# VALIDATION REPORT

# Mitigation of Methane Emissions in the Charcoal Production of Plantar in Brazil

REPORT NO. 2007-0196

REVISION NO. 03B

# VALIDATION REPORT

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| Date of first issue:<br>20/2/2007 | Project No.:<br>45010125 |
| Approved by:<br>Einar Telnes, Director | Organisational unit:<br>DNV Oslo, Norway |
| Client:<br>Rama Chandra Reddy | Client ref.:<br>Carbon Finance Unit, ENV<br>The World Bank Group |

**Project Name:** Mitigation of Methane Emissions in the Charcoal Production of Plantar
**Country:** Brazil
**Methodology:** AM0041
**Version:** 1
**GHG reducing Measure/Technology:** Mitigation of Methane Emission in the Wood Carbonization Activity for Charcoal Production
**ER estimate:**
**Size**
☒ Large Scale
☐ Small Scale
**Validation Phases:**
☒ Desk Review
☒ Follow up interviews
☒ Resolution of outstanding issues
**Validation Status**
☒ Corrective Actions Requested
☒ Clarifications Requested
☒ Full Approval and submission for registration
☐ Rejected

In summary, it is DNV's opinion that the Mitigation of Methane Emissions in the Charcoal Production of Plantar in Brazil, as described in the PDD of 29 June 2007, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology AM0041. DNV thus requests the registration of the project as a CDM project activity.

| Report No.: | Date of this revision: | Rev. No. |
|---|---|---|
| 2007-0196 | 29/3/2007 | 03b |

Report title:
Mitigation of Methane Emissions in the Charcoal Production of Plantar in Brazil

Work carried out by:
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Einar Telnes

Key words:

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## Abbreviations

| | |
|---|---|
| CAR | Corrective Action Request |
| CDM | Clean Development Mechanism |
| CEF | Carbon Emission Factor |
| CER | Certified Emission Reduction |
| $CH_4$ | Methane |
| CL | Clarification request |
| $CO_2$ | Carbon dioxide |
| $CO_2e$ | Carbon dioxide equivalent |
| DNV | Det Norske Veritas |
| DNA | Designated National Authority |
| GHG | Greenhouse gas(es) |
| GWP | Global Warming Potential |
| IPCC | Intergovernmental Panel on Climate Change |
| MP | Monitoring Plan |
| MVP | Monitoring and Verification Plan |
| $N_2O$ | Nitrous oxide |
| NGO | Non-Governmental Organisation |
| ODA | Official Development Assistance |
| PDD | Project Design Document |
| UNFCCC | United Nations Framework Convention on Climate Change |

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## 1 EXECUTIVE SUMMARY – VALIDATION OPINION

*Det Norske Veritas Certification Ltd. (DNV) has performed a validation of the "Mitigation of Methane Emissions in the Charcoal Production of Plantar" on the basis of UNFCCC criteria for the Clean Development Mechanism and host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.*

*The review of the project design documentation and the subsequent follow-up interviews have provided DNV with sufficient evidence to determine the fulfillment of stated criteria.*

*The project participants are Plantar S/A, International Bank for Reconstruction and Development as a Trustee of the Prototype Carbon Fund and the DNA of the Netherlands. The participating Parties, i.e. Brazil and the Netherlands, meet all relevant participation requirements. The Netherlands has approved and authorized the participation in the project. Prior to the submission of this validation report to the CDM Executive Board, DNV has received the written approval of the DNA of the participating Parties, including confirmation by the DNA of Brazil that the project assists in achieving sustainable development*

*The proposed project involves mitigation of methane emission during charcoal production, which takes place when the yield is increased by controlling temperature and air inlets in the production kilns. Given that the project is implemented as designed, the project is likely to achieve the estimated amount of emission reductions. The emission reductions are limited to a production capacity cap of 80 323 tons of charcoal.*

*The validation has confirmed that the project correctly applies the baseline and monitoring methodology AM0041 version 1. The determination of the baseline is well elaborated, transparent and sufficiently supported with facts. The selected baseline scenario is reasonable and an analysis of the barriers facing the project demonstrates that project is not a likely baseline scenario. The monitoring plan makes sufficient provision for monitoring relevant emission indicators.*

*The validation did not reveal any information indicating that the project can be seen as a diversion of ODA funding towards Brazil.*

*A local stakeholder consultation process has been carried out by the project participant. DNV published the PDD on the DNV Climate Change web site and comments by Parties, stakeholders and UNFCCC accredited NGOs were invited through the CDM web site. No comments were received.*

*In summary, it is DNV's opinion that the project, as described in the project design document of 29 June 2007, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the approved baseline and monitoring methodology AM0041 version 1. Hence, DNV requests the registration of the "Mitigation of Methane Emissions in the Charcoal Production of Plantar" as a CDM project activity.*

# 2 INTRODUCTION

The Carbon Finance Unit of the World Bank has commissioned DNV to perform a validation of the Mitigation of Methane Emissions in the Charcoal Production of Plantar project in Brazil (the project). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board. The only changes made to this version of the validation report compared to the validation report rev. 03 dated 19 March 2007 referred to in the letter of approval of the DNA of Brazil are linked to the status of issuance of the letter of approval by the DNA of Brazil.

## 2.1 Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant UNFCCC and host Party criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

## 2.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology. The validation team has, based on the recommendations in the Validation and Verification Manual /2/ employed a risk-based approach, focusing on the identification of significant risks for project implementation and the generation of CERs.

The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.

# 3 METHODOLOGY

The validation consists of the following three phases:

I a desk review of the project design documents

II follow-up interviews with project stakeholders

III the resolution of outstanding issues and the issuance of the final validation report and opinion.

The following sections outline each step in more detail.

## 3.1 Desk Review of the Project Design Documentation

The following table outlines the documentation reviewed during the validation:

**/1/** Mitigation of Methane Emission in the Charcoal Production of Plantar, Brazil, PDD, Version 5 dated 3 January 2007 and Version 6 dated 6 March 2007.

**/2/** International Emission Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF): *Validation and Verification Manual*. http://www.vvmanual.info

**/3/** AM0041, version 1

**/4/** Comments by Local Stakeholders

The main changes between the version published for the 30 days stakeholder comment period and the final version submitted for registration:

- *Project emission factor and emission reduction calculations*
- *Transparency of production cap and emission factors*
- *Improved step 1 of the additionality test*
- *Leakage approach*
- *Correction of errors in the net char mass in the baseline study*

## 3.2 Follow-up Interviews with Project Stakeholders

The following persons have been interviewed during the validation of the project:

| | Date | Name | Organization | Topics |
|---|---|---|---|---|
| /5/ | 2007-01-29 | Thiagos Mendes,<br>Luiz Carlos Goulart,<br>Patrícia Moura,<br>Cristiana Oliveira,<br>Markson Fonseca,<br>Augusto Felício,<br>Alessandro Batista,<br>Daniel Pacheco,<br>Lucas Menezes | Plantar | • Charcoal production capacity<br>• Monitoring plan<br>• Wood source<br>• Baseline study<br>• Training<br>• Methane emission regulations<br>• Additionality |

- Leakage
- Environmental and social issues

## 3.3 Resolution of Outstanding Issues

The objective of this phase of the validation is to resolve any outstanding issues which need be clarified prior to DNV's positive conclusion on the project design. In order to ensure transparency a validation protocol is customised for the project. The protocol shows in transparent manner criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organises, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The validation protocol consists of two tables. The different columns in these tables are described in the figure below. The completed validation protocol for the Mitigation of Methane Emissions in the Charcoal Production of Plantar is enclosed in Appendix A to this report.

Findings established during the validation can either be seen as a non-fulfilment of CDM criteria or where a risk to the fulfilment of project objectives is identified. Corrective action requests (CAR) are issued, where:

i) mistakes have been made with a direct influence on project results;
ii) CDM and/or methodology specific requirements have not been met; or
iii) there is a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

A request for clarification (CL) may be used where additional information is needed to fully clarify an issue.

