



VALIDATION REPORT

USE OF CHARCOAL FROM RENEWABLE BIOMASS PLANTATIONS AS REDUCING AGENT IN PIG IRON MILL OF ARCELORMITTAL JUIZ DE FORA, BRAZIL

REPORT No. 2010-9179

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DET NORSKE VERITAS



VALIDATION REPORT

Date of first issue: 6 December 2010	ConCert Project No.: PRJC-233430-2010-CCS-BRA	DNV CLIMATE CHANGE SERVICES AS Veritasveien 1, 1322 HØVIK, Norway Tel: +47 67 57 99 00 Fax: +47 67 57 99 11 http://www.dnv.com Org. No: NO 994 774 352 MVA
Approved by Edwin Aalders	Organisational unit: DNV KEMA Energy & Sustainability, Accredited Climate Change Services	
Client: ArcelorMittal Brasil S.A. and Instituto Totum	Client ref.: Rodrigo Lana de Almeida	
Summary: Project Name: Use of Charcoal from Renewable Biomass Plantations as Reducing Agent in Pig Iron Mill of ArcelorMittal Juiz de Fora, Brazil, Country: Brazil Methodology: AM0082 version 1 GHG reducing Measure/Technology: Metal Production and Manufacturing industries ER estimate: 460 474 tCO ₂ e per year (average) Size <input checked="" type="checkbox"/> Large Scale <input type="checkbox"/> Small Scale Validation Phases: <input checked="" type="checkbox"/> Desk Review <input checked="" type="checkbox"/> Follow up interviews <input checked="" type="checkbox"/> Resolution of outstanding issues Validation Status <input type="checkbox"/> Corrective Actions Requested <input type="checkbox"/> Clarifications Requested <input checked="" type="checkbox"/> Full Approval and submission for registration <input type="checkbox"/> Rejected <p>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 11 July 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. 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 of ArcelorMittal Juiz de Fora, Brazil," as described in the PDD, version 02.7 of 21 June 2012, meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology AM0082 version 1. Hence DNV requests the registration of the project as a CDM project activity. Brazil meets all relevant participation requirements.</p>		
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<i>Table of Content</i>	<i>Page</i>
ABBREVIATIONS.....	II
1 EXECUTIVE SUMMARY – VALIDATION OPINION	1
2 INTRODUCTION	3
2.1 Objective	3
2.2 Scope	3
3 METHODOLOGY.....	4
3.1 Desk review of the project design documentation	4
3.2 Follow-up interviews with project stakeholders	10
3.3 Resolution of outstanding issues	11
3.4 Internal quality control	13
3.5 Validation team	13
4 VALIDATION FINDINGS	14
4.1 Participation requirements	14
4.2 Project design	14
4.3 Application of selected baseline and monitoring methodology	16
4.4 Project boundary	22
4.5 Baseline determination	25
4.6 Additionality	28
4.7 Monitoring	34
4.8 Algorithms and/or formulae used to determine emission reductions	41
4.8.1 Baseline Emissions:	41
4.8.2 Project emissions	42
4.8.3 Leakage	44
4.8.4 Emission Reductions	44
4.9 Environmental impacts	45
4.10 Comments by local stakeholders	45
4.11 Comments by Parties, stakeholders and NGOs	45
Appendix A Validation Protocol	
Appendix B Curricula vitae of the validation team members	



Abbreviations

AMS	Associação Mineira de Silvicultura
BEN	Brazilian Energy Report
CAF	Companhia Agrícola e Florestal Santa Bárbara
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction(s)
CH ₄	Methane
CL	Clarification request
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
FAR	Forward Action Request
FEAM	Environment Minas Gerais State Agency
GHG	Greenhouse gas(es)
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)
MCD	Cubic meter of charcoal
MDF	Medium-density fibreboard
N ₂ O	Nitrous oxide
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PDD	Project Design Document
SEMAD	Environment Minas Gerais State Secretary
st	Stereo meter (Cubic meter of wood stacked)
tCO ₂ e	Tonnes of CO ₂ equivalents
TKU	Tonne of cargo per useful kilometer (railway transportation)
UNFCCC	United Nations Framework Convention on Climate Change
GWP	Global Warming Potential



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 of ArcelorMittal Juiz de Fora, Brazil,” in Brazil. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host Party criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

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

The project participants are ArcelorMittal Brasil S.A. and Instituto Totum from the host Party Brazil. No participating Annex I Party is yet identified. Brazil meets all relevant participation requirements.

The “Use of Charcoal from Renewable Biomass Plantations as Reducing Agent in Pig Iron Mill of ArcelorMittal Juiz de Fora, Brazil,” involves the construction and assembling 2 new blast furnaces, as well as, implement new eucalyptus forest plantation and invest on clones and fertilization on existent forest to produce sustainable charcoal to fuel these new blast furnaces of ArcelorMittal Juiz de Fora facilities.

By promoting renewable energy, the project is in line with the current sustainable development priorities of Brazil.

The project correctly applies the baseline and monitoring methodology AM0082, version 1 “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 reducing agent in the new iron ore reduction process (Blast furnace), thereby avoiding the use of coke and reducing GHG emissions.

As a result, the project results in reductions of CO₂ emissions that are real, measurable and give long-term benefits to the mitigation of climate change. The baseline methodologies have been correctly applied and the assumptions made for the selected baseline scenario are sound. It is sufficiently demonstrated that the project is not a likely baseline scenario and that emission reductions attributable to the project are 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 460 474 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 of ArcelorMittal Juiz de Fora, Brazil,” in Brazil, as described in the PDD, version 02.7 dated 21 June 2012, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies



the baseline and monitoring methodology AM0082, version 1 . Hence, DNV requests the registration of the project as a CDM project activity.

Rio de Janeiro and Oslo, 12 November 2012



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Edwin Aalders
Approver
DNV Climate Change Services AS



2 INTRODUCTION

ArcelorMittal Brasil S.A. 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 of ArcelorMittal Juiz de Fora, Brazil,* project in Brazil (hereafter called “the project”).

This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board.

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 /2/ 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). The validation was based on the recommendations in the Validation and Verification Manual /38/.

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.

* Project name in the PDD published for Global Stakeholder Consultation was “Use of Charcoal from Renewable Biomass Plantations as Reducing Agent in Pig Iron Mill at ArcelorMittal Juiz de Fora, Brazil”, but has been corrected to “Use of Charcoal from Renewable Biomass Plantations as Reducing Agent in Pig Iron Mill of ArcelorMittal Juiz de Fora, Brazil”..



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/	ArcelorMittal Brasil S.A. and Instituto Totum :CDM-PDD for project activity “Use of Charcoal from Renewable Biomass Plantations as Reducing Agent in Pig Iron Mill of ArcelorMittal Juiz de Fora, Brazil,” in Brazil, Version 1 dated 16 June 2010
/2/	ArcelorMittal Brasil S.A. and Instituto Totum CDM-PDD for project activity “Use of Charcoal from Renewable Biomass Plantations as Reducing Agent in Pig Iron Mill of ArcelorMittal Juiz de Fora, Brazil,” in Brazil, Version 02.7 dated 21 June 2012
/3/	ArcelorMittal Brasil S.A. and Instituto Totum: CERs calculation spreadsheet, Version 1, Date 5/12/2011
/4/	<p>ArcelorMittal: CDM consideration</p> <ul style="list-style-type: none"> • PwC report to Arcelor France about Charcoal CDM in Brazil on 27 May 2002 • PwC report to CAF/Belgo about Charcoal CDM issued on June 2004 • Arcelor/CAF Sustainability Belgo Program Seminar on 14/09/2004 • Arcelor - Sustainability Belgo Program stakeholders presentation on 3 December 2004, including the CER generation by the project; • Arcelor - Sustainability Belgo Program status January, March, May 2006 • <i>Encontro Brasil – América do Sul</i>, 18 and 19 September 2003 • <i>Minute of meeting which defined the plan of action of Belgo sustainable development program</i>, August 2004 • <i>Crescimento Sustentado da Belgo em Minas Gerais</i>, 22 September 2004
/5/	<p>Belgo Mineira/Arcelor</p> <p>Sustainability Belgo Program: meeting on 23 December 2005 establishing the work plan to 2006</p> <p>Sustainability Belgo Program: meeting on 20 February 2006 for accompaniment of work plan.</p>
/6/	<p>ArcelorMittal Brasil S.A. and Instituto Totum:</p> <p><i>Letters from stakeholders regarding the stakeholder consultation</i>, February–April 2010</p>
/7/	<p>Paul Wurth : ArcelorMittal Brasil S.A. Juiz de Fora Blast Furnace specification</p> <p>http://www.paulwurth.com/pt/NOSSAS-ATIVIDADES/Fabrica%C3%A7%C3%A3o-de-ferro/Constru%C3%A7%C3%A3o-e-Moderniza%C3%A7%C3%A3o-de-Altos-Fornos</p>



/8/	Paul Wurth: Consolidate Commercial proposal <i>O-16/1270</i> , 6 April 2005
/9/	ArcelorMittal Brasil S.A. and Paul Wurth do Brasil Tec. Equi. Metal. Ltda contract #UJ-AC-0001-GGEP 024/05 signed on 12 August 2005
/10/	ArcelorMittal Brasil S.A.– BioFlorestas: Incra land registration
/11/	ArcelorMittal Brasil S.A.– BioFlorestas: Forest Inventory
/12/	ArcelorMittal Brasil S.A.– BioFlorestas: plantation records: FCP 007/1980 Ibitira Munic. Área 2420G
/13/	ArcelorMittal Brasil S.A.– BioFlorestas: Land locations ppt, #15-12-00-45, #72-01-01-014 issued 30 Aug 2010
/14/	ArcelorMittal Brasil S.A. – BioFlorestas: Land drawing center west Minas Gerais state (Bom Despacho, Martinho Campos, Ibitira and Dores Indaia) issued on March 2008
/15/	ArcelorMittal Brasil S.A. – BioFlorestas: Land drawing north Minas Gerais state #72-01-01-020 and # 72-01-01-014 (Carbonita, Diamantina, Itamarandiba, Capelinha, Veredinha and Minas Novas) issued on March 2008
/16/	ArcelorMittal Brasil S.A.– BioFlorestas: Land drawing Rio Doce region (Dionisio and São Pedro Ferros) issued on June 2007
/17/	ArcelorMittal Brasil S.A.– BioFlorestas: Land drawing south Bahia state (Prado - Alcobaça) issued on August 2008
/18/	ArcelorMittal Brasil S.A. João Monlevade Blast Furnaces coke rate 2001-2004 spreadsheet v01
/19/	ArcelorMittal Brasil S.A. ship cargo report of imported coke to João Monlevade Blast Furnaces Jan-Dec 2007.
/20/	ArcelorMittal Brasil S.A. Brazilian DNA meeting record (PC12) on 08 June 2005
/21/	ArcelorMittal Brasil S.A. Steel history - timeline http://www.belgo.com.br/conglomerado/historico/linha_tempo/
/22/	ArcelorMittal Brasil S.A. BioFlorestas - Forest Management Plan http://www.arcelormittalbioenergia.com.br/index.asp?Grupo=2&SubGrupo=59
/23/	<p>ArcelorMittal Brasil S.A. BioFlorestas: CAF boarding meeting about the change from charcoal activity:</p> <ul style="list-style-type: none"> • 05/01/1993 - Negotiation with Aracruz and Cenibra for sold forests; • 21/05/1993 – Clarification of Cenibra agreement; • 19/11/1993 – Considerations about Santa Barbara forests to be sold to Cenibra; • 17/05/1994 – Approval of Martinho Campos wood mill; • 10/06/1994 – Consideration about the activities reduction with consequent loses and timeline of Bom Despacho wood mill implementation; • 17/08/1994 – Comments about wood exportation possibility, sold raw wood on the open market, urgency to sold forest; • 18/11/1994 – Consideration about Bom Despacho forest to be sold to Samarco and urgency to conclude the others negotiation of forests; • 19/03/1995 – Comments about negative result of 2 wood exportation and pressure to identify alternative options to CAF; • 16/02/1996 – MDF project and conclusion of sold forest at Bom Despacho to Cenibra;



