VALIDATION REPORT

USE OF CHARCOAL FROM RENEWABLE BIOMASS PLANTATIONS AS REDUCING AGENT IN PIG IRON MILL IN BRAZIL

REPORT NO. 2011-0207

REVISION NO. 01B

DET NORSKE VERITAS

VALIDATION REPORT

Date of first issue: 21 Feb 2011	ConCert Project No.: PRJC-284475-2011-CCS-NOR
Approved by Michael Lehmann	Organisational unit: DNV KEMA Energy & Sustainability Accredited Climate Change Services
Client: Plantar Carbon Ambiental and International Bank for Reconstruction and Development as Trustee of the Prototype Carbon Fund (indirectly)	Client ref.: Luiz C. Goulart and Werner L Kornexl

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Summary:

Project Name: Use of Charcoal from Renewable Biomass Plantations as Reducing Agent in Pig Iron Mill in Brazil **Country:** Brazil

Methodology: AM0082 version 1.0

GHG reducing Measure/Technology: Metal Production and Manufacturing industries

ER estimate: 329 068 tCO_2e per year (average)

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

This validation report summarizes the findings of the validation. The only changes made to this version of the validation report compared to the validation report rev. 01 dated 20 June 2012 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 and the letter of approval by the DNA of the Netherlands, as well as the incorporation of further details as requested by by the UNFCCC Secretariat on 17 December 2012 as part of its completeness check.

In summary, it is DNV's opinion that the project activity "Use of Charcoal from Renewable Biomass Plantations as Reducing Agent in Pig Iron Mill in Brazil", as described in the PDD Version 03 dated 15 June 2012, meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology AM0082, version 1.0. Hence, DNV requests the registration of the project as a CDM project activity.

Report No.: 2011-0207	Subject Group: Environment	
Report title: Use of Charcoal from Renewable Biomass Plantations as Reducing Agent in Pig Iron Mill in Brazil		
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Abbreviations

ABRAF	Brazilian Association of Planted Forest Producers http://www.abraflor.org.br/
AMS	Associação Mineira de Silvicultura (Minas Gerais State Silviculture Association)
BEN	Brazilian Energy Balance Report
BNDES	Brazilian Development and Sustainability Bank
CAF	Companhia Agrícola e Florestal Santa Bárbara(Santa Bárbara Agricultural and Forest Company)
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction(s)
CH_4	Methane
CL	Clarification request
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DNA	Designated National Authority
DNV	Det Norske Veritas
FAR	Forward Action Request
FEAM	Environment Minas Gerais State Agency
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
ha	hectare
IEF	Forest Minas Gerais State Institute
INCRA	Brazilian Institute for Colonization and Land Reform
IPCC	Intergovernmental Panel on Climate Change
LoA	Letter of approval
MAI	Mean average increment of small forest (Incremento Media Annual-IMA)
MDC	Cubic meter of charcoal
MDF	Medium-density fiberboard
MME	Brazilian Mine and Energy Ministry
N_2O	Nitrous oxide
NGO	Non-governmental Organization
ODA	Official Development Assistance
PDD	Project Design Document
SEMAD	Environment Minas Gerais State Secretary
st	Stereo meter (Cubic meter of wood stacked)
tCO_2e	Tonnes of CO_2 equivalents
TKU	Tonne of cargo per useful kilometer (railway transportation)
UNFCCC	United Nations Framework Convention on Climate Change

1 EXECUTIVE SUMMARY – VALIDATION OPINION

DNV Climate Change Services AS (DNV) has performed a validation of the project activity "Use of Charcoal from Renewable Biomass Plantations as Reducing Agent in Pig Iron Mill in Brazil". The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism 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 host Party is Brazil and the Annex I Party is the Netherlands. Both Parties fulfil the participation criteria and have approved the project and authorized the project participants Plantar, Plantar Siderúrgica and Plantar Carbon Ambiental of host Party Brazil and International Bank for Reconstruction and Development as Trustee of the Prototype Carbon Fund of the Netherlands. The Netherlands is participating directly in the project. The DNA from Brazil confirmed that the project assists in achieving sustainable development.

The project correctly applies the baseline and monitoring methodology AM0082, version 1.0 "Use of charcoal from planted renewable biomass in the iron ore reduction process through the establishment of a new iron ore reduction system".

The purpose of this project activity is to use charcoal, produced from new dedicated Eucalyptus plantations, as the main reducing agent in the refurbished iron ore reduction process (Blast furnace), thereby avoiding the use of coke and reducing GHG emissions. Hence the project results in reductions of CO_2 emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be on the average 329 068 tCO_2e per year over the selected 7 year renewable crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

The monitoring plan provides for the monitoring of the project's emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the project design and it is DNV's opinion that the project participants are able to implement the monitoring plan.

In summary, it is DNV's opinion that the project activity "Use of Charcoal from Renewable Biomass Plantations as Reducing Agent in Pig Iron Mill in Brazil" as described in the PDD, version 03 dated 15 June 2012, meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology AM0082, version 1.0. Hence, DNV requests the registration of the project as a CDM project activity.

Rio and Oslo, 23 December 2012

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2 INTRODUCTION

Plantar Carbon Ambiental has commissioned DNV Climate Change Services AS (DNV) to perform a validation of the "Use of Charcoal from Renewable Biomass Plantations as Reducing Agent in Pig Iron Mill in Brazil" project in Brazil (hereafter called "the project"). This report summarizes 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.

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 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 AM0082 version 1.0. The validation was based on the recommendations in the Validation and Verification Manual /29/.

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 consisted 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 tables list the documentation that was reviewed during the validation.

3.1.1 DOCUMENTATION PROVIDED BY THE PROJECT PARTICIPANTS

/1/ Plantar Carbon Ambiental *CDM-PDD for project activity "Use of Charcoal from Renewable Biomass Plantations as Reducing Agent in Pig Iron Mill in Brazil"* (EPddIN_SUB_101221) version 01 of 24 November 2010

/2/ Plantar Carbon Ambiental *CDM-PDD for project activity "Use of Charcoal from Renewable Biomass Plantations as Reducing Agent in Pig Iron Mill in Brazil"* (EPddIN_SUB_101221) version 03 of 15 June 2012

/3/ Plantar Carbon Ambiental: CERs calculation spreadsheet, (EPddIN_Final 100629) Version 1

/4/ Plantar Carbon Ambiental: Fuel consumption table spreadsheet, (EPddIN_SUB_110809_FuelConsumptionTable) Version 2

/5/ Plantar Carbon Ambiental: Fuel consumption table spreadsheet, (EVrfFL_Final 110809) Version 1

/6/ Plantar Carbon Ambiental: Transport consumption table spreadsheet, (EVrfFL_Final 101221) Version 1

/7/ Plantar Carbon Ambiental: Stakeholders list MG02, MG03, MG04 and Mill

/8/ Plantar Carbon Ambiental: CDM consideration

- Contract signed by Plantar Siderurgica S.A and Plantar Planejamento, Técnica e Administração de Reflorestamentos S.A sharing all rights of CDM carbon credits, signed on 25 October 2009
- *Letter#15/MCT issued on 30 August 2000 by Mr. Ronaldo Mota Sardemberg, Brazilian Minister for Science and Technology notifying Plantar S.A Reflorestamento about the rules for submission CDM project to Brazilian DNA and confirm no opposition from Brazilian Government to Plantar applying on World Bank Prototype Carbon Fund.*
- *Email issue on 26 October 1999 from Mr. Andre Guimarães of Private Sector Liaison/Rain Forest Pilot Program/World Bank to Mr. Marco Antonio Fujihara and forward to Mr. Geraldo Alves de Moura, Plantar Director, about the Plantar project to be applied on World Bank PCF and UNFCCC CDM.*

/9/ Continued actions to secure CDM

- LoA |PCF – Plantar 23 March 2001;
- Baseline determination for Plantar: Evaluation of the emissions reduction potential of the Plantar project. Eco securities/PCF 17 October 2001;
- Environmental Assessment of Plantar Project/ Minas Gerais – 18 October 2001;
- Monitoring and Verification Protocol for Plantar coal coke to charcoal substitution project - Eco securities/PCF 14 March 2002;
- DNV Validation Report # 2001-1263 of Plantar Project – 12 June 2002 for the Prototype Carbon Fund-World Bank;
- Indian Mission (Kerala Forestry Project) visit to MG02 site and Plantar Siderúrgica - 29 November 2002
- China Afforestation Department of State Forestry Administration visit to MG02 site and Plantar Siderúrgica - 06 to 08 October 2004;
- Initial verification report issued by SGS issued on 13 September 2005 Phase 1 and 2 for Prototype Carbon Found – World Bank;
- Final verification report issued by SGS issued on 10 September 2006 for the Period 1 June 2005 to 31 July 2006 for Prototype Carbon Found – World Bank
- Clyde Materials Handling: Sale invoice # 0901 issued on 01 October 2006 for charcoal injection system

/10/ Plantar Carbon Ambiental:

Letters from stakeholders regarding the stakeholder consultation, 16 December 2010.

/11/ Plantar Siderurgica - : Blast Furnace 1 refurbishing expenses demonstration Code 90.01 concluded on 09/2007.

/12/ Plantar Siderurgica - : Blast Furnace 2 refurbishing expenses demonstration Code 90.01 concluded on 03/2010.

/13/ Plantar Siderurgica: Powder Charcoal Injection installation expenses demonstration Code 90.16 concluded on 10/2008.

/14/ Plantar Forest Handling Plan 045/2008

/15/ Plantar Forest Plant Register system with all forest plots information about land, plantation, production and cost.

/16/ Plantar MG02, MG03, MG04 and MG15 drawing # SIG-01.01.01 issued on 30/10/09

/17/ Plantar compendium of land ownership registration for MG02 and MG15 properties

/18/ Plantar Charcoal Control System Report from 01/01/2010 to 31/12/2010:

Charcoal reception from Plantar MG02 area – 58,021 m^3 = 25%

Charcoal reception from Plantar MG03 area – 102,297 m^3 = 44%

Charcoal reception from Plantar MG04 area – 0 m^3 = 0%

Charcoal reception from external suppliers* – 73,829 m^3 = 31%.

*suppliers:

- Minas Emp. Agr. Lit. Faz Enjeitado.
- V.N. Carbo Veg. Lit. Faz Brajão
- VN Carbo Caraíbas/Olhos D'água
- VN Carbo Veg. Lit. Faz Gaitas

/19/ IBAMA: MG15 Wood harvest authorization:
78/87 issued on 21 April 1987 for Plantar, Fazenda Tamanduá IV /Itacambira
020064 issued on 07 April 1997 for Plantar, Fazenda Tamanduá IV /Itacambira

/20/ IBAMA: MG15 Wood harvest authorization:
020855 issued on 11 May 1998 for Plantar, Fazenda Tamanduá XXXIII /Itacambira with IMA as 5.61 m^3/ha/year
054611 issued on 30 August 2000 for Plantar, Fazenda Tamanduá IX/Itacambira with IMA as 7.09 m^3/ha/year

/21/ Silveira, Carlo J.A et all, IEF: Environment Promotion Program, 2008

/22/ Del Rey Engenharia Ltda. (October 2005). Environmental Impact Study (EIA) and Environmental Impact Report (RIMA).

/23/ SUPRAM/SEMAD: *Blast Furnace Operation License #314 issued on 29 November 2010 and valid until 29 November 2014*
IEF/COPAM *: Reforestation Jacaré Farm (MG02)#198, issued on 03 October 2005 and valid until 30 October 2011*
IEF/COPAM *: Reforestation Buenos Aires Farm (MG03)#021, issued on 31 March 2006 and valid until 30 March 2012*
IEF/COPAM *: Reforestation Buriti Grande Farm (MG04)#199, issued on 03 October 2005 and valid until 30 October 2011*

/24/ Sampaio, Ronaldo S. (RSConsultants Ltda.), 'Evaluation on thermo reducing agent replacement on the Plantar pig iron production. July 2000

/25/ World Bank – Prototype Carbon Fund - Environmental Assessment of Plantar Project / Minas Gerais issued on 18 October 2011.

/26/ World Bank – Prototype Carbon Fund - Integrated Safeguards Data Sheet 24223 http://go.worldbank.org/0ASXK5G3Z0

/27/ Forest Stewardship Council – Plantar project SCS-FM/COC-57P registered on 01 December 1996
http://www.brasil.fsc-products.org/search/company.php?lang=de&c_id=1330

/28/ Heringer Fertilizers supply invoice 184246 issue date 11/09/2004 for fertilizer MG 5259.048-7 NPK 06.30.06 for Plantar Florestas S.A.

3.1.2 LETTERS OF APPROVAL

/29/ Comissão Interministerial de Mudança Global do Clima (DNA of Brazil):
Letter of approval dated 20 August 2012, available in:
http://www.mcti.gov.br/index.php/content/view/338082/Uso_de_Carvao_Vegetal_Proveniente_de_Plantios_de_Biomassa_Renovavel_como_Agente_Redutor_em_Usina_de_Ferro_gusa_no_Brasil.html

/30/ IenM. Ministry of Infrastructure and the Environment (DNA of the Netherlands):
Letter of approval dated 03 February 2012, received via e-mail on 07 February 2012

3.1.3 METHODOLOGIES, TOOLS AND OTHER GUIDANCE BY THE CDM EXECUTIVE BOARD

/31/ CDM Executive Board: *Validation and Verification Manual*. Version 01.2

/32/ CDM Executive Board: *Baseline and monitoring methodology AM0082* "*Use of charcoal from planted renewable biomass in the iron ore reduction process through the establishment of a new iron ore reduction system*" version 1.0

/33/ CDM Executive Board: Baseline and monitoring methodology AM0041 "*Mitigation of Methane Emissions in the Wood Carbonization Activity for Charcoa*l Production" version 1.0

/34/ CDM Executive Board: Baseline and monitoring methodology AR-AM0005 – "*Afforestation and reforestation project activities implemented for industrial and/or commercial uses,"* version 1

/35/ CDM Executive Board: Baseline and monitoring methodology AM0042 – "*Grid-connected electricity generation using biomass from newly developed dedicated plantation*", version 02

/36/ CDM Executive Board: Baseline and monitoring methodology ACM0003 – "*Emissions reduction through partial substitution of fossil fuels with alternative fuels or less carbon intensive fuels in cement manufacture*", version 7.3

/37/ CDM Executive Board: Baseline and monitoring methodology AR-AM0005 - *Afforestation and Reforestation project activities implemented for industrial and commercial uses*", version 1;

/38/ CDM Executive Board: *Combined tool to identify the baseline scenario and demonstrate additionality*, Version 04.0.0

/39/ CDM Executive Board: "*Guidelines on the demonstration and assessment of prior consideration of the CDM"*

/40/ CDM Executive Board: Guidelines for objective demonstration and assessment of barriers", EB 50 Annex 13

/41/ CDM Executive Board: *Tool to calculate project or leakage of CO_2 emissions from fossil fuel combustion*, Version 2

/42/ CDM Executive Board: Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity, version 04.0.0 (new version for the former Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities, version 01);

/43/ CDM Executive Board: Tool to calculate baseline, project and/or leakage emissions from electricity consumption, version 01;

/44/ CDM Executive Board: Tool for the degraded or degrading lands for consideration in implementing CDM A/R project activities, Version 1

/45/ CDM Executive Board: *Guidelines on the demonstration and assessment of prior consideration of the CDM;*
http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid04.pdf

/46/ Plantar MG3 and MG 4 reforestation project: UNFCCC 2569 Reforestation as Renewable Source of Wood Supplies for Industrial Use in Brazil
http://cdm.unfccc.int/Projects/DB/TUEV-SUED1242052712.92/view

/47/ Plantar MG3 and MG 4 reforestation project: UNFCCC 1051 Mitigation of Methane Emissions in the Charcoal Production of Plantar, Brazil

http://cdm.unfccc.int/Projects/DB/DNV-CUK1175235824.92/view

/48/ Plantar new methodology NM0278 submission
http://cdm.unfccc.int/methodologies/PAmethodologies/pnm/byref/NM0278

/49/ UNFCCC – EB, Global Stakeholders Consultation: *Use of Charcoal from Renewable Biomass Plantations as Reducing Agent in Pig Iron Mill in Brazil*
http://cdm.unfccc.int/Projects/Validation/DB/J2QOHEDIY0LY3KFX04NFEUB5CFJO6N/view.html

/50/ Plantar Monitoring Report for CDM/AR 2569 for the period of 10 November 2000 to 09 November 2010
http://cdm.unfccc.int/Projects/DB/TUEV-SUED1242052712.92/iProcess/DNV-CUK1293110659.42/view

/51/ UNFCCC – EB, Global Stakeholders Consultation: Use of Charcoal from Renewable Biomass Plantations as Reducing Agent in Pig Iron Mill at ArcelorMittal Juiz de Fora, Brazil
http://cdm.unfccc.int/Projects/Validation/DB/J8FCIF2GBXEOLBK7RXX62128L0A4Q8/view.html

3.1.4 DOCUMENTATION USED BY DNV TO VALIDATE / CROSS-CHECK THE INFORMATION PROVIDED BY THE PROJECT PARTICIPANTS

/52/ Plantar Project Activity
http://www.plantar.com.br/portal/page/portal/plantar
http://ravel.plantar.com.br/portal/page/portal/plantar/projeto_carbono/introducao

/53/ IEF – Forest http://www.ief.mg.gov.br/florestas

/54/ IEF – Forest Program Guidelines
http://www.ief.mg.gov.br/images/stories/notatecnica/nota_tecnica_fomento_ambiental%5B1%5D.pdf

/55/ IBAMA - Brazilian Forest Code http://www.ibama.gov.br/flores/leis/leis.html

/56/ Brazilian Forest Legislation http://www.codigoflorestal.com/
http://www.redebrasilatual.com.br/temas/ambiente/especial/codigo-florestal
http://www2.camara.gov.br/agencia/noticias/MEIO-AMBIENTE/197560-CAMARA-APROVA-NOVO-CODIGO-FLORESTAL-COM-MUDANCA-EM-REGRAS-PARA-APPS.html

/57/ IBAMA – List of 60 pig iron companies cited
http://200.195.77.153/engine.php?pag=art&sec=16&cat=59&art=11612
http://www.estadao.com.br/noticias/geral,ibama-multa-60-siderurgicas-por-utilizar-carvao-ilegal,188418,0.htm

/58/ IBAMA release – charcoal crime
http://www.rondoniadinamica.com/arquivo/ibama-em-rondonia-desbarata-braco-da-mafia-do-carvao,24091.shtml
http://metropolionline.com.br/sete-lagoas/ibama-apreende-carvao-proximo-a-sete-lagoas/
http://www.diarionline.com.br/?s=noticia&id=12104
http://www.agu.gov.br/sistemas/site/TemplateTexto.aspx?idConteudo=128664&id_site=1106
http://www.prr4.mpf.gov.br/site/index.php?option=com_content&view=article&id=178:suspensa-comercializacao-de-carvao-nativo-para-siderurgicas-com-mais-de-dez-anos&catid=10:noticias&Itemid=58

/59/ AMS: Calais D. Brazilian Energetic Forest - Demand and availability, April 2009.
http://www.silviminas.com.br/Publicacao/Arquivos/publicacao_472.pdf

/60/ AMS – 2009 Yearly Statistics
http://www.ciflorestas.com.br/arquivos/doc_numeros_2009_14292.pdf

/61/ ABRAF – 2009 Statistics
http://www.abraflor.org.br/estatisticas/ABRAF10-EN/capitulo04.pdf

/62/ Hoeflich V. A. and Tuoto M.: Planted forest save native forest, Painel Florestal 2007
http://painelflorestal.com.br/artigos/408/floresta-plantada-poupa-mata-nativa

/63/ IBS Brazilian Steel Institute. Participants.
http://www.acobrasil.org.br/site/portugues/instituto/associadas.asp
http://www.acobrasil.org.br/site/portugues/biblioteca/Folder_Aco_Brasil_2011_Institucional.pdf

/64/ IEF – Productivity of eucalyptus forest
http://www.ief.mg.gov.br/index.php?Itemid=102&id=165&option=com_content&task=view

/65/ CSN (Companhia Siderúrgica Nacional) Prospects for Brazilian Steel Industry 2009.
http://www.abmbrasil.com.br/cim/download/20090525_40Aciaria_MarcioLins.pps

/66/ UFMG/DEMED: Brazilian coal
http://www.demec.ufmg.br/disciplinas/ema003/solidos/coque/carvao.htm

/67/ UFMG/DEMED: Alternative use of coke on charcoal Blast Furnaces
http://www.demec.ufmg.br/disciplinas/ema003/solidos/coque/altern.htm

/68/ UFMG/CETEC : Technological research for environmental control of independent pig iron production units on Minas Gerais, Vol 3 pages 33 to 382000

/69/ BNDES: The Forestry and Development Question, 8 July 2003.
http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Publicacoes/Paginas/s_florestal.html

/70/ BNDES: Metallurgical coal in Brazil.
http://www.bndes.gov.br/SiteBNDES/export/sites/default/bndes_pt/Galerias/Arquivos/conhecimento/bnset/set2307.pdf

/71/ BNDES – financing R$ 449 MM (55%) Valorec-Sumitomo coal blast furnace (starting with coal coke until develop new forest for
http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Sala_de_Imprensa/Noticias/2009/Todas/20091222_VSB_Siderurgia.html

/72/ BNDES – Vital, Marcos H.F., Pinto Marco A.C., Conditions for sustainable charcoal production for pig iron production in Brazil,
http://www.bndes.gov.br/SiteBNDES/export/sites/default/bndes_pt/Galerias/Arquivos/conhecimento/bnset/set3006.pdf

/73/ Brazilian Energy and Mines Ministry. National Energy Balance 2007
http://www.mme.gov.br/mme/galerias/arquivos/publicacoes/BEN/8_-_Edicoes_Anteriores_BEN_e_Resenhas_-_pdf/1_-_BEN_Anteriores/4_-_BEN_2007_-_Ano_Base_2006.pdf

/74/ Minitec – Mini steel plant.
http://www.minitecnologias.com.br/msp-pt_16-07-09.pdf

/75/ UnB (Universidade de Brasília) - Legal Reserve and Environmental Management of Rural Property, Liliane Miranda Joels.
http://www.fazendeiro.com.br/Cietec/artigos/ArtigosTexto.asp?Codigo=368

/76/ CI-Florestas: Forest financing.
http://www.ciflorestas.com.br/arquivos/doc_qualidade_vegetal_23002.pdf

/77/ Sindifer: Study of pig-iron producers in Brazil – Annuary *2007*, December 2007.
http://www.sindifer.com.br/Anuario_2007.html

/78/ Sindifer – Associates relation.
http://www.sindifer.com.br/associadas.html

/79/ Gonçalves, Jose M. F. and Martins, Gilberto - Energy consumption and greenhouse

gases emission by cargo transportation in Brazil.
http://rodoviasverdes.ufsc.br/files/2010/03/Emis%C3%A3o-de-CO2-no-Transporte.pdf
http://www.brasilengenharia.com.br/ed/586/Art.Transporte_1.pdf

/80/ EPE: National Energetic Balance of Brazil 2009.
https://ben.epe.gov.br/downloads/Resultados_Pre_BEN_2009.pdf

/81/ Carneiro, Angelica, CIFOREST, Blast furnaces charcoal specific consumption.
http://www.ciflorestas.com.br/arquivos/doc_qualidade_vegetal_23002.pdf

/82/ IPCC: Guidelines 2006.
http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html

/83/ IPPC – Integrated Pollution Prevention and Control - BAT Reference Document on the Production of Iron and Steel, December 2001, Table 7.1:
http://eippcb.jrc.es/reference/BREF/sa_bref_0505.pdf
ftp://ftp.jrc.es/pub/eippcb/doc/isp_bref_1201.pdf

/84/ INPE – Minas Gerais Vegetation Map.
http://mtc-m17.sid.inpe.br/col/sid.inpe.br/MTC-m13@80/2006/12.21.13.36/doc/publicacao.pdf

/85/ IBGE – Brazilian Biomass Map.
http://www.ibge.gov.br/home/presidencia/noticias/21052004biomashtml.shtm

/86/ IBGE – Brazilian Weather.
http://www.ibge.gov.br/home/geociencias/default_prod.shtm#HIDROGEO

/87/ COPAM. Normative Deliberation #40 of 28 September 2001
http://www.siam.mg.gov.br/sla/download.pdf?idNorma=132

/88/ Minas Gerais Legislation - Law 14,309/02
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/112/ SGS: Verification report dated 10 September 2006

3.2 Follow-up interviews with project stakeholders

On 20 February 2011 DNV visited the Plantar Siderurgia facilities at Sete Lagoas Municipality in order to verify the Blast Furnaces, reception, treatment, storage and use of charcoal and check the consumption index according the carbonization facilities.
On 21 February 2011, DNV visited the Plantar Forest in order to visit the eucalyptus forest on Curvelo municipality and the respective carbonization facilities. On 22 February 2011 DNV visited the Plantar head office.
Interviews were conducted with the project stakeholders to confirm selected information and to resolve issues identified in the document review. The site interviews were carried out by Luis Filipe Tavares (qualified validator for the relevant technical area) of DNV Rio. Representatives of Plantar Carbon Ambiental /113//114//115/ and representatives of Plantar Siderurgica /116//117//118/ and Plantar S.A. /119/ were interviewed.

	Date	Name	Organization	Topic
/113/	20 Feb 2011	**Luiz C. Goulart**	Plantar Carbon Ltda.	➢ Visit Blast Furnaces at Sete Lagoas facilities ➢ Visit MG02, including Planning office, Carbonizations Canabrava and Lagoa Capim and the nursery seedling; ➢ Baseline ;determination project; ➢ Applicability of methodology; ➢ Issues related to the additionality; ➢ Common practice analysis; ➢ Emission reductions calculation; ➢ Emission reduction monitoring plan and project management; ➢ Consulting process for stakeholder's comments.
/114/		Fabio N. A. Marques		
/115/		Patricia M Moura		
/116/	21 Feb 2011	Markson B Fonseca	Plantar Siderurgica	
/117/		Jader Luiz Alves		
/118/		Afonso Magno		
/119/		Geraldo Alves Moura	Plantar S.A.	

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 was customized for the project. The protocol shows in a transparent manner the criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organizes, 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 four tables. The different columns in these tables are described in the figure below. The completed validation protocol for the project activity "Use of Charcoal from Renewable Biomass Plantations as Reducing Agent in Pig Iron Mill in Brazil" in Brazil is enclosed in Appendix A to this report.

A corrective action request (CAR) is raised if one of the following occurs:

(a) The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;

(b) The CDM requirements have not been met;

(c) There is a risk that emission reductions cannot be monitored or calculated.

A clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

A forward action request (FAR) is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.

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**) or a **corrective action request (CAR)** if a requirement is not met.*

Validation Protocol Table 2: Requirement Checklist				
Checklist question	***Reference***	***Means of verification (MoV)***	***Assessment by DNV***	***Draft and/or Final Conclusion***
The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organized in different sections, following the logic of the CDM-PDD	*Gives reference to documents where the answer to the checklist question or item is found.*	*Means of verification (MoV) are **document review (DR)**, **interview (I)** or any other follow-up actions (e.g., on site visit and telephone or email interviews) and **cross-checking (CC)** with available information relating to projects or technologies similar to the proposed CDM project activity under validation.*	*The discussion on how the conclusion is arrived at and the conclusion on the compliance with the checklist question so far.*	*OK is used if the information and evidence provided is adequate to demonstrate compliance with CDM requirements. A **corrective action request (CAR)** is raised when project participants have made mistakes, the CDM requirements have not been met or there is a risk that emission reductions cannot be monitored or calculated. A **clarification request (CL)** is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. A **forward action request (FAR)** during validation is raised to highlight issues related to project implementation that require review during the first verification of the project activity.*

Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests			
Corrective action and/ or clarification requests	***Ref. to checklist question in table 2***	***Response by project participants***	***Validation conclusion***
*The **CARs** and/ or **CLs** raised in Table 2 are repeated here.*	*Reference to the checklist question number in Table 2 where the CAR or CL is explained.*	*The responses given by the project participants to address the CARs and/or CLs.*	*The validation team's assessment and final conclusions of the CARs and/or CLs.*

Validation Protocol Table 4: Forward Action Requests		
Forward action request	***Ref. to checklist question in table 2***	***Response by project participants***
The FARs raised in Table 2 is repeated here.	*Reference to the checklist question number in Table 2 where the FAR is explained.*	*Response by project participants on how forward action request will be addressed prior to first verification.*

Figure 1 Validation protocol tables

3.4 Internal quality control

The validation report underwent a technical review performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

3.5 Validation team

				Type of involvement					
Role	***Last Name***	***First Name***	***Country***	Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	TA 9.1 competence
Team leader (Validator)	Tavares	Luis Filipe	Brazil	✓	✓	✓	✓		✓
Technical reviewer	Kakaraparthi	Venkata Raman	India					✓	
Person with sectoral competence assisting technical reviewer	Van Evercooren	Jan	Belgium					✓	✓
Technicla reviewer (revision 01b)	Lehmann	Michael	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 PDD, version 03 dated 15 June 2012.