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| *Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities* | | |
|---|---|---|
| ***Requirement*** | ***Reference*** | ***Conclusion*** |
| *The requirements the project must meet.* | *Gives reference to the legislation or agreement where the requirement is found.* | *This is either acceptable based on evidence provided (**OK**), a **Corrective Action Request (CAR)** of risk or non-compliance with stated requirements or a request for **Clarification (CL)** where further clarifications are needed.* |

| *Validation Protocol Table 2: Requirement checklist* | | | | |
|---|---|---|---|---|
| ***Checklist Question*** | ***Reference*** | ***Means of verification (MoV)*** | ***Comment*** | ***Draft and/or Final Conclusion*** |
| *The various requirements in Table 2 are linked to checklist questions the project should meet. The checklist is organised in different sections, following the logic of the large-scale PDD template, version 03 - in effect as of: 28 July 2006. Each section is then further sub-divided.* | *Gives reference to documents where the answer to the checklist question or item is found.* | *Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.* | *The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.* | *This is either acceptable based on evidence provided (**OK**), or a **corrective action request (CAR)** due to non-compliance with the checklist question (See below). A request for clarification (CL) is used when the validation team has identified a need for further clarification.* |

| *Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests* | | | |
|---|---|---|---|
| ***Draft report clarifications and corrective action requests*** | ***Ref. to checklist question in table 2*** | ***Summary of project owner response*** | ***Validation conclusion*** |
| *If the conclusions from the draft Validation are either a CAR or a CL, these should be listed in this section.* | *Reference to the checklist question number in Table 2 where the CAR or CL is explained.* | *The responses given by the project participants during the communications with the validation team should be summarised in this section.* | *This section should summarise the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".* |

**Figure 1: Validation protocol tables**

## 3.4 Internal Quality Control

The draft validation report including the initial validation findings underwent a technical review before being submitted to the project participants. The final validation report underwent another technical review before requesting registration of the project activity. The technical review was performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

## 3.5 Validation Team

| Role/Qualification | Last Name | First Name | Country |
|---|---|---|---|
| Team leader, GHG auditor | Brinks | Hendrik W. | Norway |
| CDM validator | Chaudhary | Anu | India |
| GHG auditor | Leiroz | Andrea | Brazil |
| Sector Expert | Kumaraswamy | Chandrashekara | India |
| Technical Reviewer | Telnes | Einar | Norway |

The qualification of each individual validation team member is detailed in Appendix B to this report.

# 4 VALIDATION FINDINGS

The findings of the validation are stated in the following sections. The validation criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A.
The final validation findings relate to the project design as documented and described in the revised and resubmitted project design documentation.

## 4.1 Participation Requirements

Plantar S/A, International Bank for Reconstruction and Development as a Trustee of the Prototype Carbon Fund and the DNA of the Netherlands are direct project participants. The participating Parties Brazil and the Netherlands fulfil the participation criteria for the CDM. A letters of approval from the Netherlands is confirming voluntary participation. Prior to the submission of this validation report to the CDM Executive Board, DNV has received the written approval of the DNA of the participating Parties, including confirmation by the DNA of Brazil that the project assists in achieving sustainable development.

The validation did not reveal any information indicating that the project can be seen as a diversion of ODA funding towards Brazil.

## 4.2 Project Design

The main project characteristics are described in the PDD /1/. The production of charcoal from wood results in methane emissions in the wood carbonization stage of the process. No increased emissions of methane by storage and use of the charcoal are expected.

The project aims at optimization of the charcoal production by mainly controlling the temperature and air supply and by this reduce the methane emissions. The emissions reductions of the project will be calculated from the weight ratio of the product charcoal and

the starting material wood, both on a dry basis. The methane emissions are reduced with an increasing weight ratio and the process is hence optimized for obtaining large weight ratios.

The charcoal carbonization units are owned and operated by Plantar and located in the north central region of the State of Minas Gerais in Brazil.

The project utilizes an improved type of charcoal kilns, which are operated in accordance with findings from research by RS consultants, carried out for this particular project. The project hence represents good practice and has been implemented for a number of the carbonization units. It has been confirmed that the project is in operation.

The project started the operations 1 July 2004 and is assumed to operate for at least 21 years. The crediting period is a renewable crediting period of seven years starting at 1 July 2004. The average annual forecasted emission reduction during the first crediting period is 16 098 $tCO_2e$.

## 4.3 Baseline Determination

The project correctly applies AM0041, version 01, which was developed on the basis of his project. The baseline is continuation of current practice with present kilns and the methane emissions are calculated from the weight ratio between dry charcoal and dry wood, based on a baseline study where the linear relationship $f(Y)$ between methane emission $f$ and weight ratio $Y$ was proven. The baseline study that ex-ante determines $f(Y)$ was conducted by an independent company, RS consultants, and supported by a statement from RS consultants of the correctness of among others the calculated f values. A complimentary statistical analysis has furthermore been assessed by an independent third party, Raris Treinamento Estatistico, and the linear relationship determined by a regression analysis to be $f(Y) = 139 – 314\ Y$, with $Y$ being the weight ratio on dry basis and $f(Y)$ being the methane emission in kg methane per ton produced charcoal. This relationship is limited to use for eucalyptus trees.

After finding $f(Y)$, the weight ratio of the baseline $Y_{BL}$ was determined by RS consultants for a series of experiments with kilns and teams using traditional production methods. The ex-ante determined $Y_{BL}$ is 0.2919 and the emission factor $EF_{BL}$ could be calculated to 47.5 kg $CH_4$ per ton dry charcoal produced.

The applicability criteria were assessed as follows:

- It was confirmed during the site visit that the previous traditional kiln design and operation was replaced by newer design and operation that was aiming at mitigating methane emissions.
- It was confirmed during the site visit in the state's environmental regulation "Deliberação Normativa COPAM 74" published 9 September 2004 there are no restrictions to limit methane emissions during the carbonization process.
- It was confirmed during the site visit that the project measures and monitors the gravimetric yield in the charcoal process and use these values according to this methodology.
- No relevant changes in GHG emissions other than methane need to be accounted for, except for possibilities of leakage.
- It was confirmed during the site visit that the wood moisture content could be measured according to the methodology.

- The emission reductions are limited to existing rated capacity of carbonization units using pre-project technology. This rated capacity is 80 323 tons and the emission reductions will be capped accordingly if the production exceeds this. The presently planned production is 108 000 tons/annum.
- The type and source of wood input for the production of charcoal is not changed, as confirmed by the site visit.

Project kilns are rebuilt from old kilns and no leakage is expected.

## 4.4 Additionality

The project correctly applies the "Tool for the demonstration and assessment of additionality":

**Step 0:** The start of the project activity was determined to be July 2004. The evidence presented to DNV is the invoice from Alfa Instrumentos Electronicos of an expensive scale for weighing trucks, which without the project would not have been of any value to the company as the charcoal product is sold by volume and not by weight.

The AM0041 methodology was originally submitted as the proposed new methodology NM0110, which had the call for public inputs period from 9 May to 2005 to 27 May 2005. The project therefore satisfies the prompt start criteria.

Documentation has been shown that Plantar considered CDM at the time of decision of another related project "Replacement of coke with charcoal" by the letter of intent from 25 April 2001 from Prototype Carbon Fund (PCF), cf. annex 8C. DNV was also engaged by the PCF to do an initial validation of that project back in 2001. In addition, letters from the Goernment of the State of Minas Geiras, Brazil (annex 8A) and Brazilian Ministry of Science and Technology (annex 8B) supporting the CDM project in 2000 have been presented. Loans were applied for by Rabobank (annex 8D) on the condition of CER revenues in January 2002. Furthermore, do the contract between Plantar and RS consultants from July 2001 (annex 8E) for research on the development of the project activity clearly aim at GHG mitigation. It is therefore deemed evidenced that CDM was considered when carrying out the research on the present project for mitigation of methane emissions during charcoal production.

Step 1: The following scenarios were identified:

- *Continuation of existing practice*. The national and regional regulations of Brazil do not require control of methane emissions of charcoal production and continuation of existing practice is thus a plausible baseline scenario.
- *Adoption of minor upgrades with resulting emission reductions*. The project participants originally tried to implement flaring of the carbonization gas, but the methane content was to low for doing this. No other minor upgrades were considered feasible by the project entity.
- *Use of sophisticated industrial processes and devices*. The transport of wood from a number of different plantations to a centralized industrial process facility is not considered cost-efficient and would cause GHG emissions. Furthermore, in a low-cost industry like charcoal production, the investments for sophisticated industrial processes and devices are not realistic.