/24/	BRANDT Meio Ambiente: Environment Impact Study for 2 Blast Furnaces Implementation (<i>Estudo de Impacto Ambiental/Relatório de Impacto Ambiental – Implantação de dois alto-fornos</i>) October 2004
/25/	PriceWaterhouseCoopers: CDM in Brazil report to Arcelor France –, 27 May 2002 GHG consultancy proposal (<i>Proposta para prestação de serviços relacionados a Projetos de Redução de GEE</i>), June 2003 Sustainability Program of Belgo consultancy proposal (<i>“Proposta para prestação de serviços de elaboração do “Programa BELGO de Sustentabilidade”</i>), July 2004 <i>Diagnóstico de Oportunidades de Projetos de Redução de Gases de Efeito Estufa na CAF</i> , 11 December 2003.
/26/	FEAM/COPAM: Blast Furnace Previous Environmental License #045, 12 July 2006 FEAM/COPAM : Blast Furnace Installation License #018, 6 February 2006 SEMAD/COPAM: Blast Furnace Operation License #0113 ZM, 10 December 2007
/27/	IEF Declaration for harvest and selling of planted forest http://www.ief.mg.gov.br/florestas/colheita-e-comercializacao-de-florestas-plantadas
/28/	IEF: Register Certificate by the Forest Entity – CRF 00062370-2, 31 January 2010
/29/	Geoconsult, Land Eligibility Study for PPF project according CDM-UNFCCC rules, 2009
/30/	Meeting of the directorship for monitoring of Program Belgo Sustainability on 20 February 2006
/31/	Totum CDM Services Proposal issued on 2 July 2007
/32/	Totum CDM Services Contract signed on 25 February 2008
/33/	Indicative Term Sheet for a Transaction of Emission Reductions Certificates between KfW Arcelor Mittal Brasil S.A. issued on 29 October 2009
/34/	Cia Belgo Mineira and CAF agreement establishing the total area available for forest activity of 97.605,14 ha signed on 1 September 2003
/35/	ArcelorMittalBioFlorestas Ltda Sales invoice # 01890 issued on 01 October 2010 evidenced the permission from IEF according DEC 96044/88 and the tractability from the own forest as number DCC 242605-B and the lock 54406.
/36/	Belgo/Arcelor&Caf Small Farmers Program <ul style="list-style-type: none"> • PwC Forest Producer Program folder; • Forest Producers Cooperative of Zona da Mata – Minas Gerais State agreement signed on 21 November 2009; • CAF Santa Barbara (Belgo-Arcelor) and the farmer Tarcisio Bomtempo Martins agreement on Small Farmer Program, signed on 5 December 2007 considering the permission to use the 30 ha of land to produce eucalyptus wood, with responsibility of CAF to arrange the environmental licensing.

3.1.2 LETTERS OF APPROVAL

/37/	Comissão Interministerial de Mudança Global do Clima (DNA of Brazil): <i>Letter of approval</i> issued on 17 October 2012. http://www.mct.gov.br/index.php/content/view/57967/57967.html (project # 389/2012)
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3.1.3 METHODOLOGIES, TOOLS AND OTHER GUIDANCE BY THE CDM EXECUTIVE BOARD

/38/	CDM Executive Board: <i>Validation and Verification Manual</i> . Version 01.2
/39/	CDM Executive Board: <i>Baseline and monitoring methodology AM0082</i> “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
/40/	CDM Executive Board: <i>Baseline and monitoring methodology AM0041</i> “Mitigation of Methane Emissions in the Wood Carbonization Activity for Charcoal Production” version 1
/41/	CDM Executive Board: <i>Combined tool to identify the baseline scenario and demonstrate additionality</i> , Version 4
/42/	CDM Executive Board: <i>Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion</i> , Version 2
/43/	CDM Executive Board: <i>Estimation of direct nitrous oxide emission from nitrogen fertilization</i> , Version 1
/44/	UNFCCC - EB: Global Stakeholders Consultation http://cdm.unfccc.int/Projects/Validation/DB/J8FCIF2GBXEOLBK7RXX62128L0A4Q8/view.html
/45/	ArcelorMittal – Tubarão - Sol Coqueria EB: Global Stakeholders Consultation http://cdm.unfccc.int/Projects/Validation/DB/F8HMNGC2JXMIIA3XNFAZIHTZPZCTXN/view.html

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

/46/	ArcelorMittal BioFlorestas http://www.arcelormittalbioenergia.com.br/
/47/	ArcelorMittal BioFlorestas Programa Produtor Florestal (PPF) http://www.arcelormittalbioenergia.com.br/index.asp?Grupo=2&SubGrupo=9
/48/	ArcelorMittal Brasil S.A. Sustainability Report 2009 http://www.arcelor.com.br/relacoes_investidores/relatorios_stakeholders/anual_social_ambiental/pdf/relatorio_sust_2009.pdf http://www.arcelor.com.br/english/sustainability/report/pdf/sustainability_report2008.pdf
/49/	ArcelorMittal Brasil S.A. http://www.cst.com.br/index.asp http://www.cst.com.br/usina/fluxo_producao/popfluxo.htm
/50/	ArcelorMittal Brasil S.A. Charcoal use on Blast Furnaces of ArcelorMittal Juiz Fora http://www.ecolatina.com.br/pdf/anais/Workshop_Mudancas_Climaticas_Siderurgia/CarlosAlexandreMiranda.pdf
/51/	ArcelorMittal Brasil S.A. Blast Furnace start up 27 February 2007 http://www.arcelor.com.br/imprensa/noticias/noticia_imprensa.asp?noticiaId=73333343323333233432334324343334333447D616256304374D2189D1434D7458D06698653BC6
/52/	IEF - MG – Forest regulations http://www.ief.mg.gov.br/florestas http://www.ief.mg.gov.br/produtos-florestais?task=view
/53/	IBAMA – List of pig iron companies cited http://www.ibama.gov.br/wp-content/files/Relacao-empresas-autuadas.pdf
/54/	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
/55/	AMS: Calais, D., "Floresta Energética no Brasil – Demanda e Disponibilidade", April 2009 http://www.silviminas.com.br/Publicacao/Arquivos/publicacao_472.pdf
/56/	AMS – 2009 Yearly Statistics http://www.ciflorestas.com.br/arquivos/doc_numeros_2009_14292.pdf
/57/	ABRAF – 2009 Statistics http://www.abraflor.org.br/estatisticas/ABRAF10-EN/capitulo04.pdf
/58/	IBS Brazilian Steel Institute. Participants http://www.acobrasil.org.br/site/portugues/instituto/associadas.asp
/59/	CSN (Companhia Siderúrgica Nacional) – <i>Perspectivas para a Siderurgia Brasileira</i> , 5 May 2009.
/60/	BNDES: <i>A questão Florestal e o Desenvolvimento</i> , 8 July 2003
/61/	BNDES – <i>Possibilidades de aproveitamento do carvão metalúrgico brasileiro</i> , March 2006
/62/	BNDES – Basic inputs area contracting (Direct operation 2010): Expansion of annual production capacity of plant João Monlevade from 1.2 to 2.4 MMt steel; reform blast furnace nos.1 and 2 of Tubarão facilities capacity expansion. Annual production of charcoal ArcelorMittal BioFlorestas Ltd from 150,000 to 450,000 tons. #17469701000177 = R\$ 171,307,961,34 and # 17469701000177 = R\$ 1,365,197,291,31 http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Galerias/Arquivos/consultas/projetosAIB2010.xls
/63/	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
/64/	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/bndes/set3006.pdf
/65/	BNDES – Vital M.A, Pinto M.: As florestas e o painel de mudanças climáticas da ONU
/66/	BNDES – Vital M.A, Florestas Independentes no Brasil, 2009
/67/	UnB (Universidade de Brasília) - <i>Reserva Legal e Gestão Ambiental da Propriedade Rural</i> , Liliane Miranda Joels, available at (accessed in July 2010): http://www.fazendeiro.com.br/Cietec/artigos/ArtigosTexto.asp?Codigo=368
/68/	CI-Florestas: Forest financing. http://www.ciflorestas.com.br/texto.php?p=financiamento
/69/	Sindifer: <i>Study of pig-iron producers in Brazil – Annuary 2007</i> , December 2007, available at (accessed in July 2010): http://www.sindifer.com.br/Anuario_2007.html
/70/	Sindifer – associates relation http://www.sindifer.com.br/associadas.html



