u> / <u>crediting period</u>

C.1 Duration of the <u>project activity</u>:

C.1.1. <u>Starting date of the project activity</u>:

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X/X/2008

C.1.2. <u>Expected operational lifetime of the project activity</u>:

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We are estimating 10 years, but PEDAI will continue the operation after that.

C.2 Choice of the <u>crediting period</u> and related information:

C.2.1. <u>Renewable crediting period</u>

C.2.1.1. Starting date of the first <u>crediting period</u>:

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C.2.1.2. Length of the first <u>crediting period</u>:
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C.2.2. <u>Fixed crediting period</u>:
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C.2.2.1. Starting date:

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X/X/2008

C.2.2.2. Length:

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10 Years

SECTION D. Environmental impacts

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

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Philippine Environmental Impact Assessment System classifies projects as within or out of their regulation according to the project's scale, accumulative effects on other projects, use of natural resources, waste generation and risks for environmental hazards or accidents. Of those that are classified as under the regulation, the projects are further categorized from A to D, and projects in category A and B are required to complete Environmental Impact Statement and acquire Environmental Compliance Certificate.

Category A projects or 'Environmentally Critical Projects (ECPs)' are projects that can potentially have a large negative impact on the environment (heavy industries, natural resource extraction, infrastructure-related, building golf courses etc.). Category B projects are projects that will be implemented in 'Environmentally Critical Areas (ECAs),' i.e. natural parks and wildlife preservation areas. Category C projects are those that have positive impact on the current environment or environmental issues, and include projects that have been advised or endorsed by Forest Management Bureau (FMB) or Protected Areas and Wildlife Bureau (PAWB). Category D is for projects that cannot be categorized in A to C or have low negative impacts on the environment and includes barangay-level facility projects with budgets below 3M pesos.

Our biomass energy CDM project is small-scale and most likely will not be required to comply with the environmental assessment policy. However, since the project is presumed to have both positive and negative effects to the environment, it will be important to take appropriate measures after discussions with DENR.

Table Potential Environmental Impact from Bio Energy Project

Project Stage	Potential Environmental Impact
<i>Jatropha</i> Afforestation	+ : Prevent soil erosion and degradation , CO2 sink etc. - : --
<i>Jatropha</i> Oil	+ : --

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Production	– : Residual crushed seed after oil extraction etc.
<i>Jatropha</i> Oil Consumption	+ : CO2 emission reduction after transition from fossil fuel consumption etc. – : --

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:

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SECTION E. Stakeholders' comments

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

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Through discussions with Local governments, DENR (central/ local governments) and the local community led by barangay captain, we have obtained opinions and ideas from the stakeholders. From October to November of 2006, we have visited each barangay and conducted socio-economic survey through consultations and questionnaires. Every survey result is recorded and saved in English.

Also, we have consulted a Japanese expert. Professor Noriyuki Kobayashi of Graduate Law School, Nihon University, is recognized as an expert on A/R CDM development from while he worked in Sumitomo Forestry Company. Prof. Kobayashi has participated in our project from August of 2006 as part of his own research. We were able to obtain some comments from him regarding our project and A/R CDM as a whole.

E.2. Summary of the comments received:

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a) D1: Mr. Richard Torres , CEO and Ms. Ludette Rasales, Marketing
D1, a UK-based biodiesel company, encourages the cultivation of *Jatropha* in Philippines and owns and operates numerous experimental *Jatropha* plantations in Mindanao Island with the objective of producing biodiesel from *Jatropha* seeds. Lack of initial investment and technical knowledge is usually the main obstacle for cultivation of *Jatropha*, therefore, initially it was suggested that there should be a loan system, technical trainings, purchase of the *Jatropha* seeds for economic benefits, or technical assistance for *Jatropha* oil refinery process. After some discussions, it was concluded that since it would be difficult to build biodiesel refinery plant in Philippines and initial investment will be necessary for extracting *Jatropha* oil, it would be best for D1 to purchase the *Jatropha* seeds from farmers. Also there were discussions on D1 to provide *Jatropha* seeds for launching the pilot project.

b) PEDAI Program Director: Ms. Elizabeth S. Nicolas
PEDAI owns dry-processing facility for harvested crops, agricultural machineries and furniture-making facilities to be lent to the local farmers in Province of Quirino, and from a cost saving point of view, uses independent electricity generator. Therefore, much enthusiasm was shown from each PEDAI operation for the use of *Jatropha* oil. Also, using PEDAI's a micro-finance program, there was an interest in

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launching a new program that supplies *Jatropha* seedlings to the local farmers. According to Ms. Nicolas, there are many women who succeed from using the micro-finance program, and it is anticipated that the women's involvement in *Jatropha* project will trigger village development and economic advancement.

c) Vice Governor of Province of Quirino: Mr. Dax Cua

Philippine government, while it is eager for policies that promote biofuel, points out that there needs to be further technical research on oil quality and machinery durability before practical use. PEDAI is an NGO established by the father of Mr. Cua (Congressman elected from Quirino) for the purpose of economic development in the Province of Quirino. Through the meeting with Mr. Cua, we were guaranteed of PEDAI's assistance for this biomass CDM project.