- *Adoption of technology or process innovation that limit methane emission from kilns.* No other technology than the project technology and the above mentioned scenarios were found. This is therefore not a viable option.
- *The project activity implemented as a non-CDM project.* Lack of incentives discourages any investments that do not provide any financial return.

The continuation of the existing practice is considered as the most likely baseline scenario.

Step 2: Investment analysis; this is not selected.

Step 3: Barrier analysis

*Barrier to investments.* Because of profitability of the industry, most other charcoal-producing companies in the region use the traditional approach, with simpler kilns and without giving attention to methane emissions.

*Barrier due to prevailing practice*. The prevailing practice is optimizing the production to large volumes and short production times. This is because the sale of charcoal is based on volume, not mass. Even though the weight of charcoal will increase by 20% with an increase in yield from 30 to 36% and may increase the volume of the product by 40% according to the description in Annex 5A of the PDD, the project activity is more time consuming and may hence less attractive from an economical point of view.

*Barriers to technology development and implementation*. Considerable efforts are needed in terms of time and investments in order to improve the kiln design. Similarly, efforts to improve the operation of the kilns and the monitoring of the operations are more expensive than without implementing the CDM initiative.

*Barriers relating to specialized knowledge, skills and training requirements*. The upfront investments in technology, training of personnel and the costs of monitoring are considered to be considerable for the project activity. Plantar have shown evidence for investments of approximately 1 285 000 Reais (about $585 000) for the research and implementation of the project.

Step 4: A survey covering 12 companies and about 20% of the charcoal production in Minas Gerais undertaken by Minas Gerais Silviculture Association shows no indication for the project activity to be undertaken by other charcoal producers. Hence, mitigation of methane during charcoal production is unlikely to represent common practice in Minas Gerais, the province where most of the charcoal in Brazil is produced.

Step 5: The revenue from sales of emission reduction credits is expected to result in alleviation of the barriers to the project activity.

Provided the above discussion, emission reductions occurring from the project can in DNV's opinion be considered additional.

## 4.5 Monitoring

### 4.5.1 Parameters determined ex-ante

The parameters $f(Y)$, $Y_{BL}$ and $EF_{BL}=f(Y_{BL})$ related to the emission amounts were determined ex-ante.

The yield, $Y$, is obtained from the difference of dry wood mass and brand (incompletely transformed wood) divided by the mass of charcoal. The moisture of wood is strongly

dependent of the diameter of the piece of wood. Therefore, the measurements of the moisture in wood have been carried out by careful sampling of the wood stock and then determine the moisture of each sample gravimetrically before and after heating to 105ºC for 3 days. This has been described in Annex 5A, attachment B of the PDD and the equipment for these measurements has been confirmed to be in place during the site visit.

The methane emission factor, the *f*-value, is determined from the product of the methane fraction of the non-condensable gas and the mass of the gas, divided by the charcoal mass. The raw data were collected by the independent company RS consultants, and the aggregated data (methane fraction of the gas and mass of the gas) was presented to DNV. The methane fraction has been determined taking the average of the methane fractions as analysed by gas chromatography during each carbonization experiment performed. The mass of the gas was determined in accordance with methodology by a mass balance calculation taken into account mass of wood, charcoal, condensed effluents and nitrogen contents.

Subsequent to determination of sets of *f* and *Y* values, a statistical analysis in order to quantify the linear relationship between *f* and *Y*, *f*(*Y*) was carried out.

The value of the baseline yield, $Y_{BL}$, was determined to 0.2919 from 50 experiments with different kilns before the implementation of the project activity. The statistical procedure of AM0041 for determination of $Y_{BL}$ was followed.

The ex-ante $EF_{BL}$ was determined by inserting $Y_{BL}$ into the *f*(*Y*) function, giving 47.5 kg $CH_4$ / ton charcoal.

The charcoal production capacity was set to 80 323 ton based on data from 2001-2003, which was prior to the implementation of the project activity. This is the upper limit for the production that may generate emission reductions. GWP($CH_4$) has been set to 21 for the first crediting period. In addition, statistical parameters for determination of the baseline have been given.

### 4.5.2 Parameters monitored ex-post

The mass of all wood used and charcoal manufactured are weighed. The moisture of wood and charcoal are recorded quarterly. Subtracting moisture from the charcoal from the project as opposed to the baseline is carried out and this is conservative. The calculated yields are recorded for each kiln and carbonization unit on a daily and monthly basis. Furthermore, the location of each carbonization unit and when the project activity was implemented will be recorded. The calculated emission factor of the project, $EF_P$, will be calculated from *f*(*Y*) and recorded. In addition, the annual compliance rate of the common practice requirement given by the methodology will be recorded.

### 4.5.3 Management system and quality assurance

During the site visit DNV confirmed that parameters such as production of charcoal, wood weight, moisture and number of kiln are monitored and the numbers put into the software system PMMCS. PMMCS was assessed and the access to the database required a password that is controlled by a limited number of persons. The spreadsheet formulas are locked to avoid errors. The database is saved in two different places and a monthly back up safety system is adopted to reduce risks. The original notes are digitalized and kept in Belo Horizonte under the responsibility of the Carbon Project manager, which for the time being is Luiz Carlos Goulart. According to the work instructions each activity has a corresponding responsible person to achieve and guarantee the project implementation. Training procedures

were also identified and procedures for the experiments were explained to DNV during the laboratory visit.
All parameters mentioned above, that is necessary in order to calculate the emission reductions, are monitored. Furthermore, environmental and social monitoring is carried out. However, few process parameters are monitored. Temperature, which according to the PDD is the most important parameter for achieving high yield and thereby emission reduction, is only controlled once a day and the thermocouple in use during the site visit had never been calibrated. Hence, improved efforts on a day-to-day basis to achieve emission reductions are possible. The yield in the project has been significantly lower than anticipated and also lower than a number of experiments during the baseline study. However, the actual emission reductions are correctly monitored.

## 4.6 Estimate of GHG Emissions

Both the baseline and project emission are calculated from the production amount, GWP($CH_4$) and the emission factor (kg methane per ton charcoal). The difference in the emission factor of the baseline ($EF_{BL}$) and project ($EF_P$) result in an emission reduction. The leakage has been set to zero.

The emission reduction forecast is based on ex-ante determined yield of 29.19% in the baseline, whereas the project yield is assumed to be 33.27%. The emission factor for the project is considered to be largest risk for not meeting the emission reduction estimations. However, the present project yield is conservative and in the baseline study more favourable yields were obtained.

The charcoal production capacity for this project is 80 323 ton, and production above this capacity will not achieve emission reduction credits. The project participants expect to produce approximately 108 000 ton to meet the demand to the pig iron mill. Hence, a cap for the emission reduction needs to be established for the project.

## 4.7 Environmental Impacts

The sustainable plantation for the charcoal production facility has a SCS (Forest Stewardship Council) Certification Registration Number: SCS-FM/COC-00057P that is valid until 6 February 2008.

Records of employment, working conditions, quality management and list of attendance in training events for the charcoal farms were shown to DNV. Local regulation EIA is required for large carbonization activities and only the MG02 farm is large enough to have it. No special provisions were identified in this.

No relevant negative environmental impacts are expected within the project boundaries for this upgrading of existing kilns.

## 4.8 Comments by Local Stakeholders

The project entity invited for comments by local stakeholder in two stages. For the first in October 2001, a list of stakeholders contacted is given in the PDD, but no comments were received. For the second stage in November and December 2006, a larger number of stakeholders were contacted with invitation-for-comments letters and stamped envelopes. The letters received were shown to the validation team during the site visit, and were all positive

in nature. Itacambira Environmental Council requested a list of the entity's environmental preservation areas within the farm, and this was provided from the project entity.