/71/	Brasil Engenharia: <i>Consumo de energia e emissão dos gases do efeito estufa no transporte de cargas no Brasil</i> , Jose Manuel Ferreira Gonçalves and Gilberto Martins http://www.brasilengenharia.com.br/ed/586/Art.Transporte_1.pdf
/72/	Comex Net: Distance between the railway in Tubarão and Ouro Branco cities Google: Distance between Ouro Branco and Juiz de Fora cities (through a highway) http://www.comexnet.com.br/comexnet/transporte_nacional/index.cfm?pag=distancia_ferrovias.cfm
/73/	EPE: National Energetic Balance of Brazil 2009, available at (accessed on July 2010): www.epe.gov.br/Estudos/Documents/Estudos.../20090415_1.pdf
/74/	IPCC: Guidelines 2006, available at (accessed on July 2010): http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html
/75/	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
/76/	IBGE – Brazilian Biomass Map http://www.ibge.gov.br/home/presidencia/noticias/21052004biomasshtml.shtm
/77/	IBGE – Brazilian Whether http://www.ibge.gov.br/home/geociencias/default_prod.shtm#HIDROGEO
/78/	Minas Gerais State Legislation - Law 14,309/02 http://hera.almg.gov.br/cgi-bin/nph-brs?d=NJMG&f=L3;1:Lei+adj+14309+adj+2002[NORM];all:njmg&l=20&n=&p=1&r=1&u=http://www.almg.gov.br/njmg/chama_pesquisa.asp&SECT1=IMAGE&SECT2=THESOFF&SECT3=PLUROFF&SECT6=HITIMG&SECT7=LINKON&SECT8=DIRINJMG&SECT9=TODODOC&co1=E&co2=E&co3=E&co4=E&s1=&s2=10561&s3=1991&s4=&s5=
/79/	IEF – Environmental Licencing for Agricultural Activities. http://www.ief.mg.gov.br/component/content/46?task=view
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/81/	Infobios: Eucalyptus plantation http://www.infobios.com/Artigos/2009_3/eucalipto/index.htm
/82/	U.S. Department of Labor's List of Goods Produced by Child Labour or Forced Labour, 2010 http://www.dol.gov/ilab/programs/ocft/pdf/2010TVPRA.pdf
/83/	Vital, M. H. (2009, 03). <i>Florestas Independentes no Brasil</i> . . From http://www.bndes.gov.br/SiteBNDES/export/sites/default/bndes_pt/Galerias/Arquivos/conhecimento/bns-et/Set2903.pdf
/84/	Januário, Viviane P. S. Forest Activities Financing Lines, UFRRJ – Forest Institute, 2008. http://www.if.ufrrj.br/inst/monografia/Viviane_Januario.pdf
/85/	AMBio FMP. (n.d.). Retrieved 11 16, 2010 from http://www.arcelormittalbioenergia.com.br/arquivos/PLANO%20DE%20MANEJO%20FLORESTAL_a_nexo_68.pdf
/86/	Norma Ambiental Environmental Lawyer Office: Brazilian Environmental Legislation collecting of 2009 - Legis Ambiental
/87/	Brazilian DNA: Resolution 7 regarding stakeholder consultation, 31 March 2008
/88/	CAF: Memory timeline of change from charcoal to wood mill and raw wood activities http://www.fundacaoarcelormittalbr.org.br/arquivos/boletim_13_-_caf_-_companhia_agricola_e_florestal_santa_barb.pdf
/89/	horia: Report for fuel change of six old blast furnaces at Monlevade from



	charcoal to coal coke on 1996, http://www.fundacaoarcelormittalbr.org.br/arquivos/boletim_96_-_a_tecnologia_dos_alto-fornos.pdf
/90/	ArcelorMittal Inox (Acesita) : Blast furnaces fuel http://www.arcelormittalinoxbrasil.com.br/ing/desenvolvimento_sustentavel/estrategia.asp http://www.acesita.com.br/port/relatorio/relatorio06/anual2006.pdf
/91/	Gerdau : Blast furnaces fuel http://www.gerdau.com.br/sobre-gerdau/unidades-no-brasil-interna.aspx?Codigo=c98a4f75-5d3f-421c-ad79-37a4760b8de5 http://www.gerdau.com.br/sobre-gerdau/unidades-no-brasil-interna.aspx?Codigo=6aa695db-8c09-4c67-9b12-1f93c727031e
/92/	GHG Protocol Brazilian Program – 2010 Tool. http://www.ghgprotocolbrasil.com.br/cms/arquivos/ferramentas_2010_v2.xls
/93/	Vale – diesel specific consumption of railway engine http://web.archive.org/web/20090508013621/http://www.vale.com/vale/templates/htm/vale/hot_sites/br_e_xtrafiles/infodin/ra2001/logistica_ferrovias.htm http://www.antt.gov.br/relatorios/ferroviario/concessionarias2004/10-MRSLOGISTICA2.pdf http://www.antt.gov.br/relatorios/ferroviario/concessionarias2004/8-FCA-FERROVIACENTRO-ATLANTICA.pdf
/94/	Lara, Mauricio, Steel industry in Brazil – First Blast Furnace http://www.uai.com.br/UAI/html/sessao_2/2008/06/15/em_noticia_interna,id_sessao=2&id_noticia=67365/em_noticia_interna.shtml
/95/	REIS, M. G. F. et al. <i>Seqüestro e armazenamento de carbono em florestas nativas e plantadas dos Estados de Minas Gerais e Espírito Santo</i> . Rio de Janeiro, 1994. Anais. Rio de Janeiro: Vale, 1994. Seminário.
/96/	Minas Gerais - Zona da Mata: Vegetation assesement http://www.asminasgerais.com.br/zona%20da%20mata/uniVlerCidades/geografia/index.htm http://en.wikipedia.org/wiki/Zona_da_Mata_(Minas_Gerais)
/97/	Brazilian Cellulose producers Brazilian Association of Planted Forest Producers http://www.abraflor.org.br/ Aracruz Celulose http://www.aracruz.com.br/home.do/ http://www.fibria.com.br/pt/ Celulose Nipo Brasileira http://www.cenibra.com.br/cenibra/english/
/98/	Minas Gerais natural gas company. http://www.gasmig.com.br/Home/Default.aspx
/99/	Brazilian Legislation: Law 5.106/1966 about forest fiscal incentives http://legislacao.planalto.gov.br/legisla/legislacao.nsf/Viw_Identificacao/lei%205.106-1966?OpenDocument

3.2 Follow-up interviews with project stakeholders

On 11 August 2010 DNV visited the ArcelorMittal Juiz de Fora steel plant in order to verify the Blast Furnaces, reception, treatment, storage and use of charcoal and check the consumption rate according the carbonization facilities.

On 30 September and 01 October 2010, DNV visited the ArcelorMittal BioFlorestas in order to visit the eucalyptus forest on Bom Despacho and Buritis municipalities and the respective Garça and Martinho Campos carbonization facilities

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 ArcelorMittal Brasil S.A. /100//103//104//105/, and representatives of Totum /101//102/ were interviewed.

	Date	Name	Organization	Topic	
/100/	11 Aug 2010	Rodrigo L. Almeida	ArcelorMittal	<ul style="list-style-type: none">➤ Blast Furnaces, reception, storage and use of charcoal and consumption rate➤ Baseline determination project➤ Applicability of methodology➤ Issues related to the additionality➤ Common practice analysis	
/101/		Natalia Pasishnyk	Totum		
/102/		Carlos Delpulpo			
/103/	30 Sep 2010	Boanerges Oliveira	ArcelorMittal BioFlorestas		<ul style="list-style-type: none">➤ ArcelorMittal BioFlorestas eucalyptus forest and the carbonization facilities➤ Emission reductions calculationEmission reduction monitoring plan and project management;➤ Consulting process for stakeholder’s comments
/104/		Wanderley L. Cunha			
/105/		Roosevelt P. Almada			
		Natalia Pasishnyk	Totum		
		Carlos Delpulpo			

3.3 Resolution of outstanding issues

The objective of this phase of the validation is to resolve any outstanding issues which needed be clarified prior to DNV's positive conclusion on the project design. In order to ensure transparency a validation protocol was customised 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 organises, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The validation protocol consists of 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 of ArcelorMittal Juiz de Fora, 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 organised 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 are 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

<i>Role</i>	<i>Last Name</i>	<i>First Name</i>	<i>Country</i>	<i>Type of involvement</i>					
				Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	TA 4.3 competence
Team leader (Validator/Expert)	Tavares	Luis Filipe	Brazil	✓	✓	✓	✓		✓
Assessor under training	Philipi	Fabiana	Brazil	✓					
Technical reviewer	Astakala	Vidyacharan	India					✓	
Person with sectoral competence assisting technical reviewer	van Evercooren	Jan	Belgium						✓

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 02.7 dated 21 June 2012.

4.1 Participation requirements

The project participants are ArcelorMittal Brasil S.A. and Instituto Totum of host Party Brazil. By this time, no project participant from any Annex I Party has being defined. The host Party (Brazil) meets all relevant participation requirements.

A letter of approval (LoA) /37/ was issued by DNA of Brazil on 17 October 2012, authorizing ArcelorMittal Brasil S.A. and Instituto Totum of host Party Brazil as project participants and confirming that the project assists in achieving sustainable development.

The letter of approval was received from the project participants. DNV does not doubt the authenticity of the letters of approval. DNV considers the letters are in accordance with paragraphs 45- 48 of the VVM /38/.

4.2 Project design

The purpose of this project activity is to implement new eucalyptus forests and invest with clones and fertilizer on existent eucalyptus forest in order to produce renewable biomass to be processed on carbonization units to produce charcoal. This charcoal is used as reducing agent in the new iron ore reduction process (Blast furnace), thereby avoiding the use of coke to fuel the blast furnaces and consequently reducing GHG emissions. Details of facilities and process are described below.

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 ArcelorMittal BioFlorestas is established mainly around Dionisio, Santa Barbara, Martinho Campos, Carbonita, and Itamarandiba Municipalities with 105,000 ha total area and 63,000 ha planted area /10//12//13//14//15//16/. These plantations are located around the carbonization facilities, identified and located on table below.

The ArcelorMittal BioFlorestas's Forest Producer Program – PPF are located mainly around Juiz de Fora, Santos Dumont, Leopoldina, Andrelandia and Lima Duarte municipalities with 7,000 ha total area and 680 ha planted area at the moment of contract signature. All areas are located in Minas Gerais State /29/.

The Forest Inventory /11/ is an internal databank of ArcelorMittal BioFlorestas that contains all information on forestry operations, occurrences and harvesting/transportation provided by regional supervisors. The Forest Inventory makes part of the System of Forest Register, an "all-inclusive" database centralized in ArcelorMittal Headquarters in Belo Horizonte.

As verified during site visit, all forest (own and PPF) area are registered in ArcelorMittal BioFlorestas system /11/ and linked with Forest Environment Licences /27/, properties



certificates registered on Official Land Register of Minas Gerais State/10/ , which could confirm the location, area, and first plantation.

DNV has assessed through land use maps /10/ /12/ /13/ /14/ /15/ /16/ /17/ and land eligibility study that new plantations are established on grasslands/29/. The description of categories areas was confirmed through Biomass Brazilian Maps /75/ /76/. As well as the Minas Gerais State are located between 14°S and 23°S with rain between 1000 and 1500 mm/y /77/.

A cross check of some forests sampled on List of Plantation areas of ArcelorMittal Bioenergética (Annex 5 of PDD version 02.7 dated 21 June 2012), verified during site visit, on Buritis area of Center West Region of Minas Gerais State were identified on GIS cartography system and confirmed through Google Earth internet system.

In order to confirm the production of renewable biomass common practice in Brazil, DNV has assessed, through the Brazilian Enterprise for Agricultural Research- EMBRAPA the forest report /80/ that describe as common practice in Brazil, the eucalyptus production system is to have three rotations with harvest period of 7 years /80/.