The only changes made to this version of the validation report compared to the validation report rev. 01 dated 20 June 2012 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 /29/ and the update of the letter of approval by the DNA of the Netherlands /30/, as well as the incorporation of further details as requested by by the UNFCCC Secretariat on 17 December 2012 as part of its completeness check. These changes do not affect any sustainability or any other criteria of the Brazilian DNA for approving the project and confirming that the project contributes to sustainable development.

4.1 Participation requirements

The project participants are Plantar, Plantar Siderúrgica and Plantar Carbon Ambiental of host Party Brazil and International Bank for Reconstruction and Development as Trustee of the Prototype Carbon Fund. The Netherlands is participating directly in the project. The participating Parties Brazil and the Netherlands meet all relevant participation requirements.

A letter of approval (LoA) /29/ was issued by DNA of Brazil on 20 August 2012, authorizing Plantar, Plantar Siderúrgica and Plantar Carbon Ambiental of host Party as project participant and confirming that the project assists in achieving sustainable development. A letter of approval (LoA) /30/ was issued by DNA of the Netherlands on 03 February 2012, authorizing International Bank for Reconstruction and Development as Trustee of the Prototype Carbon Fund of Annex I Party as project participant.

Brazil has ratified the Kyoto Protocol on 23 August 2002. The Brazilian designated national authority for the CDM is the Comissão Interministerial de Mudança Global do Clima.

The Netherlands has ratified the Kyoto Protocol on 31 May 2002. The Netherlands designated national authority for the CDM is the Ministry of Infrastructure and the Environment (IenM).

The letters of approval were received from the project participants. DNV does not doubt the authenticity of the letters of approval. The letter of approval from the Brazilian DNA was cross-checked in the Brazilian DNA webpage /29/, and the letter of approval from the Netherlands was confirmed via an e-mail message from the DNA /30/. DNV considers the letters are in accordance with paragraphs 45- 48 of the VVM /29/.

4.2 Project design

The purpose of this project activity is to use charcoal, produced from new dedicated Eucalyptus plantations, as the main reducing agent used in the refurbished iron ore reduction process (Blast furnace), thereby avoiding the use of coke and reducing GHG emissions.

The project activity is located in the Minas Gerais state, and the project activities are located in the following municipalities:

Forest plantation:

The existent Eucalyptus plantation of Plantar nominated as MG02 is established mainly around Curvelo municipality, with 6 881 ha total area and limited by the following geographic coordinates

West extreme point: 18º50'08S/ 44º46'14W
Northeast extreme point: 18º44'35S/ 44º30'55W
Southeast extreme point: 18º55'05S/ 44º30'12W

The Eucalyptus plantation implemented and nominated as MG15 was established mainly around Itacambira municipality, with 20 513 ha total area and limited by the following geographic coordinates

- Northeast extreme point: 16º43'04S/ 43º20'03W
- Southeast extreme point: 16º56'56S/ 43º23'19W
- Northwest extreme point: 16º41'12S/ 43º28'00W
- Southwest extreme point: 16º54'04S/ 43º31'32W

Two new Eucalyptus plantations of Plantar (MG3 and MG4) were established and included in the CDM-AR project activity 2569, and these plantations consist of two new areas with 11 642 ha total area.

The first, nominated as MG3, is established mainly around Felixlândia municipality, limited by the following geographic coordinates

Northeast extreme point: 18º36'19S/ 45º00'38W
Southeast extreme point: 18º40'15S/ 44º59'41W
Northwest extreme point: 18º35'30S/ 45º07'07W
Southwest extreme point: 18º43'19S/ 45º06'22W

The second, nominated as MG4, was established mainly around Morada Nova de Minas municipality, limited by the following geographic coordinates

West extreme point: 18º47'52S/ 45º23'32W
Northeast extreme point: 18º41'07S/ 45º14'35W
Southeast extreme point: 18º47'48S/ 45º17'07W.

The carbonization units responsible for producing charcoal are installed inside each forest area. All areas are located in Minas Gerais State.

Forest Cadaster is an internal databank of Plantar that contains all information on forestry operations, occurrences and harvesting/transportation provided by regional supervisors. Forest Cadaster makes part of the System of Forest Register, an "all-inclusive" database centralized in Plantar Headquarters in Belo Horizonte. As verified during site visit, all forest areas are registered in Plantar's system and linked with Forest Environment Licenses. Properties certificates are registered in the Official Land Register of Minas Gerais State, which allowed DNV to confirm the location, area, and first plantation.

- DNV has assessed through the documents Embrapa report /89/ that the common practice in Brazil regarding eucalyptus production system is to have three rotations.
- DNV has assessed through land use maps and land eligibility study /84//85/ that new plantations are established on grasslands. The description of areas categories was confirmed through Biomass Brazilian Maps /84//85/. Minas Gerais State is located between 14ºS and 23ºS with rain between 1000 and 1500 mm/y /86/.
- Some forests plots were sampled in the Curvelo municipality (MG02) during site visit and their location was verified by using GPS, identifying the plots on the GIS cartography system and confirmed through Google Earth internet system /16/.

Plantar Blast Furnaces:
Located at Sete Lagoas Municipality, Minas Gerais State at 19°26'21" S and 44°20'25" W.

The project activity includes the implementation of two refurbished blast furnaces /11/ /12/ /24/ with installed capacity of 330 t/day of pig iron or 120,000 t/year each blast furnace, and a total of 240,000 t/year pig iron. The refurbishment of the blast furnaces had included the introduction of new charcoal powder injection system on both blast furnaces. These devices allow Plantar to achieve the production level mentioned above without the use of fossil fuels as a supplementary fuel.

The consumption of fuel at blast furnace is estimated as follows /24/:

	Baseline	Project activity
	Coke Estimation 87%C (tonnes/tonne pig iron)	Charcoal Consumption – 79%C (tonnes/tonne pig iron)
Top of Blast Furnace	0.360	0.402
Injection trough tuyeres	0.170	0.187

The blast furnaces specification after the refurbishing includes:

Parameter	BF 1	BF 2
Working volume (m^3)	107	116
Inner Volume (m^3)	119	129
Hearth Diameter (m)	2.73	2.9
Throat Diameter(m)	2.37	3.27
Effective height (m)	14.18	15.12
Blowing flow (Nm3/h)	15000	15000
Blowing air temp. ºC	770	770
Number of tuyeres	6	6
Number of Glendons	3	3

This information was verified during the site visit through project specification /24/, the project EIA and environmental licenses /23/.

The starting date of the project activity is 10 November 2000 which is the date of the first planting of the dedicated plantations for the new iron ore reduction system, which occurred on 10 November 2000 at stand Buritis 6, with 57.74 ha, located in MG3 Farm (part of the A/R project activity 2569). This date is justified to be the start date of this project activity as the CDM A/R project also forms a part of this project activity.

The project lifetime was considered indefinite, at least as long as the incentives for undertaking project activities are sufficiently strong. DNV had confirmed that the lifetime of the blast furnaces could be extended to more than the 21 years of possible credit period as the practice of the steel industry is the periodical refurbishing of blast furnace /83/ as carried out by Plantar on existent blast furnaces at Sete Lagoas /11//12/.

The project activity under implementation as stated above, is expected to result in emission reductions of 329 068 tCO_2e annually throughout the renewable crediting period of 7 years starting from 01 June 2012 or the date of registration with UNFCCC.

DNV considers the project description of the project contained in the PDD to be complete and accurate. The PDD complies with the relevant forms and guidance for completing the PDD.

4.3 Application of selected baseline and monitoring methodology

The project applies the approved baseline methodology of AM0082 version 1.0 titled "*Use of charcoal from planted renewable biomass in the iron ore reduction process through the establishment of a new iron ore reduction system*". The use of this methodology is appropriate as the project activity involves new planted forest and carbonization facilities to fuel the refurbished Plantar blast furnaces.

DNV was able to verify that the project meets all applicability criteria of the baseline methodologies as stated below.

Table 2 Justification of the applicability for the criteria set as per AM0082 version 1.0

Methodology applicability criteria	Applicable or not relevant	Justification / Explanation of Proposed Project Activity
Emission reductions are from partial or complete use of renewable reduction agents from dedicated plantations instead of fossil fuel.	Applicable	DNV has verified during the site visit that only charcoal manufactured from dedicated plantations is used as iron ore reducing agent in two Blast Furnaces installed on Plantar Sete Lagoas facilities.
Blast furnace technology is used	Applicable	DNV has verified during the site visit that the project activity uses blast furnace technology. This information can also be verified through the project EIA and environmental licenses /23/.
New iron ore reduction systems (new investment)	Applicable	DNV has assessed the quotation regarding the refurbishing of 2 Blast Furnaces in the Plantar Siderurgia plant in Sete Lagoas, Minas Gerais state (investment type 3). Also, DNV has verified that the project comprehends investing in dedicated

		plantations by Plantar for the production of reducing agents to be used on own Blast Furnaces (investment type 1).
All the corresponding land – dedicated plantations – are geographically identified and delineated	Applicable	Eucalyptus forest was implemented on the Area MG02 with 6,881 ha, at Curvelo municipality and the MG15 with 20,513 ha at Itacambira municipality The plots of MG02 and MG15 are described in the Plantar Forest Plant Register system /15/ and specific drawing /16/ according with the Annex 5 of PDD /2/. For the components MG03 and MG04 of CDM/AR project 2569 /46/ the list of plots are available in the registered PDD as well as controlled by the Plantar Forest Plant Register system /15/: The carbonization units responsible for producing charcoal are installed inside each forest area. The forest areas were, during the site visit, verified through the GPS coordinates of the MG02 office, Canabrava and Lagoa Capim carbonization units by using Google Earth and drawings by Plantar /16/.
Dedicated plantations in the host country are under the control of the projects participants	Applicable	All the planted eucalyptus forests are owned by Plantar as verified from the land ownership registration /17/.
Dedicated plantations are located only in tropical conditions	Applicable	All dedicated plantations are located in Minas Gerais State. DNV has assessed through land use maps and land eligibility study that new plantations are established on grasslands. The description of areas categories was confirmed through Biomass Brazilian Maps **/84//85/**. As well as the Minas Gerais State are located between 14ºS and 23ºS with rain between 1000 and 1500 mm/y **/86/**
Demonstrated through evidence that plantation locations are established in areas categories: grassland, forest plantation after its last rotation and degraded areas	Applicable	The reformed MG02 and MG15 areas of eucalyptus plantations had started on 2008 **/15/** after their last rotation as well as the acquisition of grassland areas of MG3 and MG4 and installing new eucalyptus plantations was considered on CDM/AR 2569 **/46/**.
Demonstrated through evidence that plantation locations are established in areas categories: in the case the dedicated plantation (or part of the dedicated plantation) is covered under a registered A/R CDM project	Applicable	According the **AM0082** version **1.0** and EB25, the plantation areas of MG3 and MG4 are considered in CDM/AR 2569 **/46/** and are not included in project boundary. The plantation of MG02 and MG15 forest will be accounting on upstream emissions from biomass production.

activity, the dedicated (or part of the dedicated plantation) shall not be included in the project boundary		
Renewable biomass and charcoal used in the new iron ore reduction system shall not be acquired from the market	Applicable	All the biomass used will be provided by the reformed and new eucalyptus plantations. The consumption of blast furnaces is 0.589 tonne charcoal/tonne pig iron /24/, and considering the pig iron production of 240,000 tonne/year the consumption of charcoal will be **141,360** tonnes/year of charcoal /3/ In other hand, it was evidenced that the production of charcoal from own forest is lower than the demand as following: Forest area: MG02 = 6881 ha (PDD Annex 5) MG15 = 20513 ha (PDD Annex 5) MG03&04 = 11642 ha (UNFCCC 2569 /50/) Forest productivity IMA MG02 and 15 = 6 m^3/ha/y /20/ MG3 and 4 = 40 m^3/ha/y /62/ a) wood density (dry basis) = 0.5 tonne/m^3 /81/ b) charcoal yielding (dry basis)= 0.30 tonne charcoal/ tonne wood (Basic data on /3//50/) The charcoal production is **94, 513** tonne/year of charcoal or **66.3%** of Plantar blast furnace demand. Only with the investment in the plantations MG02 and MG15 with fertilization and clones to enlarge the productivity of old forest to the same productivity as the AR/CDM forests, Plantar will be capable to fuel the Blast furnaces with onw charcoal.
For the case that demonstrates the supply of reducing agent from biomass projects registered as the A/R CDM project activities, upstream emission from biomass production needs not to be accounted if they are accounted under the respective A/R CDM project	Applicable	The dedicated plantation composed by reformed plantations (MG02 and MG15 established on the own areas of Plantar) and newly established plantations (MG3 and MG4 plantations registered as CDM/AR 2569). Only MG02 and MG15 emissions will be accounted. The MG03 and MG04 will be excluded from the boundary of this industrial project.
If the renewable biomass is sourced from a plantation registered as an A/R CDM project activity, the first verification of this A/R CDM	Applicable	The PDD states that as requested by the applied methodology, the first verification of this A/R CDM project activity will take place before the first harvesting of the wood takes place. The project participant of CMD/AR 2569 had

project activity should take place before the first harvesting of the wood takes place and the DOE shall verify that the plantation registered as an A/R CDM project activity from which the renewable biomass is sourced has generated net cumulative tCERs or lCERs at the time of verification of this CDM project activity		submitted on January 2011 the first monitoring report for the period of 10 November 2000 to 09 November 2010 and is awaiting issuance **/50/**.
The land area of dedicated biomass plantations shall be established either through direct planting and/or seedling	Applicable	According to the plantation management practices in the region for the considered species, i.e. eucalyptus, the typical cycle is composed of 2 or 3 rotations of coppicing after which the plantation site is replanted. The land areas of dedicated biomass plantations are established through planting, as verified in the Forest Plant Register system /14//15/ and as confirmed during the site visit to the MG02 seedlings nursery.
Flood irrigation is not expected to take place on the plantation sites (in case the dedicated plantation is covered under a registered A/R CDM project activity, this condition is not applicable)	Applicable	No flood irrigation is expected to take place on the plantation sites that are not covered by the registered A/R CDM project **/22/**.
For at least ten years before the implementation of the project activity, no forest stocks were on the land where the dedicated plantations will be established (this condition does not apply to forest stocks in the form of productive forest plantations)	Applicable	The new eucalyptus plantations, to be implemented on MG3 and MG4, were included in CDM A/R project activity 2569. The MG02 and MG15 consist of degraded forest plantation (eucalyptus) after the last rotation /20/ and restarted on 2008 /15/
In case blast furnace gas is recovered and used outside of the project boundary for electricity and/or heat generation in the baseline situation, the project activity shall provide similar and/or equivalent energy outputs as the ones identified in the baseline scenario	Applicable	DNV has verified during the site visit that there is no recovery of blast furnace gas to be used outside of the project boundary for electricity and/or heat generation in the baseline situation /11//12/.
In cases where the project scenario involves partial consumption of the mineral coke in the projects new iron ore reduction system this methodology is only applicable	Applicable	DNV has verified that the project scenario does not involve consumption (neither partial) of the mineral coke in the project's new iron ore reduction system /11//12/. Also, the environmental implementation license was granted to a blast furnace that operates with renewable charcoal /23/.

if the production of the mineral coke is undertaken within the host country		
This methodology is not applicable to cases in which the most plausible baseline scenario is the non-renewable charcoal iron ore reduction system or is an iron ore reduction system partially using non-renewable charcoal. *In order to ensure a conservative assessment of this applicability condition, the use of non-renewable charcoal shall be assessed in the baseline scenario identification procedure, as per the procedures presented in the corresponding section of this methodology.*	Applicable	DNV has verified that the most plausible baseline scenario identified is the production of pig iron based on an iron ore reduction system that relies completely or partially on the use of fossil fuel based (see section Barrier Analysis). The use of non-renewable charcoal is severely restricted by the environment license of Minas Gerais State /88/. Although Plantar had historically used part of charcoal from external suppliers, as verified during site visit by DNV, these suppliers were authorized by the IEF as verified from the receipts for sustainable forest products /18/. Charcoal from external suppliers were used as a complement during the period necessesary for forming the new eucaliptos forests. After the establishement of the new planted forest on MG2, MG3, MG4 and MG15, all charcoal used by the Plantar Blast furnaces will be produced from own sustainable eucalyptus forest. The supplemental area of MG 15 with the investment of project activity will reach the same productivity of A/R project (MAI=40 m^3/ha/y /62/) and will be capable to produce 123 083 tonne charcoal per year, which exceeds the 31% of total charcoal demanded to produce 240 000 tonne/year of pig iron by Plantar blast furnaces. This amount is enough to replace the charcoal from external suppliers. Therefore, during the project activity lifetime all charcoal used will be produced from Plantar own forests, and no external supply will be used during the project's crediting period.
This methodology is only applicable if the most plausible baseline scenario identified is the production of iron and/or steel based on an iron ore reduction system that relies completely or partially on the use of fossil fuel based.	Applicable	As the Minas Gerais state has significant restriction to produce enough renewable charcoal to fuel the all blast furnaces installed on state, including Plantar blast furnace /59//60//61//63/. Hence, the pressure over the charcoal market will reflect the use of illegal non-renewable charcoal or the use of coal-coke as fossil fuel.

DNV validated that, in compliance with paragraph 38 of the twenty-fifth meeting of the Board, emissions associated with the A/R activity are accounted for in the A CDM A/R project activity 2569. Hence, upstream emissions from biomass production are not accounted in this project.
DNV was able to confirm that since the A/R CDM project activity and the project activity covering the iron ore reduction process are part of an integrated development project, the baseline selection and additionality procedures are performed considering the two activities together, and the demonstration of additionality of the A/R CDM project activity also complies

with the requirements of the approved A/R CDM methodology. The third condition from AM0082 – "The project proponents shall refer to the integrated process in the two PDDs and shall submit them for registration together although the crediting period of the iron ore reduction activity may only start after the first harvesting of the trees established in the context of the A/R CDM project activity" does not apply, since Plantar A/R CDM project activity (UNFCCC 2569) was submitted to Global Stakeholders Process before the approval of AM0082.

The assessment of the project's compliance with the applicability criteria of AM0082 (version 1.0) are documented in detail in section B.2 of Table 2 in the validation protocol in Appendix A of this report.

4.4 Project boundary

The project boundaries include:

(i) The dedicated plantation composed by a reformed forest as MG02 and MG15 (established on the own areas of Plantar /19/) and new established plantations implemented as the CDM-AR 2569 (MG03 and MG04). However this new CDM-AR plantation, as well as the associated project emissions, was excluded from the boundary of project activity, according AM0082 (version 1.0) and paragraph 38 EB 25 and the boundary was restricted to the dedicated plantation MG02, MG 15 and Plantar Blast Furnaces.

(ii) The geographic boundaries of the reducing agents production sites (the eucalyptus forest) and the carbonization units, as DNV confirmed during the site visit and from reviewing the forest handling plan /14/ /16/, Plantar forest plant register system /15/, Plantar compendium of land registration /17/ and environmental licenses /23/;

(iii) The physical site of the blast furnace where the iron ore reduction process takes place, as DNV confirmed during the site visit and environmental licenses /23/;

(iv) The transportation of the wood to the carbonization units and of the charcoal from the carbonization units to the blast furnace, which is in accordance with AM0082 as DNV confirmed during the site visit to the reception area for charcoal transported by truck and the road maps on Minas Gerais /97/.

		GHGs	*Y/N*	*Description*	
Baseline emissions	**Iron ore Reduction Process**	CO_2	***Y***	**Main source of baseline emissions by the use of coal coke feed by the top of blast furnaces and coal injected through the tuyeres of same blast furnaces**	/24/
		CH_4	N	Negligible	
		N_2O	N	Negligible	
	Reducing agents (coal) transportation	CO_2	N	Existent but conservatively neglected	Maritime transportation from another country but not considered on baseline
		CH_4	N	Negligible	
		N_2O	N	Negligible	
	Reducing agent (coke) production	CO_2	**Y**	**Coal coke production at mini coke oven**	
		CH_4	N	Existent but conservatively neglected	

		N_2O	N	Negligible	
	Transportation of primary carbon (coke) sources to Blast Furnace	CO_2	**Y**	**Fossil fuel by train from Vitoria seaport to Plantar**	
		CH_4	N	Existent but conservatively neglected	
		N_2O	N	Negligible	
	Primary carbon source extraction	CO_2	N	Existent but conservatively neglected	
		CH_4	N	Existent but conservatively neglected	
		N_2O	N	Existent but conservatively neglected	
Project emissions	Iron ore Reduction Process	***CO_2***	***Y***	**Main source of project emissions, however as the charcoal is a renewable reductor, this is null**	
		CH_4	N	Negligible	
		N_2O	N	Negligible	
	Reducing agents transportation	*CO2*	Y	Fossil fuels consumption on charcoal transportation from the carbonization units to Plantar blast furnaces	
		CH4	N	Negligible because the differences in the baseline and project activity are not substantial	
		N_2O	N	Negligible	
	Reducing agent production	CO_2	N	CO2 emissions in the carbonization process are expected to be neutral since all the wood carbonized will come from renewable sources.	
		CH_4	**Y**	Biomass carbonization process on charcoal kilns	
		N_2O	N	Negligible	
	Transportation of primary carbon sources	CO_2	Y	Fossil fuels machinery & vehicles used to load and transport the wood from the forest to carbonizations units.	
		CH_4	N	Negligible.	
		N_2O	N	Negligible	
	Primary carbon source extraction	CO_2	Y	Fossil fuels combustion in forest operations used on planting, maintenance and harvest of planted forests	
		CH_4	N	Not applicable as biomass burning in the plantation establishment will not occur	
		N_2O	Y	Application of fertilizers in the planting activity on Plantar renewable forests.	

The identified boundary and selected sources and gases are justified for the project activity. The validation of the project activity did not reveal other greenhouse gas emissions occurring within the proposed CDM project activity boundary as a result of the implementation of the proposed project activity which are expected to contribute more than 1% of the overall expected average annual emission reduction, which are not addressed by AM0082 (version 1.0).

4.5 Baseline determination

The baseline scenario is identified as the most plausible baseline scenario among all realistic and credible alternatives taking into account specific circumstances of the iron ore reduction system.

Regarding the use of reducing agents in the iron ore reduction process in blast furnaces, the baseline was determined through the steps included in AM0082 (version 1.0) and the "*Combined tool to identify the baseline scenario and demonstrate additionality*":

STEP 1. - Identification of baseline alternative scenarios

For this project activity, the baseline candidates involve the basic equipment in the iron ore reduction process as the blast furnace. The blast furnace technology corresponds to 98.5% of the Brazilian primary iron ore reduction process /63/ and the reducing agent used in the iron ore reduction process, either coal coke or charcoal with the significant role in the intensity of CO_2 emissions in the iron and steel production /83/. The baseline candidates were considered for the Plantar blast furnace facilities and the following scenarios:

- Alternative Scenario #1 - Coal coke iron ore reduction system with pulverized coal injection (**baseline scenario**);
- Alternative Scenario #2 - Renewable charcoal iron ore reduction system produced with renewable planted forests sources, based on new plantations (**project scenario**);
- Alternative Scenario #3 - Non-renewable charcoal iron ore reduction system (produced with non-renewable sources);
- Alternative Scenario #4 - Iron ore reduction system based on the use of a mix of reducing agents. According to Minas Gerais State forest regulation, this condition is restricted to the following situations: a) 20% of coal coke, 80% renewable charcoal /87/ or b) 90% renewable charcoal and 10% of charcoal produced from the management of native forest /88/;
- Alternative Scenario #5 - Renewable charcoal from planted biomass iron ore reduction system based on existing plantations.

Sub-step 1a: Compliance with actual laws and regulations

DNV had confirmed that there are **no** regulatory restrictions to use coal and coal coke to fuel the blast furnaces in Brazil /63//87/ that would be restriction to Alternative **Scenario #1**.

The Brazilian government has significant control against the deforestation of native areas /57//58/ as this activity is considered illegal /55/ mainly in Atlantic Forest and Cerrado flora, the main native forest in Minas Gerais State /53/. This situation is an impeditive for Alternative **Scenario #3.**

DNV had confirmed, as well, that according to Minas Gerais State forest regulation, the use of a mix of reducing agents is restricted to the following situations: a) 20% of coal coke, 80% renewable charcoal /87/ (within the existent environmental license. Exceeding this limit would require the project to obtain a new environmental license) or b) 90% renewable charcoal and 10% of charcoal produced from the management of native forests /88/, which means no restriction to Alternative **Scenario #2** and a restriction but not impeditive to Alternative **Scenario #4**.

Hence, this step has reduced the possible alternative scenarios to option #1, #2, #4 and #5.

Sub-step 1b: Assessment of supply and demand of reducing agents

DNV had assessed the supply and demand unbalances of reducing agents trends in two levels according AM0082 version 1.0:

Sector level:

The Brazilian iron and steel industry uses coal coke since the 1940's /63/ with several new projects to enlarge the production of pig iron/steel with Brazilian iron ore, based on blast furnace fuelled with coal coke /65/. Although Brazil doesn't have significant sources of metallurgic coal, as the mines in Santa Catarina State have high sulfur and ash /66/, there is no restriction to import coal from several countries. The steel companies in Brazil had imported about 13 million tonnes of metallurgical coal and 2 million tonnes of coal coke in 2004 /70/. Hence, there is no restriction to Alternative Scenario #1.

With respect to the use of renewable charcoal, DNV had verified that there is a significant gap between the production and the demand. In 2008, the demand of charcoal in Brazil was 33 million cubic meter of charcoal (MDC) sourced with biomass from planted forest at 17 million MDC (53%) and from illegal native deforestation at 15 million MDC (47%). It is noted that the 35% of planted forest are owned mainly by the cellulose companies' /60//61/.

According to the Associação Mineira de Silvicultura (AMS) /59//60/, the demand of charcoal for blast furnaces in Brazil is supplied only with 52% of sustainable forest /reforest. In Minas Gerais state, the consumption of charcoal for pig iron production in 2008 was 20,935,000 MDC /59/. According to the AMS, the planted forest in 2008 at Minas Gerais was 65,587 ha /59/.

Considering the productivity of charcoal production from a renewable forest as 100 MDC/ha /60/, the production of charcoal from 2008 from planted area reaches 6,558,700 MDC, which means only 31% of Brazilian demand, and doesn't meet the market demand, which is supplied by non-renewable forests in Brazil.

The same statistic predicts a scarcity of 11 million MDC in 2016 /59/ . The pig iron producers registered on Sindifer at Minas Gerais State /78/ was verified that 75% had cited by IBAMA about use of non-renewable charcoal, 10% had implemented reforestation program to get auto sustainability on the next 7 years and 2% had own supply of charcoal for blast furnace activities /57/.

This situation is evidenced with the several actions from IBAMA against the crime of deforestation in Brazil /57//58/, including Minas Gerais State as to 2009, the source of charcoal was 29% imported from another states of Brazil/60/. Hence, there are some restrictions to Alternative **Scenario #2 and #5**

Project level:

The demand of charcoal by Plantar blast furnaces is estimated as the blast furnace production of 240,000 tonne pig iron/y and the specific charcoal consumption of blast furnace as 2.7 MDC/tonne pig iron result on the demand of 648,000 MDC/y /81/. Considering the charcoal correspondence factor of 220 kg/MDC /64/ it will mean 142, 560 tonne/year of charcoal.

Plantar had started the Blast Furnace operation in 1985 and the MG02 plantation was established in 1967 /17/ with the area of 6,661 ha. Moreover, plantation MG15 was established in 1987 with 20,513 ha /19/. Before the project starting date, the lands of MG02 and MG15 contained degraded forest plantations after its last rotation (established in the past with fiscal incentives). These forests were characterized by low productivity with average MAI as 6 cubic meters per ha per year, as verified by the IBAMA authorization /20/.

Considering:

a) forest productivity (MG02 and MG15) = 6 m^3/ha/y /20/

b) wood density (dry basis) = 0.5 tonne/m^3 /81/
c) charcoal yielding (dry basis)= 0.30 tonne charcoal/ tonne wood /50/

MG02 and MG15 would be capable to supply:

(MG02) 6,881 * 6 * 0.5 * 0.3 = 6,193 tonne/year of charcoal or 4.34% of blast furnace demand;

(MG15) 20,513 * 6 * 0.5 * 0.3 = 18,462 tonne/year of charcoal or 12.95% of blast furnace demand, or the old capacity of degraded Plantar forest reaches only **17.29%** of Plantar blast furnace demand.

On the other hand, Plantar's A/R project (CDM project activity 2569) with 11,643 ha, which has received new investments to develop the forest, reach a MAI productivity of an average of 40 cubic meters per ha per year /62/. Considering the b) and c) above, the A/R project will produce 69,858 tonne/year charcoal or 49% of Plantar blast furnace demand.

Hence, the charcoal supplying capacity, with the existent degraded forest is **17.29%** of Plantar blast furnace demand. Even with the new A/R project the supplying capacity will reach only 66.3% of Blast furnace demand.