## 4.9 Comments by Parties, Stakeholders and NGOs

The PDD of 3 January 2007 was made publicly available on DNV's climate change website (www.dnv.com/certification/climatechange) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 20 January 2007 to 18 February 2007. No comments were received.

# APPENDIX A

## CDM VALIDATION PROTOCOL

## Table 1 Mandatory Requirements for Clean Development Mechanism (CDM) Project Activities

| Requirement | Reference | Conclusion |
|---|---|---|
| **About Parties** | | |
| The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3. | Kyoto Protocol Art.12.2 | ~~**CAR 1**~~<br>OK |
| The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC. | Kyoto Protocol Art.12.2. | ~~**OK**~~ |
| The project shall have the written approval of voluntary participation from the designated national authority of each Party involved. | Kyoto Protocol<br>Art. 12.5a,<br>CDM Modalities and Procedures §40a | ~~**CAR 1**~~<br>~~**OK**~~ |
| The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof. | Kyoto Protocol Art. 12.2,<br>CDM Modalities and Procedures §40a | OK |
| In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties. | Decision 17/CP.7,<br>CDM Modalities and Procedures Appendix B, § 2 | OK |
| Parties participating in the CDM shall designate a national authority for the CDM. | CDM Modalities and Procedures §29 | OK |
| The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol. | CDM Modalities §30/31a | OK |
| The participating Annex I Party's assigned amount shall have been calculated and recorded. | CDM Modalities and Procedures §31b | OK |
| The participating Annex I Party shall have in place a national system for estimating | CDM Modalities and Procedures §31b | OK |

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| Requirement | Reference | Conclusion |
|---|---|---|
| GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7. | | |
| **About additionality** | | |
| Reduction in GHG emissions shall be additional to any that would occur in the absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity. | Kyoto Protocol Art. 12.5c,<br>CDM Modalities and Procedures §43 | OK |
| **About forecast emission reductions and environmental impacts** | | |
| The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change. | Kyoto Protocol Art. 12.5b | OK |
| **For large-scale projects only** | | |
| Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out. | CDM Modalities and Procedures §37c | OK |
| **About stakeholder involvement** | | |
| Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received. | CDM Modalities and Procedures §37b | OK |
| Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available. | CDM Modalities and Procedures §40 | OK |

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| Requirement | Reference | Conclusion |
|---|---|---|
| **Other** | | |
| The baseline and monitoring methodology shall be previously approved by the CDM Executive Board. | CDM Modalities and Procedures §37e | OK |
| A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances. | CDM Modalities and Procedures §45c,d | OK |
| The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure. | CDM Modalities and Procedures §47 | OK |
| The project design document shall be in conformance with the UNFCCC CDM-PDD format. | CDM Modalities and Procedures Appendix B, EB Decision | OK |
| Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP. | CDM Modalities and Procedures §37f | OK |

**Table 2 Requirements Checklist**

| CHECKLIST QUESTION<br>* MoV = Means of Verification, DR= Document Review, I= Interview | Ref. | MoV* | COMMENTS | Draft Concl. | Final Concl. |
|---|---|---|---|---|---|
| **A. General Description of Project Activity**<br>*The project design is assessed.* | | | | | |
| **Project Boundaries**<br>*Project Boundaries are the limits and borders defining the GHG emission reduction project.* | | | | | |
| Are the project's spatial boundaries (geographical) clearly defined? | /1/ | DR | The project is located in the North central region of the state of Minas Gerais in Brazil. | | OK |
| Are the project's system boundaries (components and facilities used to mitigate GHGs) clearly defined? | /1/ | DR | The project's system boundaries mainly consist of carbonization units owned and operated by Plantar. | | OK |
| **Participation Requirements**<br>*Referring to Part A, Annex 1 and 2 of the PDD as well as the CDM glossary with respect to the terms Party, Letter of Approval, Authorization and Project Participant.* | | | | | |
| Which Parties and project participants are participating in the project? | /1/ | DR | The Parties involved are Federative Republic of Brazil as the host country and the Netherlands as the Annex I Party. The project participants are Plantar S/A as the project proponent and the International Bank for Reconstruction and Development as a | | OK |

# VALIDATION REPORT

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|---|---|---|---|---|---|
| | | | Trustee of the Prototype Carbon Fund as the buyer of the CERs. | | |
| Have all involved Parties provided a valid and complete letter of approval and have all private/public project participants been authorized by an involved Party? | /1/ | DR | LoA from the DNAs of both the Parties involved needs to be provided. | ~~CAR 1~~ | OK |
| Do all participating Parties fulfil the participation requirements as follows:<br>- Ratification of the Kyoto Protocol<br>- Voluntary participation<br>- Designated a National Authority | /1/ | DR | Brazil ratified the Kyoto Protocol on 23 August 2002. | ~~CAR 1~~ | OK |
| Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance. | /1/ | DR | No public funding is provided for the proposed project activity. | | OK |
| **Technology to be employed**<br>*Validation of project technology focuses on the project engineering, choice of technology and competence/ maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.* | | | | | |

# VALIDATION REPORT

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|---|---|---|---|---|---|
| Does the project design engineering reflect current good practices? | /1/ | DR, I | The project activity relies on the technological and process innovation in charcoal production to increase carbonization gravimetric yield and reduce methane emissions. Improvement in the kiln design and operations of the project activity would allow for greater control of carbonization variables and enable the project to reduce methane emissions. | | OK |
| Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country? | /1/ | DR | The project technology is expected to result in significantly better performance than other commonly used technologies in Brazil. | | OK |
| Does the project make provisions for meeting training and maintenance needs? | /1/ | DR, I | The PDD indicates that appropriate training would be provided to the operational personnel. This was confirmed during site visits. | | OK |
| **Contribution to Sustainable Development**<br>*The project's contribution to sustainable development is assessed.* | | | | | |
| Has the host country confirmed that the project assists it in achieving sustainable development? | /1/ | DR | LoA received from the DNA of Brazil, dated 23 March 2007. | | OK |

# VALIDATION REPORT

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|---|---|---|---|---|---|
| Will the project create other environmental or social benefits than GHG emission reductions? | /1/ | DR, I | The project will create other environmental and social benefits such as improvement of environmental safety in the vicinity of carbonization units, implementation of measures that address the environmental health and safety of workers in the carbonization units, contribution to rural development objectives by providing skilled employment to the local population. | | OK |
| **B. Project Baseline**<br>*The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.* | | | | | |
| **Baseline Methodology**<br>*It is assessed whether the project applies an appropriate baseline methodology.* | | | | | |
| Does the project apply an approved methodology and the correct version thereof? | /1/ | DR | The project applies Version 1 of approved baseline methodology AM0041 “Mitigation of methane emissions in the wood carbonization activity of charcoal production”. | | OK |
| Are the applicability criteria in the baseline methodology all fulfilled? | /1/ | DR, I | Yes, the project fulfils the applicability criteria for AM0041. | ~~CAR 2 CL 1~~ | OK |

# VALIDATION REPORT

| CHECKLIST QUESTION<br>* MoV = Means of Verification, DR= Document Review, I= Interview | Ref. | MoV* | COMMENTS | Draft Concl. | Final Concl. |
|---|---|---|---|---|---|
| | | | However, the maximum charcoal production capacity of 80 323 ton for achieving emission reduction should be noted. The planned production is 108 000 ton.<br>Evidence for no regulations of methane emissions needs to be provided. | | |
| **Baseline Scenario Determination**<br>*The choice of the baseline scenario will be validated with focus on whether the baseline is a likely scenario, and whether the methodology to define the baseline scenario has been followed in a complete and transparent manner.* | | | | | |
| What is the baseline scenario? | /1/ | DR | The baseline scenario is the continuation of the existing practice of unimproved carbonization in the absence of technology and process improvement. | | OK |
| What other alternative scenarios have been considered and why is the selected scenario the most likely one? | /1/ | DR | Five alternative scenarios to the proposed project activity have been identified:<br>1. Continuation of existing practice of unimproved carbonization in the absence of technology, process improvement, incentives, and the presence of other barriers will result in the continued use of traditional practices by the project entity. | | OK |

| CHECKLIST QUESTION<br>* MoV = Means of Verification, DR= Document Review, I= Interview | Ref. | MoV* | COMMENTS | Draft Concl. | Final Concl. |
|---|---|---|---|---|---|
| | | | 2. Adoption of minor efficiency upgrades / refurbishments / improvements that are readily available and economically feasible, and may result in the emission reductions in the existing carbonization practice.<br>3. Investment in carbonization technologies that are based on sophisticated industrial processes and devices.<br>4. Adoption of technology and process innovations that limit the methane emissions, taking into accounts the barriers and incentives in implementing such technologies.<br>5. Project Activity implemented as a non-CDM project.<br>The most likely scenario chosen is the continuation of current practice of unimproved carbonization. This is justified in view of the fact that there are no current legislations or regulations in place to impose restrictions on the GHG emissions or incentives to undertake improvements in the carbonization activity. Also as per the survey | | |