Charcoal production:

The carbonization facilities of ArcelorMittal Bioenergética are located on the following municipality with the geographic coordinates:

Region	Municipality	Unit	Geographical coordinates	
Centro Oeste	Bom Despacho	Garça	19°40'49"S	45°22'38"W
Centro Oeste	Quartel Geral	Fazendinha	19°18'13"S	45°27'33"W
Centro Oeste	Martinho Campos	Buritis	19°27'11"S	45°18'18"W
Rio Doce	Dionísio	Requerente	19°53'16"S	42°36'36"W
Carbonita	Carbonita	Forquilha	17°41'25"S	43°16'36"W

Steel and iron mill (Blast Furnaces):

BR 040 – Km 769, Juiz de Fora Municipality, Minas Gerais State. (geo-geographical coordinates: 21°37'40"S and 43°27'47"W).

The project activity is the implementation of two new blast furnaces /9//10/ with installed capacity of 514 t/day of pig iron or 180,000 t/year each and a total of 360,000 t/year pig iron.

The specification includes:

Working volume:	250 m ³	Inner volume:	285 m ³
Hearth Diameter (A):	4 300 mm	Throat Diameter(B):	3 750 mm
Effective height (C):	15.179 mm	Top pressure:	0,35 bar (max)
Blowing flow:	28 000 Nm ³ /h	Blowing air temperature :	800 °C
Number of tuyères	= 12	Number of Glendons	4

This information was verified during the site visit and can also be verified through Paul Wurth project specification /7/ the project EIA and environmental licenses/26/.



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

The starting date of the project activity is 12 August 2005 which is the date of the investment in the blast furnace construction contract between ArcelorMittal Brasil S.A. (as the previous name of Belgo Siderúrgica S.A.) and Paul Wurth do Brasil /9/. The minimum operational lifetime of the project activity is 20 years, considering the common lifetime of existent Blast Furnaces of Belgo Siderúrgica /21/ and according to Paul Wurth project specification /7/. The crediting period is 7 years (renewable).

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

DNV was able to verify that the project meets all applicability criteria of the baseline methodologies and the applicability of this methodology is justified since:

Table 2 Justification of the applicability for the criteria set as per AM0082 version 1

Methodology applicability criteria	Applicable or not relevant	Justification / Explanation of Proposed Project Activity
<i>Emission reductions are from partial or complete use of renewable reduction agents from dedicated plantations instead of fossil fuel.</i>	Applicable	DNV has assessed during the site visit that only charcoal manufactured from dedicated plantations /22/ is used as iron ore reducing agent on two Blast Furnaces /9/ /10/ /26/ installed on ArcelorMittal Juiz de Fora facilities through the charcoal sales invoices /35/ presented during the reception of charcoal. Only charcoal produced by ArcelorMittal Bio Florestas is received on blast furnace plant.
<i>Blast furnace technology is used</i>	Applicable	DNV has assessed during the site visit that the project activity uses blast furnace technology furnaces /9//10/. This information can also be verified through the project specification /7/, EIA and environmental licenses /26/.
<i>New iron ore reduction systems (new investment)</i>	Applicable	DNV has assessed quotation regarding the implementation of two blast furnaces in the Cia. Siderúrgica Belgo Mineira (ArcelorMittal Brasil S.A.) plant in Juiz de Fora, Minas Gerais state (investment type 4) /9/. Also, the project consists on investing in dedicated plantations (investment type 1) /10//13/ and establishment of specific long-term



		binding contracts for the supply of reducing agents as PPF (investment type 2) /29/.
<i>All the corresponding land – dedicated plantations – are geographically identified and delineated</i>	Applicable	<p>DNV has assessed the existent forest plantation of ArcelorMittal BioFlorestas is established mainly around Dionisio, Santa Barbara, Martinho Campos, Carbonita, Itamarandiba Municipalities /14//15//16/. The ArcelorMittal BioFlorestas's Forest Producer Program – PPF are located mainly around Juiz de Fora, Santos Dumont, Leopoldina, Andrelandia and Lima Duarte municipalities. All in Minas Gerais State /13/.</p> <p>As well as, DNV has assessed the Forest Cadastre, an internal databank of ArcelorMittal BioFlorestas, which contains all information on forestry operations /12/, occurrences, harvesting and transportation. The Forest Cadastre makes part of the System of Forest Register, an "all-inclusive" database centralized in ArcelorMittal Headquarters in Belo Horizonte.</p> <p>As verified during site visit, all forest area are registered in ArcelorMittal BioFlorestas system /12/ and linked with Forest Environment Licences, properties certificates registered on Official Land Register of Minas Gerais State - INCRA /10/, which could confirm the location, area, and first plantation.</p> <p>DNV has assessed trough land use maps and land eligibility study that new plantations are established on grasslands /29/. The description of categories areas was confirmed trough Biomass Brazilian Maps /75//76/.</p> <p>A cross check of some forests sampled on Annex 5 of PDD version 02.7 dated 21 June 2012, verified during site visit, on Buritis area of Center West Region of Minas Gerais State were identified on GIS cartography system and confirmed trough Google Earth internet system.</p>



<i>Dedicated plantations in the host country are under the control of the projects participants</i>	Applicable	<p>DNV has assessed the existent planted eucalyptus is owned of ArcelorMittal BioFlorestas /10/ /12/ /35/, a branch of ArcelorMittal Brasil, owner of Blast Furnaces.</p> <p>The new forest plantations, which will be established under the auspices of ArcelorMittal BioFlorestas's Forest Producer Program known as PPF project is under a long term agreement and captive supplier of renewable biomass to produce charcoal /29/.</p>
<i>Dedicated plantations are located only in tropical conditions</i>	Applicable	<p>DNV has assessed trough land use maps and land eligibility study that new plantations are established on grasslands /29/.</p> <p>The description of categories areas was confirmed trough Biomass Brazilian Maps /75//76/. As well as the Minas Gerais State are located between 14°S and 23°S with rain between 1000 and 1500 mm/y /77/.</p>
<i>Demonstrated through evidence that plantation locations are established in categories areas: grassland, forest plantation after its last rotation and degraded areas</i>	Applicable	<p>DNV has assessed trough the documents Brazilian Enterprise for Agricultural Research - Embrapa Forest report /80/ and Infobios that the common practice in Brazil regarding eucalyptus production system is to have three rotations of 7 years, and as verified on the land registration, all old farms were implemented before 1980. As complementary evidence of last rotation, several evidences dated from 1993 to 1996 had demonstrated the declination of charcoal activity of CAF and intention to sell the eucalyptus forests to cellulose companies or implement wool mills.</p> <p>In addition, the land use maps /52/ and land eligibility study that new plantations are established on grasslands /29/ /76/.</p>
<i>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</i>	Applicable	<p>DNV has confirmed that the dedicated plantation is composed by reformed plantations (established on the own areas of ArcelorMittal BioFlorestas, the company established by project participant to raise eucalyptus) /10/ and</p>



<i>under a registered A/R CDM project activity, the dedicated (or part of the dedicated plantation) shall not be included in the project boundary</i>		newly plantations (plantations by forest farmers that produce wood in frames of ArcelorMittal BioFlorestas, named Forest Outgrowth Programme - PPF). On the moment when PPF is registered as an A/R CDM PoA, the newly established plantations as well as associated project emissions will be excluded form the boundary of this industrial project /29/.
<i>Renewable biomass and charcoal used in the new iron ore reduction system shall not be acquired from the market</i>	Applicable	DNV has confirmed that all the renewable biomass used will be provided by the reformed plantations (established on the own areas of ArcelorMittal BioFlorestas, the company established by project participant to raise eucalyptus) /10/ and newly established plantations (plantations by forest farmers that produce wood in frames of ArcelorMittal BioFlorestas, named Forest Outgrowth Programme – PPF, long-term contracts) /29/.
<i>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 project</i>	Applicable	DNV has confirmed that the dedicated plantation composed by reformed plantations (established on the own areas of ArcelorMittal BioFlorestas, the company established by project participant to raise eucalyptus) /10/ and newly established plantations (plantations by forest farmers that produce wood in frames of ArcelorMittal BioFlorestas, named Forest Outgrowth Programme - PPF) /29/. On the moment when PPF is registered as an A/R CDM PoA, the newly established plantations as well as associated project emissions will be excluded form the boundary of this industrial project.
<i>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</i>	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 /29/. At the time of verification of the CDM project activity, the DOE will verify that the plantation registered as an A/R CDM



VALIDATION REPORT

<i>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</i>		project activity from which the renewable biomass is sourced has generated cumulated net tCERs or lCERs /29/.
<i>The land area of dedicated biomass plantations shall be established either through direct planting and/or seedling</i>	Applicable	DNV has confirmed that according to the plantation management 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 /22/. The land areas of dedicated renewable biomass plantations (both in the own lands and through outgrowth) are established through seedling, as stated in the Forest Management Plan of ArcelorMittal BioFlorestas (AMBio FMP) /22/.
<i>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)</i>	Applicable	DNV has confirmed that no flood irrigation is expected to take place on the plantation sites that are not covered by the registered A/R CDM project /10/ /29/, it means, the own forest of ArcelorMittal Bioflorestas are old and no flood irrigation was done at forest management /22/.
<i>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)</i>	Applicable	DNV has confirmed that the new eucalyptus forest, to be implemented on PPF, are located mainly on southeast region of Minas Gerais state, where the main activity is production of extensive milk production and coffee, The inexistence of forest stock were confirmed by Geoconsult report: Land Eligibility Study for PPF project according CDM-UNFCCC rules /29/.
<i>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</i>	Applicable	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 since it is a Greenfield project /9/. In addition, the blast furnace gas have a low NCV (2.47 TJ/Gg) /74/



<i>equivalent energy outputs as the ones identified in the baseline scenario</i>		and has not commercial attractiveness compared with natural gas (44.2 TJ/Gg) /74/ available on the region /98/.
<i>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</i>	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 /7/. Also, the environmental implementation license was granted to a blast furnace that operates with renewable charcoal /26/.
<i>Tis 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.</i> <i>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.</i>	Applicable	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 the use of fossil fuel based (see section B4). The use of non-renewable charcoal is severely restricted by the environment license of Minas Gerais State /78/. However, as verified during site visit by DNV, all charcoal used by the ArcelorMittal Juiz de Fora Blast furnaces are produced from own sustainable eucalyptus forest as authorized by the IEF under controlled receipt for sustainable forest products /35/.
<i>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</i>		DNV has confirmed that Minas Gerais state has significant restriction to produce enough renewable charcoal to fuel all blast furnaces installed on Minas Gerais state, including ArcelorMittal Juiz de Fora blast furnace /55//56//57/, the pressure over the charcoal market will reflect the use of illegal non-renewable charcoal or the use of coal-coke as fossil fuel ArcelorMittal/Monlevade had changed on 1996, six old blast furnaces to be fueled from charcoal to coal coke due the restriction of charcoal supply /89/ DNV had confirmed that the area of forest available by CAF/ ArcelorMittal Bioenergia as 97.605,14 hectares that without



		<p>investment of fertilization and clones, and the final productivity of forest will decrease from 17.2 to 12.04 after one rotation of 7 years that would be insufficient to fuel the ArcelorMittal Juiz de Fora blast furnaces as the forest would produce only 82.4% of charcoal demand 52% at second rotation and as well as, this situation will reduced more on the subsequent rotations.</p> <p>Hence without project activity the ArcelorMittal Juiz de Fora would install the blast furnace fueled with coal coke.</p>
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The dedicated forest plantation is composed by reformed plantations (established on the own areas of ArcelorMittal BioFlorestas, the company established by project participant to raise eucalyptus) /10/ and newly established plantations (plantations by forest farmers that produce wood in frames of ArcelorMittal BioFlorestas, named Forest Outgrowth Programme - PPF) /29/. On the moment when PPF is registered as an A/R CDM PoA, the newly established plantations as well as associated project emissions will be excluded form the boundary of this industrial project as per paragraph 38 EB 25 and the boundary was restricted to reformed plantations and Blast Furnaces's ArcelorMittal Juiz de Fora.