DNV had confirmed that the charcoal demand from the Plantar Blast Furnaces would not be met by the production of wood/charcoal of MG02, the MG15 and A/R project forest area before the starting date of project, and only with the new investment on these forests Plantar will be capable to fuel the own blast furnaces with renewable charcoal.

Hence, this justifies the exclusion of the Alternative **Scenario #5**.

In line with the AM0082 (version 1.0) and based on the analysis conducted in this Step and its sub-steps, the remaining alternative scenarios are #1 (baseline), #2 (project activity) and #4.

STEP 2 – Barrier analysis

This step serves to identify barriers and to assess which alternative scenarios are prevented by these barriers. According to the "Guidelines for objective demonstration and assessment of barriers", /40/, the following Sub-steps were considered:

Sub-step 2a) Identify barriers that would prevent the implementation of alternative scenarios

The identified barriers and incentives that influence the use of reducing agents in the production of iron and/or steel and possible sources of market failures include:

a) Barriers/incentives to investment and financing.
b) Sectoral barriers and policies.
c) Regulatory and/or technical barriers, e.g. different environmental licensing requirements for different reducing agents.

Sub-step 2b) Eliminate alternative scenarios which are prevented by the identified barriers

Alternative **scenario #1** (baseline): Coal coke iron ore reduction system with pulverized coal injection:

a) Barriers/incentives to investment and financing: The iron and steel industry based on coke and coal were encouraged through governmental incentives (1994 – 2006) and

those investments aiming at production capacity increase continue to be happen /63/. DNV had verified that the production of pig iron from coal coke increased during 14 years (based on recent available statistics) by 41% from 17 MM tonne in 1994 to 24 MM tonne in 2008 and compared with pig iron from charcoal had enlarged on the same period only 31% from 7.9 MM tonne in 1994 to 10.5 MM tonne in 2008 /60/. In addition, during the last 18 years prior to the project implementation (1983-2000), participation of charcoal-based pig-iron production in the total production of integrated steel and iron mills decreased from 18% to 5%, and up to now there is no trend of possible revert of this scenario in the short term /75/.
Although Brazil doesn't have significant sources of metallurgic coal, as the mines in Santa Catarina State have high sulfur and ash /66/, there is no restriction to import coal from several countries. The steel companies in Brazil had imported about 13 million tonnes of metallurgical coal and 2 million tonnes of coal coke in 2004 /70/.
These considerations had evidenced the encouraging of pig iron with coal coke scenario.

b) Sectoral barriers and policies: DNV had confirmed that the Brazilian government has a policy to develop the steel industry in Brazil, in order to aggregate value of iron ore exported mainly by Vale with the implementation and enlargement of several steel plants fuelled with coal coke at the total of 25 million tonnes/year of steel until 2014 /65/;

c) Regulatory and/or technical barriers, e.g. different environmental licensing requirements for different reducing agents: As mention above, the enlargement of steel production capacity will consist of 9 new steel plants and enlargement of 3 existent plants, including new coke ovens and blast furnaces /65/. DNV had confirmed, as well, the feasibility to implement mini coke ovens with technology of "non-recovery" in Brazil /74/ /107/.

Hence this alternative **scenario #1** does not have applicable barrier.

Alternative **scenario #2** (project): Renewable charcoal iron ore reduction system produced with renewable planted forests sources, based on new plantations:

a) Barriers/incentives to investment and financing: There are 7 forest financing lines in Brazil /76//92/, only two of them could be applied, as follow:
   - FINEN: Applicable to cellulose forest and facilities
   - FINAME: Applicable to cellulose forest and facilities
   - FCOnature: Not applicable on Minas Gerais state
   - FNOForest: Not applicable on Minas Gerais state
   - FNEgreen: Not applicable on Minas Gerais state

   - PRONAF: forest for industry in Brazil.
   - PROPFLORA: Energetic forest on Brazil

   Nonetheless, these two programs have some restrictions as follow:
   - PRONAF has small resources and was directed to protection and reserve areas. /76//92/
   - PROPFLORA is only suitable for small farmers that desire to get involved in industrial wood production. It provides loans of up to 144 months duration, with

either half year or annual payments. For reforestation activities to industrial use, PROPFLORA guarantees an interest-only period until the first harvest; on reforestation for other uses it allows 12 months of interest-only period.

DNV had confirmed that there is no program for financing land acquisitions /76//92/.

b) Sectoral barriers and policies: As verified above, Brazil had changed the policy of forest incentives and the discontinuous of FISET program /76//92/, which results in a reduction of the planted area after that /77//78/. According to the AMS /59//60/ and ABRAF /61/, the demand of charcoal for blast furnaces in Brazil is supplied only with 52% of sustainable forest /reforest. In Minas Gerais state, the consumption of charcoal for pig iron production in 2008 was 20,935,000 MDC /59/. According to the AMS, the planted forest in 2008 at Minas Gerais was 65,587 ha /59/. Considering the productivity of charcoal production from a renewable forest as 100 MDC/ha /60/, the production of charcoal from 2008 planted area reaches 6,558,700 MDC, which means only 31% of Minas Gerais demand, and this does not meet the market demand, which is supplied by non-renewable forest in Brazil, mainly from Minas Gerais, Espirito Santo, Bahia and Mato Grosso states.

   As the forest activity, considering mainly eucalyptus, needs 7 years to the first harvest, this and the restriction of financing, the sustainability forest activity has low attractiveness and faces real barriers to be implemented.

c) Regulatory and/or technical barriers, e.g. different environmental licensing requirements for different reducing agents: DNV had confirmed that at the present, a new forest law is under discussion in Brazilian congress with the focus only on preservation of native forest /56/. In addition, DNV had confirmed that the environmental licensing for implementation of renewable forest to produce charcoal has complex environment licensing such as environmental impact assessment/report (EIA/RIMA) including flora and fauna assessment, historical assessment, water resources impact and population impact, legal reserve and public hearing /56//88/. Considering that the project has the total of 20 farms with 1493 stands, this condition has significant impact compared to single industrial activity;

Hence this alternative **scenario #2** faces barriers.

Alternative **scenario #4** - Iron ore reduction system based on the use of a mix of reducing agents

a) Barriers/incentives to investment and financing: The consideration for renewable forest could be described in Alternative **scenario #2 and #4**.

   According AM0082(version 1.0), it is good practice to apply the legal constraint as a potential alternative regarding the use of mix of reducing agents in the assessment of baseline scenarios and additionality, preventing infinite possibilities of scenarios involving such use.

   For non-renewable charcoal, the Minas Gerais legislation permits only 10% of charcoal produced from the management of native forest /88/, over that is considered illegal and no incentive or financing could be applied.

b) Sectoral barriers and policies: The non-renewable charcoal produced from native wood is illegal in Minas Gerais State which establishes the use of 90% of wood coming from

planted forest /88/. In addition, the production of illegal non-renewable charcoal (native wood) is done with man power under undesirable conditions (child and forced labor). According to the pig iron register of Sindifer at Minas Gerais State /77/ and cross checking with the IBAMA pig iron companies cited list /58/ DNV could verify that 75% of companies were cited due to the use of non-renewable charcoal, only 10% were implemented by reforestation programs to get auto sustainability on the next 7 years and only one company, 2%, has own supply of charcoal for own blast furnace activities. IBAMA is the federal environment agency responsible by supervision and reprimand for environment crime inter stat, which had implemented several action against charcoal illegal trade produced from native forests in Bahia, Mato Grosso e Mato Grosso do Sul states

c) Regulatory and/or technical barriers, e.g. different environmental licensing requirements for different reducing agents: DNV confirmed that, according to Minas Gerais State forest legislation (Forest and Biodiversity Protection Law) /88/, the forest exploitation is limited to 8 st/ha in Atlantic Forests (the residual of native forest) and 18 st/ha to other types of forests. Hence a demand of charcoal to fuel a blast furnace with capacity of 240,000 tonnes/year would demand 648,000 MDC. Considering a productivity of 6 m^3/ha/y /20/ it would represent annual interventions on natural vegetation of around 108,000 hectares *per year*. This area is substantially larger than the *total* amount of land required by high-yielding eucalyptus plantations, e.g. approximately 3,300 per year.

   As well as, the environmental licensing need to be approved for this level of exploitation is significantly larger, as described in alternative **scenario #2**/C /53/, compared with baseline scenario.

In light of the above barriers, a baseline scenario consisting of a mix of renewable charcoal and non-renewable charcoal or charcoal derived from native forests is prevented by barriers. Hence, the only iron ore reduction system based on the use of a mix of reducing agents not prevented by above described barriers would thus be a mix of coke and renewable charcoal derived from dedicated plantations. However, according to Minas Gerais State forest regulation, the use of a mix of reducing agents is restricted to the use of 20% of coal coke in combination with 80% renewable charcoal /87/ (within the existent environmental license, exceeding this limit the project needs new environmental license).

As demonstrated above, the existing plantations (MG02 and MG15) are capable of supplying 17.29% of the charcoal demand of Plantar's blast furnaces. Even considering the new A/R CDM project, the capacity of Plantar's forest reaches only 66.30% of this demand, not sufficient to supply 80% of the charcoal demand of Plantar's blast furnaces. During the site visit, DNV observed that Plantar was consuming around 30% charcoal from the market /18/, due to the fact that the implementation of new investment in increasing the productivity of plantations MG 02 and MG 15 as established by the project activity was not yet fully concluded.

In addition, there are technical restrictions as described in the section on Regulatory and/or technical barriers of the PDD. In a mix of 80% of charcoal and 20% of coal coke, the charcoal alkalis react with the coal coke diminishing its mechanical resistance and enlarging its reactivity. Any alkalis in the blast furnace affect the refractories creating crusts and also

reacting with the cargo jeopardizing the gases flow and the smooth descend of the cargo. Other example is that the use of coal coke also implies the need of a desulphurization unit. Other different characteristics that have significant influence one the blast furnace performance are found between charcoal and coal coke, such as sulphur content, percentage of ashes, mechanical resistance"/69/.

DNV had confirmed that according the experiences in similar 4 blast furnaces at Companhia Siderúrgica Belgo Mineira (ArcelorMittal) during the conversion from charcoal to coal process /67/, the diferent characteristics of charcoal and coal coke, like resistivity, ash, acidity/alkalis and sulfur had provoque quickly substitution from charcoal to100% coal coke. A study describing the experience of similar blast furnaces concluded that "*the mix of 30% and 40% of coal coke in charcoal blast furnace had reduced the productivity and impacts of pig iron quality with increasing of sulphur contend. The phase of 70% coke caused a rapid deterioration of the operation of the furnace, making it necessary to change to 100% coke before the expected time*".

No other blast furnace in the Brazilian pig iron industry is currently using a mix of coke and charcoal /60/ /63/ /77/. Hence, given the technical barriers described above, a baseline scenario considering a mix of coke and charcoal is not a viable baseline scenario.

Moreover, although environmental regulation allows the use of up to 20% of coal coke as a guideline to control sulfur gases to the atmosphere /87/, small pig iron producers do not have access to coal coke produced by the big steel companies in Brazil or capacity to import and transport coke, as using only 20% coke becomes an uneconomical use of coke in small blast furnaces, as well as it impact on pig iron quality due the contamination with sulfur /68/.

Hence, baseline alternative **scenario #4** of a mix of coke and renewable charcoal derived from dedicated plantations is not a viable baseline scenario as it is prevented by regulation or technical barriers.

As well as, the condition that the Plantar use coke, as identified the Alternative **Scenario #1**, was demonstrated by the barriers analysis that the use of 100% of coke have significantly less restrictions compared with the use of partial amount of coke.

STEP 3 – Investment analysis

According to the steps of AM0082 version 1.0 and the combined tool for additionality, only the alternative scenario to the project activity that is not prevented by any barrier is ***Scenario #1***, "coal coke iron ore reduction system with pulverized coal injection" and the investment analysis is not applicable to this project activity. Hence this scenario could be considered as the baseline scenario.

The approved baseline methodology has been correctly applied to identify a complete list of realistic and credible baseline scenarios, and the identified baseline scenario most reasonably represents what would occur in the absence of the proposed CDM project activity.

All the assumption and data used by the project participants are listed in the PDD and/or supporting documents. All documentation relevant for establishing the baseline scenario was correctly quoted and interpreted in the PDD. Assumptions and data used in the identification of

the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD.

4.6 Additionality

The additionality was determined using the "*Combined tool to identify the baseline scenario and demonstrate additionality*" version 04.0.0 according to the methodology AM0082 version 1.0.

4.6.1 Evidence for prior CDM consideration and continuous actions to secure CDM status

DNV confirmed that the CDM CERs sharing contract signed on 25 October 1999 between Plantar Forest S.A. and Plantar Siderurgica S.A. **/8/** is a clear evidence of prior consideration according to the guideline **/39/**. Plantar was one of the first companies in Brazil, developing actions linked with Climate Change, supported by the Word Bank Prototype Carbon Fund and others stakeholders in Brazil.

The starting date of the project activity is 10 November 2000 which is the date of the first planting of the dedicated plantations for the new iron ore reduction system, which occurred on 10 November 2000 at stand Buritis 6, with 57.74 ha, located in MG3 Farm (part of the A/R project activity 2569) as confirmed by DNV during site visit and assessing the Plantar Forest Plant Register system /15/ /16/. This date corresponds to the first significant long-term investment of Plantar for the recuperation of degraded areas (prevalence of pastureland) required to the establishment of dedicated plantations with long-term maturity cycles as registered on Plantar forest inventory system providing evidences of the starting date of the planting activities within the project boundaries, including **/54/**:

- Land preparation
- Tree seedling
- Fertilizer
- Equipment for land work
- Trucks

Evidences assessed by DNV that supported the CDM consideration are the following:

- The email dated 26 October 1999 from consultancy by Marco Antonio Fujihara to Plantar Director Geraldo Alves Moura advising Plantar to apply to PCF /8/
- Letter 262/MCT dated 30 August 2000 from Science and Technology Minister Ronaldo M Sardemberg to Plantar Director Geraldo Alves Moura informing about the establishment of Brazilian Interministerial Climate Change Committee on 7 July 1999 and consideration about Plantar PDD submission /8/.

The continued actions to secure CDM for the project activity were demonstrated from the following actions:

- 25 October 1999: Plantar internal agreement related to CERs rights /8/;
- July 2000: development of the engineering study "Assessment for Reducing Agent Change in Pig Iron Production of Plantar Siderurgica" carried out by iron and steel experts RSConsultants for the project entity (SAMPAIO, 2000) /24/;

- 30 August 2000: Non-objection letter on Plantar Reforestation Project in the context of future CDM project, by Ronaldo Mota Sardemberg, State Minister of Science and Technology (Interministerial Commission of Global Climate Change)/8/;
- 10 November 2000: date of the first planting of the project entity dedicated planted forests. This date is the starting date of the project entity's project activities under the CDM /14/;
- 23 March 2001: Signing of the Letter of Intention with PCF - PCF's Investors Committee approval /9/;
- 17 October 2001: the Prototype Carbon Fund in partnership with Eco securities produced the documents " 'Plantar' Project – Project Design Document", "Baseline determination for Plantar: Evaluation of the emission reduction potential of the Plantar Project" and "Monitoring and Verification Protocol for Plantar coal coke to charcoal substitution project" and submitted to DNV as part of validation process /9/.
- 18 October 2001: the document "Environmental Assessment of Plantar Project/ Minas Gerais" was produced by the Prototype Carbon Fund –World Bank team and submitted to DNV as part of the validation process /9/;
- November 2001: DNV was involved in a pre-CDM validation of this project with respective site visit where DNV was able to confirm that the project was anticipated as CDM project /9/;
- 14 March 2002: the revised documents " 'Plantar' Project – Project Design Document", "Baseline determination for Plantar: Evaluation of the emission reduction potential of the Plantar Project" and "Monitoring and Verification Protocol for Plantar coal coke to charcoal substitution project" were resubmitted to DNV as part of the validation process under World Bank's Prototype Carbon Fund scheme /9/;
- 12 June 2002: DNV issues a validation report recommending the project to registration under the World Bank's Prototype Carbon Fund taking into account the applicable UNFCCC regulations at that time /9/;

The "Plantar Project" was eventually split in December 2003 (after COP's issuance of Decision 19) into three separate project activities:

1) one project activity which comprises the mitigation of methane emissions in the wood carbonization process in the charcoal production (UNFCCC 1051 registered on 09 August 2007 /47/)
2) one project activity which comprises the reforestation activities of the project (UNFCCC 2569 registered on 21 July 2010 /50/)
3) one project activity which comprises the use of charcoal as reducing agent in the pig iron production (the project validated in this validation report)

Hence, the following actions demonstrate that continuous actions were undertaken to secure CDM registration of the three components of the "Plantar Project":

- 13 Mar 2006: Submission of NM0110-rev "Mitigation of Methane Emissions in the Wood Carbonization Activity for Charcoal Production" by Plantar and approved as AM0041 /35/

- 30 Oct 2006: Submission of ARNM0015-rev "Reforestation as Renewable Source of Wood Supplies for Industrial Use in Brazil" by Plantar and approved as AR-AM0005 /34/
- 20 January 2007: Submission for validation of the PDD for "Mitigation of Methane Emissions in the Charcoal Production of Plantar, Brazil" which was registered as CDM project activity 1051 /47/
- December 2007: Installation of charcoal powder injection through the tuyeres and refurbishing Blast Furnace 1 and 2 /11//12/.
- 8 May 2008: Submission for validation of the PDD for "Reforestation as Renewable Source of Wood Supplies for Industrial Use in Brazil" which was registered as CDM project activity 2569 /50/.

The following actions are specific to the "Use of Charcoal from Renewable Biomass Plantations as Reducing Agent in Pig Iron Mill in Brazil" project, after the original project was split in December 2003:

- 13 September 2005: final verification report issued by SGS for the emission reductions reported for the project (for pre-CDM project registration carbon revenues under the ERPA agreement with the the World Bank's Prototype Carbon Fund) /111/;
- 10 September 2006: final verification report issued by SGS for the emission reductions reported for the project (for pre-CDM project registration carbon revenues under the ERPA agreement with the the World Bank's Prototype Carbon Fund)/112/;
- 02 July 2008 - Submission of NM0278 /48/ by Plantar;
- 17 July 2009: Approval by the CDM Executive Board of methodology AM0082 /32/ prepared by the Plantar Carbon Teal and The World Bank Carbon Finance Unit.

It is DNV's opinion that the proposed CDM project activity complies with the requirements of the latest version of the guidance on prior consideration of CDM, since all actions were taken within a 2-year gap.

4.6.2 Identification of alternatives to the project activity

This assessment is evidenced on previous section 4.5 "Baseline Determination"

4.6.3 Barrier analysis (Step 2)

This assessment is evidenced on previous section 4.5 "Baseline Determination" step 2.

The alternative acenario #5 as the renewable charcoal from planted biomass iron ore reduction system based on existing plantations is not feasible due the scarcity of renewable charcoal in Minas Gerais. According to the assessement of Associação Mineira de Silvicultura (AMS) /59//60/, production of charcoal from 2008 from planted area reaches 6,558,700 MDC, which means only 31% of Brazilian demand, and doesn't meet the market demand, which is supplied by non-renewable forests in Brazil.

In addition, the blast furnace is not capable to be fuelled partially with renewable charcoal and coke fossil fuel as demonstrated by the assessment of alternative **scenario #4** due the reaction of acidity of coke ash with blast furnace refractory and contamination of pig iron with sulphur /68/. As well as, the diference on physical characteristics of charcoal and coke /69/ provoque

lower productivity of blast furnace as verified during the changing process of fuel on ArcelorMittal João Monlevade Blast furnaces /67/.

The alternative scenario #3 as non-renewable charcoal iron ore reduction system (produced with non-renewable sources) is illegal according environment legislation of Minas Gerais Stare.

And finally, the alternative **scenario #2** (project) as the renewable charcoal iron ore reduction system produced with renewable planted forests sources, based on new plantations faces several barriers as lack of investment and financing, sectoral and polices restrictions and regulatory and technical barriers, that is thus an unlikely baseline scenario.

As demonstrated, Plantar would not be capable to fuel the blast furnace in compliance with environment regulation using renewable charcoal, and the baseline would be the use of coke fossil fuel.

4.6.4 Investment analysis

As seen in section 4.5 "Baseline Determination" step 3, only one alternative is not affected by the barriers and hence this step is not applicable.

Choice of approach

Not applicable.

Benchmark selection

Not applicable.

Input parameters

Not applicable.

Calculation and conclusion

Not applicable.

Sensitivity analysis

Not applicable.

4.6.5 Common practice analysis

The project participants had applied the common practice test to the plausible alternatives as following.

The national scenario for iron ore reduction shall be assessed, taking into account the use of reducing agents in either solid (pig iron manufacturing) or liquid (hot metal used in steelmaking) forms;	The PDD had considered Brazil as the boundary of scope and all pig-iron and steel production of integrated iron and steel companies' /63/ with the implementation and enlargement of several steel plants fuelled with coal coke at the total of 25 million tonnes/year of steel until 2014 /65/. DNV verified that the production of pig iron from coal coke increased during last 14 years by 41% from 17 Million tonnes in 1994 to 24 MM tonne in 2008 (latest available statistics), while production of pig iron from charcoal had

	increased on the same period only by 31% from 7.9 MM tonne on 1994 to 10.5 MM tonne on 2008 /60/. In addition, during the last 18 years, prior to the project implementation (1983-2000), participation of charcoal-based pig-iron production in the total production of integrated steel and iron mills decreased from 18% to 5%, and up to now there is no trend of possible revert of this scenario in the short term /75/.
The assessment of the sector level data shall only be based on the legally available forms and alternatives of reducing agents options to the iron and steel industry. Therefore, the PP shall consider local, regional and national laws and regulations concerning the use of each of reducing agents (including mix of reducing agents) in the assessment of the common practice within the industry;	The steel companies in Brazil had imported about 13 million tonnes of metallurgical coal and 2 million tonnes of coal coke in 2004 /70/ and 15.3 million tonnes of metallurgical coal and 1.9 million tonnes of coal coke in 2009 /80/. With respect to the use of renewable charcoal, DNV had verified that there is a significant gap between the production and the demand. In 2008, the demand of charcoal in Brazil was 33 million Cubic meter of charcoal (MDC) sourced with biomass from planted forest at 17 million MDC (53%) and from illegal native deforestation at 15 million MDC (47%). Even though, 35% of planted forest is owned mainly by the cellulose company's /60//61/. The same statistic predicts a scarcity of 11 million MDC in 2016 /59/ . Information on the pig iron producers registered at Sindifer at Minas Gerais State /78/ was reviewed to verify that 75% were cited by IBAMA with regard to the use of non-renewable charcoal, 10% implemented reforestation programs to get auto sustainability in the next 7 years and 2% had own supply of charcoal for blast furnace activities /57/.
Historical and existing sector trends shall be taken into account in light of the relationship between supply and demand of reducing agents	According to the AMS /59//60/, the demand of charcoal for blast furnaces in Brazil is supplied only by 52% from sustainable forest /reforest. In Minas Gerais state, the consumption of charcoal for pig iron production in 2008 was 20,935,000 MDC and the planted forest in 2008 was 65,587 ha /59/. Considering the productivity of charcoal production from a renewable forest, at 100 MDC/ha /60/, the production of charcoal from 2008 planted area reaches 6,558,700 MDC, which means only 31% of demand, which is not able to meet the market demand, resulting in supply of charcoal from non-renewable forest in Brazil.

DNV had confirmed the common practice according to publicly available data and/or technical/scientific assessment demonstrating the historical and trends patterns of the pig iron industry in using each specific coal coke and renewable charcoal.

DNV has confirmed the gap between the sustainable charcoal demand for pig iron production and the actual plantation/´production of wood/charcoal at Minas Gerais State according to official figures from Sindifer and AMS. At the time of the start date of the validation in 2010, only 52% of charcoal was sustainable /59//60/. The main sources of charcoal for pig iron production were produced from native forest, with significant environment impact. Actions of IBAMA evidence the incidence of illegal charcoal in Brazil and Minas Gerais State /57//58/.

In addition, the PDD confirms the predominance of pig iron production on steel industry, including integrated facilities with coal coke, mainly due to the incapacity of charcoal industry to supply the demand of iron redactor /59//60//61/. DNV had identified the 47 pig iron producers registered in Sindifer at Minas Gerais State /78/, of which 75% were cited by IBAMA about use of non-renewable charcoal, 10% were implementing reforestation programs to get auto sustainability in the next 7 years and 2% had own supply of charcoal for blast furnace activities /57/

Besides, according to the "*Combined tool to identify the baseline scenario and demonstrate additionality*" version 04.0.0 /38/ the common practice analysis is carried out on similar projects which are considered to be in the same region, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc.

The applicable output range was calculated considering the rated capacity of 240 000 tons of pig iron/year. Therefore only projects between 120 000 and 360 000 tons of pig iron/year of rated capacity were taken into consideration.

The selected geographical scope for common practice analysis is Brazil, which is found to be appropriate.

Following the steps of the "*Combined tool to identify the baseline scenario and demonstrate additionality*", N_{all} and N_{diff} have been calculated. According to the Sindifer database /78/ there are 40 pig iron producers in the range between 120 000 and 360 000 tons of pig iron/year of rated capacity in Brazil, not considering CDM projects. Therefore $N_{all} = 40$.

DNV could confirm by checking press data that none of these 40 power plants uses 100% of renewable charcoal as a reducing agent in the pig iron production /110/.

Therefore all 40 projects were classified as different technologies and N_{diff} equals to 40.

Finally, calculating F as $1-N_{diff}/N_{all}$, which equals to zero, and $N_{diff} - N_{all}$, which also equals to zero. Hence, it can be concluded that the proposed project activity of use the renewable charcoal as reductor in Plantar Blast Furnaces is not a common practice in Brazil, as it has constraints as described in the section above and the emission reductions occurring from the project are deemed additional to those that would occur in the absence of the project activity.

In addition, DNV had confirmed that the CDM will alleviate the restriction to substitute the external charcoal supply by own renewable charcoal.

4.7 Monitoring

The project applies the approved monitoring methodology AM0082 (version 1.0). The selected monitoring methodology is applicable for the project activity as it involves the use of renewable charcoal as reductor on Plantar blast furnaces. DNV considers the project participants capable to implement the monitoring plan.

Monitoring of sustainable development indicators is not required by the Brazilian DNA. The environmental impacts on the forest plantation and blast furnace operation are considered controlled and will be monitored according to respective environmental license during the project lifetime /23/.

The project monitoring plan is in compliance with the monitoring methodology AM0082 (version 1.0).

It is DNV's opinion that the project participant is able to implement the monitoring plan.