# VALIDATION REPORT

| CHECKLIST QUESTION<br>* MoV = Means of Verification, DR= Document Review, I= Interview | Ref. | MoV* | COMMENTS | Draft Concl. | Final Concl. |
|---|---|---|---|---|---|
| | | | conducted by the project entity, none of the companies in the charcoal industry control group is implementing a technology that leads to reduction in methane emissions. | | |
| Has the baseline scenario been determined according to the methodology? | /1/ | DR | The baseline scenario 4 is not clearly explained | ~~CL 2~~ | OK |
| Has the baseline scenario been determined using conservative assumptions where possible? | /1/ | DR | All baseline scenarios are not clearly defined | ~~CL 3~~ | OK |
| Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations? | /1/ | DR | Yes | | OK |
| Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced? | /1/ | DR | Yes | | OK |
| Have the major risks to the baseline been identified? | /1/ | DR | Yes, the baseline will be monitored by determining the compliance rate for the project activity in the charcoal production in Minas Gerais. | | OK |
| **Additionality Determination**<br>*The assessment of additionality will be validated with* | | | | | |

# VALIDATION REPORT

| CHECKLIST QUESTION<br>* MoV = Means of Verification, DR= Document Review, I= Interview | Ref. | MoV* | COMMENTS | Draft Concl. | Final Concl. |
|---|---|---|---|---|---|
| *focus on whether the project itself is not a likely baseline scenario.* | | | | | |
| Is the project additionality assessed according to the methodology? | /1/ | DR | The project correctly applies the "Tool for the demonstration and assessment of additionality":<br>Step 0: The start of the project activity was determined to be July 2004. The evidence presented to DNV is the invoice from Alfa Instrumentos Electronicos of a costly scale for weighing trucks which without the project would not have been interesting because the product charcoal is sold by volume not by weight. Documentation has been shown that Plantar considered CDM at the time of decision of another related project "Replacement of coke with charcoal" by the letter of intent from 25 April 2001 from Prototype Carbon Fund. It is therefore highly likely that CDM was considered when carrying out the research on the present project for mitigation of methane emissions during charcoal production.<br>Step 1: The following scenarios were identified: | | OK |

| CHECKLIST QUESTION<br>* MoV = Means of Verification, DR= Document Review, I= Interview | Ref. | MoV* | COMMENTS | Draft Concl. | Final Concl. |
|---|---|---|---|---|---|
| | | | • Continuation of existing practice. The national and regional regulation of Brazil does not require control of methane emissions of charcoal production and this is a plausible baseline scenario.<br>• Adoption of minor upgrades with resulting emission reductions. The project participants originally tried to implement flaring of the carbonization gas, but the methane content was to low for doing this. No other minor upgrades were considered feasible by the project entity.<br>• Use of sophisticated industrial processes and devices. The transport of wood from a number of different plantations is not considered cost-efficient and furthermore the investments would have been too high.<br>• Adoption of technology or process innovation that limit methane emission from kilns. Which | | |

| CHECKLIST QUESTION<br>* MoV = Means of Verification, DR= Document Review, I= Interview | Ref. | MoV* | COMMENTS | Draft Concl. | Final Concl. |
|---|---|---|---|---|---|
| | | | technology/innovation has been considered and why is it not likely. Project activity implemented as a non-CDM project<br>The alternatives to the project activities have to be clearly defined.<br>Step 2: Investment analysis; not applicable<br>Step 3: Barrier analysis<br>*Barrier to investments*. Because of profitability of the industry, most other charcoal-producing companies in the region use the traditional approach.<br>*Barrier due to prevailing practice*. The prevailing practice is optimizing the production to large volumes and short production times. This is because the sales are based on volumes not mass. Even though the weight of charcoal will increase by 20% with an increase in yield from 30 to 36% and may increase the volume of the product by 40% according to Annex 5A, the project activity is more time consuming and may hence less attractive from an economical | ~~CL 3~~ | |

| CHECKLIST QUESTION<br>* MoV = Means of Verification, DR= Document Review, I= Interview | Ref. | MoV* | COMMENTS | Draft Concl. | Final Concl. |
|---|---|---|---|---|---|
| | | | point of view.<br>*Barriers to technology development and implementation*. Considerable efforts are needed in terms of time and investments in order to improve the kiln design. Similarly, efforts to improve the operation of the kilns and the monitoring of the operations are expensive without the CDM initiative.<br>*Barriers relating to specialized knowledge, skills and training requirements*. The upfront investments in technology, training of personnel and the costs of monitoring are considered to be considerable for the project activity.<br>Step 4: A survey that covers 12 companies and about 20% of the charcoal production in Minas Gerais, undertaken by Minas Gerais Silviculture Association show no indication for the project activity to be undertaken by other charcoal producers. Hence, mitigation of methane during charcoal production is unlikely to be common practice in Minas Gerais, where most of the charcoal in Brazil is produced. | | |

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| | | | Step 5: The revenue from sales of emission reduction credits is expected to result in alleviation of barriers for the project activity. | | |
| Are all assumptions stated in a transparent and conservative manner? | /1/ | DR | Yes | | OK |
| Is sufficient evidence provided to support the relevance of the arguments made? | /1/ | DR | Yes | | OK |
| If the starting date of the project activity is before the date of validation, has sufficient evidence been provided that the incentive from the CDM was seriously considered in the decision to proceed with the project activity? | /1/ | DR | Evidence needs to be provided for the starting date of the project and that CDM was seriously considered in order to proceed with the project acitivity. | ~~CL 4~~ | OK |
| **Calculation of GHG Emission Reductions – Project emissions**<br>*It is assessed whether the project emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.* | | | | | |
| Are the calculations documented according to the approved methodology and in a complete and transparent manner? | /1/ | DR | The determination of the yield for the project (including moisture of wood and charcoal) and the calculations of the emission factor and the project emissions are complete and | | OK |

| CHECKLIST QUESTION<br>* MoV = Means of Verification, DR= Document Review, I= Interview | Ref. | MoV* | COMMENTS | Draft Concl. | Final Concl. |
|---|---|---|---|---|---|
| | | | transparent. | | |
| Have conservative assumptions been used when calculating the project emissions? | /1/ | DR | Actual production and project emission factors have not been used to calculate the emission reduction for 2004-2006. The actual emission reductions are only about 40% of the values presented in the PDD. | ~~CL 5~~ | OK |
| Are uncertainties in the project emission estimates properly addressed? | /1/ | DR | Yes | | OK |
| **Calculation of GHG Emission Reductions – Baseline emissions**<br>*It is assessed whether the baseline emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.* | | | | | |
| Are the calculations documented according to the approved methodology and in a complete and transparent manner? | /1/ | DR | No evidence was given that determination of f(Y) has been carried out with the correct mixture of pre-project and post-project activity described in AM0041.<br>There are errors in the calculations of f(Y).<br>The yield of the baseline and the emission factor are not transparent in section B.6.1. | ~~CL 6~~<br>~~CAR 3~~<br>~~CL 7~~ | OK |
| Have conservative assumptions been used when calculating the | /1/ | DR | Yes | | OK |