The assessment of the project's compliance with the applicability criteria of AM0082 "(version 1) are documented in detail in section B.2 of Table 2 in the validation protocol in Appendix A to this report.

The AM0041 "Mitigation of Methane Emissions in the Wood Carbonization Activity for Charcoal Production" (version 1) is applicable only to calculate the CH₄ emissions in the renewable charcoal production process. No emissions reduction is requested with relation the methodology. Related issues are monitored according to the procedures of the approved methodology.

4.4 Project boundary

The project boundaries include:

- (i) 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 ArcelorMittal Brasil S.A. BioFlorestas: Incra land registration spreadsheet /10/, ArcelorMittal Brasil S.A. BioFlorestas: plantation records /12/ ArcelorMittal Brasil S.A. BioFlorestas: Land locations /13/ and ArcelorMittal Brasil S.A. BioFlorestas: Land drawing center west Minas Gerais state /14/, north Minas Gerais state /15/, Rio Doce region /16/ and south Bahia state /17/
- (ii) the physical site of the blast furnace where the iron ore reduction process takes place and /26/
- (iii) the transportation of the wood until the carbonization units and of the charcoal from the carbonization units until the blast furnace /35/, which is in accordance with the methodologies (see 4.2 above).



The reforestation activities on the lands of forest farmers participating in the PPF Program /29/ are undergoing the validation process simultaneously with the industrial component.

When the A/R CDM PoA of PPF (plantations by forest farmers that produce wood in frames of ArcelorMittal BioFlorestas, named Forest Outgrowth Program – PPF) /29/ project will be registered, the upstream project emissions associated with the establishment of plantations on these areas will be discounted.

As verified during site visit, all forest area are registered in ArcelorMittal BioFlorestas system /13/ /14/ /15/ /16/ /17/ and linked with Forest Environment Licences, properties certificates registered on Official Land Register of Minas Gerais State /10/, which could confirm the location, area, and first plantation.

DNV has assessed through land use maps and land eligibility study that new plantations are established on grasslands. The description of categories areas was confirmed through Biomass Brazilian Maps /75//76/. As well as the Minas Gerais State are located between 14°S and 23°S with rain between 1000 and 1500 mm/y /77/.

A cross check of some forests sampled on Annex 5 of PDD version 02.7 dated 21 June 2012, verified during site visit, on Buritis area of Center West Region of Minas Gerais State were identified on GIS cartography system and confirmed through Google Earth internet system



		GHGs	Description	DNV Assessment
Baseline emissions	Iron ore Reduction Process	CO ₂	Yes. Main source of baseline emissions	Blast furnace fuelled with coal coke as ArcelorMittal João Monlevade Blast Furnaces /7//18/
		CH ₄	Negligible and excluded for simplification	
		N ₂ O	Negligible and excluded for simplification	
	Reducing agents transportation	CO ₂	Yes. Coal coke transportation emissions	Coal coke transport from coke oven at ArcelorMittal Tubarão to ArcelorMittal Juiz de Fora /18//19//50//51//72/
		CH ₄	Negligible and excluded for simplification	
		N ₂ O	Negligible and excluded for simplification	
	Reducing agent production	CO ₂	Yes. Coal coke production emissions	Coal Coke production coke ovens at ArcelorMittal Tubarão /45/ /47/
		CH ₄	Negligible and excluded for simplification	
		N ₂ O	Negligible and excluded for simplification	
	Transportation of primary carbon sources	CO ₂	Existent but conservatively neglected	Transport of coal from outside country. Not applicable
		CH ₄	Negligible and excluded for simplification	
		N ₂ O	Negligible and excluded for simplification	
	Primary carbon source extraction	CO ₂	Existent but conservatively neglected	Mining of coal at outside country. Not applicable
		CH ₄	Existent but conservatively neglected	
		N ₂ O	Existent but conservatively neglected	
Project emissions	Iron ore Reduction Process	CO ₂	Due to the renewable biomass source and its fixation during the process, the CO ₂ emissions are negative. Considered Zero for conservativeness.	The pig iron is produced with around 6% of carbon content Not applicable as foot note 20 of AM0082
		CH ₄	Negligible and excluded because the differences in the baseline and project activity are not substantial.	
		N ₂ O	Negligible and excluded because the differences in the baseline and project activity are not substantial.	
	Reducing agents transportation	CO ₂	Yes. Fossil fuels consumption	Transport charcoal from carbonization units to ArcelorMittal Juiz de For a Blast Furnace /35/
		CH ₄	Negligible and excluded because	



	Reducing agent production		the differences in the baseline and project activity are not substantial	
		N ₂ O	Negligible	
		CO ₂	No. CO ₂ emissions in the carbonization process are expected to be neutral since all the wood carbonized will come from renewable sources.	
		CH ₄	Yes. Renewable biomass carbonization process	According AM0041/40/
	Transportation of primary carbon sources	N ₂ O	Negligible and excluded because the differences in the baseline and project activity are not substantial.	
		CO ₂	Yes. Fossil fuel consumption	Yield of carbonization units /10/
		CH ₄	Negligible and excluded for simplification	
	Primary carbon source extraction	N ₂ O	Negligible and excluded for simplification	
		CO ₂	Yes. Fossil fuels combustion in forest operations	Transport of wood to carbonization unit
		CH ₄	Biomass burning in the plantation establishment will not occur	
		N ₂ O	Yes. Application of fertilizers in the planting activity	Eucalyptus plantation /80//81/

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).

4.5 Baseline determination

Baseline regarding the use of reducing agents in the iron ore reduction process in blast furnaces was determined through methodology AM0082 (version 1) /39/ guidance and “Combined tool to identify the baseline scenario and demonstrate additionality” through the following steps:

STEP 1. Identification of baseline alternative scenarios

In accordance with AM0082 version 1 the following scenarios were identified:

- 1) Metallurgical coke iron ore reduction system.

The project participant would operate coke-based blast furnaces and there would be no need to guarantee supply of charcoal;

- 2a) Renewable charcoal iron ore reduction system from new planted biomass

The project participant would operate charcoal-fed blast furnaces, would opt for renewable charcoal from dedicated plantations and would establish these plantations in order to meet his own demand;

- 2b) Renewable charcoal iron ore reduction system from existing planted biomass



The project participant would operate charcoal-fed blast furnaces, would opt for renewable charcoal from dedicated plantations and would obtain it from the market;

3) Non-renewable charcoal iron ore reduction system

The project participant would operate charcoal-fed blast furnaces and would opt for non-renewable charcoal from natural forests (either available on the market and/or produced by project entity);

4) Iron ore reduction system based on the use of a mix of reducing agents

The project participant would operate charcoal-fed blast furnaces, mixing renewable and non-renewable charcoal.

The described scenarios are related to the use of reducing agents in the iron ore reduction process in blast furnaces.

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

The non renewable charcoal produced from native wood is illegal on Minas Gerais State which establish the use of 90% of wood coming from planted forest /78/, as well as, the production illegal of non renewable charcoal (native wood) is done with man power under undesirable conditions (child and forced labour).

According the pig iron register of Sindifer at Minas Gerais State /70/ and cross checking with the IBAMA pig iron companies cited list /53/ DNV could verify that 75% of companies were cited due the use of non renewable charcoal, only 10% were implemented reforestation program to get auto sustainability on 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 on Bahia, Mato Grosso e Mato Grosso do Sul states /54/.

Hence the Non-renewable charcoal (**scenario 3**) and a mix with non renewable charcoal (**scenario 4**) scenario were eliminated due the non-compliance to existing regulatory conditions on Brazilian and Minas Gerais State legislation /76/ and the sustainability commitment of ArcelorMittal /48/ to use only legal and licensed charcoal to fuel the Juiz de Fora Blast Furnace.

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

DNV had verified that Minas Gerais State has the biggest iron ore reserve in Brazil and the first Blast Furnace implemented in Brazil were installed at Morro do Pilar on Minas Gerais on 1815 /94/.

The development of forest plantations in Brazil has only started in 1967, in response to a federally subsidized reforestation program, enacted by the national government under law 5.106/1966 /99/. In response to the growing demand for wood-based industries and to limit deforestation practices, a fiscal incentives program (which was later referred to as Fiset) was implemented to stimulate the establishment of plantations/84/. The program lasted until 1988 and the state of Minas Gerais accounted for over 70% of the plantation projects /81/.

The plantation area has grown in response to the program. The total area of plantations in Brazil, almost non-existent before, increased to 6.5 million hectares in 1992 /95/. With the discontinuation of the Program in 1988, plantation establishment decreased, while harvesting of existing plantations continued at a rapid rate. The replacement of the Brazilian Institute for Forestry Development (IBDF) with the Brazilian Institute of Environment and Natural



Resources (IBAMA), in 1989, also emphasized a focus away from plantation forest establishment to native forest preservation and its sustainable management. As a result, charcoal consumption remained at rates similar to pre-1989 values and the area of plantations declined from 6.5 millions hectares in 1992 to 4.8 million in 1998 /95/.

The declining trends in plantation activity were strongly observed in the state of Minas Gerais (the project region), as it has historically dominated the Brazilian plantation sector, especially in terms of plantations for charcoal supply. The plantation forestry sector in the state has evolved hand-in-hand with the iron and steel industry. The rich-deposits of iron ore and the need for a thermal reduction agent (carbon) have led to the rapid depletion of the regional native forests. The end of the Fiset led to a marked drop in area under plantation establishment in Minas Gerais. This was followed by a reduction in the forest cover in the state, as the harvesting levels continued high, with almost no replanting.

In addition, DNV had confirmed that in 1992, the state was covered with over 2.6 million hectares of forest plantations. By 1998, this figure was reduced to 1.67 million hectares /95/. In 2003 and 2004, the forest plantation stock in Minas Gerais respectively accounted for 1.16 and 1.15 million hectares, 75% of which were established for charcoal supply.