4.7.1 Parameters determined ex-ante

According to AM0082 version 1.0, the following data and parameters used for the emission reduction calculations available at validation and listed in PDD include:

- Carbon content in percent of the non-renewable reducing agent *i* in the baseline scenario (coal coke): $\%C_{BL,i}$ =87.05% (according to specific study /24/);
- Reducing agent type i (i.e. coal coke) required to produce one tonne of hot metal: RABLi = 0.358 tonne coal coke/tonne pig iron. This value was capped according to the AM0082 version 1.0 based on IPCC2006 /82/ chapter 4.2.2.3 which mentions the table 6.2 of IPCC – BAT for Production of Iron and Steel /83/. According to this document, this value was established to calculate the mass stream overview and input/output data of only coke ovens plant, not including other consumption of coal;
- Reducing agent type i (i.e. pulverized coal) required to produce one tonne of hot metal: RABLi = 0.170 tonne coal/tonne pig iron (according to specific study /24/).
  As verified based on IPPC – BAT for Production of Iron and Steel /83/ chapter 6.5 and Table 7.1: "*Input/output data from four existing blast furnaces in four different EU Member States"*, the practice to reduce the coke rate in blast furnace is the injection of auxiliary fuel through the tuyeres, including powder coal. The table mentions that for production of 1 tonne of pig iron, the reductor consumption is 280-410 kg coke/tonne pig iron, and additional 0-180 kg injected coal/tonne pig iron. Hence DNV had considered applicable the consideration of this figure and the rate established by the specific study /24/ is compatible with IPCC-BAT for Production of Iron and Steel /83/;
- Emission factor for train with diesel (diesel used to transport coal from harbor to Sete Lagoas at baseline): $EF_{vf,BL}$ = 2.622312 kg CO_2/liter considering the national diesel specification /80/ and, conservatively, the lower diesel carbon emission factor as IPCC2006 volume 2 table 2.2 /82/;
- Emission factor for truck with diesel (diesel used to transport wood from forest and charcoal from carbonization units to Sete Lagoas at project activities): $EF_{vf,BL}$ = 2.7018 kg CO_2/liter considering the national diesel specification /80/ and, conservatively, the higher diesel carbon emission factor as IPCC2006 volume 2 table 2.2 /82/
- Number of round trips from Vitoria harbor to Sete Lagoas per train to transport coal in the baseline scenario: $N_{v,BL}$ = 45.99.
  This figure had considered the foreseen blast furnace production of 240,000 tonne/year of pig iron, the coal rate consumption (top and injection) according to specific study /24/ and the 240 wagons with capacity of 14,135 tonne according to the railway operator (Vale) /98/;

- Average round trip distance from Vitoria harbor and Sete Lagoas to transport coal: $AVD_{j,BL,y}$ = 600 km distance /96/. The return of train is used to transport own iron ore of Vale mines /108/.
- CO_2 emission factor for train: $EF_{v,kmCO2,Bl,y}$= 0.02589 tCO_2/km considering the specific consumption of train as 2.91 liters /1000TKU confirmed through Vale diesel specific consumption of railway engine /98/;
- Emission factor to produce one tonne of coal coke in the baseline scenario supply chain: $EF_{CO2e,coal\ coke,BL,y}$= 0.537 tCO_2e/t Coal coke considering the 402.6 $kgCO_2e$/ tonne coal as established on Table 3 of AM0082 version 1.0 "Default emission factors for fugitive CH_4 and CO_2 emissions from coal coke production" as the lowest emission factor, and the quantity of coal coke to produce one tonne of pig iron effectively charged by the top of blast furnace according to specific study /24/.
- Emission Factor for emissions from N inputs: EF_1 = 1% according IPCC default, 2006 Guidelines, Chapter 11, Table 11.1
- Nitrogen content of synthetic fertilizer type *i* applied; producers of synthetic fertilizer purchased and used: NC_{SFi}= 6 g-N/100 g fertilizer as confirmed through supply receipt of fertilizer used by Plantar at planted forests /28/;
- Fraction that volatilizes as NH_3 and NO_X for synthetic fertilizers: $Frac_{GASF}$ = 0.10 according to IPCC 2006 Guidelines, Chapter 11, Table 11.3;
- Weighted average CO_2 emission factor of diesel: $EF_{CO2,I,y}$ = 0.0748 tCO_2/ GJ according to 2006 IPCC Guidelines for National GHG Inventories, Volume 2, Chapter 1, Table 1.4 (upper limit) /82/

4.7.2 Parameters monitored ex-post

The parameters used for the emission reduction calculations that are monitored are listed in PDD. According to AM0082 version 1.0:

- Hot metal production in project scenario in year *y* (expected pig iron production of the refurbished Plantar blast furnaces at Sete Lagoas): $P_{PJ,Y}$.= 240,000 tonnes pig iron/year. The pig iron will be weighed through truck calibrated weight Toledo 9091. This equipment should be calibrated according to Brazilian regulation for commercial scales /109/;
- Number of round trips from forest to carbonization facilities of wood trucks during year *y* in the project scenario will be controlled through the production control system of Plantar forests management: $N_{v,PJ,y}$= 31,721 considering the capacity of 38 m^3 /99/ and the amount of wood needed to supply the carbonization facilities and charcoal for Plantar blast furnaces at Sete Lagoas (see next section 4.8.b);
- Number of round trips from carbonization units to Plantar blast furnaces at Sete Lagoas per charcoal truck during year *y* in the project scenario, will be controlled through the production control system of Plantar and Forest Product Transport Authorization issued by IEF /87//88/: $N_{v,PJ,y}$= 5,841 considering the capacity of 24 tons of charcoal /99/ and the amount of charcoal needed to supply the Plantar blast furnaces at Sete Lagoas (see next section 4.8.b);
- Average round trip distance (to and from) between the project plantation and the carbonization sites during the year. It will be controlled through the production control system of Plantar forests management: $AVD_{iPJ,y}$ = 15.7 km distance in average between the forests and Plantar carbonization units was verified during the site visit and confirmed through Plantar Forest Handling Plans /14/;

- Average round trip distance (to and from) between the charcoal production site (MG15 Itacambira) and the Plantar blast furnaces at Sete Lagoas during the year will be controlled through the production control system of Plantar forests management Plantar and Forest Product Transport Authorization issued by IEF /87//88/: AVD $_{iPJ,y}$ = 880 km distance considering the highest distance between the Plantar carbonizations units and Plantar blast furnaces at Sete Lagoas /97/
- CO_2 emission factor for the type *v* of vehicle during year *y* in the project scenario:
  $EF_{v,km,CO2,PJ,y}$ = a) Wood truck = 1.8 kgCO_2/km considering 0.6667 liter diesel /km /99/
  b) Charcoal truck = 1.29 kgCO_2/km considering 0.4762 l/km diesel/km /100/
- Emission Factor to produce one tonne of renewable charcoal identified in the project supply chain: EF $_{CH\$,charcoal,PJ,y}$ = 0,0324 tCH_4/t charcoal considering the calculation established by AM0041 version 1.0 /33/ (see next section 4.8.b) and the carbonization gravimetric yield of Plantar carbonization facilities;
- Quantity of renewable charcoal to produce one tonne of hot metal in the project: $F_{PJ,charcoal}$ = 0.589 t charcoal/t of hot metal. DNV had confirmed that the expert consideration on "*Evaluation on thermo reducing agent replacement on the Plantar pig iron production*"/24/ had considered 0.589 t charcoal/t of hot metal. As well as, similar CDM project activity /51/ had considered 0.60 t charcoal/t of hot metal. This parameter will be monitored daily and calculated annually.
- Carbonization gravimetric yield: Y $_{PJ}$ = 0.34 tonne of charcoal / tonne of wood on dry basis Measurements performed according to AM0041 provisions, Appendix 3. This parameter will be implemented as the Plantar project activity (UNFCCC # 1051) "Mitigation of Methane Emissions in the Charcoal Production of Plantar, Brazil" /47/;
- Quantity of fuel type *i* combusted in forest activities of MG02 and MG15 (planting, maintenance, harvest) during the year. It will be controlled through the production control system of Plantar forests management including a) machine work hours and b) specific consumption of each equipment: FC $_{i,j,y}$ = 1,900,892 litters diesel/year considering 27.395 ha and the historic consumption of 69.4 l/ha /4/,
  MG03 and MG04 is accounted under Plantar A/R project (2569)
- Weighted average net calorific value of fuel type *i* in year *y*

4.7.3 Management system and quality assurance

The PDD identifies overview on the organization of the project activity and procedures for the monitoring of the baseline and project scenarios.

The systems used to monitor the parameters were identified as being used to day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation).

Quality procedures for each project activity is also described in the PDD.

4.8 Algorithms and/or formulae used to determine emission reductions

Emission Reductions

The emission reduction ER_y by the project activity during the crediting period is the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y).

a) Baseline Emissions:

$$\mathbf{BE_y = RAE_{BL,y} + IRE_{BL,y}}$$

Where:

BE_y = Total baseline emissions in the iron ore reduction system in year y (tCO_2e)

$RAE_{BL,y}$ = Baseline upstream emissions in the reducing agent supply in year y (tCO_2e)

$IRE_{BL,y}$ = Baseline process emissions in the industrial facility in year y (tCO_2e)

a.1) DNV had confirmed that the likely baseline activity would import coal to Vitoria Harbor and transported by train to Sete Lagoas, where mini coke oven would produce coal coke to fuel the Plantar blast furnaces, hence:

$$\mathbf{RAE_{BL,y} = PCE_{BL,y} + RAP_{BL,y} + RAT_{Vehicle,BL,y}}$$

Where:

$PCE_{BL,y}$ = Emissions from the Primary carbon sources extraction in the baseline scenario during year y (tCO_2e)

$RAP_{BL,RA,y}$ = GHG emissions from the production of reducing agents within the boundary under the baseline scenario during year y; (tCO_2e/yr.)

$RAT_{Vehicle,BL,y}$ = CO_2 emissions in fossil fuel combustion in the transport of reducing agent(s) to iron ore reduction facility during year y in the baseline scenario; (tCO_2e/yr)

a.1.1) DNV had assessed and confirmed that:

$PCE_{BL,y}$ = as the primary carbon sources extraction of GHG emissions attributable to the coal mining related activities occurred outside the host country boundaries was considered **null**.

$PCE_{BL,y} = 0$

a.1.2) $RAP_{BL,RA,y} = RAP_{BL,coal\ coke,y} = P_{PJ,y} * EF_{CO2e,coal\ coke,y} * RA_{BL,i}$

$P_{PJ,y}$ = 240 000 t (according to Sete Lagoas Blast Furnace specification /11//12/)

$EF_{CO2e,coal\ coke,y}$ = 0.5368 tCO_2e / t coal coke (reducing agent is not under the control of the PP) according to "default emission factors for fugitive CH_4 and CO_2 emissions from coal coke production on AM0082 version 1.0 determines the use of default value (Table 3 of the Annex 1) as 402.6 $kgCO_2e$/t of coal) and 0.75 for the conversion of coal to coal coke /103/.

$RA_{BL,y}$ = 0.358 t coal coke/t hot metal (according to AM0082 version 1.0 page 16 it was establish capped conservatively)

$RAP_{BL,coal\ coke,y}$ = 46 122 tCO_2/yr (No charcoal is used in the baseline)

a.1.3) DNV had confirmed that the baseline activity would import coal to Vitoria Harbor and be transported by train to Sete Lagoas, where mini coke oven would produce coal coke to fuel the Plantar blast furnaces, the $RAT_{Vehicle,BL}$ was calculated as $CM_{PJ,Vehicle,y}$ according to option 2 of AM0082 version 1.0

$$RAT_{Vehicle,BL,y} = CM_{PJ,\ Vehicle,\ y\ ,} = N_{v,\ BL,\ y} * AVD_{j,\ BL,\ y} * EF_{v,km,CO2,BL,y}$$

Where:

$CM_{PJ,\ Vehicle,\ y\ ,}$ = CO_2 emissions within the project boundary due to fossil fuel combustion from vehicles to transport coal to coal coke production unit in the baseline scenario; (tCO_2/yr)

$N_{v,\ BL,y}$ = Number of round trips (to and from) per type v of vehicle during the year y in the baseline scenario

$AVD_{j,BL,\ y}$ = Average round trip distance (to and from) between the reducing agent type v production site (s) and the site of the project activity during the year y (km)

$EF_{v,\ km,CO2,\ BL,y}$ = CO_2 emission factor for the type v of vehicle during the year y in the baseline scenario (tCO_2/km)

$CM_{PJ,\ Vehicle,\ y\ ,=}$ the primary carbon transportation emission as train transport from Vitoria Harbor where the coal imports reach Brazil and Sete Lagoas municipality where the Blast furnaces are located.

a.1.3.1) DNV had confirmed the railway operator (Vale) /98/, the number of 240 wagons per train, the volume of a wagon is 25.7 m^3 and considering the coal density as 0.550 tonne/m^3/101/ the weight capacity of the coal is 14.135 t of coal per wagon, which means 3392.4 tonne/trip.In addition, as the production of Blast Furnace was considered 240,000 tonne/year of pig iron /11//12//18/, the consumption of coal coke is 0.4875 tonne coal coke/tonne pig iron /24/ and the conversion of coal to coal coke is 0.75 /103/, and the need of coal is 156,000 tonne coal. Hence the number of round trips would be 45.99.

a.1.3.2) $A_{VF,BL,y}$ = 600 km distance from Vitoria to Sete Lagoas /96/ The return of the train is used to transport own iron ore of Vale.

a.1.3.3) DNV had confirmed that the fuel diesel specific consumption of railway engine is 2.91 liters /1000TKU /98/ and the emission factor for diesel is 2.622312kgCO_2/l considering 36.1MJ/l diesel /95/ an lower CO_2 emission factor for diesel /82/, hence the emission factor is $EF_{VF,BL}$ = 0.02589 tCO_2/km

$CM_{PJ,\ Vehicle,\ y}$ = 45.99 * 600 * *0.02589 = 714 tCO_2/y

Hence:

$RAE_{BL,y}$ = 0 tCO_2/y + 46 122 tCO_2/y + 714 tCO_2/y = **46 836 tCO_2/y**

a.2) DNV had confirmed that the likely baseline activity would import coal to Vitoria Harbor and transport by train to Sete Lagoas, where mini coke oven would produce coal coke to fuel the Plantar blast furnaces,

$$\mathbf{IRE_{BL,y} = (P_{PJ,y} * EF_{Ind,BL}) - (P_{PJ,y} * Cc_{HM,BL,y} * 44/12)}$$

a.2.1) $P_{PJ,y}$ = 240 000 tonne/y of pig iron produced by Plantar blast furnaces /11//12//18/

a.2.2) $EF_{Ind,\ BL}$= Baseline emission factor to produce one tonne of hot metal (t CO_2e/t of hot metal)

$Cc_{HM,\ BL,\ y}$= Carbon content per t of hot metal produced in year y (t C/t of hot metal), which corresponds to zero.

$$EF_{Ind,BL} = \sum (\%C_{BL,i} * RA_{BL,i})/100 * 44/12$$

This approach had considered for the two sources of carbon on blast furnace:

$$EF_{Ind,BL} = EF_{Ind,BL,i+} EF_{Ind,BL,j}$$

a.2.2.1) Coal coke added to blast furnace top:

$\%C_{PJ,I}$ = Carbon content in percent of reducing agent i (coal coke) used in the project scenario, considered as 87,5% according to specific study /24/).

RA_{BLi} = Reducing agent type i (coal coke) required to produce one tonne of hot metal (capped as 0.358 tonne coal coke/tonne pig iron according to the value provided in IPCC 2006 Guidelines and according to AM0082 version 1.0).

$EF_{Ind,BL}$ = 1.1427 tonne top coal coke/tonne pig iron

a.2.2.2) Injection of pulverized coal at blast furnace bottom level /83/:

$\%C_{PJ,j}$ = Carbon content in percent of reducing agent i (coal powder) injected through the tuyeres, considered as 78,9% according to specific study /24//103/

RA_{BLj} = Reducing agent type i (coal powder) injected through the tuyeres to produce one tonne of hot metal (as 0.170 tonne coal coke/tonne pig iron according to specific study /24/).

$EF_{Ind,BL}$ = 0.4918 tonne injection coal /tonne pig iron

Hence

$EF_{Ind,BL\ =}$ 1.6345 tCO_2e/t pig iron

a.2.2.3) DNV confirmed the approach for $Cc_{HM,BL,y}$ as “0”.According to footnote 20 of AM0082 version 1.0, hence:

$IRE_{BL,y}$ = 240 000 tonnes pig iron/year * 1.6345 tCO_2e/t pig iron = 392 277 tCO_2/yr

BE_y = 46 836 tCO_2/yr + 392 277 tCO_2/yr **= 439 113 tCO_2/yr**

b) Project emissions:

$$PE_y = RAE_{PJ,\,y} + IRE_{PJ,\,y}$$

Where:

$PE_{\,y}$ = Project emissions in the new iron ore reduction system in year y (tCO2e)

$RAE_{PJ,\,y}$ = Project upstream emissions associated with production of reducing agents and transport in year y in the project scenario (tCO2e)

$IRE_{\,PJ,\,y}$ = Project process emissions in the iron ore facility in year y (tCO2e)

b.1) $RAE_{PJ,\,y} = PCE_{PJ,\,y} + RAP_{PJ,\,RA,\,y} + RAT_{Vehicle,\,PJ,y}$

Where

$RA_{EPJ,\,y}$ = Project upstream emissions associated with production of reducing agents and transport in year y in the project scenario (tCO_2e)

$PCE_{PJ,\,y}$ = Primary carbon source extraction emissions in the project scenario; (tCO_2e)

$RAP_{PJ,\ RA,\,y}$ = Emissions associated with production of reducing agents within the project boundary in the project scenario during year y; (tCO_2/yr)

$RAT_{Vehicle,\,PJ,\,y}$ = CO_2 emissions due to fossil fuel combustion from vehicles used to transport reducing agent(s) to iron ore reduction facility within the project boundary during year y of the project scenario; (tCO_2/yr)

b.1.1) DNV had confirmed during site visit that the Plantar Blast furnace is fuelled only with renewable charcoal (produced from planted forest /4//5//23//27/). There are only GHG activities related to the forest establishment to supply the Plantar blast furnaces in the project scenario.

Hence

$$PCE_{PJ,\,y} = EP_{\,PJ,\,y}$$

As well as, DNV had verified during site visit to the Plantar forests and carbonization units (charcoal kilns), the activities enhance the following:

- CO_2 emissions from combustion of fossil fuels with equipments within the forests project boundary
- N_2O emissions as a result of direct nitrogen application in forest soil within the project boundary;
- CO_2 emissions within the project boundary due to fossil fuel combustion from vehicles used to transport biomass to carbonization units during year *y* of the project scenario.

DNV had confirmed during site visit that the project entity does not burn biomass for site preparation as a forestry management practice /15//22//23//25//26//27/.

Hence

$$EP_{\,PJ,\,y} = E_{Fuelburning,\,PJ,\,y} + PE_{BB,\,y} + N_2O_{direct\,-\,fertilizer\,N\,PJ,\,y} + EP_{Vehicle,\,PJ,\,y}$$

Where:

$EP_{PJ,\ y}$ = GHG emissions of the establishment of plantations to produce biomass in the project scenario during year y; (tCO_2/t biomass);

$E_{FuelBurn,PJ,\ y}$ = CO_2 emissions from combustion of fossil fuels within the project boundary in the project scenario; tCO_2e/year in year y;

$PE_{BB,\ y}$ = Project emissions arising from field burning of biomass at the plantation site (tCO_2e/yr);

$N_2O_{direct\text{-}N_{fertilizerPJ,\ y}}$ = N_2O emissions as a result of direct nitrogen application within the project boundary in the project scenario; (tonnes CO_2e/year in year y);

$EP_{Vehicle,\ PJ,\ y}$ = CO_2 emissions within the project boundary due to fossil fuel combustion from vehicles used to transport biomass to carbonization unit during year y of the project scenario; (tCO_2/yr)

b.1.1.1) $\mathbf{E_{Fuelburning,\ PJ,\ y} = \sum FC_{i,j,y} * COEF_{i,y}}$

Where:

$FC_{i,j,y}$ = Quantity of fuel type *i* combusted in process *j* during the year *y* (litres/yr);
$COEF_{i,y}$ = Is the CO_2 emission coefficient of fuel type *i* in year *y* (tCO_2/litres)
i = Are the fuel types combusted in process *j* during the year *y*

DNV had confirmed the Plantar forest includes the following areas:

MG3 and MG4 = 11 642 ha (According A/R project 2569 /47/ it is not considered on project activities of present PDD)

MG02 = 6 881 ha /14//15//16//17/

MG05 = 20 513 ha /14//15/

$\sum FC_{i,j,y}$ = 1 900 892 liter/yr (27 395 ha * 69.4 l/ha /4/)

$COEF_{i,y}$ = 0.0027018 tCO_2/liter (74.8 tCO_2/TJ /82/ * 0.00003612 TJ/liter /95/)

$E_{Fuelburning,\ PJ,\ y}$ = 1 900 892 * 0.0027018

$E_{fuelburning,\ PJ,\ y}$ = 5 136 tCO_2e/yr

b.1.1.2) $PE_{BB,\ y}$ = 0 (there is no biomass burning at the project activity)

b.1.1.3) DNV had confirmed that the Project participant manage the forest as the best technique to production of wood /21//22//25//26//27/.

According to the tool "*Estimation of direct nitrous oxide emission from nitrogen fertilization'*

$$N_2O_{direct\ -\ fertilizer\ N\ PJ,\ y} = (F_{SN,t} + F_{ON,t}) * EF_1 * MW_{N2O} * GWP_{N2O}$$

As no organic fertilizer nitrogen is applied in Plantar forests, it only considers:

$$F_{SN,t} = \sum M_{SFi,t} * NC_{SFi} * (1 - Frac_{GASF})$$

Where:

$N_2O_{direct\ -\ fertilizer\ N\ PJ,\ y}$ =Direct N_2O emission as a result of nitrogen application within the project boundary, tCO_2e in year t

$F_{SN,t}$ = Mass of synthetic fertilizer nitrogen applied adjusted for volatilization as NH_3 and NO_X, t-N in year t

$MS_{Fi,t}$ = Mass of synthetic fertilizer type i applied, tonne in year t

EF_1 = Emission Factor for emissions from N inputs, tonne-N_2O-N /(t-N input)

$Frac_{GASF}$ = Fraction that volatilizes as NH_3 and NO_X for synthetic fertilizers, dimensionless

MW_{N2O} = Ratio of molecular weights of N_2O and N (44/28), tonneN_2O/(t-N)

GWP_{N2O} = Global Warming Potential for N_2O, $kgCO_2e$ /kg-N_2O (IPCC default =310, valid for the first commitment period)

NCSFi =Nitrogen content of synthetic fertilizer type i applied, g-N /(100 g fertilizer)

NC_{SFi} = Nitrogen content of organic fertilizer type j applied, g-N /(100 g fertilizer)

I Number of synthetic fertilizer types

$M_{SFi,t}$ = 786 tonne/y from the fertilizer type NPK (201 kg/ha/y /15/ * 27 395 ha);

NC_{SFi} = 6 gN/100g Fertilizer NPK /28/

$Frac_{GASF}$ = 0.1 (IPCC 2006 Guidelines -table 11.1 /82/)

EF_1 = 0.01 (IPCC 2006Guidelines - table 11.3/82/)

MW_{N2O} = 44/28

GWP_{N2O} = 310 (IPCC Guidelines 2006 /82/)

Hence

$N_2O_{direct\ -\ fertilizer\ N\ PJ,\ y} = (M_{SFi,t} * NC_{SFi} * (1 - Frac_{GASF}\ F)\ )* EF_1 * MW_{N2O} * GWP_{N2O}$

$N_2O_{direct\ -\ fertilizer\ N\ PJ,\ y} = (786 * 0.06 *(0.9)\ )* 0.01 * 44/28 * 310$

$N_2O_{direct\ -\ fertilizer\ N\ PJ,\ y}$ = 207 tCO_2/year

b.1.1.4) DNV had verified during site visit that the Plantar forest had implemented the carbonization facilities inside the forest areas /16//17/ and the transportation of wood harvested to the carbonization facilities is lower than 15.7 km. The project emissions from wood transportation are calculated as following:

$$EP_{Vehicle,\ PJ,\ y} = N_{\ PCE,\ PJ,\ y} * AVD_{\ PCE,\ PJ,\ y} * EF_{TRUCK,\ km,\ CO2,\ y}$$

Where:

$EP_{Vehicle,\ PJ,\ y}$ = CO2 emissions within the project boundary due to fossil fuel combustion from vehicles used to transport biomass to carbonization unit during year y of the project scenario; (tCO_2/yr)

$N_{\ PCE,\ PJ,\ y}$ = Number of round trips (to and from) per type v of vehicle during year y in the project scenario

$AVD_{\ PCE,\ PJ,\ y}$ = Average round trip distance (to and from) between the biomass v production site(s) and the site of the project plantation during year y (km)

$EF_{TRUCK,\ km,\ CO2,\ y}$ = CO_2 emission factor for the type *v* of vehicle during year *y* in the project scenario (tCO_2/km)

DNV had confirmed that:

The amount of wood transported is 308 m^3/ha /15/ and considering 6,881 ha (MG02) + 20,514 ha (MG15)* 308 m^3/ha/7 year-cycle = 1,205,384 m^3/y

The wood truck capacity was conservatively as a lower volume of 38 m^3 /99/, hence

$N_{\ PCE,\ PJ,\ y}$ = 31 721 round trips

$AVD_{\ PCE,\ PJ,\ y}$ = 2 * 15.7 = 31.4 km

DNV had confirmed that the fuel diesel specific consumption of trucks is 0.6667 l/km /99/ and the emission factor for diesel is 2.7018 $kgCO_2/l$ considering 36.1MJ/l diesel /95/, higher CO_2 emission factor for diesel as 74.8 tCO_2/MJ /82/, hence the emission factor is:

$EF_{TRUCK,\ km,\ CO2,\ y}$ = 0.6667 l/km * 0.0027018 $kgCO_2/l$ = 1.8 $kgCO_2/km$.

$EP_{Vehicle,\ PJ,\ y}$ = 31 721 * 31.4 * 1.8 = 1 794 tCO_2e/yr

$EP_{Vehicle,\ PJ,\ y}$ = 1 794 tCO_2e/yr

$PCE_{PJ,\ y}$= 5 136 + 0 + 207 + 1 794

$PCE_{PJ,\ y}$ = 7 137 tCO_2e/tonne biomass

b.1.2) DNV had confirmed during site visit that the Plantar Blast furnace will be fuelled only with renewable charcoal (produced from own planted forest from MG02, MG03, MG04 and MG 15 /4//5//23//27/):

$$\mathbf{RAP_{PJ,\ RA,\ y}} = RAP_{\ PJ,\ charcoal,\ y}$$

$RAP_{\ PJ,\ charcoal,\ y} = P_{PJ,y} * EF_{CH4,charcoal,PJ,y} * F_{PJ,charcoal} * GWP_{CH4}$ (Option 1)

Where:

$RAP_{PJ,\ charcoal,\ y}$ = GHG emissions within the project boundary due to the production of charcoal used in the iron ore reduction facility in the project operation during year *y*; (tCO_2/yr)

$P_{PJ,y}$ = Pig iron production in the project scenario in year *y*; (blast furnace) (tonnes of hot metal)

$EF_{CH4,charcoal,PJ,y}$ = Emission Factor to produce one tonne of renewable charcoal identified in the project supply chain; (tCH4 / t of charcoal)

$F_{PJ,charcoal}$ = Quantity of charcoal necessary to produce one tonne of hot metal; (t charcoal/t of hot metal)

b.1.2.1) $P_{PJ,y}$ = 240 000 tonnes of hot metal /11//12//18//22/

b.1.2.2) $EF_{CH4,charcoal,PJ,y} = f\ (Y_{BL})$

According to AM0041 version 1.0 /33/

$f\ (Y_{BL})$ = Carbonization gravimetric yield (t charcoal/ t wood on dry basis), and

$$EF_{\ CH4,\ charcoal,\ PJ,y} = f\ (Y_{PJ}) = (A - B) * Y_{PJ}$$

This figure is according to the registered Plantar's project activity UNFCCC 1051, "Mitigation of Methane Emissions in the Charcoal Production of Plantar, Brazil" /47/.

Y_{pj} = 0.34 , A= 139.13 and B=313.8

Hence

$EF_{CH4,charcoal,PJ,y}$ = 0.0324 tCH_4/t of charcoal

b.1.2.3) DNV had confirmed that the expert consideration on "*Evaluation on thermo reducing agent replacement on the Plantar pig iron production*"/24/ had considered 0.589 t charcoal/t of hot metal. As well as, similar CDM project activity /51/ had considered 0.60 t charcoal/t of hot metal.

$F_{PJ,charcoal}$ = 0.589 t charcoal/t of hot metal.

GWP_{CH4} = 21 tCO_2e/tCH_4

$RAP_{PJ,\ charcoal,\ y}$ = 240 000 * 0.032438 * 0.589 * 21=

$RAP_{PJ, charcoal, y} = 96\ 294\ tCO_2/year$

b.1.3) Charcoal transportation

DNV had confirmed during site visit that the Plantar Blast furnace will be fuelled only with renewable charcoal (produced from own planted forest) /18/ and the distances from the carbonization units installed into Plantar forest area are as follow:

The distances from each forest to Sete Lagoas, where the blast furnace is installed are:

MG02 (Curvelo)	102 km /23//96/;
MG03 (Felixlândia)	141 km /23//96/;
MG04 (Morada Nova de Minas)	214 km /23//96/;
MG15 (Itacambira)	440 km /96/.

Conservatively, the Project participant will consider the higher distance in the calculation:

$RAT_{Vehicle, PJ, y} = N_{v, PJ, y} * AVD_{i, PJ, y} * EF_{v, km, CO2, y}$ (Option 2)

$N_{v, PJ, y}$ = 240 000 tonne $_{pig\ iron}$/year * 0.589 tonne $_{charcoal}$/tonne $_{pig\ iron}$/24 t one truck) = 5 841 round trips

$AVD_{RAT, PJ, y}$ = 880 km

$EF_{TRUCK, km, CO2, y}$ = 0.4762 l/km * 0.0027018 tCO_2/l= 0.00129 tCO_2/km

$RAT_{vehicle, PJ, y}$ = 5 841 * 880 * 0.00129

$RAT_{vehicle, PJ, y}$ =6 614 tCO_2/year

$RAE_{PJ, y}$ = 7 137 + 96 294+6 614 = 110 045 tCO_2/year

$IRE_{PJ, y} = (P_{PJ,y} * EF_{Ind,PJ,y}) - (P_{PJ,y} * Cc_{HM,PJ,y} * 44/12)$

$EF_{Ind,PJ,y}$ = 0 (carbon content of renewable reducing agent from biomass dedicated plantations)

$Cc_{HM,PJ,y}$ = 0 (as the pig iron is produced using renewable charcoal

$IRE_{PJ, y}$ = 0

PE_y = 110 045 tCO_2/year

b.2) Project process emissions

$IRE_{PJ, y} = (P_{PJ, y} * EF_{Ind,PJ,y}) - (P_{PJ, y} * C_{CHM,PJ,y} * 44/12)$

Where:

$IRE_{PJ,\ y}$ = *Project process* emissions in the iron ore reduction facility in year y (tCO_2e)

$P_{PJ,\ y}$ = Hot metal production in year *y* (expected hot metal production of the new iron ore reduction system). (tonnes of hot metal)

$EF_{Ind,PJ,y}$= Emission factor of one tonne of hot metal production under the project scenario (tCO_2e/ t of hot metal)

$C_{CHM,PJ,y}$= Carbon content per t of hot metal produced in the year *y* (tonne C/tonne hot metal)

DNV had confirmed that the Plantar blast furnaces are fuelled only with renewable charcoal, hence

$EF_{Ind,PJ,y} = 0$.