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|---|---|---|---|---|---|
| baseline emissions? | | | | | |
| Are uncertainties in the baseline emission estimates properly addressed? | /1/ | DR | Yes | | OK |
| **Calculation of GHG Emission Reductions – Leakage**<br>*It is assessed whether leakage emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.* | | | | | |
| Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner? | /1/ | DR | Possible leakages related to disposal of old kilns have not been considered. | ~~CL 8~~ | OK |
| **Emission Reductions**<br>*The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.* | | | | | |
| Are the emission reductions real, measurable and give long-term benefits related to the mitigation of climate change. | /1/ | DR | Yes, a relationship has been found between the yield of charcoal and methane emissions during charcoal production. When the yield during charcoal production is increased from the baseline study this leads to mitigation of climate change | | OK |

# VALIDATION REPORT

| CHECKLIST QUESTION<br>* MoV = Means of Verification, DR= Document Review, I= Interview | Ref. | MoV* | COMMENTS | Draft Concl. | Final Concl. |
|---|---|---|---|---|---|
| **Monitoring Methodology**<br>*It is assessed whether the project applies an appropriate baseline methodology.* | | | | | |
| Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner? | /1/ | DR | Yes, the monitoring plan is designed as per the applied approved methodology. | | OK |
| Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later? | /1/ | DR | The data will be kept until 2027, i.e. two years after end of expected crediting periods. | | OK |
| **Monitoring of Project Emissions**<br>*It is established whether the monitoring plan provides for reliable and complete project emission data over time.* | | | | | |
| Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period? | /1/ | DR | Yes, the monitoring plan makes provision for monitoring of all relevant parameters such as charcoal production, wood weight used, wood humidity, charcoal humidity, project gravimetric yield etc. | | OK |
| Are the choices of project GHG indicators reasonable and conservative? | /1/ | DR | Yes | | OK |
| Is the measurement *method* clearly stated for each GHG value to be monitored and deemed appropriate? | /1/ | DR, I | Yes, the monitoring methods have been clearly indicated for each of the parameters to | | OK |

# VALIDATION REPORT

| CHECKLIST QUESTION<br>* MoV = Means of Verification, DR= Document Review, I= Interview | Ref. | MoV* | COMMENTS | Draft Concl. | Final Concl. |
|---|---|---|---|---|---|
| | | | be monitored. | | |
| Is the measurement *equipment* described and deemed appropriate? | /1/ | DR, I | Yes, this was confirmed during the site visit. | | OK |
| Is the measurement *accuracy* addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements? | /1/ | DR, I | QA/QC measures have been proposed. There are procedures in place on how to deal with erroneous measurements. Calibration certificates were presented during the site visit for the laboratory scale and the temperature control of the furnace that is used for moisture measurements of wood was controlled. | | OK |
| Is the measurement *interval* identified and deemed appropriate? | /1/ | DR | Yes | | OK |
| Is the *registration*, *monitoring*, *measurement* and *reporting* procedure defined? | /1/ | DR | Yes, the manager appointed would be responsible for monitoring, record keeping computation of ERs, audit and verification. | | OK |
| Are procedures identified for *maintenance* of monitoring equipment and installations? Are the calibration intervals being observed? | /1/ | DR | No maintenance of monitoring equipment has been identified. Calibration intervals of equipment are not described | ~~CL 9~~ | OK |
| Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation). | /1/ | DR | Yes | | OK |

# VALIDATION REPORT

| CHECKLIST QUESTION<br>* MoV = Means of Verification, DR= Document Review, I= Interview | Ref. | MoV* | COMMENTS | Draft Concl. | Final Concl. |
|---|---|---|---|---|---|
| **Monitoring of Baseline Emissions**<br>*It is established whether the monitoring plan provides for reliable and complete baseline emission data over time.* | | | | | |
| Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period? | /1/ | DR | To calculate the baseline emissions, the total charcoal production on dry weight basis (in the project scenario) will be monitored. | | OK |
| Are the choices of baseline GHG indicators reasonable and conservative? | /1/ | DR | Yes | | OK |
| Is the measurement *method* clearly stated for each baseline indicator to be monitored and also deemed appropriate? | /1/ | DR | Yes | | OK |
| Is the measurement *equipment* described and deemed appropriate? | /1/ | DR | Yes | | OK |
| Is the measurement *accuracy* addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements? | /1/ | DR | Yes | | OK |
| Is the measurement *interval* for baseline data identified and deemed appropriate? | /1/ | DR | Yes | | OK |
| Is the *registration*, *monitoring*, *measurement* and *reporting* procedure defined? | /1/ | DR | Yes | | OK |

# VALIDATION REPORT

| CHECKLIST QUESTION<br>* MoV = Means of Verification, DR= Document Review, I= Interview | Ref. | MoV* | COMMENTS | Draft Concl. | Final Concl. |
|---|---|---|---|---|---|
| Are procedures identified for *maintenance* of monitoring equipment and installations? Are the calibration intervals being observed? | /1/ | DR | No maintenance of monitoring equipment has been identified. Calibration intervals of equipment are not described | ~~CL 9~~ | OK |
| Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation) | /1/ | DR | Yes | | OK |
| **Monitoring of Leakage**<br>*It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.* | | | | | |
| Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage? | /1/ | DR | No leakage emissions are expected to occur due to the project activity. | | OK |
| **Monitoring of Sustainable Development Indicators/ Environmental Impacts**<br>*It is assessed whether choices of indicators are reasonable and complete to monitor sustainable performance over time.* | | | | | |
| Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country? | /1/ | DR | No | | OK |
| Does the monitoring plan provide for the collection and | /1/ | DR | Yes, the monitoring plan describes records of | | OK |

# VALIDATION REPORT

| CHECKLIST QUESTION<br>* MoV = Means of Verification, DR= Document Review, I= Interview | Ref. | MoV* | COMMENTS | Draft Concl. | Final Concl. |
|---|---|---|---|---|---|
| archiving of relevant data concerning environmental, social and economic impacts? | | | employment, safety records, health records, ABRINQ standards (child labor) and work conditions. | | |
| Are the sustainable development indicators in line with stated national priorities in the Host Country? | /1/ | DR | As above | | OK |
| **Project Management Planning**<br>*It is checked that project implementation is properly prepared for and that critical arrangements are addressed.* | | | | | |
| Is the authority and responsibility of overall project management clearly described? | /1/ | DR | Yes, the project manager appointed would be responsible for monitoring, record keeping computation of ERs, audit and verification. | | OK |
| Are procedures identified for training of monitoring personnel? | /1/ | DR | Yes, procedures for training were identified during the site visit. | | OK |
| Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions? | /1/ | DR | In the work instructions there are procedures for emergency preparedness. | | OK |
| Are procedures identified for review of reported results/data? | /1/ | DR | Yes | | OK |
| Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting? | /1/ | DR | In the work instructions there are procedures for corrective actions. | | OK |

# VALIDATION REPORT

| CHECKLIST QUESTION<br>* MoV = Means of Verification, DR= Document Review, I= Interview | Ref. | MoV* | COMMENTS | Draft Concl. | Final Concl. |
|---|---|---|---|---|---|
| **C. Duration of the Project/ Crediting Period**<br>*It is assessed whether the temporary boundaries of the project are clearly defined.* | | | | | |
| Are the project's starting date and operational lifetime clearly defined and evidenced? | /1/ | DR | Yes, the project starting date is July 1, 2004 and is expected to have an operational lifetime of at least 21 years. | | OK |
| Is the start of the crediting period clearly defined and reasonable? | /1/ | DR | The project crediting period is expected to start from 1 July 2004 | | OK |
| **D. Environmental Impacts**<br>*Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.* | | | | | |
| Has an analysis of the environmental impacts of the project activity been sufficiently described? | /1/ | DR | Yes, environmental and social impact assessment studies have been carried out by a technical team identified by the project proponent. | | OK |
| Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved? | /1/ | DR, I | No Environmental Impact Assessment is required for the project activity. However, an EIA is in place for running the largest farm. | | OK |
| Will the project create any adverse environmental effects? | /1/ | DR | The project is not expected to result in any significant negative impacts. | | OK |
| Are transboundary environmental impacts considered in the | /1/ | DR | The project activity is not expected to lead to | | OK |

| CHECKLIST QUESTION<br>* MoV = Means of Verification, DR= Document Review, I= Interview | Ref. | MoV* | COMMENTS | Draft Concl. | Final Concl. |
|---|---|---|---|---|---|
| analysis? | | | any transboundary environmental impacts. | | |
| Have identified environmental impacts been addressed in the project design? | /1/ | DR | No such negative impacts have been identified and proper measures are being undertaken to minimise any likely impacts such as those related to worker safety and health issues. | | OK |
| Does the project comply with environmental legislation in the host country? | /1/ | DR | This shall be confirmed on receipt of the LoA from the host country. | | OK |
| **E. Stakeholder Comments**<br>*The validator should ensure that stakeholder comments have been invited with appropriate media and that due account has been taken of any comments received.* | | | | | |
| Have relevant stakeholders been consulted? | /1/ | DR, I | Yes, all relevant stakeholders have been consulted. | | OK |
| Have appropriate media been used to invite comments by local stakeholders? | /1/ | DR, I | Yes | | OK |
| If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws? | /1/ | DR, I | Yes, a stakeholder consultation process is required by the Brazilian government and the same has been complied with. This shall also be confirmed during site interviews. | | OK |
| Is a summary of the stakeholder comments received provided? | /1/ | DR | No comments were received regarding the | | OK |