According the 2008 AMS reports /55/ /56/ and ABRAF statistics /57/, the demand of charcoal for blast furnaces in Minas Gerais is supplied only with 52% of Brazilian sustainable forest /reforest. Specifically 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, what, considering 100 mcd/ha /55/ results on 6,558,700 mcd, which means only 31% of demand, which is insufficient to attend the market, and only could be supplied by non renewable (native) forest in Brazil.

The action of IBAMA /54/ had evidenced the scarcity of charcoal on Minas Gerais state, with the import illegal charcoal from Bahia, Mato Grosso e Mato Grosso do Sul states to supply the pig iron companies on Minas Gerais.

Conclusion of Step 1

The ArcelorMittal

The renewable charcoal iron ore reduction system from existing planted renewable biomass where the project activity could obtain it from the market (**scenario 2b**) was eliminated due the lack of existing plantations to supply the renewable biomass demand as it was verified a plantation deficits in Brazil, resulting in the near-exhaustion of the forest plantations established under the fiscal incentives. As well as, there is a lack of new forest plantations /19/ /20/).

DNV had confirmed that the actual area of forest available by CAF/ ArcelorMittal Bioenergia of 97.605,14 hectares /34/, that without investment of fertilization and clones, the productivity of degraded forest would be only 17.2 m³/ha/year /65/. Although this area and productivity will support the charcoal demand of ArcelorMittal Juiz de Fora blast furnaces at the first years, according the age of forest and more degradation the original productivity will decrease around 30% each rotation and will reach only 12.04 m³/ha/year after one rotation of 7 years /66/. This means that the original area would supply only 82.4% of blast furnaces charcoal demand after the first rotation, 52% after the second rotation and so on.

Hence, DNV confirmed that without the CDM project activity the ArcelorMittal Juiz de Fora blast furnace will not have sufficient available charcoal to continue the pig iron production.



The non renewable charcoal produced from native wood is illegal on Minas Gerais State which establish the use of 90% of wood coming from planted forest /78/, as well as, the production illegal of non renewable charcoal (native wood) is done with man power under undesirable conditions (child and forced labor), hence the Non-renewable charcoal (**scenario 3**) and a mix with non renewable charcoal (**scenario 4**) were eliminated.

Hence, after the analysis above, the realistic and credible option is metallurgical coke iron ore reduction system (**scenario 1**) and the renewable charcoal iron ore reduction system from new planted renewable biomass (**scenario 2a**).

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 4 according the methodology AM0082 version 1.

4.6.1 EVIDENCE FOR PRIOR CDM CONSIDERATION AND CONTINUOUS ACTIONS TO SECURE CDM STATUS

✓ *Retrospective*

As verified on historic records of CAF, the company, originally supplier of renewable charcoal to Belgo Mineira Monlevade Blast Furnaces, was submitted to a condition of close this activities when the Belgo Mineira had changed all blast furnaces on João Monlevade facilities to be fuelled with coal coke in 1994.

Several documents /23/ had evidenced that the CAF had reduced the amount of forest by:

- Sold some forest to cellulose companies;
- Start the implementation of wood mill;
- Sold charcoal for independent pig iron producers;
- Try to export eucalyptus wood;
- Start implementation MDF mill.

This situation was present until the change of share owner for ArcelorMittal, including the consolidation several activities of group in Brazil, and the identification the possible scenario to implement a new Blast Furnace at Juiz de Fora facilities, which until that was only steel producer using scrap on electric furnace and purchasing pig iron from the third suppliers /21/.

The possibility to implement the Blast Furnace fuelled with charcoal /24/ was possible only after the establish the program for recovered the old forest areas of CAF and complement the charcoal demand with new production of charcoal facility using new planted forest through the Forest Producer Program (PPF) /29/.



✓ *CDM consideration*

The first CDM serious consideration was evidenced on the Belgo Mineira/Arcelor board meeting records carried on 14 September 2004 when the CDM was included into the Sustainability Belgo Program /4/. This statement was consequence of a presentation from PWC /4/ (a consultancy firm) to Arcelor France that provide insights on status, risks and opportunities of developing Clean Development Mechanisms projects in Brazil in May 2002. It mentions the opportunities of developing CDM projects in some plants, including Belgo Mineira, where this project activity will be implemented (proposals of PWC services were issued in June 2003 and July 2004). Also, the possibility of using climate change mechanism as part of the company investments was assessed in the meeting of Arcelor companies in South America on September 2003.

DNV assessed a contract between PWC and CAF to the assessment and development of CDM projects in CAF (Compania Agrícola e Florestal Santa Bárbara dated December 2003 /25/. CAF was founded with the objective to establish and manage eucalypt plantations, manufacture charcoal and manage all rural programs of Belgo-Mineira).

The starting date of the project activity is 12 August 2005 which is the date of the investment in the blast furnace construction contract /9/. According the Glossary of CDM terms (EB66 annex 63), the construction of ArcelorMittal Juiz de Fora blast furnaces was the actual real action of CDM project activity as an irreversible process. DNV had confirmed that the old forests were involved to supply wood to cellulose manufacturers and charcoal to independent pig iron producers' /23/. The own blast furnace construction was the in equivoque eligible new investment for projects under AM0082 version 1. As well as, the paragraph of methodology with respect the Barriers Analysis was established that "*Considering the long-term maturity period associated with the establishment of plantation resources, a minimum period of 10 years prior to the start of the project activity shall be considered.*"

✓ *Continuation of CDM actions*

DNV has assessed and confirmed the follow actions:

- A minute of meeting from August 2004 which defined the action plan for Belgo sustainable development program, including the CDM project for forest activities /4/.
- The Belgo sustainable development program was presented to company board on September 2004; in order to approve the communication to the Brazilian government with the intention to submit a CDM project activity /4/.
- The Arcelor had included into the Blast Furnaces EIA from October 2004 that the Kyoto Protocol and the emission reductions is the base of the development of the project activity and decision making on investment /24/ in order to be approved by the Minas Gerais Environmental Agency and consider the use of charcoal as fuel to the blast furnace.
- ArcelorMittal Belgo had submitted, in June 2005, to Mr. José Domingues Miguez (coordinator of the Brazilian DNA) the CDM project details in order to identify the approach to submit the CDM project to Brazilian approval, once the methodology AM0082 was not approved yet by the EB.
- ArcelorMittal Belgo and PWC had implement meetings in 23 December 2005 and 20 February 2006 in order to prepare the PIN of the CDM project
- ArcelorMittal hired Instituto Totum in December 2007 to develop the CDM project in the ArcelorMittal Juiz de Fora plant /4//25/.



- ArcelorMittal, Instituto Totum and Plantar submitted in 2008, a new methodology to Meth Panel (NM0110) in order to establish clear conditions to consider the sustainable renewable biomass production to fuel blast furnace as an approved methodology.
- ACM0082 v.01 was approved in EB48 held on July 2009
- PDD submitted to GSC on 6 July 2010.

Therefore, DNV opinion is that it is sufficiently evidenced that continuous action were taken in order to assure CDM status.

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.

4.6.2 IDENTIFICATION OF ALTERNATIVES TO THE PROJECT ACTIVITY

As verified on section 4.5 Baseline Scenario, the step 1 and 1a, the likely baseline scenarios are the "Metallurgical coke iron ore reduction system" (**scenario 1**) and the "Iron ore reduction system based on renewable charcoal from newly established dedicated plantations and from reformed existing plantations at their last rotation" (**scenario 2a**).

DNV considers the listed alternatives to be credible and complete

4.6.3 BARRIER ANALYSIS (STEP 2)

According the AM0082 version 1, the PDD presents the following barriers:

INVESTMENT BARRIERS

Scenario 1 "Metallurgical coke-based iron ore reduction system"

DNV had assessed and confirmed that the investment in the production expansion of iron and steel companies in Brazil, the iron and steel industry based in coke and coal were encouraging through governmental incentives (1994 – 2006) and those investments aiming the production capacity increase continue happening /59//60//69/.

On the other hand, DNV had verified that, in the last 20 years prior to the project activity implementation (1983-2003), the participation of charcoal-based pig-iron production in the total production of integrated steel and iron mills decreased from 22.8% to 5.6% /69/, what means that the production of pig iron based on coal coke don't have restriction..

Scenario 2a "Iron ore reduction system based on renewable charcoal from newly established dedicated plantations and from reformed existing plantations at their last rotation"

Lack of attractiveness due to long-term maturity and associated risks to investment: the coal coke needs no investment and its related use implicates in minor risk. On the other hand, establishment of forest plantations requires large amounts of investment with overwhelmingly long payback periods /23/.

The actual area of forest available by CAF/ ArcelorMittal Bioenergia as 97.605,14 hectares /34/ that without investment of fertilization and clones, and the final productivity of forest will decrease from 17.2 cubic meters/ha/year of degraded forest productivity /65/ to 12.04 cubic meters/ha/year after one rotation of 7 years as it reduce around 30% on each rotation /64/ due



the pauperization of soil, which means that would be insufficient to fuel the ArcelorMittal Juiz de Fora blast furnaces as the forest would produce only 82.4% of charcoal demand after the first rotation, 52% after the second rotation and so on, this situation will be reduced more on the subsequent rotations.

Hence, the investment on clone and fertilization is condition to guarantee the supplying of charcoal to operate the Arcelor Mittal blast furnaces. According BNDES study to eucalyptus forest in Brazil /64/, the investment cost are between R\$ 1040/ha and R\$1440/ha. Considering the actual area of forest available by CAF/ ArcelorMittal Bioenergia as 97.605,14 hectares /34/, significant resources will be necessary to implement the project activity.

As well as, DNV could confirm that exist a lack of access to capital necessary to produce reducing agents /68//84/. Usually, the loan guarantee involves possession of property, i.e. in case of some failure of wood production the farmer loses the property /84/. For farmers with no experience with eucalyptus the risk of failure is often considered too high, thus turning unreasonable a decision to start forestry activities. In the absence of the project activity and, consequently, of the PPF program, the participating would not be able to use this credit line due to the barriers and would not have any other option to obtain investment capital for reforestation activities. To be eligible for a loan, an applicant farmer must be in compliance with environmental legislation /78/. As the small agriculture is activity that doesn't need environment licensing /79/, the search of environmental licence from the farmers is not common in Brazil.

Although there are 7 forest financing lines in Brazil.

- | | |
|-------------|-----------------------------------------------|
| • 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 |

No one of this programs financing the land /68//84/. Only the next two could be applied on renewable forest on Minas Gerais State as follow:

- | | |
|-------------|--------------------------------|
| • PRONAF | Forest for industry in Brazil. |
| • PROPFLORA | Energetic forest in Brazil |

However this 2 program have some restriction as follow:

PRONAF have small resources and was directed to protection and reserve areas not for industrial forest /68/ /84/;

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, as verified by DNV on UFRRJ study /84/.