Consequently the **$IRE_{PJ,\ y} = 0$**

Leakage

$LE_y = 0$

No leakage has been considered in the project activity. DNV had confirmed that the owned dedicated forests plantations within this project activity's boundary (MG02 and MG15) are under the category of plantations after last rotation and no activity displacement occurred in this area /59//60//61//84/.

As well as, the new plantation areas (MG3 and MG4) were registered as the CDM-AR project 2569 /46/. Hence according AM0082 version 1.0 no leakage was applicable.

Emission Reductions

According to AM0082 version1.0, despite the interdependency among the components of the iron ore reduction system, the differences in the total estimation of upstream emissions (production of reducing agents) in the baseline and upstream emissions in the project shall be accounted as zero if these emissions in baseline are higher than those of the project. Thus only emission reductions based on the use of renewable reducing agents in the iron ore reduction facility will generate CERs

$$ER_y = BE_y - PE_y - LE_y - MAX\ (0,\ RAE_{BL\ y} - RAE_{PJ,y})$$

As

BE_y = 439 113 tCO_2/yr

PE_y = 110 045 tCO_2/year

LE_y = 0

RAE_{BL} = 46 836 tCO_2/y and

$RAE_{PJ,y}$ = 110 045 tCO_2/year

ER_y = 439 113 tCO_2/yr - 110 045 tCO_2/year – 0 – 0 = 329 068tCO_2/year

Based on the calculations and results presented in the sections above the implementation of the project activity will result in an average *ex-ante* estimation of emission reduction conservatively calculated to be 329 068 tCO_2e per year for the selected crediting period.

All assumptions and data used by the project participants are listed in the PDD and/or supporting documents, including their references and sources. All documentation used by the project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD. All values used in the PDD are considered reasonable in the context of the proposed CDM project activity. The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and the emission reductions. All estimates of the baseline, project and leakage emissions can be replicated using the data and parameter values provided in the PDD.

4.9 Environmental impacts

The Brazilian legislation requires the development of an EIA to grant the environmental license (previous, implementation and operation). The Plantar EIA/RIMA was presented and the environmental licenses were granted /23/ for the blast furnaces and a register certificate by the state forest entity for the MG02, MG03 and MG04. With respect to the new forest of Itacambira, the project participant submitted the Assessment of Environment Performance Report to the Minas Gerais State Regional Superintendence for Environment and Sustainable Development (SUPRAM) for technical assessment and licensing.

In addition, the World Bank – Prototype Carbon Fund had issued an Environmental Assessment of Plantar Project / Minas Gerais /25/

The environmental impacts expected from the Blast Furnace operation are controlled under the conditioners of Environmental Operation License #314 and respective Environmental Control Plan with respect to atmosphere emission, wastewater discharge and solid waste recirculation/destination.

The environmental impacts expected from the forest plantation were identified on section D of PDD version 03 controlled according to the under conditioners of Environmental Operation License #198 for MG02, #021 for MG03 and #199 for MG4. DNV could confirm that these impacts are controlled under FSC's principles and criteria for sustainable forest management /27/.

4.10 Comments by local stakeholders

The project participants have addressed the GHG related comments as per responses and reports made publicly available on the World Bank's Prototype Carbon Fund Website and, also, in several public presentations carried out by the project entity and by the PCF over the past years /93/.

In addition, local stakeholders were invited on 16 December 2010 for comments over the project activity /52/, according to the requirements of Brazilian Global Climate Change Inter-ministerial Commission Resolution #7, from 5 March 2008 /94/, including several stakeholders related to the forest and industrial activities at Sete Lagoas, Curvelo, Felixlândia and Morada Nova de Minas municipalities.

As a result of inclusion the forests at Bocaiuva, Juramento, Itacambira, Grão Mogol and Francisco Sá municipalities, supplementary stakeholder's consultation was carried out on 6 June 2011.

The entities invited were the City Hall and Council of each municipality as well as the FEAM Minas Gerais State Environmental Agency, Brazilian Forum of NGO´s, Brazilian Forum of Climate Change, Federal Public Prosecution Office, Minas Gerais State Public Prosecution Office

DNV had verified during the site visit and has received copies of letters sent to the local stakeholders and notification from the Brazilian Post Office that stakeholders described above received a letter communicating the project activity. Only positive comments from stakeholders were received /10/. No action is required since all the comments are positive, in order to praise the project activity.

DNV considers the local stakeholder consultation carried out adequately.

4.11 Comments by Parties, stakeholders and NGOs

The PDD, version 01 dated 24 November 2010, was made publicly available on the CDM website and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 day period from 22 January to 20 February 2011 (https://cdm.unfccc.int/Projects/Validation/DB/J2QOHEDIY0LY3KFX04NFEUB5CFJO6N/view.html).

The same comment was received from two stakeholders and is given (in unedited form) in the below text box.

Comment by: Iara Castelar on behalf of Secretary of Agriculture of the State of Minas Gerais

☐ Accredited NGO ☐ Party ☒ Stakeholder

Inserted on: 15 February 2011

Subject: Statement on context of the A/R CDM Project Activity "Use of charcoal from renewable biomass plantations as reducing agent in a pig iron mill in Brazil", developed by Plantar and the World Bank's Prototype Carbon Fund.

Comment:

To whom it may concern:

As members of the governmental and non-governmental organizations listed below, we would like to draw your attention to important aspects of the context of the CDM project activity entitled "Use of charcoal from renewable biomass plantations as reducing agent in a pig iron mill in Brazil", implemented by Plantar in rural areas of the State of Minas Gerais, Brazil.

It is important to make clear that the development of sound mitigation actions in the iron and steel industry is one of the main challenges within the scope of climate change and sustainable development policies in Brazil. This industry is a major economic development driver and the additional use of renewable charcoal from sustainably managed planted forests in the manufacturing process may play a major role in a future low-carbon economy. The potential climate benefits may occur through the generation of net GHG removals, resulting from new reforestation practices for the production of renewable charcoal, and through emission reductions accruing from the use of renewable charcoal as a reducing agent in the thermo-reduction process.

Nonetheless, the country has been facing a serious deficit of renewable charcoal, which is widely known and well documented, due to a series of obstacles, ranging from the lack of sustainable corporate cultures to the lack of adequate regulatory schemes, proper policies and debt-funding structures. Moreover, one of the most pressing problems in the context of this industry was the use of non-renewable charcoal, extracted from native forests, which also resulted in other serious environmental losses. However, as legislation has severely restricted the use of non-renewable charcoal, iron and steel producers are left with very little alternatives other than the use of coal coke, given the still prevailing scarcity of renewable charcoal from dedicated and sustainable planted forests.

Aware of the above mentioned context, we recognize that additional incentives such as CDM can play a major role in the establishment of new and sustainably managed planted forests to supply renewable charcoal for the iron and steel industry, with a substantial potential to reduce GHG emissions and generate net GHG removals, in the same way they helped Plantar becoming the first company to achieve self-sufficiency in renewable charcoal. The need to overcome the above mentioned obstacles and to create additional incentives to tackle the deficit of renewable charcoal is recognized by several state and federal government bodies and civil society organizations, especially if one considers that the production of iron and steel in Brazil is expected to double within the next years. Such an increase will be almost totally based on coal coke, a global commodity, with substantially lower transaction costs, which does not face the seven-year harvesting gap inherent to the use of renewable charcoal.

As important as the potential climate benefit created by the use of renewable charcoal is the way the required planted forests are managed, including its social and environmental implications. Depending on the adopted management practices, the potential climate benefits may be overwhelmed by negative environmental impacts. Although a balanced analysis on the sustainability aspects of the renewable charcoal supply chain must also be considered in light of the sustainability aspects of the coal coke production chain, we support strict social-environmental criteria for the establishment and maintenance of the planted forests, including biodiversity aspects, which can result in an important contribution to sustainable development.

One of the most appropriate ways of ensuring the fulfillment of such criteria is the adoption of independent forest certification schemes. We understand that all plantation areas, covered by the CDM project activity at stake, are certified in accordance with the principles and criteria of the Forest Stewardship Council (FSC), a respected NGO which we all support. In this sense, we are confident that any relevant social or environmental issue related with the project's reforestation practices has been adequately addressed and, most importantly, is subject to a continuous improvement policy under strict accountability mechanisms.

To conclude, we wish to stress our support to the use of the CDM for the promotion of the additional use of renewable charcoal from sustainably planted forests in Brazil, since it has a substantial potential of being integrated with climate change and sustainable development policies, reinforcing the Kyoto Protocol's environmental integrity. In this context, the pioneer case of Plantar is a good example.

Truly yours,

Elmiro Nascimento
Secretary for Agriculture of Minas Gerais – SEAPA

With the support of
Minas Gerais Federation of Agriculture and Livestock – FAEMA
Minas Gerais Federation of Agriculture Workers – FETAEMG
Minas Gerais Silviculture Association – AMS
Minas Gerais Iron Industry Association – SINDIFER
Brazilian Association of Planted Forest – ABRAF

and

Biodiversitas Foundation
Bioatlantica Institute
Conservation International
Friends of the Earth - Amazonia Brasileira
Minas Gerais Defence Association - AMDA
Professor José Goldemberg - University of São Paulo
Professor Sebastião Valverde - University of Viçosa
SOS Mata Atlântica

Submitted by: Elizabete Lino

***How DNV has considered the comment received in its validation**:*
One comment was received for the proposed project, and is available on the PDD publication page. DNV has verified that the comment has been posted supporting the baseline and the sustainability of the project in question. It is DNV's opinion that this general comment has been sufficiently covered in the validation process and reflected in the validation protocol.

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APPENDIX A

CDM VALIDATION PROTOCOL

Table 1 Mandatory requirements for Clean Development Mechanism (CDM) project activities

Requirement	Reference	Conclusion
About Parties		
1. 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	Table 2, Section A.3.
2. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	Table 2, Section A.3.
3. The project shall have the written approval of voluntary participation from the designated national authority of each Party involved.	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	OK
4. 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 CDM Modalities and Procedures §40a	Table 2, Section A.3.
5. 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, CDM Modalities and Procedures Appendix B, § 2	The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Brazil.
6. Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	The Brazilian designated national authority for the CDM is the Comissão Interministerial de Mudança Global do Clima The DNA of the Netherlands is the Ministry of Infrastructure and the Environment (IenM)
7. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	Brazil has ratified the Kyoto Protocol on 23 August 2002

Requirement	Reference	Conclusion
		Netherlands ratified the Kyoto Protocol on 31 May 2002
8. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	The assigned amount of the Netherlands is 92% of the emissions in 1990.
9. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7.	CDM Modalities and Procedures §31b	No participating Annex I Party is yet identified
About additionality		
10. 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, CDM Modalities and Procedures §43	Table 2, Section B.3.1
About forecast emission reductions and environmental impacts		
11. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	Table 2, Section B.4 to B.7
For large-scale projects only		
12. 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	Table 2, Section D.
About stakeholder involvement		
13. 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	Table 2, Section E.
14. 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	The PDD, version 01 dated 24 November 2010, was made publicly available on the CDM website and Parties, stakeholders and NGOs were

Requirement	Reference	Conclusion
		through the CDM website invited to provide comments during a 30 day period from 22 January to 24 February 2011. One same comment was received from two stakeholders and all aspects mentioned by the comments were considered on validation opinion
Other		
15. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	Table 2, Section B.1.1
16. 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	Table 2, Section B.2
17. 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	Table 2, Section B.2
18. 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	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A General description of project activity					
A.1 Title of the project activity (VVM para 55-57)					
A.1.1 Does section A.1 of the PDD include a clearly identifiable project title, version number of the PDD and date of the PDD?		DR	☒ Clearly identifiable title of the project activity ☒ Version number of the PDD is included ☒ Date of the PDD is included.		OK
A.1.2 Is the PDD is in accordance with the applicable requirements for completing PDDs?		DR	☒ Yes		OK
A.2 Description of the project activity (VVM para 58-64)					
A.2.1 How was the design of the project assessed?		DR	*What type is the project?* ☒ Project in existing facility or utilizing existing equipment(s) ☒ Large scale project ☐ bundled small scale projects, each with emission reductions not exceeding 15 000 tCO_2e per year ☐ individual small scale project activity with emission reductions not exceeding 15 000 tCO_2e per year ☐ Greenfield project *How was the design of the project assessed?* ☒ Physical site inspection ☒ Reviewing available designs and feasibility studies		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	A.2.2 If a Greenfield project, describe the physical implementation of the project when the validation was commenced.		DR	Not applicable	-	-
A.2.3	If physical site visits were performed based on sampling (only applicable for bundled small scale projects, each with emission reductions not exceeding 15 000 tCO_2e per year), justify the sampling through a statistical analysis:		DR	Not applicable.	-	-
A.2.4	Is the description of the proposed CDM project activity as contained in the PDD sufficiently covers all relevant elements, is accurate and that it provides the reader with a clear understanding of the nature of the proposed CDM project activity?		DR	Yes. The project activity is the implementation of an iron ore reduction system based on renewable charcoal from dedicated planted forests and it is appropriately described in the PDD. The source of renewable charcoal is the Area MG02 with 6,881 ha, which has restarted the plantation in 2008 after the last rotation, as verified in Plantar Forest Control System for the plot 27 of Lagoa Capim with 5.87 ha on October 2008 /15/ and the Area MG3 and MG4, components of CDM/AR project 2569 /46/. Although it was verified during the site visit, the Plantar Forest Plant Register with record of plot 27 of Lagoa Capim with 5,87 ha, concluded on October 2000 /16/, this information was not identified in the PDD, including the evidences to demonstrate that no other plantation was done before this date	~~CL 2~~	OK
A.2.5	Does the project activity involve alteration of existing installations? If so, have the differences between pre-project and post-project activity been clearly described in the PDD?		DR	Yes. The project activity is the implementation of a new system considering the refurbishing of 2 Blast Furnaces on 2007 and 2010 /11//12/ and installation of new charcoal powder injection system on 2008 /13/ at Blast Furnaces and restarted the reformed MG02 area of eucalypt plantations in 2008 /15/ after their last rotation as		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				well as the acquisition of grassland areas of MG3 and MG4 and installing new eucalypt plantations /46/ as source of biomass. In addition, the construction and refurbishing of the carbonization facilities on MG02, MG03 and MG04 were established to produce charcoal to be used as reductor on Blast Furnaces.		
A.2.6	Does the project design engineering reflect current good practices?		DR	Yes, the project activity applies state of the art technology in eucalypt plantations, charcoal production and use charcoal as reductor on Blast Furnace feed by the top and injection dust way.		OK
A.2.7	Would the technology result in a significantly better performance than any commonly used technologies in the host country? Is any transfer of technology from any Annex-I Party involved?		DR	Although the project has best performance as pig iron production on Blast Furnaces using charcoal, compared with pig iron producers in Brazil, the technology was developed in host country.		OK
A.3	**Participation requirements (VVM para 51-54, 123-125)**					
A.3.1	Do all participating Parties fulfill the participation requirements as follows:		DR			OK
				Brazil (host) / The Netherlands		
	a) Party has ratified the Kyoto Protocol			☒ Yes ☐ No / ☒ Yes ☐ No		
	b) Party has designated a Designated National Authority			☒ Yes ☐ No / ☒ Yes ☐ No		
	c) The assigned amount has been determined			☒ Yes ☐ No / ☒ Yes ☐ No		
A.3.2	Do the letters of approval meet the following requirements?		DR			OK
				Brazil (host) / The Netherlands		
	a) LoA confirms that Party has ratified the Kyoto Protocol			☒ Yes ☐ No / ☒ Yes ☐ No		
	b) LoA confirms that participation is voluntary			☒ Yes ☐ No / ☒ Yes ☐ No		
	c) The LoA confirms that the project contributes to the sustainable development of the host country?			☒ Yes ☐ No / NA		
	d) The LoA refers to the precise project activity title in the			☒ Yes ☐ No / ☒ Yes ☐ No		

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
PDD					
e) The LoA is unconditional with respect to (a) to (d) above			☒ Yes ☐ No		
f) The LoA is issued by the respective Party's DNA			☒ Yes ☐ No		
g) The LoA was received directly by the DNA or the PP			☐ DNA ☒ PP		
h) In case of doubt regarding the authenticity of the letter of approval, describe how it was verified that the letter of approval is authentic			The letter of approval was cross-checked in the Brazilian DNA webpage		
A.3.3 Have all private/public project participants been authorized by an involved Party?		DR	Yes. See A.2.3.		OK
A.4 Technical description of the project activity (VVM para 58-64)					
A.4.1 Is the project's location clearly defined?		DR	Yes, project activity is located in the Minas Gerais state, and the following activities are located in the following municipalities: 2 Blast Furnaces to produce pig iron located in Sete Lagoas municipality with the follow specification /24/:		

Parameter	BF 1	BF 2
Working volume (m^3)	107	116
Inner Volume (m^3)	119	129
Hearth Diameter (m)	2,73	2,9
Throat Diameter(m)	2,37	3,27
Effective height (m)	14,18	15,12
Blowing flow (Nm3/h)	15000	15000
Blowing air temp. ºC	770	770
Number of tuyeres	6	6
Number of Glendons	3	3

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			However The address or location of Blast furnaces was not available in PDD The address or location of Blast furnaces was not available in PDD. Eucalyptus forest implemented on the Area MG02 with 6,881 ha, at the municipality of Curvelo limited on the following geographic coordinates West extreme point: 18º50'08S/ 44º46'14W Northeast extreme point: 18º44'35S/ 44º30'55W Southeast extreme point: 18º55'05S/ 44º30'12W As well as the components of CDM/AR project 2569 /46/: Eucalyptus forest implemented on the Area MG3 at Felixlândia municipality, limited on the following geographic coordinates Northeast extreme point: 18º36'19S/ 45º00'38W Southeast extreme point: 18º40'15S/ 44º59'41W Northwest extreme point: 18º35'30S/ 45º07'07W Southwest extreme point: 18º43'19S/ 45º06'22W Eucalyptus forest implemented on the Area MG4 at Morada Nova de Minas municipality, limited on the following geographic coordinates West extreme point: 18º47'52S/ 45º23'32W Northeast extreme point: 18º41'07S/ 45º14'35W Southeast extreme point: 18º47'48S/ 45º17'07W. The carbonization units responsible to produce charcoal are installed inside each forest area.	~~CL 1~~	OK
A.5 Public funding of the project activity					
A.5.1 In case public funding from Parties included in Annex I is used for the project activity, have these Parties provided an		DR	The validation did not reveal any information that indicates that the project can be seen as a		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	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?			diversion of ODA funding towards Brazil.		
B	**Application of a baseline and monitoring methodology**					
B.1	**Methodology applied (VVM para 65-76)**					
B.1.1	Does the project apply an approved methodology and the correct version thereof?		DR	Yes, AM0082 version 1.0. The AM0041 version 1.0 was applied in order to calculate and demonstrate the CH4 emissions in the reducing agent (renewable charcoal) production process. The following tools were applied too: • Combined tool to identify the baseline scenario and demonstrate additionality – Version 02.2; • Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion – Version 02; • Estimation of direct nitrous oxide emission from nitrogen fertilization – Version 01.		OK
B.2	**Applicability of methodology (and tools) (VVM para 65-76)** *Insert a row for each applicability criteria of the applied methodology (and tools)*					
B.2.1	How was it validated that project complies with the AM0082 following applicability criteria: *emission reductions are from partial or complete use of renewable reduction agents from dedicated plantations instead of fossil fuel?*		DR	DNV has verified during the site visit that just charcoal from dedicated plantations is used as iron ore reductor on 2 Blast Furnaces installed on Plantar Sete Lagoas facilities.		OK
B.2.2	How was it validated that project complies with the AM0082 following applicability criteria: *blast furnace technology is*		DR	DNV has verified during the site visit that the project activity uses blast furnace technology.		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	used?			This information can also be verified through the project EIA and environmental licenses /23/.		
B.2.3	How was it validated that project complies with the AM0082 criteria: *new iron ore reduction systems (new investment)?*		DR	DNV has assessed the quotation regarding the refurbishing of 2 Blast Furnaces in the Plantar Siderurgia plant in Sete Lagoas, Minas Gerais state (investment type 3). Also, DNV has verified that the project comprehends investing in dedicated plantations by Plantar for the producing of reducing agents to be used on own Blast Furnaces (investment type 1).		OK
B.2.4	How was it validated that project complies with the AM0082 criteria: *all the corresponding land – dedicated plantations – are geographically identified and delineated?*			Eucalyptus forest was implemented on the Area MG02 with 6,881 ha, at the municipality of Curvelo limited on the following geographic coordinates West extreme point: 18º50'08S/ 44º46'14W Northeast extreme point: 18º44'35S/ 44º30'55W Southeast extreme point: 18º55'05S/ 44º30'12W The plots of MG02 are described on Plantar Forest Plant Register system /15/ and specific drawing /16/ according with the Annex 5 of published PDD. For the components MG3 and MG4 of CDM/AR project 2569 /46/ the list of plots are available on registered PDD as well as controlled on Plantar Forest Plant Register system /15/: The Area MG3 at Felixlândia municipality is limited on the following geographic coordinates Northeast extreme point: 18º36'19S/ 45º00'38W Southeast extreme point: 18º40'15S/ 44º59'41W Northwest extreme point: 18º35'30S/ 45º07'07W Southwest extreme point: 18º43'19S/ 45º06'22W		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			The Area MG3 at Morada Nova de Minas municipality is limited on the following geographic coordinates West extreme point: 18º47'52S/ 45º23'32W Northeast extreme point: 18º41'07S/ 45º14'35W Southeast extreme point: 18º47'48S/ 45º17'07W. The carbonization units responsible to produce charcoal are installed inside each forest area. The forest areas were cross checked during the site visit through GPS coordinates at MG02 office, Canabrava and Lagoa Capim carbonizations on Google Earth and the Plantar drawing /16/.		
B.2.5 How was it validated that project complies with the AM0082 criteria: *dedicated plantations in the host country are under the control of the projects participants?*			All the planted eucalyptus forest is owned by Plantar.		OK
B.2.6 How was it validated that project complies with the AM0082 criteria: *dedicated plantations are located only in tropical conditions?*			All dedicated plantation are located on Minas Gerais State. DNV has assessed through land use maps and land eligibility study that new plantations are established on grasslands. The description of areas categories was confirmed through Biomass Brazilian Maps **/84//85/**. As well as the Minas Gerais State, are located between 14ºS and 23ºS with rain between 1000 and 1500 mm/y **/86/**		OK
B.2.7 How was it validated that project complies with the AM0082 criteria: *demonstrated through evidence that plantation locations are established in categories areas: grassland, forest plantation after its last rotation and degraded areas?*			The reformed MG02 area of eucalypt plantations had started on 2008 **/15/** after their last rotation as well as the acquisition of grassland areas of MG3 and MG4 and installing new eucalypt plantations were considered on CDM/AR 2569 **/46/**.		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.2.8	How was it validated that project complies with the AM0082 criteria: *demonstrated through evidence that plantation locations are established in categories areas: in the case the dedicated plantation (or part of the dedicated plantation) is covered under a registered A/R CDM project activity, the dedicated (or part of the dedicated plantation) shall not be included in the project boundary?*			According to the **AM0082** version **1.0** and EB25, the areas of MG3 and MG4 and as considered on CDM/AR 2569 **/46/** will be not included on project boundary, only the MG02 forest will be accounting on upstream emissions from biomass production.		OK
B.2.9	How was it validated that project complies with the AM0082 criteria: *renewable biomass and charcoal used in the new iron ore reduction system shall not be acquired from the market?*			All the biomass used will be provided by the reformed and new eucalyptus plantations. However during the site visit was identified that, according to the Plantar Charcoal Control System was identified that 31% of charcoal received was from external suppliers' **/18/**. PP must evidence the compliance with this.	~~CAR 1~~	OK
B.2.10	How was it validated that project complies with the AM0082 criteria: *for the case that demonstrate the supply of reducing agent from biomass projects registered as the A/R CDM project activities, upstream emission from biomass production need not to be accounted if they are accounted under the respective A/R CDM projects?*			The dedicated plantation composed by reformed plantations (MG02 established on the own areas of Plantar) and newly established plantations (MG04 and MG03 plantations registered as a CDM/AR 2569). Only MG02 emissions will be accounting. The MG04 and MG03 will be excluded from the boundary of this industrial project.		OK
B.2.11	How was it validated that project complies with the AM0082 criteria: *if the renewable biomass is sourced from a plantation registered as an A/R CDM project activity, the first verification of this A/R CDM project activity should take place before the first harvesting of the wood takes place and the DOE shall verify that the plantation registered as an A/R CDM project activity from which the renewable biomass is sourced has generated cumulated net tCERs or lCERs at the time of verification of this CDM project activity?*		DR	The PDD states that as requested by the applied methodology, the first verification of this A/R CDM project activity will take place before the first harvesting of the wood takes place. The project participant of CMD/AR 2569 had submitted on January 2011 the first monitoring report for the period of 10 November 2000 to 09 November 2010 waiting issuance approval **/50/**.		OK
B.2.12	How was it validated that project complies with the AM0082		DR	According to the plantation management		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	criteria: *the land area of dedicated biomass plantations shall be established either through direct planting and/or seedling?*			practices in the region for the considered species, i.e. eucalypt, the typical cycle is composed of 2 or 3 rotations of coppicing after which the plantation site is replanted. The land areas of dedicated biomass plantations are established through planting, as verified in the Forest Plant Register system **/14//15/** and confirmed on MG02 nursery seedlings.		
B.2.13	How was it validated that project complies with the AM0082 criteria: *flood irrigation is not expected to take place on the plantation sites (in case the dedicated plantation is covered under a registered A/R CDM project activity, this condition is not applicable)?*		DR	No flood irrigation is expected to take place in the plantation sites that are not covered by the registered A/R CDM project **/22/**.		OK
B.2.14						
B.2.15	How was it validated that project complies with the AM0082 criteria: *for at least ten years before the implementation of the project activity, no forest stocks were on the land where the dedicated plantations will be established (this condition does not apply to forest stocks in the form of productive forest plantations)?*		DR	The new eucalyptus forest, to be implemented on MG3 and MG4 were included on CDM/AR 2569. The MG02 consists of forest plantation (eucalyptus) after the last rotation and restarted on 2008**/15/**		OK
B.2.16	How was it validated that project complies with the AM0082 criteria: *In case blast furnace gas is recovered and used outside of the project boundary for electricity and/or heat generation in the baseline situation, the project activity shall provide similar and/or equivalent energy outputs as the ones identified in the baseline scenario?*		DR	DNV has verified that there is no recovery of blast furnace gas to be used outside of the project boundary for electricity and/or heat generation in the baseline situation /11//12/.		OK
B.2.17	How was it validated that project complies with the AM0082 criteria: *in cases the project scenario involves partial consumption of the mineral coke in the projects new iron ore reduction system this methodology is only applicable if the production of the mineral coke is undertaken within the host country?*		DR	DNV has verified that the project scenario does not involve consumption (neither partial) of the mineral coke in the project's new iron ore reduction system /11//12/. Also, the environmental implementation license was granted to a blast furnace that operates with		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				renewable charcoal /23/.		
B.2.18	How was it validated that project complies with the AM0082 criteria: *this methodology is not applicable to cases in which the most plausible baseline scenario is the non-renewable charcoal iron ore reduction system or is an iron ore reduction system partially using non-renewable charcoal and this methodology is only applicable if the most plausible baseline scenario identified is the production of iron and/or steel based on an iron ore reduction system that relies completely or partially on the use of fossil fuel based?*		DR	DNV has verified that the most plausible baseline scenario identified is the production of iron and/or steel based on an iron ore reduction system that relies completely or partially on the use of fossil fuel based (see section Barrier Analysis).		OK
B.2.19	Is the selected baseline on of the baseline(s) described in the methodology and this hence confirms the applicability of the methodology?		DR	Yes, DNV has verified that the most plausible baseline scenario identified is the production of iron and/or steel based on an iron ore reduction system that relies completely or partially on the use of fossil fuel based (see section Barrier Analysis).		OK
B.3	**Project boundary (VVM para 78-80)**					
B.3.1	What are the project's system boundaries (components and facilities used to mitigate GHGs)? Are they clearly defined and in accordance with the methodology?		DR	The project activities boundaries includes: (i) the geographic boundaries of the reducing agents production sites (the plantation areas MG02, MG03 andMG04) and the respective carbonization units, (ii) the physical site of the 2 blast furnaces at Sete Lagoas municipality where the iron ore reduction process takes place and (iii) The transportation of the wood until the carbonization units inside the MG02, MG03 and MG4 forest areas and of the charcoal from the carbonization units until the blast furnace, which is in accordance with the methodologies.		OK