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| CHECKLIST QUESTION<br>* MoV = Means of Verification, DR= Document Review, I= Interview | Ref. | MoV* | COMMENTS | Draft Concl. | Final Concl. |
|---|---|---|---|---|---|
| | | | proposed project activity. | | |
| Has due account been taken of any stakeholder comments received? | /1/ | DR | N/A | | OK |

**Table 3 Resolution of Corrective Action and Clarification Requests**

| Draft report clarifications and corrective action requests by validation team | Ref. to checklist question in table 2 | Summary of project owner response | Validation team conclusion |
|---|---|---|---|
| ~~CAR 1~~<br>Letter of approval from the Netherlands is missing | A | A copy of the Letter of Approval from the Netherlands is submitted in response to this Draft Validation Report. | The Letter of Approval has been provided. CAR closed. |
| ~~CAR 2~~<br>The maximum charcoal production capacity of 80 323 ton for achieving emission reduction should be noted in order to cap the emission reductions according to AM0041. The planned production is 108 000 ton. | B | The production of 80 323 tons was verified by the DOE validation team during the site visit. This production is the average annual charcoal production over three years prior to the project implementation. It is based on the renewable sources of wood supplies available during the three years prior to the project.<br>The Project entity's pig iron mill although requires higher charcoal production capacity than the capacity of the baseline case to achieve economies of scale at the pig iron mill's full operation, the project entity will adopt the annual cap of 80 323 tons of charcoal production for the project activity and proposes to comply with the provisions of approved methodology AM00041. | Change verified. CAR closed. |

* MoV = Means of Verification, DR= Document Review, I= Interview

| Draft report clarifications and corrective action requests by validation team | Ref. to checklist question in table 2 | Summary of project owner response | Validation team conclusion |
|---|---|---|---|
| ~~CAR 3~~<br>There are errors in the calculations of f(Y); for two experiments the brand has not been subtracted | B | With regard to the calculations of *f(Y)* the technical statement of RS Consultants (the independent researchers) certifying the research as per the requirements of the approved methodology AM0041 was submitted during the validation. The typographical errors in the two brand calculations are corrected in the revised PDD as per the following formula:<br>Charcoal Yield *bone dry basis* =<br>Net Charcoal Production / (Dry Wood – Brand Mass)<br>Test 13 : 27.7% = 1062/ (3842 – 14)<br>Test 1/2: 40.3% = 1897/(4768 -56)<br>The RS Consultants cross-checked the final calculations and certified them to be correct | The error was claimed to be of typographical nature in the net char mass. This result in correct yield Y as well as f(Y). CAR closed. |
| ~~CL 1~~<br>Evidence for no regulations of methane | B | The state's environmental regulation "Deliberação Normativa COPAM 74" | The document was verified. CL closed. |

* MoV = Means of Verification, DR= Document Review, I= Interview

| Draft report clarifications and corrective action requests by validation team | Ref. to checklist question in table 2 | Summary of project owner response | Validation team conclusion |
|---|---|---|---|
| emissions needs to be provided. | | published in September 9th, 2004 was presented to the DOE during the field visit of the validation. It does not regulate the methane emissions during the carbonization process. A copy of the regulation and state's regulation database website was handed to the DOE validation team as the supporting evidence during the field visit. | |
| ~~CL 2~~<br>The baseline scenario 4 is not clearly explained. | B | The *scenario 4* refers to the development and adoption of technology or process innovations or improvements that limit methane emissions from kilns. | Changes in PDD verified. CL closed. |
| ~~CL 3~~<br>The choice of baseline scenario has not been clearly defined | B | As per the baseline approach 48(a), the *scenario 1*, which is the continuation of the prevailing pre-project charcoal production practice without consideration of emissions. This pre-project charcoal production results in high methane emissions.<br><br>The list presented below outlining the | Changes verified. CL closed. |

| Draft report clarifications and corrective action requests by validation team | Ref. to checklist question in table 2 | Summary of project owner response | Validation team conclusion |
|---|---|---|---|
| | | alternatives is intended to clarify the baseline scenario in the context of the available alternatives.<br>1. Continuation of the existing charcoal production practice: Emphasis on volumetric yield; continuation of the existing production practices. Baseline: Yes.<br>2. Adoption of minor efficiency upgrades / refurbishments: Unsuccessful flare of carbonization gases; technically and economically infeasible. Baseline: No.<br>3. Investment in carbonization technologies: High costs of capital equipment, implementation and transportation to supply dispersed wood sources of plantations to the fixed of locations carbonization unit. Baseline: No.<br>4. Adoption of technology and process innovations: Upfront investment in the upgrades in the kiln infrastructure, industrial measurement scales and improvement of kiln operations; large risks and uncertainties associated with the implementation of first of a kind | |

| Draft report clarifications and corrective action requests by validation team | Ref. to checklist question in table 2 | Summary of project owner response | Validation team conclusion |
|---|---|---|---|
| | | carbonization technology and process innovations and improvements. Baseline: No.<br>5. Project Activity implemented as a non-CDM project: Not plausible taking into account the lack of regulation and and absence of incentives to overcome barriers and risks. Baseline: No. | |
| ~~CL 4~~<br>Evidence needs to be provided for the starting date of the project and that CDM was seriously considered in order to proceed with the project activity. | B | During the validation, the project entity submitted the following evidences, which demonstrated that the CDM was seriously considered in proceeding to undertake the project activity.<br>• A copy of the invoice of the first scale acquired for the project's implementation in 2004 as an evidence of the start of the implementation of the project activity.<br>Initial verification report of SGS (an accredited DOE) in 2005, which demonstrated the implementation progress of the project activity to the Prototype Carbon Fund of the World | The evidence for the starting date of the project presented to DNV is the invoice for of an expensive scale for weighing trucks, which without the project would not have been of any value to the company as the product charcoal is sold by volume and not by weight.<br><br>Documentation has been shown that Plantar considered CDM at the time of decision by the letter of intent from 25 April 2001 from Prototype Carbon Fund (PCF).<br>CL closed. |

| Draft report clarifications and corrective action requests by validation team | Ref. to checklist question in table 2 | Summary of project owner response | Validation team conclusion |
|---|---|---|---|
| | | Bank. A copy of this document was shown to the validation team and copy of the front page of the report was also submitted as evidence. | |
| ~~CL 5~~<br>Actual production and project emission factors have not been used to calculate the emission reduction for 2004-2006. The actual emission reductions are only about 40% of the values presented in the PDD. | B | The revised values are used in the latest update of the PDD submitted with this validation report.<br>It is clarified that for the years, 2004 to 2006, the emission reductions in tonnes of $CO_2e$ are the actual values based on monitoring data. It is further clarified that the low values in the early years of the project highlight the time required in the learning by doing improvements with a first of a kind technology; gradual upgrades of the carbonization infrastructure without completely disrupting the charcoal production process; operational breakdowns of new carbonization infrastructure and as well as the regular maintenance and supervision required in implementing the new technology and process | Changes verified. CL closed. |