DNV could confirm through the ABRAF report (capt 4) /57/ that Propflora credit line considers productive cycle of eucalypt and has a grace period of 96 months. Although, it doesn't consider a possibility that applicant cannot sell produced wood: it doesn't accept payment in product (wood) neither can it extend the deadline for payment. Availability of forestry-related technical assistance for small farmers was identified as a considerable problem.

The resources invested by the Propflora were not significant for the demand of charcoal in Minas Gerais,:

PROPFLOA (BRI thousand)					
State	2005	2006	2007	2008	2009
MG	4,777	7,087	20,382	30,313	47,034

As the PPF of ArcelorMittal was estimated on R\$ 490,840,000 (considering the total area to produce the required amount of wood as 82,800 hectare /26/ with the cost per hectare as R\$ 5,928 /76/), the resources supported by PROPFLOA are not capable to financing even this project activity.

Zone Mata was a dense forest cover, in its original condition. The pattern of agricultural holdings who settled in the Forest Zone beginning of Brazil colonization entailed continuous felled the forests, which were then replaced by crops that would be traditional in the region. The forests are reduced to small spots and roosts in steep slopes; they were replaced by coffee plantations and later by pastures and other crops. Most of the land area is occupied by pastures and natural Artificial, which support herds for dual purpose (milk/cutting), spread on farms of medium and small. Among the traditional cultures of the region, coffee was the most formative rents. The eradication of coffee contributed to the emptying of the economy regional, whereas the release of the manpower for such activity, unabsorbed by other industries, reduced job opportunities, creating tensions social /96/.

As the forest activity, considering mainly eucalyptus, need 7 years to the first harvest, this and the restriction of financing, the sustainability forest activity has low attractiveness.

Hence, the small farmers from Zona da Mata region are not able to access loans of Propflora and are not motivated to get involved in the wood production, i.e. are used with faster cash-flow in their economic activities and have no experience with commercial plantations /96/. The lack of previous experience in eucalypt cultivation and their inability to provide loan guarantees renders the above-mentioned incentives inaccessible to independent small farmers from Zona da Mata.

REGULATORY BARRIERS

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.

DNV had confirmed that the impact of farm licensing process as the project consist on renew 92 existents farms and 191 new small farmers. These sites, according the environment licence regulation of Minas Gerais State /78/ need a complex environment impact assessment/report (EIA/RIMA), including flora and fauna assessment, historical assessment, waster resources



impact and population impact, which means get and maintain 1 238 environmental licensing only for charcoal production. Hence, the implementation of the 2a option has significant higher demand on licensing process compared with the baseline.

As well as, project activity with the new “Small Farmers Program”, had developed a new activity on Minas Gerais State that is incentive several farmer to implement renewable forest on degraded or pasture areas, which in absence of project activity would not invest in new environmental licensing and stay on same condition/36/.

In conclusion, assessment barrier have evidenced that project activity as the renewable charcoal iron ore reduction system from new planted renewable biomass (**scenario 2a**) is not the likelihood scenario.

4.6.4 INVESTMENT ANALYSIS

According steps of AM0082 version 1 and the combined tool for additionality, only the alternative scenario to the project activity that is not prevented by any barrier is *Scenario 1*, “Metallurgical coke-based iron ore reduction system” and the investment analysis is not applicable to this project activity.

4.6.5 COMMON PRACTICE ANALYSIS

The Minas Gerais state, as the largest pig-iron production pool in Brazil has specific laws and regulations regarding forest establishment and exploitation of native forests that are quite different in other states which establish the use of 90% of wood coming from planted forest /78/, as well as, the production illegal of non renewable charcoal (native wood) is done with man power under undesirable conditions (child and forced labour) /80//82/.

According the AMS /55//56/, 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, what considering 100 mcd/ha results 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.

Considering the pig iron register of Sindifer at Minas Gerais State /70/ were verified that 75% were cited by IBAMA about use of non renewable charcoal, 10% were implemented reforestation program to get auto sustainability on next 7 years and only one (2%) had own supply of charcoal for blast furnace activities /53/.

In addition, for the equivalent of ArcelorMittal Juiz de Fora integrated steel companies was verified that:

- ArcelorMittal inox (Acesita) have 1 blast furnace with coal coke and one small with charcoal from external suppliers /90/ however has applied to CDM /58/.
- Gerdau Barão de Cocais and Divinópolis facilities five blast furnaces fueled with charcoal from external suppliers /91/
- ArcelorMittal Monlevade have 4 blast furnaces fueled with coal coke /58/;
- V&M have 2 blast furnaces fueled with charcoal, however had applied to CDM on 2003/58/;
- Usiminas and Açominas are integrated coal coke steel plants /58/.

The ArcelorMittal Juiz de Fora is the first project of AM0082 published on UNFCCC GSD. The second is the Plantar project also applying AM0082.



The Valourec-Sumitomo are implemented a new blast furnace at Jeceaba municipality, MG state, starting with coal coke until develop new forest during first 7 years to supply the new blast furnaces with charcoal /63/.

Additionally, as required in the “Combined tool to identify the baseline scenario and demonstrate additionality” version 4, the following steps were taken:

Step 4a: The proposed CDM project activity(s) applies measure(s) that are listed in the definitions section above

Sub-step 4a(1): Calculate applicable output range as +/-50% of the design output or capacity of the proposed project activity.

- The blast-furnaces do not differ technologically and their production capacities are not revealed.

Sub-step 4a(2): In the applicable geographical area, identify all plants that deliver the same output or capacity within the applicable output range, calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number N_{all} . Registered CDM project activities and projects activities undergoing validation shall not be included in this step.

- The number of Integrated Iron & Steel Companies, N_{all} , is 5 /58/ /70/.

Sub-step 4a(3): Within the plants identified in Step 2, identify those that apply technologies different to the technology applied in the proposed project activity. Note their number N_{diff} .

- All the alternatives differ from the project activity is 4 ($N_{diff} = 4$)

Sub-step 4a(4): Calculate factor $F = 1 - N_{diff}/N_{all}$ representing the share of plants using a technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity.

- The factor of common practice F equals to 0.2, as $F = 1 - N_{diff} / N_{all}$, given that $4 / 5 = 0.8$

The calculation above shows that F is equal to 0.2 and thus not greater than 0.2 and $N_{diff} - N_{all}$ is equal to 1 and thus not greater than 3. Therefore it is sufficiently demonstrated that the project activity, as renewable charcoal iron ore reduction system from new planted renewable biomass (**scenario 2a**), is not a likely baseline scenario and that emission reductions are hence additional to what would have happened in absence of the project activity.

4.7 Monitoring

The project applies the approved monitoring methodology AM0082 version 1 “Use of charcoal from planted renewable biomass in the iron ore reduction process through the establishment of



a new iron ore reduction system” /39/. The selected monitoring methodology is applicable for the project activity as it involves charcoal production and using on Blast furnaces.

The project activity also draws upon “AM0041 - Mitigation of Methane Emissions in the Wood Carbonization Activity for Charcoal Production – Version 01” to monitoring the yield of carbonization process (Y_{PJ})

Monitoring of sustainable development indicators is not required by the Brazilian DNA. The environmental impacts are considered minor /23/ and will be monitored according established by environment operation license /24/.

The project monitoring plan is in compliance with the monitoring methodology AM0082 version 1.

Considering that ArcelorMital Juiz de Fora has quality and environment management system as ISO 9001 and ISO 14001 and the ArcelorMittal has the certification of FSC /48/, it is DNV’s opinion, that the project participant is able to implement the monitoring plan.



4.7.1 PARAMETERS DETERMINED EX-ANTE

<i>Data and Parameters</i>	<i>Unit</i>	<i>Value applied</i>	<i>DNV validation</i>
$RA_{BL,i}$ (The quantity of coal coke necessary to produce one tonne of hot metal)	t	0.5170	The amount of coal coke necessary to produce one tonne of hot metal (0.517 t coal coke/t hot metal) was verified through historical fuel rate data of ArcelorMittal João Monlevade Blast Furnaces /18/.
$\%C_{BL,i}$ (carbon content in percent of in the non-renewable reducing agent <i>i</i> in the baseline scenario)	-	89	The carbon content in percent of in the non-renewable reducing agent <i>i</i> in the baseline scenario (89%) was verified through ship cargo reports from Jan to December 2007, when Monlevade blast furnaces had used imported coal coke /19/.
$EF_{CO_2e, \text{ coal coke}, y}$ (emission factor to produce one tonne of coal coke in the iron ore reduction system baseline scenario)	tCO ₂ e/t coal coke	0.4026	The emission factor to produce one tonne of coal coke in the iron ore reduction system baseline scenario was verified with the default value of Emission Factor (for conservativeness, the option “flared” was used 0.4026 tCO ₂ e/t coal coke). There is no operational data available.
$EF_{VF, BL}$ (emission factor to produce one tonne of coal coke in the iron ore reduction system baseline scenario)	tCO ₂ /liter	0.002575	The emission factor for vehicle type <i>v</i> with fuel type <i>f</i> (diesel) in the baseline scenario (0.002575 tCO ₂ /liter) was verified through the GHG Protocol Brazilian Program /92/.



VALIDATION REPORT

$n_{VF,BL,y}$ (emission factor for vehicle type v with fuel type f (diesel) in the baseline scenario)	-	1	The number of vehicles of type v with fuel type f in year y in the baseline scenario (1) was verified considering that all the load was transported in 1 load considering 2 trips of 626 km as the distance from Vitoria (ArcelorMittal Tubarão) to Juiz de Fora /72/
$k_{VF,BL,y}$ (kilometres travelled by each of vehicle type v with fuel type f in the baseline scenario)	km/year	1 252	The kilometres travelled by each of vehicle type v with fuel type f in the baseline scenario (626 km/year, distances between the cities Vitoria (ArcelorMittal Tubarão) and Juiz de Fora. Tubarão is where the coke coal is received and Juiz de Fora where the blast furnaces are installed) /72/
$e_{VF,BL,y}$ (average fuel consumption of vehicle type v with fuel type f in the baseline scenario)	litters/km	2002.98	The average fuel consumption of vehicle type v with fuel type f in the baseline scenario was calculated on CER calculation spreadsheet as $e_{VF,BL,y} = P_{PJ,Y} * RA_{BL,Y} * 10.76 \text{ l/tku}$ or $360\,000 \text{ ton pig iron} * 0.517 \text{ ton coke/ton pig iron} * 10.76 \text{ l/tku} = 2002.98 \text{ litters/km}$ The fuel rate of railway engine is according best practice of Vale. /93/,
v_{BL} (vehicle type in the baseline scenario)	-	train	The vehicle type in the baseline scenario (train) was verified since it is the most conservative option for coal coke transportation in the baseline scenario.
f_{BL} (fuel type in the baseline scenario)	-	diesel	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.
$\%C_{HM,PJ,y}$ (percentage of carbon in hot metal in the project situation)	%	0	The percentage of carbon in hot metal in the project situation (0%) was verified through the AM0082 version 1 that defines zero as a conservative approach.
$Cc_{HM,BL,y}$ (carbon content fixed in hot metal)	-	0	The carbon content fixed in hot metal expressed in t CO ₂ e per t of hot metal produced (zero) was considered as zero, as it was calculated as $Cc_{HM,BL,Y} = \frac{\%C_{HM,PJ,Y}}{100}$ And as the pig iron is produced using renewable charcoal only, AM0082/Version 01 considers $\%C_{HM,PJ,y}$ as zero.