Checklist Question		Ref	MoV	Assessment by DNV				Draft Concl.	Final Concl.
B.3.2	Which GHG sources are identified for the project? Does the identified boundary cover all possible sources linked to the project activity? Give reference to documents considered to arrive at this conclusion.		DR			*GHGs*	*Y/N*	*Description*		OK
				Baseline emissions	**Iron ore Reduction Process**	CO_2	***Y***	**main source of baseline emissions**		
						CH_4	N	Negligible		
						N_2O	N	Negligible		
					Reducing agents (coal) transportation	CO_2	N	Negligible		
						CH_4	N	Negligible		
						N_2O	N	Negligible		
					Reducing agent (coke) production	CO_2	**Y**	**Coal coke production**		
						CH_4	N	Negligible		
						N_2O	N	Negligible		
					Transportation of primary carbon (coke) sources to Blast Furnace	CO_2	**Y**	**Fossil fuel by train from Vitoria seaport to Plantar**		
						CH_4	N	Negligible		
						N_2O	N	Negligible		
					Primary carbon source extraction	CO_2	N	Negligible		
						CH_4	N	Negligible		
						N_2O	N	Negligible		
				Project emissions	Iron ore Reduction Process	***CO_2***	***Y***	**Yes main source of project emissions**		
						CH_4	N	Negligible		
						N_2O	N	Negligible		
					Reducing agents transportation	*CO2*	Y	Fossil fuels consumption		
						CH4	N	Negligible because the differences in the base-line and project activity are not substantial		
						N_2O	N	Negligible		
					Reducing agent production	CO_2	N	CO2 emissions in the carbonization process are expected to be neutral since all the wood carbonized will come from renewable sources.		
						CH_4	**Y**	Biomass carbonization process		
						N_2O	N	Negligible		
					Transportation of primary carbon sources	CO_2	Y	Fossil fuel fossil fuels by machinery & vehicles		
						CH_4	N	Negligible.		
						N_2O	N	Negligible		
					Primary carbon source	CO_2	Y	Fossil fuels combustion		

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			extraction; CH_4; N; Biomass burning in the plantation establishment will not occur extraction; N_2O; Y; Application of fertilizers in the planting activity.		
B.3.3 Does the project involve other emissions sources not foreseen by the methodologies that may question the applicability of the methodology? Do these sources contribute with more than 1% of the estimated emission reductions of the project?		DR	No other emissions sources were verified during the site visit.		OK
B.4 Baseline scenario determination (VVM para 80-87, 103-105).					
B.4.1 Which baseline scenarios have been identified? Is the list of baseline scenarios complete?		DR	Baseline Alternative Scenarios: 1) Coal coke iron ore reduction system; 2) Renewable charcoal iron ore reduction system produced with renewable planted forests sources, based on new plantations (project scenario); 3) Non-renewable charcoal iron ore reduction system (produced with nonrenewable sources)/88/; 4) Iron ore reduction system based on the use of a mix of reducing agents (coal coke/renewable charcoal/nonrenewable charcoal) /87/. 5) Renewable charcoal from planted biomass iron ore reduction system based on existing plantations. The described scenarios are related to the use of reducing agents in the iron ore reduction blast furnaces.		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.4.2	How have the other baseline scenarios been eliminated in order to determine the baseline?		DR	The renewable charcoal iron ore reduction system from existing planted biomass (5) was eliminated due the lack of existing plantations to supply the biomass demand (plantation deficits in Brazil, near exhaustion of the forest plantations established under the fiscal incentives, and the lack of new plantations). The non-renewable charcoal produced from native wood is illegal in Minas Gerais State which establishes the use of 90% of wood coming from planted forest /88/, as well as, the production of illegal non-renewable charcoal (native wood) is done with man power under undesirable conditions (child and forced labor), hence the Non-renewable charcoal (3) and a mix with non-renewable charcoal (4) scenarios were eliminated. The Renewable charcoal iron ore reduction system from new planted biomass has been removed due barriers (please see section B.5).		OK
B.4.3	What is the baseline scenario?		DR	Use of coal coke within iron ore reduction system (Alternative Scenario 1).		OK
B.4.4	Is the determination of the baseline scenario in accordance with the guidance in the methodology?		DR	Yes, baseline regarding the use of reducing agents in the iron ore reduction process in blast furnaces was determined through methodology AM0082 version 1.0, guidance and Combined tool to identify the baseline scenario and demonstrate *additionality*		OK
B.4.5	Has the baseline scenario been determined using conservative assumptions where possible?		DR	See B.4.6		OK
B.4.6	Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic		DR	According to AM0082 version 1.0 supply and demand unbalancing reducing agents trends shall		

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
trends and political aspirations?			be assessed in two levels: (i) sectoral and (ii) project level. As well as the time line and sequence of decisions within the project boundary shall be considered in the assessment According to the AMS /59//60/, the demand of charcoal for blast furnaces in Brazil is supplied only with 52% of sustainable forest /reforest. On Minas Gerais state, the consumption of charcoal for pig iron production on 2008 was 20,935,000 mdc, and the planted forests on 2008 was 65,587 ha, what considering 100 mcd/ha result on 6,558,700 mcd, which means only 31% of demand, and doesn't attend the market demand, which is supplied by non-renewable forest in Brazil. In addition, considering the pig iron register of Sindifer at Minas Gerais State /78/ it was verified that 75% were cited by IBAMA about use of non-renewable charcoal, 10% were implemented reforestation programs to get auto sustainability on the next 7 years and 2% had own supply of charcoal for blast furnace activities /57/. Hence the sectoral renewable charcoal scarcity could be demonstrated. However, considering that Plantar had started the Blast Furnace operation in 1985 and the MG02 plantation was installed in 1967 /17/ it was not demonstrated clearly <u>at project level</u>, the unbalance of the charcoal demand from the Plantar Blast Furnaces and the production of wood/charcoal of MG02 before the starting date of project which could justify the exclusion of the	~~CAR 2~~	OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				scenario 5. Project Participant is requested to demonstrate it with supported evidences.		
B.4.7	Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?		DR	See B.4.6		OK
B.4.8	Is the baseline determination adequately documented in the PDD? • All assumptions and data used by the project participants are listed in the PDD and related document to be submitted for registration. The data are properly referenced. • All documentation is relevant as well as correctly quoted and interpreted. • Assumptions and data can be deemed reasonable • Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD. • The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity			Project participant is requested to, besides reference number provided in the PDD; add the document name, author and date. All the documentation presented is relevant, assumptions and data are deemed reasonable. The methodology has been correctly applied.	~~CL 7~~	OK
B.5	**Additionality determination (VVM para 93-119)**					
B.5.1	What approach/tool does the project use to assess additionality? Is this in line with the methodology?		DR	The "*Combined tool to identify the baseline scenario and demonstrate additionality*" version 02.2.		OK
B.5.2	Have the regulatory requirements correctly been taken into account to evaluate the project activity and the alternatives?		DR	Yes.		OK
B.5.3	Is sufficient evidence provided to support the relevance of the arguments made?		DR	Yes.		OK
B.5.4	What is the project additionality mainly based on (Investment analysis or barrier analysis)?		DR	Barrier analysis.		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
Prior consideration of CDM (VVM para 96-102)						
B.5.5	What is the evidence for serious consideration of CDM prior to the time of decision to proceed with the project activity?		DR	The first CDM serious consideration submitted to DOE was a letter issued on 30 August 2000 from Mr. Ronaldo Mota Sardemberg, Brazilian Minister for Science and Technology notifying Plantar S.A Reflorestamento about the rules for submission CDM project to Brazilian DNA and confirms no opposition from Brazilian Government to Plantar applying on World Bank Prototype Carbon Fund. In addition, an email issued on 26 October 1999 from Mr. Andre Guimarães of Private Sector Liaison/Rain Forest Pilot Program/World Bank to Mr. Marco Antonio Fujihara and forward to Mr Geraldo Alves de Moura, Plantar Director, about the Plantar project to be applied on World Bank PCF and UNFCCC CDM /8/, However, according to the guideline for prior consideration /45/ "*The project participant must indicate awareness of the CDM prior to the project activity starts date, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project. Evidence to support this would include, inter alia, minutes and/or notes related to the consideration of the decision by the Board of Directors, or equivalent, of the project participant, to undertake the project as a CDM project activity".* DNV requests evidences from the Plantar directors or equivalent.	~~CAR 3~~	OK
B.5.6	If the starting date is after 2 August 2008 and before the global stakeholder consultation, has the DNA and UNFCCC		DR	Not applicable. The project starting date was 10 November 2000, what corresponds to the date of		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	confirmed that the project participants have informed in writing of the project's intention to seek CDM status?			the first planting of the dedicated plantations on MG3 area, plot Buritis 1 and 1A with 41 and 12 ha respectively, as verified during the site visit on Plantar Forest Plant .		
	Continuous efforts to secure CDM status (only to be completed if starting date is before 2 August 2008)					
B.5.7	What initiatives where taken by the project participants from the starting date of the project activity to the start of validation in parallel with the physical implementation of the project activity?		DR	The starting date of the project activity is 10 November 2000. The project participant had listed several documents regarding continuous efforts for secure CDM status. However these evidences were not submitted to DNV yet. Nonetheless, DNV had assessed some public documents inter alia: • World Bank PCF Minas Gerais Plantar Project registered on 04 September 2002 with closing date on 31 August 2012 with total project cost of US$ 51 MM (50% Forestry and 50% Renewable Energy) /93/; • Plantar MG3 and MG 4 reforestation project: UNFCCC 2569 Reforestation as Renewable Source of Wood Supplies for Industrial Use in Brazil, as part of industrial project /46/; • Plantar MG3 and MG4 reforestation project: UNFCCC 1051 Mitigation of Methane Emissions in the Charcoal Production of Plantar, Brazil, as part of iron ore reduction production /47/.	~~CL 6~~	OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.8	When did the construction of the project activity start?		DR	The starting date of the project activity is 10 November 2000, which corresponds to the date of the first planting of the dedicated plantations on MG3 area, plot Buritis 1 and 1A with 41 and 12 ha respectively, as verified during the site visit on Plantar Forest Control System /15/		OK
B.5.9	When was the project commissioned?		DR	Blast Furnace 1 refurbishing concluded on 09/2007 /11/; Blast Furnace 2 refurbishing concluded on 03/2010 /12/; Powder Charcoal Injection installation concluded on 10/2008 /13/.		OK
B.5.10	Does the timeline of the project confirm that continuous actions in parallel with the implementation were taken to secure CDM status?		DR	Yes, DNV opinion is that it is sufficiently evidenced that continuous actions were taken in order to assure CDM status.		OK
	Barrier analysis (VVM para 113-116)					
B.5.11	Are the barriers identified complimentary to a potential investment analysis? Does the barrier have a clear impact on the financial returns so that it can be assessed in an investment analysis? Each barrier is discussed separately.		DR	The additionality has been assessed through the "*Combined tool to identify the baseline scenario and demonstrate additionality*" version 02.2 according to the methodology AM0082 version 1.0. The PDD does not present a financial analysis from the project activity. The Barrier Analysis was assessed for the 3 selected scenarios: 1) Coal coke iron ore reduction system; 2) Renewable charcoal iron ore reduction system		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			produced with renewable planted forests sources, based on new plantations (project scenario); 4) Iron ore reduction system based on the use of a mix of reducing agents (coal coke/renewable charcoal/non-renewable charcoal). And according to the 3 approaches from AM0082 version 1.0: a) Barrier/incentives to investment and financing; b) Sectoral barriers and policies c) Regulatory barriers and/or technical barriers		
B.5.12 How were the Barrier/incentives to investment and financing assessed to be real? Are the investment barriers substantiated by a source independent of the project participants?		DR	**1-** Coal coke: The iron and steel industry based on coke and coal were encouraged through governmental incentives (1994 – 2006) and those investments, aiming the production capacity increase, continue to be happen /63/. DNV had verified the production of pig iron from coal coke enlarged during last available statistics of 14 years as 41% from 17 MM tonne 1994 to 24 MM tonne on 2008 and compared to pig iron from charcoal had enlarged on same period only 31% from 7.9 MM tonne on 1994 to 10.5 MM tonne on 2008 /60/. In addition, during the last 18 years prior to the project implementation (1983-2000), participation of charcoal-based pig-iron production in the total production of integrated steel and iron mills decreased from 18% to 5%, and up to now there is no trend of possible revert of this scenario in the short term /75/. These considerations had		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			evidenced the encouraging of pig iron with coal coke scenario. **2-** Renewable charcoal. There are 7 forest financing lines in Brazil /76//92/, only two could be applied as follow: FINEN: Applicable to cellulose forest and facilities FINAME: Applicable to cellulose forest and facilities FCOnature: Not applicable on Minas Gerais state FNOForest: Not applicable on Minas Gerais state FNEgreen: Not applicable on Minas Gerais state PRONAF: forest for industry in Brazil. PROPFLORA: Energetic forest in Brazil Nonetheless, this 2 programs have some restrictions as follow: PRONAF has small resources and was directed to protected and reserved areas. /76//92/ PROPFLORA is only suitable for small farmers that desire to get involved in industrial wood production. It provides loans of up to 144 months duration, with either half year or annual payments. For reforestation activities for industrial use, PROPFLORA guarantees an interest-only period until the first harvest; for reforestation for other uses it allows 12 months of interest-only period. It was verified that no one was financing the		

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				land/76//92/. **3-** Mix of reducing agents (coal coke/renewable charcoal/non-renewable charcoal): According to the Minas Gerais Environment Regulation the pig iron production has permission to use until 20% of coal coke on Blast Furnace charge/87/. As well as, the legislation /88/ allows to use non-renewable charcoal as follow: 2009-2013 – 15% 2014-2017 – 10% after 2018 – 5% Hence, considering 20% of coal and 5% non-renewable charcoal, the scenario must comply with 75% of renewable charcoal what is similar to scenario 2.		
B.5.13	How does CDM alleviate the Barrier/incentives to investment and financing?		DR	The CDM would enlarge the attractiveness of sustainable forest to attend the pig iron industry in Minas Gerais.		OK
B.5.14	Is the project activity prevented by the Barrier/incentives to investment and financing and at least one of the possible alternatives to the project activity is feasible under the same circumstances?		DR	Considering the barrier of incentives to investment and financing, the non-renewable (native) charcoal iron ore reduction system was considered illegal and applied with restrictions by the PP, hence the metallurgical coke iron ore reduction system would the feasible baseline scenario.		OK
B.5.15	How were the sectoral barriers and policies assessed to be real? Are the technological barriers substantiated by a source independent of the project participants?		DR	**1-** Coal coke The PDD states that the policy incentive of BNDES is to finance new investment to	~~CAR 4~~	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			reach self-sufficiency in coal and coal coke by 2010, However it was verified that the BNDES invested on 55% of the charcoal blast furnace of Valorec/Sumitomo in 2010 /71/. The PP must justify this barrier. **2-** Renewable charcoal. According to the AMS /59//60/ and ABRAF /61/, the demand of charcoal for blast furnaces in Brazil is supplied only with 52% of sustainable forest /reforest. On Minas Gerais state, the consumption of charcoal for pig iron production on 2008 was 20,935,000 MDC, and the planted forest on 2008 was 65,587 ha, considering 100 MDC/ha result on 6,558,700 MCD, which means only 31% of demand, and doesn't attend the market, which is supplied by non-renewable forest in Brazil, mainly from Minas Gerais, Espirito Santo, Bahia and Mato Grosso states. As the forest activity, considering mainly eucalyptus, it needs 7 years to the first harvest, this and the restriction of financing; the sustainability forest activity has low attractiveness and faces real barrier to be implemented. **3-** Mix of reducing agents (coal coke/renewable charcoal/non-renewable charcoal): The non-renewable charcoal produced from		

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				native wood is illegal in Minas Gerais State which establishes the use of 90% of wood coming from planted forest /88/, as well as, the production of illegal non-renewable charcoal (native wood) is done with man power under undesirable conditions (child and forced labor). According to the pig iron register of Sindifer at Minas Gerais State /77/ and cross checking with the IBAMA pig iron companies cited list /58/ DNV could verify that 75% of companies were cited due to the use of non-renewable charcoal, only 10% were implemented reforestation program to get auto sustainability on the next 7 years and only one company, 2% has own supply of charcoal for own blast furnace activities. IBAMA is the federal environment agency responsible by supervision and reprimand for environment crime inter stat, it had implemented several actions against charcoal illegal trade produced from native forests on Bahia, Mato Grosso e Mato Grosso do Sul states		
B.5.16	How does CDM alleviate the sectoral barriers and policies?		DR	See B.5.15		OK
B.5.17	Is the project activity prevented by the sectoral barriers and policies and at least one of the possible alternatives to the project activity is feasible under the same circumstances?		DR	See B.5.15		OK
B.5.18	How were the regulatory barriers and/or technical barriers assessed to be real? Are the other barriers substantiated by a source independent of the project participants?		DR	**1-** Coal coke According to the "Evaluation on thermo reducing agent replacement on the Plantar pig iron production" /24/, the blast furnaces could be fuelled with 100% of coal coke without restrictions.		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			2- Renewable charcoal The PDD presents the regulatory barriers, since coal coke system is based on an imported good (coal), so the environmental impacts from the mining activities occur outside the national boundaries, hence no environmental license is required, simplifying the licensing process comparing to the route of renewable charcoal originated from forest plantations that require an extra licensing process and land registration, which most of times is a great and difficult problem to be solved. However the environment licensing in Minas Gerais state, through the IEF had evidenced the established forestry licensing system. /53/. As well as, the amount of new incentivized forest on Minas Gerais state was enlarged from 44,000 ha on 2000 to 199,000 on 2009 /60/. As the environment licensing was not demonstrated as a regulatory barrier, it must be reviewed on PDD. **3-** Mix of reducing agents (coal coke/renewable charcoal/non-renewable charcoal): The PDD states that the limit for exploitation is of 8st/ha in Atlantic Forests and 18 st/ha to other types of forests. If one conservatively assumes that to reduce a tonne of hot metal is necessary to convert around 8 wooden stereos into non-	~~CAR 5~~ ~~CL 5~~	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				renewable charcoal, a pig iron mill to supply the production of the project activity (240,000 tonnes of pig iron annually) would necessarily require annual interventions on natural vegetation, varying from 104,000 to 240,000 hectares *per year*. This area is substantially larger than the *total* amount of land required by high-yielding eucalyptus plantations, e.g. approximately 3,300 per year (23,100 ha for the whole project period, 21 years). However no references were considered on the statement. DNV requests identify the sources of these.		
B.5.19	How does CDM alleviate the regulatory barriers and/or technical barriers?		DR	See B.5.18		OK
B.5.20	Is the project activity prevented by the regulatory barriers and/or technical barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?		DR	See B.5.18	-	OK
B.5.21	How does CDM alleviate the other barriers?		DR	No other barrier were applied		OK
B.5.22	Is the project activity prevented by the other barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?		DR	See B.4.6, B.5.15 and B.5.18	-	OK
	Investment analysis (VVM para 106-112) *The list of questions below must be adjusted to the parameters in the investment analysis relevant to the project under validation.*					
B.5.23	Does the project activity or any of the remaining alternatives generate revenues apart from CDM? Is this reflected in the PDD?		DR	The project had applied only the step 2 of methodology: Barrier analysis.	-	-
B.5.24	Do any of the alternatives to the project activity involve		DR	Not applicable.	-	-

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	investment? Is this reflected in the PDD?					
B.5.25	Is the choice of benchmark analysis, investment comparison or simple cost analysis correct?		DR	Not applicable.	-	-
B.5.26	Is the benchmark/discount rate the latest available at the time of decision?		DR	Not applicable.	-	-
B.5.27	What is the financial indicator? Is it on equity/project basis? Before/after tax? Is the financial indicator in correspondence with the benchmark?		DR	Not applicable.	-	-
B.5.28	Are the underlying assumptions appropriate, e.g. what is considered as waste in the baseline is considered to have zero value?		DR	Not applicable.	-	-
B.5.29	Does the income tax calculation take depreciation into account? Is the depreciation year in accordance with normal accounting practice in the host country?		DR	Not applicable.	-	-
B.5.30	Is the time period of the investment analysis and operating time of the project realistic? Has salvage value been taken into account? Is working capital returned in the last year of operation?		DR	Not applicable.	-	-
B.5.31	When feasibility studies report or similar approved by the government is used as the basis for the investment analysis: Can it be confirmed that the values used in the PDD are fully consistent with the FSR and is the period of time between finalization of the FSR and the investment decision adequate?		DR	Not applicable.	-	-
B.5.32	How was the amount of output (e.g. sales of electricity) assessed? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.		DR	☐ The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval ☐ The plant load factor determined by a third party contracted by the project participants (e.g.	-	-

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				an engineering company) ☐ Other approach. Not applicable.		
B.5.33	How was the output price (e.g. electricity price) assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.		DR	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☐ Review of feasibility reports, public announcements and annual financial reports - related to the project and the project participants Not applicable.	-	-
B.5.34	How was the investment costs assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.		DR	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☐ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants Not applicable.	-	-
B.5.35	How were the O&M costs assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.		DR	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☐ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants Not applicable.	-	-
B.5.36	Describe the assessment of the other input parameters. Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.		DR	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☐ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants	-	-

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				Not applicable.		
B.5.37	Was the financial calculation spreadsheet verified and found to be correct?		DR	Not applicable.	-	--
B.5.38	Sensitivity analysis: Have the key parameters contributing to more than 20% of the revenue/costs during operating or implementation been identified? Has possible correlation between the parameters been considered?		DR	Not applicable.		-
B.5.39	Sensitivity analysis: Is the range of variations is reasonable in the project context?		DR	Not applicable.	-	-
B.5.40	Have the key parameters been varied to reach the benchmark and the likelihood of this to happen been justified to be small?		DR	Not applicable.	-	-
	Common practice analysis (VVM para 117-119)					
B.5.41	What is the geographical scope of the common practice analysis? Is this justified?		DR	The PDD had considered Brazil as the boundary of scope. However the project activity and largest pig-iron production pool in Brazil are located in the Minas Gerais and this region has specific laws and regulations regarding forest establishment and exploitation of native forests that are quite different in other states. Project participant is requested to consider it.	~~CAR 6~~	OK
B.5.42	What is the scope of technology and size (e.g. capacity of power plant) for the common practice analysis and how has this been justified?		DR	The PDD had considered all pig-iron and steel production of integrated iron and steel companies. However the production of pig iron from charcoal couldn't be compared to steel electric furnace or integrated steel facilities, once the dimension and the technology is quite different. Project participant is requested to adjust the	~~CAR 6~~	OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				common practice analysis.		
B.5.43	What is the data source(s) used for the common practice analysis?		DR	Project participant is requested to provide consolidated data source(s) used for the common practice analysis, once some statistic showed in Table 6 are double counting, like IABR, BNDES and other companies.	~~CAR 6~~	OK
B.5.44	How many similar non-CDM-projects exist in the region within the scope?		DR	This is the second project of AM0082 published on UNFCCC GSD. The first the Arcelor Mital project also applying AM 0082. The Valourec-Sumitomo has implemented a new blast furnace at Jeceaba municipality, MG state, starting with coal/coke until develop a new forest during the first 7 years to supply the new blast furnaces with charcoal /71/.		OK
B.5.45	How were possible essential distinctions between the project activity and similar activities assessed?		DR	The PDD presents an assessment of the projects regarding: being an integrated steel production; investing in steel production based on coal coke or charcoal after 2007 and after to the implementation of the project activity. Analysis considering the time of project implementation decision must be reviewed.	~~CAR 6~~	OK
B.5.46	What is the conclusion of the common practice analysis?		DR	See B.5.41 to B.5.45		
	Conclusion					
B.5.47	What is the conclusion with regard to the additionality of the project activity?		DR	The analysis above is not sufficiently to demonstrate that the project activity is not a feasible activity without CDM incentives.	~~CAR 4~~ ~~CAR 5~~ ~~CAR 6~~	OK
B.6	**Calculations of GHG emission reductions**					
	Data and parameters that are available at validation and that are not monitored (VVM para 198-200)					
B.6.1	How was the $RA_{BL,i}$ verified?		DR	According to the "Evaluation on thermo		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			reducing agent replacement on the Plantar pig iron production /24/ the demonstrated balance of coal coke Blast Furnace consumes 360 kg coke/tonne of pig iron produced. However, according to the AM0082 version 1.0 (page 16), the ratio of use of coal coke per tonne of hot metal was capped by the value provided in IPCC 2006 Guideline, i.e. 0.358 tonne coal coke/tone pig iron.		
B.6.2 How was the $\%C_{BL,i}$ verified?		DR	The carbon content, in percent of, in the non-renewable reducing agent *i* in the baseline scenario (87.5%) was considered according to the "Evaluation on thermo reducing agent replacement on the Plantar pig iron production. July 2000" /24/. Records of similar project had considered 89% /51/.		OK
B.6.3 How was the $EF_{CO2e,\ coal\ coke,y}$ verified?		DR	The emission factor to produce one tonne of coal coke in the iron ore reduction system baseline scenario was calculated as 0.537 tCO2e/t coal coke as: ***$kgCH_4$-CO_2*tonne coal^{-1} / ratio of coal-coke*** and considering the default emission for fugitive CH_4 and CO_2 from coal coke production (COG) as 402.6 kg/tonne coal according table 3 Annex 2 of AM0082 version 1.0 and the ratio of coal/coke production of 0.75 according to the "Evaluation on thermo reducing agent replacement on the Plantar pig iron production. July 2000" /24/. There is no operational data available.		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.6.4	How was the $EF_{VF, BL}$ verified?		DR	The average CO_2 emission factor of fuel type i (diesel) in year y was considered 74.8 tCO_2/TJ as the upper emission factor. Conservatively, the lower emission factor of 72.6 tCO_2/TJ should be applied if the value provided by the supplier is not available.	~~CL 9~~	OK
B.6.5	How was the $n_{VF,BL,y}$ verified?		DR	The number of vehicles of type v with fuel type f in year y in the baseline scenario was considered as 45.99 by the calculation of the demand of charcoal transported by train with 240 wagons and 3 engines.		OK
B.6.6	How was the $k_{VF, BL, y}$ verified?		DR	The kilometers travelled by each of vehicle type v with fuel type f in the baseline scenario (600 km/year, distances between the cities Vitoria harbor– Sete Lagoas. Vitoria harbour is where the coal is received; Sete Lagoas is where the project is installed /96/. Sete Lagoas. The return was not considered in calculation as the train transport iron ore from Minas Gerais to Vitoria harbour.		OK
B.6.7	How was the $e_{VF,BL,y}$ verified?		DR	The average fuel consumption of vehicle type v with fuel type f in the baseline scenario was considered as 0.00310 l/tku, however according to the report of ANTT/Vale /98/ the consumption on Ferrovia Vitoria Minas has on 2008/2009 an average of 0.00291 l/tku. The PP must review the calculation.	~~CL 10~~	OK
B.6.8	How was the v_{BL} verified?		DR	The vehicle type in the baseline scenario (train) was verified since it is the most conservative option for coal coke transportation in the baseline		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			scenario.		
B.6.9 How was the f_{BL} verified?		DR	The fuel type in the baseline scenario (diesel) was verified since it is the most common used in that vehicle type in the host country and also the most conservative in terms of GHG emissions.		OK
B.6.10 How was the $\%C_{HM, PJ, y}$ verified?		DR	The percentage of carbon in hot metal in the project situation (0%) was verified through the AM0082 version 1.0 that defines zero as a conservative approach.		OK
B.6.11 How was the $Cc_{HM, BL, y}$ verified?		DR	The carbon content fixed in hot metal expressed in t CO_2e per t of hot metal produced (zero) was considered as 4.3%, however according to AM0082 version 1.0, it must be calculated as $Cc_{HM,BL,Y} = \frac{\%C_{HM,PJ,Y}}{100}$ And as the pig iron is produced using renewable charcoal at the project activity, only, the footnote 20 of methodology considers $\%C_{HM, PJ, y}$ as zero. The PP must review the calculations.	~~CL 11~~	OK
B.6.12 How was the $EF_{CO2,i,y}$ verified?		DR	The average CO_2 emission factor of fuel type i (diesel) in year y (74.8 tCO_2/TJ) as the upper emission factor. Conservatively, the lower emission factor of 72.6 tCO_2/TJ should be applied if value provided by the supplier is not available.	~~CL 9~~	OK
B.6.13 How was the NCV_{DIESEL} verified?		DR	The average net calorific value of diesel (0.0000386 TJ/litter) was applied according to the DEMEC/UFMG however considering the GHG Protocol Brazilian Program /95/ and IPCC 2009	~~CL 12~~	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				the NCV of diesel is 0.000043 TJ/kg and the density 0.85 what result on 0.00003612 TJ/litter. THE PP must review the calculation		
B.6.14	How was the $EF_{v(TRUCK),\,km,CO2,\,y}$ verified?		DR	See B.6.4 and B.6.13	~~CL 7~~ ~~CL 12~~	OK
B.6.15	How was the EF_1 verified?		DR	The emission Factor for emissions from N inputs (0.01 tonne-N_2O-N /t-N input) was verified through IPCC 2006 Guidelines.		OK
B.6.16	How was the $Frac_{GASF}$ verified?		DR	The Fraction that volatilizes as NH3 and NOX for synthetic fertilizers (0.01) was verified through the "Fraction that volatilizes as NH_3 and NO_X for organic fertilizers".		OK
B.6.17	How was the GWP $_{CH4}$ verified?		DR	The Global warming potential for CH_4 (21 tCO_2e/tCH_4) was verified through IPCC 2006 Guidelines.		OK
B.6.18	How was the GWP $_{N2O}$ verified?		DR	The Global warming potential for GWP_{N2O} (310 tCO_2e/tN_2O) was verified through IPCC 2006 Guidelines.		OK
	Baseline emissions (VVM para 88-92)					
B.6.19	Are the calculations documented according to the approved methodology and in a complete and transparent manner?		DR	Yes, baseline emissions are in accordance with AM0082 version 1.0 and clear stated in PDD.		OK
B.6.20	Have conservative assumptions been used when calculating the baseline emissions?		DR	Yes, conservative assumptions have been used (primary carbon sources extraction (coal) in the baseline scenario were considered zero).		OK
B.6.21	Are uncertainties in the baseline emission estimates properly addressed?		DR	See B.6.4 and B.6.13		OK
	Project emissions (VVM para 88-92)					
B.6.22	Are the calculations documented according to the approved		DR	Yes, project emissions are in accordance with		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	methodology and in a complete and transparent manner?			AM0082 version 1.0 and clear stated in PDD.		
B.6.23	Have conservative assumptions been used when calculating the project emissions?		DR	Yes, conservative assumptions have been used.		OK
B.6.24	Are uncertainties in the project emission estimates properly addressed?		DR	See B.6.4 and B.6.13		OK
	Leakage (VVM para 88-92)					
B.6.25	Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?		DR	No leakage has been considered in the project activity. The owned dedicated forests plantations within this project activity's boundary (MG02) are under the category of plantations after last rotation and no activity displacement occurred in this area. As well as, the new plantation areas (MG3 and MG4) were registered as the CDM-AR project 2569 /46/. Hence according AM0082 version 1.0 no leakage was applicable.		OK
B.6.26	Have conservative assumptions been used when calculating the leakage emissions?		DR	See B.6.26		OK
B.6.27	Are uncertainties in the leakage emission estimates properly addressed?		DR	See B.6.26		OK
	Emission Reductions (VVM para 88-92)					
B.6.28	Algorithms and/or formulae used to determine emission reductions: • All assumptions and data used by the project participants are listed in the PDD and related document submitted for registration. The data are properly referenced • All documentation is correctly quoted and interpreted. • All values used can be deemed reasonable in the context of the project activity • The methodology has been correctly applied to calculate		DR	The emission reduction ER_y by the project activity during the crediting period is the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y). **Baseline Emissions:** $\mathbf{BE_y = RAE_{BL,y} + IRE_{BL,y}}$		