* MoV = Means of Verification, DR= Document Review, I= Interview

| Draft report clarifications and corrective action requests by validation team | Ref. to checklist question in table 2 | Summary of project owner response | Validation team conclusion |
|---|---|---|---|
| | | implements.<br>The variation between the expected and the effective numbers are related to the *learning curve* effect over the 21 years of project activity. As was shown during the site visit that the project activity is gradually implemented in different Carbonization Units over time. Therefore, some variation in the effective yield of Carbonization Units was identified.<br>With improvements in carbonization operations under new technology and with gradual reduction in the variation in the carbonization activity, it is expected to achieve greater economies of scale starting from 2007.<br>Therefore, for the years 2007 to 2025, the projections assume that the operational efficiencies will be achieved with the new technology after the complete implementation, which translate into the emission reductions that are expected to follow the projected | |

* MoV = Means of Verification, DR= Document Review, I= Interview

| Draft report clarifications and corrective action requests by validation team | Ref. to checklist question in table 2 | Summary of project owner response | Validation team conclusion |
|---|---|---|---|
| | | values.<br>The differences in the expected and effective emission reductions do not affect the final results of the project in terms of the conservativeness as the actual emissions reductions are based on the monitored effective charcoal production data of the project activity. | |
| ~~CL 6~~<br>No evidence was given that determination of f(Y) has been carried out with the correct mixture of pre-project and post-project activity described in AM0041. | B | It is clarified that the same independent researchers, RS Consultants, who undertook the tests to determine the f(Y) adopted in the PDD (evidence provided to the DOE at the time of validation) also prepared the protocol outlined in the Appendix 1 of the AM0041. A formal statement of the independent researches, RS Consultants that undertook the carbonization research, confirming the validity of the tests and coherence with the approved methodology AM0041 has been submitted during the validation. | Statement from RS Consultants and explanation for pre-project vs. post-project activities reviewed. CL closed. |

* MoV = Means of Verification, DR= Document Review, I= Interview

| Draft report clarifications and corrective action requests by validation team | Ref. to checklist question in table 2 | Summary of project owner response | Validation team conclusion |
|---|---|---|---|
| | | It is clarified that two types of kilns are used in the traditional charcoal production representing the baseline scenario. These are - hot tail kilns and one chimney kilns.<br><br>*Pre-project (baseline) activity*: The one chimney kilns are in the baseline of the Plantar, which correspond to the 1/3 of the *f(Y)* determination tests. The kilns represent the actual physical and operational conditions of the baseline. It is further clarified that per the provisions of AM0041 (Appendix 1), 1/3 of the tests were conducted in physical and operational settings of the baseline and the samples chosen are based on statistical procedures so the real pre-project situation of the baseline scenario is captured in the calculations as the baseline kilns are operated with the sole focus on charcoal volume.<br><br>*Post-Project activity*: The upgraded | |

| Draft report clarifications and corrective action requests by validation team | Ref. to checklist question in table 2 | Summary of project owner response | Validation team conclusion |
|---|---|---|---|
| | | carbonization infrastructure involved replacement of traditional one chimney kilns with kilns with thermal-couples for temperature control and "mechanical *tatus*" for moderating carbonization and other operational improvements. Therefore, upgraded kiln infrastructure under the project adopts carbonization and temperature control devices, which are not installed in the baseline kilns. | |
| ~~CL 7~~<br>The yield of the baseline and the emission factor are not transparent in section B.6.1. | B | All the details and the raw data from the yield calculation of the baseline are available in the Annex 3 of the PDD and the revised version of the PDD clarifies the baseline yield in section B.6.1. | Changes verified. CL closed. |
| ~~CL 8~~<br>Possible leakages related to disposal of old kilns have not been considered. | B | As the carbonization kilns are made of bricks and clay, the bricks and clay from the dismantled old kilns are reused in the new kilns. The kiln components remaining after the dismantled brick and clay structures of old kilns are | Changes verified. CL closed. |

| Draft report clarifications and corrective action requests by validation team | Ref. to checklist question in table 2 | Summary of project owner response | Validation team conclusion |
|---|---|---|---|
| | | expected to have insignificant emissions, therefore, no leakage is expected in this project. Therefore, leakage emissions are treated as zero. | |
| ~~CL 9~~<br>No maintenance of monitoring equipment has been identified. Calibration intervals of equipment are not described. | B | The procedure for the calibration intervals of equipment and monitoring of the equipment are available in the Work Instructions presented to the validation team as the evidence. A copy of the Work Instructions is submitted with the revised PDD in response to this draft validation report. | Work instructions verified. CL closed. |

* MoV = Means of Verification, DR= Document Review, I= Interview

# APPENDIX B

## CERTIFICATES OF COMPETENCE

# CERTIFICATE OF COMPETENCE

## *Hendrik W. Brinks*

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJI-i1

| | | | |
|---|---|---|---|
| ***GHG Auditor:*** | Yes | | |
| ***CDM Validator:*** | - | ***JI Validator:*** | - |
| ***CDM Verifier:*** | - | ***JI Verifier:*** | - |
| ***Industry Sector Expert for Sectoral Scope(s):*** | Sectoral scope-1,2,3,12 | | |

Høvik, 1 February 2007

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director

# CERTIFICATE OF COMPETENCE

## *Anu Chaudhary*

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJI-i1

| | | | |
|---|---|---|---|
| ***GHG Auditor:*** | Yes | | |
| ***CDM Validator:*** | Yes | ***JI Validator:*** | -- |
| ***CDM Verifier:*** | -- | ***JI Verifier:*** | -- |
| ***Industry Sector Expert for Sectoral Scope(s):*** | -- | | |

Høvik, 6 November 2006

Einar Telnes
*Director, International Climate Change Services*

Michael Lehmann
*Technical Director*

# CERTIFICATE OF COMPETENCE

## *Andrea Leiroz*

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJI-i1

| | | | |
|---|---|---|---|
| ***GHG Auditor:*** | Yes | | |
| ***CDM Validator:*** | -- | ***JI Validator:*** | -- |
| ***CDM Verifier:*** | -- | ***JI Verifier:*** | -- |
| ***Industry Sector Expert for Sectoral Scope(s):*** | -- | | |

Høvik, 6 November 2006

Einar Telnes
*Director, International Climate Change Services*

Michael Lehmann
*Technical Directo*

# CERTIFICATE OF COMPETENCE

## *Einar Telnes*

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJI-i1

| | | | |
|---|---|---|---|
| ***GHG Auditor:*** | Yes | | |
| ***CDM Validator:*** | Yes | ***JI Validator:*** | Yes |
| ***CDM Verifier:*** | Yes | ***JI Verifier:*** | Yes |
| ***Industry Sector Expert for Sectoral Scope(s):*** | Sectoral scope 1,2,3,6 & 10 | | |
| ***Technical Reviewer for (group of) methodologies:*** | | | |
| *ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G* | Yes | *AM0021* | Yes |
| *ACM002, AMS-I.A-D, AM0019, AM0026, AM0029* | Yes | *AM0023* | Yes |
| *ACM003, ACM0005, AM0033, AM0040* | Yes | *AM0024* | Yes |
| *ACM0004* | Yes | *AM0027* | Yes |
| *ACM0006, AM0007, AM0015, AM0036, AM0042* | Yes | *AM0028, AM0034* | Yes |
| *ACM0007* | Yes | *AM0030* | Yes |
| *ACM0008* | Yes | *AM0031* | Yes |
| *ACM0009, AM0008, AMS-III.B* | Yes | *AM0032* | Yes |
| *AM0006, AM0016, AMS-III.D* | Yes | *AM0035* | Yes |
| *AM0009, AM0037* | Yes | *AM0038* | Yes |
| *AM0013, AM0022, AM0025, AM00379, AMS-III.H, AMS-III.I* | Yes | *AM0041* | Yes |
| *AM0014* | Yes | *AM0034* | Yes |
| *AM0017* | Yes | *AMS-II.A-F* | Yes |
| *AM0018* | Yes | *AMS-III.A* | Yes |
| *AM0020* | Yes | *AMS-III.E, AMS-III.F* | Yes |

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director