d) PFC: Mr. Rodolfo Noel I. Lozanda Jr., President and Mr. Alexander T. Lichauco, Technical Dept. PFC is a sub-organization of Department of Environment and Natural Resources (DENR) and Department of Land Reform (DLR) and promotes agricultural villages in highlands. Currently, PFC is planning to plant *Jatropha* in about 375K ha of government owned wastelands with a \$5M loan fund to finance the project, assessing the increase in IRR efficiency from CER revenue through AR-CDM and biomass CDM using *Jatropha* oil. The organization has already started the F/S for AR-CDM using *Jatropha* and promised to share the data and technical know-how.

e) Local Residents:

In the meetings held, the local communities seem to show much interest in growing *Jatropha* from an economic point of view. However, in the survey conducted, there were both positive and negative replies. Reasons for positive replies were, increase in income (352 respondents, 71%), medicinal use (40 respondents, 8%), decrease in CO₂ emissions (17 respondents, 3%), source of biodiesel (10 respondents, 2%), environmental conservation and prevention of soil erosion (5 respondents, 1%), ease in establishment and maintenance (3 respondents, 0.6%) and use as dish washing detergent (1 respondent, 0.2%) among others. The main negative opinion was the difficulty of marketing *Jatropha* oil (51 respondents). These respondents fear that if they transition to growing *Jatropha* and there is no market for the seeds, they will be impoverished. Other negative replies were lack of technical know-how (0.8%), spread of vermin (0.2%), length of time until harvest (0.2%) and lack of information (0.2%).

f) Graduate Law School, Nihon University: Prof. Noriyuki Kobayashi

The professor has visited the Madera and surrounding towns in August of 2006 for A/R CDM research. The area has been used for afforestation for the past 50 years, and in the recent years, there has been an increase in farming corn and other cash crops. Adjacent to Madera, there is the Sierra Madre Biodiversity Corridor, a very important forest area for biodiversity conservation. Madera and surrounding towns are in a remote area with bad access from Manila, and as a result, left out of the economic development in the past (and that is why there is much area of natural forest untouched). Any agricultural development linked with the market economy is a welcomed as an economic development opportunity for the local residents. It is unrealistic to stop the spread of agricultural land in the area; there is a need to come up with a solution that would protect the forests and at the same time, encourage agricultural development. This solution will be the key to the development of Madera and the province of Quirino.

The biomass energy CDM project has the potential to be one of the solutions to realize Quirino province's sustainable development, due to its global warming prevention and development of the local economy aspects.

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The below are some of the issues that needs to be resolved for a successful CDM project.

(1) The current CDM regulation requires A/R CDM and energy conversions to be submitted as separate project with different PDDs, but it would be more efficient to combine the two projects into one through some unique method.

(2) Afforestation projects are categorized into either A/R CDM approved forests or non-approved, and this Jatropha cultivation project will be categorized as the latter. It would be better if the project can be categorized as A/R CDM approved in order to strengthen its status as a CDM project.

(3) It is important to establish from the start each person or organization's role and responsibilities, despite the conflict of interests arising among participants from public and private sectors. For the A/R project, PENRO, and for the bioenergy, PEDAI, are the reasonable managing organizations, but it will be necessary for a central organization to manage the two.

(4) A system to fairly divide the income generated from CDM credit among local communities and project participants. (How to grant incentives for continuous forest conservation and maintenance.)

(5) Environmental and Economic Effect Evaluation: In order to fully assess the project, it would be important to evaluate the cash crop cultivation from environmental and socio-economic point of view, and in comparison with the Quirino project.

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

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Issues	Solutions
Difficulty in constructing esterification plant for biodiesel production from Jatropha oil in Philippines	From the profitability point of view, the project will refine the Jatropha to vegetable oil form with a degum process and will not perform esterification. The refined oil will be used in electricity generators and in mixture with diesel fuel, other appropriate machineries
Potential for launching a new program using micro-finance mechanism to provide Jatropha seeds and seedlings	We will consider micro-finance program for participants, since the local residents do not have any initial funds to buy seeds and seedlings.
Technical research and development for Jatropha oil quality and durability in machineries for its use	Technology for using Jatropha oil is still in its developing stage, and there is no machinery exclusive for its use. Therefore, we will continue to develop and acquire new technologies within and out Philippines.
Establish the market for Jatropha seeds	Establish a stable market for excess seeds from the project by joint-efforts with private companies like D1.
Combine A/R CDM and this project	Set up the project so that the combining effect is maximized. Through the integration, it will be possible for the local communities and the government to join force in participating in this environmental conservation and poverty reduction project.
Combine the projects by including Jatropha cultivation project in A/R	Jatropha is within the threshold of forest definition as it grows to about 10m in height if untouched. When cultivated, its

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CDM approved	main branch is cut in early stages, and as a result, only grows to a few meters in height. Therefore for this project, it is not appropriate for Jatropha cultivation to be included in A/R CDM approved.
Establish and clarify responsibilities and distribution of income among the interested parties in both A/R CDM and this project	The project will be run by an independent organization, but we will establish a system that will include the Philippines government, which has promised an active involvement.
Distribution of income from CDM credit among local residents and interested parties	We will come up with a system to fairly divide the income according to the level of participation in the project.
Evaluate cash crop cultivation from socio-economic aspect in comparison with this project for a fair assessment	We will it consider during the project implementation. With regard to cash crop like corn, it is mainly cultivated for short-term results, and it is important to evaluate the possibility of continuous use of land.