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
the emission reductions and this can be replicated by the data provided in the PDD and supporting files to be submitted for registration.			**$RAE_{BL,y} = PCE_{BL,y} + RAP_{BL,y} + RAT_{Vehicle,BL,y}$** $PCE_{BL,y}$ = as the primary carbon sources extraction of GHG emissions attributable to the coal mining related activities occur outside the host country boundaries was considered null) The PDD considers the primary carbon transportation emission as $CM_{Bl,v,y}$ = km** $N_{VF,BL,y}$ y * $EF_{v,km,CO2,y}$ Where: km = distance Vitoria harbor - Sete Lagoas; $n_{VF,BL,y}$ = one way trips considering the amount of necessity of coal by the train capacity $EF_{v,km,CO2,y}$ = emission factor of train However, the methodology AM0082 version 1 had established this as $RAT_{BL,RA,y.}$ The PP must adjust the PDD. $RAP_{BL,RA,y} = RAP_{BL, coal\ coke, y} = P_{PJ, y} * EF_{CO2e, coal\ coke, y} * RA_{BL, i}$ $P_{PJ,y}$ = 240 000 t (according to Sete Lagoas Blast Furnace specification /11//12/) $EF_{CO2e, coal\ coke, y}$ = 0.4026 tCO_2e / t coal coke (reducing agent is not under the control of the PP, AM0082 version 1.0 determines the use of default value - Table 3 of the Annex 1) $RA_{BL, y}$ = 0.358 t coal coke/t hot metal (according to AM0082 version 1.0 page 16 it	~~CL 14~~ ~~CL 10~~	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			was establish capped conservatively) $RAP_{BL,\ coal\ coke,\ y}$ = 46 122 tCO_2/yr (No charcoal is used in the baseline) $RAT_{Vehicle,BL,y} = \sum\sum (EF_{V,BL} * FC_{VF,BL,y})/1000$ $EF_{VF,BL}$ = 0.00269 tCO_2/liter (published paper) however the $EF_{diesel,PJ}$ had considered 0.002575 tCO_2/liter $FC_{VF,BL,y} = n_{VF,BL,y} * A_{VF,BL,y} * F_{VF,BL}$ $n_{VF,BL,y}$ = 45.99 (considering $A_{VF,BL,y}$ = 600 km (Vitoria-Sete Lagoas –The return of train is with iron ore of Vale) $EF_{V,BL}$ = 30.36 kg CO_2/km, as however the PDD had considered on calculation 0.00310 l/tku and the ANTT report evidence 0.00291 l/tku and the diesel NCV as the upper and the AM0082 version 1.0 establish the lower **$RAE_{BL,y}$ = 46 960 tCO_2** **$IRE_{BL,y} = (P_{PJ,y} * EF_{Ind,BL}) – (P_{PJ,y} * Cc_{HM,BL,y} * 44/12)$** $EF_{Ind,BL} = \sum (\%C_{BL,i} * RA_{BLi})/100 * 44/12$ $\%C_{BL,I}$ = 87,5 according to specific study /24/ (Similar project consider 89% /51/). $EF_{Ind,BL}$ was considered as $EF_{Ind,BL,i+}$ $EF_{Ind,BL,j}$ $EF_{Ind,BL,i}$ = 1.14 tCO_2e/t of hot metal as charcoal feed by the top of blast furnace and $EF_{Ind,BL,j}$ = 0.4918 tCO_2e/t as charcoal powder injected by tuyeres Hence $EF_{Ind,BL}$ = 1.6345 tCO_2e/t	~~CL 14~~ ~~CL 10~~ ~~CL 9~~ ~~CL 11~~	

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			$Cc_{HM,BL,y}$ = 4.3% however according to AM0082 version 1.0, it must be considered as 0. $IRE_{BL,y}$ = 392 280 tCO_2/yr **BE_y = 439 240 tCO_2/yr** **<u>Project Emissions</u>** **$PE_y = RAE_{PJ,y} + IRE_{PJ,y}$** **$RAE_{PJ,y} = PCE_{PJ,y} + RAP_{PJ,RA,y} + RAT_{Vehicle,PJ,y}$** **$PCE_{PJ,y}$** = $EP_{PJ,y}$ $EP_{PJ,y} = E_{fuelburning,PJ,y} + PE_{BB,y} + N_2O_{direct\text{-}fertilizer\ N\ PJ,y} + EP_{Vehicle,PJ,y}$ $E_{fuelburning,PJ,y} = \sum FC_{i,j,y} * COEF_{i,y}$ $FC_{i,j,y}$ = 477 467 litter/yr (255 l/ha) $COEF_{i,y}$ = 0.002622 tCO_2/liter (72.6 tCO_2/TJ * 0.00003612 TJ/liter $E_{fuelburning,PJ,y}$ = 1 252 tCO_2e/yr $PE_{BB,y}$ = 0 (there is no biomass burning at the project activity) $N_2O_{direct\text{-}fertilizer\ N\ PJ,y} = (F_{SN,t} + F_{ON,t}) * EF_1 * MW_{N2O} * GWP_{N2O}$ $F_{SN,t} = \sum M_{SFi,t} * NC_{SFi} * (1 - Frac_{GASF})$ $M_{SFi,t}$ = 0.180 from the fertilizer type I; NC_{SFi} = 6 gN/100g Fertilizer I	~~CL 9~~ ~~CL 12~~ ~~CL 13~~	

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			$Frac_{GASF}$ = 0.1 EF_1 = 0.01 IPCC 2006 Guidelines MW_{N2O} = 44/28 GWP_{N2O} = 310 IPCC Guidelines 2006 $N_2O_{direct\text{ - }fertilizer\ N\ PJ,\ y}$ = 52 tCO_2/year $EP_{Vehicle,\ PJ,\ y}$ = $N_{PCE,\ PJ,\ y}$ * $AVD_{PCE,\ PJ,\ y}$ * $EF_{TRUCK,\ km,\ CO2,\ y}$ $N_{PCE,\ PJ,\ y}$ = 7 968 round trips $AVD_{PCE,\ PJ,\ y}$ = 29 km $EF_{TRUCK,\ km,\ CO2,\ y}$ = 1.41 $kgCO_2$/km (according Plantar records) $EP_{Vehicle,\ PJ,\ y}$ = 372 tCO_2e/yr $PCE_{PJ,\ y}$= 1 379+0+52+327 $PCE_{PJ,\ y}$ = 1 757 tCO_2e/tonne biomass **$RAP_{PJ,\ RA,\ y}$** = $RAP_{PJ,\ charcoal,\ y}$ $RAP_{PJ,\ charcoal,\ y}$ = $P_{PJ,y}$ * $EF_{CH4,charcoal,PJ,y}$ * $F_{PJ,charcoal}$ * GWP_{CH4} (Option 1) $P_{PJ,y}$ = 240 000 tonnes of hot metal $EF_{CH4,BL}$= f (Y_{BL}) $EF_{CH4,\ charcoal,\ PJ,y}$ = f (Y_{PJ}) = (A – B) * Y_{PJ} where:	~~CL 13~~	

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			Y_{pj} = 0.34 A= 139.13 B=313.8 according the Mitigation of Methane Emissions /47/. $EF_{CH4,charcoal,PJ,y}$ = 0.0324 tCH_4/t of charcoal $F_{PJ,charcoal}$ = 0.58 t charcoal/t of hot metal. The "*Evaluation on thermo reducing agent replacement on the Plantar pig iron production*" had considered 0.589 t charcoal/t of hot metal and similar project had considered 0.60 t charcoal/t of hot metal/51/. PP must adjust the calculation. GWP_{CH4} = 21 tCO_2e/tCH_4 $RAP_{PJ, RA, y}$ = 94 823 tCO_2/year $RAT_{Vehicle, PJ, y}$ = $EP_{VEHICLE, PJ, y}$ $EP_{VEHICLE, PJ, y}$ = $N_{RAT, PJ, y}$ * $AVD_{RAT, PJ, y}$ * $EF_{TRUCK, km, CO2, y}$ (Option 2) Biomass transportation (This demonstration was not included in PDD) $N_{RAT, PJ, y}$ = 7 968 round trips (302 769 t biomass/year; 38 t one truck) $AVD_{RAT, PJ, y}$ = 29 km $EF_{TRUCK, km, CO2, y}$ = 0.00137 tCO_2/km (See above) $RAT_{biomass, PJ, y}$ = 414 tCO_2/year	~~CL 8~~ ~~CL 13~~ ~~CL 12~~	

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			Charcoal transportation $N_{RAT, PJ, y}$ = 5 752 round trips (139 200 t charcoal/year; 24.2 tonne truck) $AVD_{RAT, PJ, y}$ = 428 km as the highest distance from Morada Nova de Minas to Sete Lagoas /96/ $EF_{TRUCK, km, CO2, y}$ = 0.00137 tCO_2/km (See above) $RAT_{charcoal, PJ, y}$ = 3 372 tCO_2/year $RAT_{Vehicle, PJ, y}$ = 414 + 3372 = 3786 $RAE_{PJ, y}$ = 100 361 tCO_2/year $IRE_{PJ, y} = (P_{PJ,y} * EF_{Ind,PJ,y}) - (P_{PJ,y} * Cc_{HM,PJ,y} * 44/12)$ $EF_{Ind,PJ,y}$ = 0 (carbon content of renewable reducing agent from biomass dedicated plantations) $Cc_{HM,PJ,y}$ = 0 (as the pig iron is produced using renewable charcoal **$IRE_{PJ, y}$ = 0** **PE_y = 100 361 tCO_2/year** *Leakage* **LE_y = 0** No leakage has been considered in the project activity. The owned dedicated forests plantations		

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				within this project activity's boundary (MG02) are under the category of plantations after last rotation and no activity displacement occurred in this area. As well as, the new plantation areas (MG3 and MG4) were registered as the CDM-AR project 2569 /46/. Hence according to AM0082 version 1.0 no leakage was applicable. **Emission Reductions** $ER_y = BE_y - PE_y - LE_y - MAX\ (0, RAE_{BL,y} - RAE_{PJ,y})$ **ER_y = 337 879 tCO_2/year** The spreadsheet and PDD must review all CERs calculation	~~CAR 7~~	
B.7	**Monitoring plan (VVM para 120-122)**					
	Data and parameters monitored					
B.7.1	Do the means of monitoring described in the plan comply with the requirements of the methodology?		DR	Yes. According to AM0082 version 1.0		OK
B.7.2	Does the monitoring plan contains all necessary parameters, and are they clearly described?		DR	Project participant is requested to explain why the following parameters are not monitored: • v_{PJ} vehicle type in the project scenario, • f_{PJ} fuel type in the project scenario, • $n_{vf,PJ,y}$ number of vehicles type v with fuel type f in year y in the project scenario,	~~CL 15~~	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				• $e_{vf,PJ,y}$ average fuel consumption of vehicle type v with fuel type f in the project scenario. • Specify the $N_{vPj,y}$ for 7968 and 5752 • Specify the $AVD_{Pj,y}$ for 29 and 428		
B.7.3	In case parameters are measured, is the measurement equipment described? Describe each relevant parameter.		DR	Project participant is requested to indicate equipment used: • **$P_{PJ,y}$** - Hot metal production in the project scenario in year *y* – parameter will be weighted daily. • **$FC_{i,j,y}$** - Quantity of fuel type i combusted in process j during the year y.	~~**CL 16**~~	OK
B.7.4	In case parameters are measured, is the measurement accuracy addressed and deemed appropriate? Describe each relevant parameter.		DR	project participant is requested to indicate measurement accuracy of**:** • **$P_{PJ,y}$** - Hot metal production in the project scenario in year y:. • FCi,j,y - Quantity of fuel type i combusted in process j during the year y:	~~**CL 16**~~	OK
B.7.5	In case parameters are measured, are the requirements for maintenance and calibration of measurement equipment described and deemed appropriate? Describe each relevant parameter.		DR	Project participant is requested to indicate calibration and maintenance requirements and manufacturer calibration recommendation. • **$P_{PJ,y}$** - Hot metal production in the project scenario in year y:. • FCi,j,y - Quantity of fuel type i combusted in process j during the year y:	~~**CL 16**~~	OK
B.7.6	Is the monitoring frequency adequate for all monitoring parameters? Describe each parameter.		DR	**$P_{PJ,y}$** - Hot metal production in the project scenario in year *y:* measured daily.		

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			N $_{PCE, PJ, y}$ and **N $_{RAT, PJ, y}$** - Number of round trips (to and from) of the trucks in the project activity during the year *y* to transport biomass to the carbonization site(s) and to transport charcoal from the reducing agent production site(s) to the iron ore reduction facility: annually. **F $_{PJ, CHARCOAL}$** - Quantity of charcoal necessary to produce one tonne of hot metal in the project scenario: monitored daily applied Standard Operational Procedures and aggregated annually. However, participant is requested to indicate monitoring frequency for the following parameters: • **$FC_{i,j,y}$** - Quantity of fuel type i combusted in process j during the year y: project. • **$M_{SFi,t}$** - Mass of synthetic fertilizer type i applied. • **AVD $_{PCE, PJ, y}$** and **AVD $_{RAT, PJ, Y}$** - Average round trip distance (to and from) between the plantation areas and the reducing agent production site and between the reducing agent production site(s) and the iron ore reduction system facility. • **Y $_{PJ}$** - Tonne of charcoal / tonne of wood on dry basis. • **EF $_{CH4, charcoal, PJ, y}$** - Emission Factor to	~~CL 17~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				produce one tonne of renewable charcoal identified in the project supply chain. • $\mathbf{M_{SFi,t}}$ - Mass of synthetic fertilizer type i applied.		
B.7.7	Is the recording frequency adequate for all monitoring parameters? Describe each parameter.		DR	See B.7.6	~~CL 17~~	OK
	Ability of project participants to implement monitoring plan					
B.7.8	How has it been assessed that the monitoring arrangements described in the monitoring plan are feasible within the project design?		DR	Yes, procedures have been developed based on many systems that are the base of the monitoring.		OK
B.7.9	Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)?			The PDD identifies overview on the organization of the project activity and procedures for the monitoring of the baseline and project scenarios. The systems used to monitor the parameters were identified as being used to day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation).		OK
B.7.10	Are the data management and quality assurance and quality control procedures sufficient to ensure that the emission reductions achieved by/resulting from the project can be reported ex post and verified?		DR	A generic quality assurance and quality control procedure was developed. Project participant is requested to present a quality assurance and quality control procedure to each activity.	~~CL 18~~	OK
B.7.11	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?		DR	Yes.		OK
	Monitoring of sustainable development indicators/ environmental impacts					
B.7.12	Is the monitoring of sustainable development indicators/		DR	Brazil legislation does not require the monitoring		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	environmental impacts warranted by legislation in the host country?			of sustainable development indicators/ environmental impacts.		
B.7.13	Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?		DR	Not applicable.		OK
B.7.14	Are the sustainable development indicators in line with stated national priorities in the host country?		DR	Not applicable.		OK
C Duration of the project activity / crediting period						
	• **Start date of project activity (VVM para 96-97, 102)**					
C.1.1	How has the starting date of the project activity been determined? What are the dates of the first contracts for the project activity? When was the first construction activity?		DR	Although was verified during the site visit, the Plantar Forest Plant Register with record of plot 27 of Lagoa Capim with 5,87 ha, concluded on October 2000 /16/, this information was not identified in the PDD, including the evidences to demonstrate that no other plantation was done before this date.	~~CL 2~~	OK
C.1.2	Is the stated expected operational lifetime of the project activity reasonable?		DR	The project lifetime established was not considered as indefinite, at least as long as the incentives for undertaking project activities are sufficiently strong, however the practice on Blast Furnace fuelled with charcoal should be considered as the likelihood of project activity	~~**CL 3**~~	OK
C.1.3	Is the start date, the type (renewable/fixed) and the length of the crediting period clearly defined and reasonable?		DR	The PDD version 2 had considered a seven year period (renewable) as chosen, starting in 01 June 2012 or the registration date, whichever occurs later. However this starting date must be up to date considering the next steps of LoA and registration.	~~**CL 4**~~	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
D Environmental Impacts (VVM para 129-131)						
D.1.1	Are there any host country requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved? Does the approval contain any conditions that need monitoring?		DR	The Brazilian legislation requires the development of an EIA and if approved the activity is granted an environmental licence (previous, implementation and operation). The EIA/RIMA was presented and the environmental licenses were granted. Also, regarding the plantation activity, the project has been granted a register certificate by the state forest entity.		OK
D.1.2	Does the project comply with environmental legislation in the host country?		DR	Yes.		OK
D.1.3	Will the project create any adverse environmental effects?		DR	No.		OK
D.1.4	Have identified environmental impacts been addressed in the project design?		DR	Yes		OK
D.1.5	Has an analysis of the environmental impacts of the project activity been sufficiently described?		DR	Yes		OK
D.1.6	Are transboundary environmental impacts considered in the analysis?		DR	No.		OK
E Stakeholder Comments (VVM para 126-128)						
E.1.1	Have relevant stakeholders been consulted?		DR	The project participants had invited several stakeholders related with the forest and industrial activities as Sete Lagoas, Curvelo, Felixlândia and Morada Nova de Minas. However according to the Brazilian DNA resolution nº7 some stakeholders were not communicated as following : Federal and State Public Prosecutor,	~~CL 19~~	OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
E.1.2	Have appropriate media been used to invite comments by local stakeholders?		DR	See D.1.1		OK
E.1.3	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?		DR	See D.1.1		OK
E.1.4	Is a summary of the stakeholder comments received provided?		DR	The project participants have addressed the GHG related comments as per responses and reports made publicly available on the World Bank's Prototype Carbon Fund Website and, also, in several public presentations carried out by the project entity and by the PCF over the past years. The comments and replies are posted at www.prototypecarbonfund.org for public review.		OK
E.1.5	Has due account been taken of any stakeholder comments received?		DR	No action is required since all the comments are positive, in order to praise the project activity.		OK

Table 3 Resolution of corrective action requests and clarification requests

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CAR 1 All the biomass used will be provided by the reformed and new eucalyptus plantations. However during the site visit were identified that, according the Plantar Charcoal Control System were identified 31% of charcoal received from external suppliers' /18/. PP must evidence the compliance with this	B.2.9	The 2008 worldwide economic crisis resulted in a temporary availability of charcoal and PP purchased charcoal for stock balance adjustments. The PP's control system is able to identify origin of all charcoal entering the pig iron mill. Charcoal origin is strictly controlled via two official forms issued by the State's Forestry Authority (IEF – Instituto Estadual de Florestas), GCA - Environmental Control Form and DCC – Declaration on Harvesting and Commercialization of Planted Forests. DCC presents detailed information on the origin of wood (e.g. farm, farm owner, area harvested, etc.). GCA presents detailed information on the origin of charcoal, i.e. to which DCC is linked to and even the route of the charcoal transportation (evidence was sent to the audit team together with this Table 3). Moreover, in order to guarantee that all biomass used will be provided by the PP plantations, the PP decided to add to the project boundary an area located in the North region of Minas Gerais state that was planted after the project's starting date. All the related documents have been provided and sent to the DOE.	The PDD version 03 dated 15 June 2012 and this complementary information about the supplemental area of MG 15 with the investment of project activity will reach the same productivity of A/R project (MAI=40 m3/ha/y **/62/**) and will be capable to produce 123,083 tonne charcoal per year, which exceeds the 31% of total charcoal demanded to produce 240,000 tonne/year of pig iron by Plantar blast furnaces. This amount is enough to replace the charcoal from external suppliers. Therefore this CAR is closed.

<table>
<tr><th>Corrective action and/ or clarification requests</th><th>Reference to Table 2</th><th>Response by project participants</th><th>Validation conclusion</th></tr>
<tr><td></td><td></td><td>PP response:
The additional area is enough to supply the 31% of charcoal received from external suppliers, based on the following calculations:

<table><tr><td>MG15 farm project area</td><td>20,513.97 ha</td></tr><tr><td>Average forest Mean Annual Increment (MAI)</td><td>40 m^3/ha/y</td></tr><tr><td>Average wood density (dry basis)</td><td>0.5 tonne/m^3</td></tr><tr><td>Average charcoal yielding (dry basis)</td><td>0.30 tonne charcoal/ tonne wood</td></tr><tr><td>Average annual charcoal production</td><td>20,513.97 x 40 x 0.5 x 0.30 = 123,083 tonne</td></tr></table></td><td></td></tr>
<tr><td>CAR 2
Considering that Plantar had started the Blast Furnace operation on 1985 and the MG02 was installed on 1967 /17/ it was not demonstrated clearly at project level, the unbalance of the charcoal demand from the Plantar Blast Furnaces and the production of wood/charcoal of MG02 before the starting date of project which could justify the exclusion of the scenario 5.
Project Participant is requested to demonstrate it with supported evidences.</td><td>B.4.6</td><td>New graph and text were inserted in Section B.4, Sub-step 1b, demonstrating the unbalance between supply and demand at project level.</td><td>The PDD version 03 dated 15 June 2012 had evidenced through the estimation of charcoal demand and illustrated on the figure 18 the charcoal demand as 240.000 tonne pig iron/y * 2,7 MDC/tonne pig iron = 648.000 MDC/y /81/.
As well as the expected charcoal production on MG02 and MG15 had evidenced the gap to supply the blast furnace demand. The MG 3, the MG 04 could evidence the justification for scenario 5 exclusion.
Therefore this CAR is closed</td></tr>
</table>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CAR 3 According the guideline for prior consideration /45/ "*The project participant must indicate awareness of the CDM prior to the project activity start date, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project. Evidence to support this would include, inter alia, minutes and/or notes related to the consideration of the decision by the Board of Directors, or equivalent, of the project participant, to undertake the project as a CDM project activity".* DNV request evidences from the Plantar directors or equivalent	B.5.5	An internal agreement related to CERs rights, dated 25/10/1999 was included in the CDM consideration Section B.5 and was sent to the audit team together with this Table 3.	DNV had confirmed the Agreement signed on 25/10 1999 between Plantar Forest and Plantar Siderurgica as clear evidence of prior consideration according the guideline. Additional evidences had supported it as following: • The email dated 26/10/99 from consultancy Marco Antonio Fujihara to Plantar Director Geraldo Alves Moura noticing the Plantar applying to PCF • Letter 262/MCT dated 30/08/2000 from Science and Technology Minister Ronaldo M Sardemberg to Plantar Director Geraldo Alves Moura noticing the establishment of Brazilian Interministerial Climate Change Committee on 7/7/99 and consideration about Plantar PDD submission. Therefore this CAR is closed.
CAR 4 The PDD states that the policy incentive of BNDES is to finance new investment to reach self-sufficiency in coal and coal coke by 2010, However it was verified the BNDES 55% investment on charcoal blast furnace of Valorec/Sumitomo on 2010 /71/. The PP must justify this barrier.	B.5.15	The PDD mentions the Brazilian objective of reaching self-sufficiency in the production of coal, as one of the ways to show that there are substantially more incentives to the production of coal than renewable charcoal and that there are no major barriers regarding the use of coal coke, as opposed to the case of renewable charcoal. The loan provided by BNDES for Sumitomo does not cover the production of planted forests. Rather it covers only the implementation of the	DNV had confirmed that Vallourec&Sumitomo Tubos do Brasil **/106/** had coke/charcoal blast furnace and will start with coal coke due to the first plantation of wood /charcoal forest had started on August 2009. Therefore this CAR is closed

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		mill. In addition, the investment performed by Sumitomo was made on a blast furnace that can use both types of input, coal coke and charcoal, in light of the difficulties of using renewable charcoal, sustainably, in the long run. As far as we are concerned, they are also considering the CDM as an alternative to enable the use of renewable charcoal in the future.	
CAR 5 The PDD presents the regulatory barriers, since coal coke system is based on an imported good (coal), so the environmental impacts from the mining activities occur outside the national boundaries, hence no environmental license is required, simplifying the licensing process comparing to the route of renewable charcoal originated from forest plantations that require an extra licensing process and land registration, which most of times is a great and difficult to be solved problem. However the environment licensing on Minas Gerais state, through the IEF had evidenced the established forestry licensing system. /53/. As well as, according AMS, the amount of incentive and licensed forests on Minas Gerais state was enlarged from 44,000 ha on 2000 to 199,000 on 2009 /60/. The project participant is requested to review the regulatory barriers.	B.5.18	The PE sought to demonstrate in the PDD that the environmental licensing process is significantly more difficult for the renewable charcoal alternative in comparison with the use of coal coke, especially because of land-use regulations, which are not applicable to the use of coal coke and adds an extra time burden for production cycle. As requested by the DOE, this Section has been revised in order to make such constraints clearer. As for the absolute increase in the plantation areas, such figures comprise all plantation activities in Minas. It is also important to recall that such a period goes beyond the time of the project's major investment decision. However, even when such an extended period is considered together with an absolute growth in the amount of plantations, one must also consider that the demand for iron has grown further. Hence the deficit of renewable charcoal has prevailed since then, which actually reinforces all difficulties involved. Thus, absolute increases in plantations alone do not	The PDD version 03 dated 15 June 2012 had evidenced the impact of farm licensing process as the project consists too on: MG02 = 5 farms with 290 stands MG03 = 3 farms with 247 stands MG04 = 4 farms with 232 stands MG15 = 8 farms with 724 stands These sites, according to the environment licence regulation of Minas Gerais State /88/ need a complex environment impact assessment/report (EIA/RIMA) including flora and fauna assessment, historical assessment, water resources impact and population impact. On other hand, the PDD had demonstrated the availability of mini no recovery coke oven which is very similar to the charcoal furnaces but use coal as raw material to produce coke. Hence, the implementation of this second option has lower demand on licencing process.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		mean the lack of barriers to the establishment of such plantations. Rather, the point at stake is that such barriers are one more factor which makes the use of coal coke more attractive than the use of renewable charcoal.	Therefore this CAR is closed
CAR 6 The PDD had considered the Brazil as the boundary of scope and integrated steel companies. However the project activity and largest pig-iron production pool in Brazil are located in the Minas Gerais and this region has specific laws and regulations regarding forest establishment and exploitation of native forests that are quite different in other states. Project participant is requested to consider it. In addition the production of pig iron from charcoal couldn't be compared with steel electric furnace or integrated steel facilities, once the dimension and the technology is quite different. Project participant is requested to provide consolidated data source(s) used for the common practice analysis, once some statistic showed in Table 6 are double counting, like IABR, BNDES and other companies. The PDD presents an assessment of the projects regarding: being an integrated steel production; investing in steel production based on coal coke or charcoal after 2007 and after to the implementation of the project activity. Project participant is requested to considering analysis at the time of project implementation decision and adjust the common practice analysis	B.5.41 B.5.42 B.5.43 B.5.45	The PDD has been corrected accordingly, including specific sector analysis. The PE checked Table 6 and confirmed that there is no double counting on it, as further clarified in the PDD. Data sources have been provided and sent to the DOE.	The PDD version 03 dated 15 June 2012 had evidenced clearly the gap from the sustainable charcoal demand for pig iron production and the actual plantation/´production of wood/charcoal at Minas Gerais State according to official figures from Sindifer and AMS. At the time of project decision, only 5% of charcoal was sustainable. The main source of charcoal for pig iron production was produced from native forest, with significant environment impact. Actions of IBAMA could evidence the incidence of illegal charcoal in Brazil and Minas Gerais State In addition, the PDD confirms the predominance of pig iron production on steel industry, including integrated facilities with coal coke, mainly due to the incapacity of charcoal industry to supply the demand of iron redactor. Therefore this CAR is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CAR 7 The spreadsheet and PDD must review all CERs calculation	B.6.28	All calculations in the spreadsheet and in the PDD were revised.	The revised spreadsheet EPddIN_SUB_ 110712_ERsCalculationTool version 12/07/2011 had to be adjusted to all changes in CERs calculation according to the AM0082 as mentioned on CL 8, 9, 10, 11, 12, 13 and 15. Therefore this CAR is closed
CAR 8 The baseline scenario had considered the as Alternative 1: Coal coke (*coal coke is a reducing agent used in iron and steel manufacturing worldwide. Normally it is added in the top of the furnace and injected at the bottom*) iron ore system. However, considering that the project had applied the baseline emissions on upstream the coal coke production as the coke oven emissions, the PDD must include in baseline scenario the implementation of a coke oven facility in Sete Lagoas, and demonstrate through the barriers analysis that implementation is a likely scenario, in order to justify the coke oven emissions on CERs calculation.		The implementation of a coke oven facility was considered in Section B.4, as requested. PP response: there seems to be an update of the website and therefore the actual reference link is http://www.cst.com.br/meio_ambiente_comunidade/mecanismo_desenvolvimento_limpo/mecanismo_desenvolvimento_limpo.asp A file in PDF format was sent to the audit team with this reference.	The PDD version 03 dated 15 June 2012 evidenced clearly the possibility to implement a mini coke oven, capable to produce coal coke on similar condition as the charcoal furnaces - like capacity, environmental impact and production. Therefore this CAR is closed.
CAR 9 According AM008 at summarized procedure to identify the baseline scenario, the option "Iron ore reduction system based on the use of a mix of the previous reducing agents" need be consider the" statement: "PPs shall assess the limits on the use of mix of reducing agents in the iron ore reduction process based on: (i) locally available data;		In order to address this issue, the PP applied the decision tree, as per the methodology (AM0082 page 11/75). Based on the decision tree, the PP assessed the guidance/restrictions under the applicable regulations, as the alternative baseline scenario regarding the use of a mix of reducing agents. Accordingly, its exclusion has been demonstrated in the PDD. As per	The PDD had evidenced the restriction of own sources of charcoal that could be capable to supply 80% of total demand on Plantar blast furnaces. In addition, according the experience of similar blast furnaces /67/, the diferent characteristics of charcoal and coal coke, like resistivity, ash, acidity/alcalis

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
(ii) scientific literature and/or industry or sectoral publications; (iii) third party expert assessment. As well as, the PDD state that the Minas Gerais State environmental licensing regulation restricts the use of a mix of reducing agents in the reduction process to a maximum of 20% of coal coke, combined with 80% of renewable charcoal in the blast furnace. Given that Plantar was using 100% charcoal in the past, it is not obvious that the baseline is 100% coke. If it is not possible to use charcoal and coke at the same time, This scenario must be demonstrated its exclusion.		the steps of the methodology's decision tree, the scenario to be assessed is the one based on applicable regulatory restrictions. Thus, the assessment of other criteria for a mix of reducing agents in the baseline would only be applicable, if there were no regulations, which is not the case. Still, in order to further clarify the matter, it is important to recall that the charcoal used in the past came from plantations established with the fiscal incentives. As demonstrated in the PDD (Section B.4), the same barriers that prevent the use of 100% of renewable charcoal also apply for the use of 80% (minimum allowed by applicable regulations). As well as, technical restriction was evidenced on section Regulatory and/or technical barriers of PDD and following: "In a mix of 80% of charcoal and 20% of coal coke, the charcoal alkalis react with the coal coke diminishing its mechanical resistance and enlarging its reactivity. Any alkalis in the blast furnace affect the refractories creating crusts and also reacting with the cargo jeopardizing the gases flow and the smooth descend of the cargo. Other example is that the use of coal coke also implies the need of a desulphurization	and sulfur had provoque quickly substitution from charcoal to100% coal coke. As mentioned on this paper, the mix of 30% and 40% of coal coke in charcoal blast furnace had reduced the productivity and impact of pig iron quality with increasing of sulphur contend. The phase of 70% coke caused a rapid deterioration of the operation of the furnace, making it necessary to change to 100% coke before the expected time. Hence the scenario of mix of reducing agents in the iron ore reduction process with the use of 80% of charcoal is not a likely scenario. Therefore this CAR is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		installation. Other different characteristics that have significant influence in the blast furnace performance are found between charcoal and coal coke, such as sulphur content, percentage of ashes, mechanical resistance"	
CAR 10 The "Combined tool to identify the baseline scenario and demonstrate additionality" version 02.2 is no longer valid.		The PDD was revised in order to apply version 04.0.0 of the tool.	The revised PDD version 03 dated 15 June 2012 applies the latest version 04.0.0 of the "Combined tool to identify the baseline scenario and demonstrate additionality". Therefore this CAR is closed.
CL 1 The address or location of Blast furnaces was not available on PDD	A.4.1	Information was inserted in Section A.4.1.4 of the PDD.	The PDD version 03 dated 15 June 2012 had evidenced clearly the address of Blast furnace as 19°26'21" S and 44°20'25" W Therefore this CL is closed.
CL 2 Although was verified during the site visit, the Plantar Forest Plant Register with record of plot 27 of Lagoa Capim with 5,87 ha, concluded on October 2000/**16/**, this information was not identified in the PDD, including the evidences to demonstrate that no other plantation was done before this date	A.2.4 C.1.1	According to the Plantar Forest Inventory System the first planting of the new iron ore reduction system dedicated plantations in MG02 Farm is Lagoa do Capim, stand number 61, with 29.23ha, planted in 15/11/2000. Therefore, the information on the first planting occurring in MG02 Farm (stand Lagoa do Capim 61, 29.23ha, planted in 15/11/2000) was included in the PDD in Section B.3. The stand Lagoa do Capim 27 totalizes an area of 34.51ha, as can be seen in Annex 5 of PDD version 1. For management reasons, this plot is divided into an area of 5.87ha and other of	The clarification and the records of Plantar Forest Plant Register could explain that plot 27 with 5.87 ha was considered as component of project activity only with the replantation on 02/04/2004. The PDD version 03 dated 15 June 2012 had evidenced the date of the first planting of the dedicated plantations for the new iron ore reduction system, occurred on 10/11/2000 in stand Buritis 6, with 57.74ha, located in MG03 Farm (part of the A/R project activity 2569) as the project starting date and considered as the real action of a project activity beginning. Therefore this Cl is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		28.64ha (totalizing 34.51ha). The first planting in stand Lagoa do Capim 27 occurred in 19/10/2000, which is before this project activity starting date (10/11/2000). This stand was replanted in 02/04/2008 (evidence was sent to the audit team together with this Table 3). According to Figure 17 of the PDD version 1, there were plantings occurring occasionally in the MG02 Farm areas before 10/11/2000 (the project activity starting date), but these areas were replanted after their last rotation as part of the project activity's dedicated forests. Therefore, the request for evidences regarding "that no other plantation was done before this date" do not suit this project activity case.	
CL 3 The project life time is was not established considering indefinite, at least as long as the incentives for undertaking project activities are sufficiently strong, however the practice on Blast Furnace fuelled with charcoal should be considered as the likelihood of project activity	C.1.2	The reference to Table 2, C.1.2 in the Validation Report, presents a text that bears no relation to the subject proposed; it is the same text as in CL 2. <u>PP response:</u> The blast furnace technology could also be considered indefinite as it is usual to periodically refurbish the blast furnace parts that wear out (e.g. refractories).	Considering that Plantar had started the Blast Furnace operation in 1985 /17/ and after the refurbishing in 2007 of blast furnace 1 /11/and in 2010 of blast furnace 2 /12/, DNV had confirmed that lifetime of blast furnace could be extended more than the 21 years of possible credit period. Therefore this CL is closed.
CL 4 Project participant is requested to review crediting period starting date	C.1.3	The crediting period was revised accordingly.	The PDD version 03 dated 15 June 2012 had evidenced the starting credit period as 01/06/2012 or the date of the project

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
			registration, the one that occurs later. Therefore this Cl is closed
CL 5 The PDD states that the limit for exploitation is of 8st/ha in Atlantic Forests and 18 st/ha to other types of forests. If one conservatively assumes that to reduce a tonne of hot metal is necessary to convert around 8 wooden stereos into non-renewable charcoal, a pig iron mill to supply the production of the project activity (240,000 tonnes of pig iron annually) would necessarily require annual interventions on natural vegetation, varying from 104,000 to 240,000 hectares *per year*. This area is substantially larger than the *total* amount of land required by high-yielding eucalyptus plantations, e.g. approximately 3,300 per year (23,100 ha for the whole project period 21 years). However no references were considered on the statement. DNV request identify the sources of these.	B.5.18	The reference for the presented calculations is Portaria 191, dated 16 September 2005 issued by the State's Forestry Authority (IEF - Instituto Estadual de Florestas). See Art.3, http://www.siam.mg.gov.br/sla/download.pdf?idNorma=11212. A footnote was included in the due paragraph of the PDD (see footnote 52).	The PDD version 03 dated 15 June 2012 had included reference for IEF Regulation #191 dated 16 September 2005 which establishes the actual permission for wood exploitation of native and planted forest in Minas Gerais State. Therefore this Cl is closed.
CL 6 The project participant had list several documents for continuous efforts for secure CDM status. However these evidences were not submitted to DNV yet.	B.5.7	A list of documents cited in Section B.5 of the PDD was sent to the audit team.	The PDD version 03 dated 15 June 2012 had included references in traceable way. Therefore this CL is closed.
CL 7 Project participant is requested to, beside the reference number provided in the PDD; add the document name, author and date.	B.4.8	All the references throughout the PDD text are referred to as Author and Date, and all these references are presented in detail in the section References, at the end of the PDD.	The PDD version 03 dated 15 June 2012 had included references in traceable way. Therefore this CL is closed.
CL 8	B.6.28	The calculation was revised accordingly,	The PDD version 03 dated 15 June 2012 and the spreadsheet EPddIN_SUB_110712

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
$F_{PJ,charcoal}$ = 0.58 t charcoal/t of hot metal. The "*Evaluation on thermo reducing agent replacement on the Plantar pig iron production*" had considered 0.589 t charcoal/t of hot metal and similar project had considered 0.60 t charcoal/t of hot metal/51/. PP must adjust the calculation.		considering 0.589 t charcoal/t of hot metal.	ERsCalculationTool was adjusted according to the "Evaluation on thermo reducing agent replacement on the Plantar pig iron production" /20/. Therefore this CL is closed.
CL 9 The average CO2 emission factor of fuel type i (diesel) in year y was considered 74.8 tCO2/TJ as the upper emission factor. Conservatively, the lower emission factor of 72.6 tCO2/TJ should be applied if value provided by the supplier is not available.	B.6.4 B.6.12	Upon request, the values were changed in the PDD. For the sake of conservativeness the lower limit was used for the baseline calculations (72.6 tCO2/TJ) and the upper limit was used for project calculations (74.8 tCO2/TJ).	The PDD version 03 dated 15 June 2012 and the spreadsheet EPddIN_SUB_110712 ERsCalculationTool was adjusted according to the IPCC conservatively as the lower for baseline emissions and the upper for project emissions estimations. Therefore this CL is closed.
CL 10 The average fuel consumption of vehicle type v with fuel type f in the baseline scenario was considered as 0.00310 l/tku; however according report of ANTT/Vale /98/ the consumption on Ferrovia Vitoria Minas has on 2008/2009 an average of 0.00291 l/tku. The PP must review the calculation.	B.6.7	The value was replaced by 0.00291 l/tku and all subsequent calculations were corrected accordingly.	The PDD version 03 dated 15 June 2012 and the spreadsheet EPddIN_SUB_110712 ERsCalculationTool have been adjusted according to the national ANTT/Vale references. Therefore this CL is closed.
CL 11 The carbon content fixed in hot metal expressed in t CO_2e per t of hot metal produced (zero) was considered as 4.3%, however according AM0082 version 1.0, it must be calculated as $Cc_{HM,BL,Y} = \frac{\%C_{HM,PJ,Y}}{100}$	B.6.11 B.6.28	The calculations were reviewed accordingly.	The PDD version 03 dated 15 June 2012 and the spreadsheet EPddIN_SUB_110712 ERsCalculationTool were adjusted according to the AM0082 version 1.0. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
renewable And as the pig iron is produced using charcoal at the project activity, only, the footnote 20 of methodology considers $\%C_{HM, PJ, y}$ as zero. The PP must review the calculations.			
CL 12 The average net calorific value of diesel (0.0000386 TJ/litter) was applied according the DEMEC/UFMG however considering the GHG Protocol Brazilian Program /95/ and IPCC 2009 the NCV of diesel is 0.000043 TJ/kg and the density 0.85 what result on 0.00003612 TJ/litter. THE PP must review the calculation.	B.6.13 B.6.28	The value for the average net calorific value of diesel was replaced by 0.00003612 TJ/litter, as requested. The calculations were revised accordingly.	The PDD version 03 dated 15 June 2012 and the spreadsheet EPddIN_SUB_110712 ERsCalculationTool were adjusted according to the GHG Protocol Brazilian Program /95/ and IPCC 2009. Therefore this CL is closed.
CL 13 Project participant is requested to review the source of data applied to EFTRUCK, km,CO2,y, since the methodology AM0082 version 1.0 indicates IPCC 2006 or identify the national source	B.6.14 B.6.28	There is no such parameter EFTRUCK, km, CO2, y in the PDD. The equivalent parameter in PDD version 1 is $EF_{v,km,CO2,y}$ which already uses Mechanical Engineering Department (DEMEC), Minas Gerais Federal University (UFMG), http://www.demec.ufmg.br/disciplinas/eng032-BL (a national source) and 2006 IPCC Guidelines for National GHG Inventories, Volume 2, Chapter 1, Table 1.4 (see footnote 48). However, as CL12 above requests the use of a more updated value for the average net calorific value of diesel, the PP dropped the DEMEC value and is now applying the GHG Protocol Brazilian Program 2010 instead (see response to	The PDD version 03 dated 15 June 2012 and the spreadsheet EPddIN_SUB_110712 ERsCalculationTool were adjusted according to the GHG Protocol Brazilian Program 2010. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		CL 12 above).	
CL 14 The PDD consider the primary carbon transportation emission as $CM_{Bl,v,y}$ = km** $N_{VF,BL,y}$ y * $EF_{v,km,CO2,y}$ Where: km = distance Vitoria harbor - Sete Lagoas; $n_{VF,BL,y}$ = one way trips considering the amount of necessity of coal by the train capacity $EF_{v,km,CO2,y}$ = emission factor of train However, the methodology AM0082 version 1 had established as $RAP_{BL,RA,y.}$ The PP must adjust the PDD..	B.6.28	Parameter $RAP_{BL,\ RA,y}$ refers to "GHG emissions from the production of reducing agents within the boundary under the baseline scenario" and bears no relation to primary carbon transportation emission.	The PDD version 03 dated 15 June 2012 had included clarifications about the import of coal and mini coke oven installation (See CAR 8). Therefore this CL is closed.
CL 15 Project participant is requested to explain why the following parameters are not monitored: • v_{PJ} vehicle type in the project scenario, • f_{PJ} fuel type in the project scenario, • $n_{vf,PJ,y}$ number of vehicles type v with fuel type f in year y in the project scenario, • $e_{vf,PJ,y}$ average fuel consumption of vehicle type v with fuel type f in the project scenario. • Specify the $N_{vPj,y}$ for 7968 and 5752 • Specify the $AVD_{Pj,y}$ for 29 and 428	B.7.2 B.6.28	The AM0082 presents two options for the PP to choose from, in order to calculate biomass transport to the carbonization sites and project emissions in the transportation of reducing agent. The PP chose Option 2 to perform both calculations and therefore, this is the reason why the parameters indicated are not monitored. The detailed calculations for $N_{v,PJ,y}$ are given in the PDD version 1. For 7,968 see Section B.6.1, Project Emissions, item 1 (d), calculated as: 302,769m3/y ÷ 38m3/truck; And the calculations for 5,752 are in Section B.6.1, Project Emissions, and item 3, calculated as: 139,200t of charcoal ÷ 24,2t capacity of each truck. However, due to calculations adjustments, value 5,752 is now 5,841.	The PDD version 03 dated 15 June 2012 had justified the approach to calculate the project emission in the transportation of reducing agent. and the average round trip distance (to and from) between the biomass production site(s) and the site of the project plantation according to the AM0082 version 1.0 In addition, PDD version version 03 dated 15 June 2012 and the spreadsheet EPddIN_SUB_110712 ERsCalculationTool were adjusted considering the doubled round trip distance for wood and charcoal transportation, according to the AM0082 version 1.0. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		The parameter $AVD_{i,PJ,y}$ refers to the average round trip distance (to and from) between the biomass production site(s) and the site of the project plantation (15.7km, see PDD version 1 Section B.6.1, Project Emissions, item 1 (d)) and between the reducing agent production site(s) and the site of the project activity (440km, see PDD version 1 Section B.6.1, Project Emissions, item 3). Therefore, considering a round trip distance, both distances were doubled resulting 31.4km and 880km considering MG15, respectively.	
CL 16 Project participant is requested to indicate: • equipment used to measure, • monitoring and recording frequency, • measurement accuracy, • maintenance requirements and manufacturer calibration recommendation, • equipment used to measure, measurement accuracy, maintenance and calibration requirements, P PJ,y - Hot metal production in the project scenario in year *y for:* **$P_{PJ,y}$** - Hot metal production in the project scenario in year y; **$FC_{i,j,y}$** - Quantity of fuel type i combusted in process j during the year y.	B.7.3 B.7.4 B.7.5	Data on the equipment that measures parameter $P_{PJ,y}$ were included in the respective table in section B.7.1. The equipment used to measure the quantity of machine working hours for parameter $FC_{i,j,y}$ is an hour meter which is part of the tractor's control panel. The hour meter does not require any type of calibration control. <u>PP response:</u> Factor "b" represents the *ex-ante* estimation of fuel consumption per hour per type of field operation for each machine type. There are different machine types used in a huge number of different forestry activities (e.g. planting,	The PDD version 03 dated 15 June 2012 and the spreadsheet ERsCalculationTool had included the details of hot metal monitoring and quantity fuel combusted. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		ants' control, chemical weed control, harvesting, etc.) during the three 7-year-rotations cycle. To calculate the fuel consumption, the machine working hours and the type of machine used will be monitored throughout the project lifetime. Therefore, factor "b" should not be included in B.6.2 Section because it is a variable that should be monitored in order to monitor the quantity of fuel consumed. The figure 1,457.15 is an *ex-ante* estimation of the fuel consumption (litters/ha) during the forest three 7-year-rotations cycle. A spreadsheet demonstrating this figure was sent to the audit team together with this response.	
CL 17 The project participant is requested to indicate monitoring frequency for the following parameters: • **$FC_{i,j,y}$** - Quantity of fuel type i combusted in process j during the year y: project. • **$M_{SFi,t}$** - Mass of synthetic fertilizer type i applied. • **$AVD_{PCE,PJ,y}$** and **$AVD_{RAT,PJ,Y}$** - Average round trip distance (to and from) between the plantation areas and the reducing agent production site and between the reducing agent production site(s) and the iron ore reduction system facility. • **Y_{PJ}** - Tonne of charcoal / tonne of wood on dry basis. • **$EF_{CH4,charcoal,PJ,y}$** - Emission Factor to	B.7.6	The monitoring frequencies for parameters $FC_{i,j,y}$ and $AVD_{i,PJ,y}$ was included accordingly. The monitoring frequencies for parameters $M_{SFi,t}$, Y_{PJ} and $EF_{CH4,charcoal,PJ,y}$ are already presented in line "Description of measurement methods and procedures to be applied" of the respective tables in section B.7.1 of PDD version 1. Parameters $AVD_{PCE,PJ,y}$ and $AVD_{RAT,PJ,y}$ are not part of this PDD. Monitoring frequency was also included for	The PDD version 03 dated 15 June 2012 had included the details of monitoring frequency as annual, including $AVD_{i,PJ,y}$ for biomass and charcoal. Therefore this CL is closed

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
produce one tonne of renewable charcoal identified in the project supply chain. • $M_{SFi,t}$ - Mass of synthetic fertilizer type i applied.		parameter $EF_{v,km,CO2,PJ,y}$. PP response: According to AM0082 there is no distinction between the notations for the parameters used to calculate average round-trip distance for both wood and charcoal transportation. The parameters are distinguished from one another by its descriptions.	
CL 18 A generic quality assurance and quality control procedure was developed. Project participant is requested to present a quality assurance and quality control procedure to each activity.	B.7.10	Quality procedures for each project activity were added to Section B.7.2 in the PDD.	Details included on PDD version 03 dated 15 June 2012 had clarified the QA/QC. Therefore this CL is closed
CL 19 The project participants had invited several stakeholders related with the forest and industrial activities as Sete Lagoas, Curvelo, Felixlândia and Morada Nova de Minas. However according the Brazilian DNA resolution nº7 some stakeholders were not communicated as following : **Federal and State Public Prosecutor**	E.1.1	The PP updated section E of the PDD with the second stage of the stakeholder consultation. Federal and State Prosecutor were already communicated during this second stage. PP response: the mail confirmation (AR) for the Federal and State Prosecutor was sent to the audit team as per request.	Evidences of the second consultation (mail AR in pdf) were received and evidenced the adequate stakeholder consultations according to Resolution 7 of Brazilian DNA. Therefore this CL is closed.
CL 20 The published PDD didn't mention the forest of MG15 included on review version. The original status of this area and the objective of the forests existent on it need be clarified in order to justify the expansion of boundary.		The original status of MG15 is the same of the MG02 unit, i.e. forest plantation after its last rotation. These areas were acquired and planted by PP in response to the fiscal incentives from the Brazilian Government that ended in 1986 and were used to produce charcoal. At the time of the project decision this areas	The complementary evidences/19/ had demonstrated that MG15 was owned by Plantar at project decision as forest in its last rotation. As evidenced on the IBAMA authorization for wood harvest/20/, the average produtivity (MAI) of old forest after last rotation is 6 m^3/ha/year

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		were covered with forests in its last rotation. These areas were included in the project boundary in response to CAR number 01 in order to guarantee that 100% of the pig iron mill wood supplies will be sourced by renewable forests, further protecting the project from risks. Since Plantar activities include not only pig iron production, the wood from other Plantar businesses would be used. (e.g. Plantar is currently operating in the market of treated wood)) Official documents from IBAMA (Brazilian Institute on the Environment) demonstrating the original status of the areas, i.e. forest plantations after its last rotation, was sent to the DOE.	Considering the MG02 as 6881 ha and MG15 as 20513h, as well as the productivity mentioned above, carbonization yield as 0.3 tonne charcoal/ tonne wood and the density of charcoal as 0.5 tonne/ m^3, the production capacity of these areas were 24655 ton/year of charcoal, what means 17.24% of Plantar blast furnaces demand of 142560 ton/year (240000 ton pig iron x2.7 MDC/ton pig iron x 0.22 ton charcoal/MDC). The project acitivy will only reach the total capacity to fuel the Plantar blast furnaces with includion of new AR/CDM project with 11643 ha and a productivity of 40 m^3/ha/year and the investment with fertilization and clones on old forest to the same productivity. During site visit, DNVhad verified the use of 30% of charcoal demand from the market, as the refurbishing of old forest was not in total capacity, which it is foreseen with the implementation of project activity. Therefore this CL is closed
CL 21 In order to evidence the continuous effort to implement the CDM project, the evidences		Information regarding the blast furnaces refurbishments (pulverized charcoal injection system) was included in Section	The PDD version 03 dated 15 June 2012 had included evidences of expenses for charcoal injection system as continuous

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
when they made the decision to refurbish the blast furnaces need be included on B.5 of PDD,		B.5 of the PDD and evidences were sent to the DOE.	effort for refurbishing the Blast Furnaces. Therefore this Cl is closed.

Table 4 Forward action requests

Forward action request	Reference to Table 2	Response by project participants
No FAR identified		

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APPENDIX B

CURRICULA VITAE OF THE VALIDATION TEAM MEMBERS

Luis Filipe Tavares

Mr. Luis Filipe Tavares holds a Technician's Degree in Chemistry and Bachelor's Degree in Metallurgical Engineering. Having an overall experience of thirty tree years.

Prior to joining DNV having around twenty tree years experience in steel production industry covering utilities (water, steam, wastewater treatment), environment control (atmosphere emissions, water emission and waste dumping).

His experience also covers the development of nitrification biological wastewater station as well as other activities as head of Utilities and Environmental Laboratory control.

He has also been actively involved in implementation of Management Systems such as ISO 9001 standard on coke oven department of steel industry as well as the ISO 140001 standard in all steel plant (the second steel company certified in the world) for more than three years.

He start on DNV as ISO 9001, ISO 14001 and OHSAS lead auditor, certifing numerous management systems during 7 years.

He has experience of around 8 years in validation and verification of numerous CDM projects in DNV, both in Brazil & South America.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in Iron and Steel; Metal production; Oil and Gas industry, CMM recovery and use; Generation from renewable energy sources; Waste handling and disposal and Animal waste management.

Jan Van Evercooren

He holds a PhD Degree in Chemistry, having an overall experience of around 40 years. Prior to joining DNV having 4 years experience in iron and steel industry covering sampling & analysis of solid bulk materials and assessment of their quality as raw material for pig iron and steel. Also having more than 25 years experience in environmental consulting in various technical areas covering set-up of air pollutant emission inventories, air pollutant emission & immission measuring, air pollution dispersion modeling and environmental impact assessment (EIA) . Acknowledgment for actually 20 years as Flemish EIA expert in the domains air pollution and climatological effects.

He has experience of around 5 years in validation and verification of CDM/JI projects and other 3rd party validation/verification services.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in Energy Generation from renewable energy sources, MI: Iron and Steel, Metal production, GHG capture and destruction and Waste handling and disposal.

Kakaraparthi Venkata Raman

He holds a bachelor degree (B.Tech) in Chemical Engineering and a Diploma in Management.

He has an overall experience of 18 years in the Chemical Process Industry - Fertilisers and Chemicals industry (FACT). His main areas of work include a) Technical Services (for Ammonia, Urea, Co-generation thermal power plants (captive), and complex fertilizers plants)- 10 years b) Erection, commissioning and hands-on operation of state of art HTAS Ammonia plant - 4 years c) Management and operation of Sulphuric acid plant as Plant Manager- 2 years and d) two years in management Information System operation and assisting of top management in planning of operations..

While in FACT he has completed the ISO14001 EMS LA course and also involved in implementation of Environmental Management Systems and in conducting internal audits. Experience prior to joining Fertiliser industry include six months experimental work on charcoal manufacture in Karnataka Regional Engineering college.

He has experience of around 5 years in validation and verification of numerous CDM projects.

His qualification, industrial experience and experience in CDM demonstrate him sufficient sectoral competence in areas of (a) 1.1 Thermal energy generation from fossil fuels and Biomass as well as thermal electricity from solar (b) 1.2 Energy Generation from renewable energy sources (c) 5.1/4.13/11.1/12.1 Chemical Processes Industries and (d) 13.1 Waste handling and disposal. At present he is Technical Manager, South Asia, DNV, India.

Michael Lehmann

He holds a Master Degree in Environmental Sciences with a specialisation in environmental chemistry. He has an overall working experience of around 13 years.

Since 1999 he has worked in the climate change field and has closely followed the international response to the climate change challenge (UNFCCC, Kyoto Protocol) and the responses by national governments (EU ETS, UK ETS) and business. He has managed the validation and verification of many CDM and JI projects and thas carried out the technical review of numerous climate change project validations and verifications.

Through his extensive work with validation and verification of CDM and JI projects, he has acquired sectoral competence within energy generation from renewable energy sources.

Since October 2010 he has been chairing the VCS Steering Committee on Standardized Methods for Baselines and Additionality and developed VCS requirements for standardized methods over the course of 2011.

He has also experience with verifying corporate greenhouse gas emissions and emission reductions from verifying the emissions of the Norwegian process, paper & pulp and oil & gas industry.