VALIDATION REPORT

EF _{CO₂,i,y} (average CO ₂ emission factor of fuel type I (diesel) in year y)	tCO ₂ /T _J	72.6	The average CO ₂ emission factor of fuel type i (diesel) in year y (72.6 tCO ₂ /TJ) was verified through the National Energetic Balance of Brazil (BEN) 2009. /73/
NCV _{DIESEL} (average net calorific value of diesel)	TJ/liter	0.00003546	The average net calorific value of diesel (0.00003546 TJ/liter) was verified through the National Energetic Balance of Brazil (BEN) 2009/73/
EF _{diesel,PJ} = COEF _{i,y} (emission factor for road transportation (diesel and gasoline) in the project scenario)	tCO ₂ /liter	0.002575	The parameter (EF _{diesel,PJ}) emission factor for road transportation (diesel and gasoline) in the project scenario. Value applied 0.002575 tCO ₂ /liter was verified through the parameters EF _{CO₂,i,y} and NCV _{DIESEL} .
EF _{TRUCK, km,CO₂, y} (CO ₂ emission factor for truck during the year y)	kgCO ₂ /km	1.12	GHG Protocol Brasil as national source.
EF ₁ (emission Factor for emissions from N inputs)	tonne-N ₂ O-N /t-N input)	0.01	The emission Factor for emissions from N inputs (0.01 tonne-N ₂ O-N /t-N input) was verified through IPCC 2006 Guidelines /74/
Frac _{GASF} (Fraction that volatilizes as NH ₃ and NO _x for synthetic fertilizers)	-	0.01	The Fraction that volatilizes as NH ₃ and NO _x for synthetic fertilizers (0.01) was verified through the "Fraction that volatilizes as NH ₃ and NO _x for organic fertilizers". /43/ CDM Executive Board: <i>Estimation of fertilization</i> , Version 1
GWP _{CH₄} (Global warming potential for CH ₄)	tCO ₂ e/tC _{H₄}	21	IPCC 2006 /74/
GWP _{N₂O} (Global warming potential for GWP _{N₂O})	tCO ₂ e/tN ₂ O	310	IPCC 2006 /74/
%C _{HM,PJ,y} percentage of carbon in hot metal,	%	0	It is noteworthy that, if pig iron is produced using renewable charcoal only, AM0082/Version 01 considers %C _{HM, PJ, y} as zero
V _{PJ} vehicle type in the project scenario	-	truck	The transport of wood to carbonization units and charcoal to blast furnace will use only trucks. No other transportations way is available.
f _{PJ} fuel type in the project	-	diesel	The truck transport is considered only diesel. No biodiesel was considered



VALIDATION REPORT

scenario			conservatively.
$n_{vf,PJ,y}$ number of vehicles type v with fuel type f in year y in the project scenario	-	1	The transportation was considered number of round trips (to and from) of the trucks in the project activity during the year y to transport renewable biomass to the carbonization site(s) and transport charcoal from the reducing agent production site(s) to the iron ore reduction facility and $EF_{v,km,CO_2,PJ,y}$ - the specific emission as kgCO ₂ /km.
$e_{vf,PJ,y}$ average fuel consumption of vehicle type v with fuel type f in the project scenario	kgCO ₂ /k m	1.12	considered as $EF_{v,km,CO_2,PJ,y}$ the specific emission as kgCO ₂ /km

As confirmed by the Geoconsult, Land Eligibility Study for PPF project /29/ and cross checked with Brazilian Biomass Map /76/, it was confirmed that the no displacement of economic activities were occur. Hence no leakage assessment was established.



4.7.2 PARAMETERS MONITORED EX-POST

According to AM0082 version 1, the following data and parameters should be monitored:

- $P_{PJ,y}$: Tonnes of hot metal (pig iron) produced by Blast Furnaces of ArcelorMittal Juiz de Fora.
- $FC_{i,j,y}$: Amount of diesel consumed (lt/year) by the trucks and equipment of 8,102.3 ha forest. For both ex ante and ex post calculations a conservative value of diesel consumption of 333.4 liters per hectare is adopted, considering a conservative approach of adoption a fixed value of fuel consumption (that is 45% higher than average diesel consumption internally registered by the project entity).
- $N_{PCE, PJ, y}$ - Number of round trips (to and from) of the trucks in the project activity during the year y to transport renewable biomass to the carbonization site(s)
- $N_{RAT, PJ, y}$ - Number of round trips (to and from) of the trucks in the project activity during the year y to transport charcoal from the reducing agent production site(s) to the iron ore reduction facility
- $AVD_{PCE, PJ, Y}$ - Average round trip distance (to and from) between the plantation areas and the reducing agent production site(s) in the project scenario during the year y
- $AVD_{RAT, PJ, Y}$ - Average round trip distance (to and from) between the reducing agent production site(s) and the iron ore reduction system facility in the project scenario during the year y
- $F_{PJ, CHARCOAL}$ - Quantity of charcoal necessary to produce one tonne of hot metal in the project scenario.
- Y_{PJ} - Tonne of charcoal / tonne of wood on dry basis;
- $EF_{CH_4, charcoal, PJ, Y}$ - Emission Factor to produce one tonne of renewable charcoal identified in the project supply chain;
- $NC_{SF, i}$ - Nitrogen content of synthetic fertilizer type i applied;
- $M_{SF, i, t}$ - Mass of synthetic fertilizer type i applied;
- A_{PJ} - Dedicated planted area for renewable biomass production in the year y;

4.7.3 MANAGEMENT SYSTEM AND QUALITY ASSURANCE

Monitoring tasks must be implemented according to the monitoring plan in order to ensure that the real, measurable and long-term greenhouse gas (GHG) emission reductions for the proposed project is monitored and reported.

Considering that ArcelorMittal Juiz de Fora has quality and environment management system as ISO 9001 and ISO 14001 and the ArcelorMittal has the certification of FSC /48/, it is DNV's opinion, that the project participant is able to implement the monitoring plan, including the personnel training and management and operation manual, responsibilities and authorities for project management, procedures for monitoring and reporting, QA/QC procedures, procedures for calibration of metering equipment and training as verified during the site visit.



4.8 Algorithms and/or formulae used to determine 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).

4.8.1 Baseline Emissions:

According AM0082 v1

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

where:

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

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

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

$PCE_{BL,y} = 0$ (the primary carbon sources extraction GHG emissions attributable to the coal mining related activities occur outside the host country boundaries)

$$RAP_{BL,RA,y} = RAP_{BL, coal coke, y} = P_{PJ, y} * EF_{CO2e, coal coke, y} * RA_{BL, i}$$

- $P_{PJ,y} = 360\,000$ t (according Juiz Fora Blast Furnace specification /7/)
- $EF_{CO2e, coal coke, y} = 0.4026$ tCO_{2e} / t coal coke
(Reducing agent is not under the control of the PP; methodology AM0082 version 1 determines the use of default value - Table 3 of the Annex 1)
- $RA_{BL, y} = 0.5170$ t coal coke/t hot metal /18/

$$RAP_{BL, coal coke, y} = 74\,932 \text{ tCO}_2/\text{yr} \text{ (No charcoal is used in the baseline)}$$

$$RAT_{Vehicle,BL,y} = \sum \sum (EF_{VF,BL} * FC_{VF,BL,y})/1000$$

- $EF_{VF,BL} = 0.002575$ tCO₂/liter /80/
- $FC_{VF,BL,y} = n_{VF,BL,y} * k_{VF,BL,y} * e_{VF,BL}$
- $n_{VF,BL,y} = 1$
- $k_{VF,BL,y} = 1\,252$ km/year
- $e_{VF,BL} = 186\,120$ t coke/year * 10.76 liter diesel/1000 tku (The fuel rate of railway engine is according best practice of Vale. /93/)
 $e_{VF,BL} = 2002.98$ liters/km



- $FC_{VF,BL,y} = 785\,722 \text{ litres/yr}$

$$RAT_{Vehicle,BL,y} = 2\,023 \text{ tCO}_2/\text{yr}$$

$$RAE_{BL,y} = 74\,932 + 2\,023 = 76\,955 \text{ tCO}_2/\text{yr}$$

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

- $P_{PJ,y} = 360\,000 \text{ ton/year}$
- $EF_{Ind,BL} = \sum (\%C_{BL,i} * RA_{BL,i})/100 * 44/12$
- $\%C_{BL,i} = 89\%$ (verified through ship cargo reports from Jan to December 2007, when Monlevade blast furnaces had used imported coal coke /19/);
- $RA_{BL,i} = 0.517 \text{ ton coke/ton pig iron}$
- $EF_{Ind,BL} = 1.687 \text{ tCO}_2/\text{t of hot metal}$
- $C_{HM,BL,y} = 0$

$$IRE_{BL,y} = 607\,372 \text{ tCO}_2/\text{yr}$$

$$BE_y = 76\,955 + 607\,372 = 684\,326 \text{ tCO}_2/\text{yr}$$

4.8.2 Project emissions

According AM0082 v1

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

where:

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

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

$$RAE_{PJ,y} = PCE_{PJ,y} + RAP_{PJ,RA,y} + RAT_{Vehicle,PJ,y}$$

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

$$E_{fuelburning,PJ,y} = \sum FC_{i,j,y} * COEF_{i,y}$$



VALIDATION REPORT

- $FC_{i,j,y} = 2\,707\,308$ liter/yr (as 8 120 ha/y and 333 l/ha /22/)
- $COEF_{i,y} = 0.002575$ tCO₂/liter (72.6 tCO₂/TJ * 0.00003546 TJ/liter according the National Energetic Balance of Brazil (BEN) 2009) /73/
-

$$E_{\text{fuelburning, PJ, y}} = 6\,970 \text{ tCO}_2\text{e/yr}$$

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

$$N_2O_{\text{direct - fertilizer N PJ, y}} = (F_{SN,t} + F_{ON,t}) * EF1 * MW_{N_2O} * GWP_{N_2O}$$

- $F_{SN,t} = \sum MS_{Fi,t} * NC_{SFi} * (1 - \text{Frac}_{GASF}) = 263 /12/$
- $M_{SFi,t} = 0.180$ from the fertilizer type I;(0.270 from the fertilizer II and III) /81/
- $NC_{SFi} = 6$ gN/100g Fertilizer I; 8 gN/100g Fertilizer II and III.
- $\text{Frac}_{GASF} = 0.1$
- $EF1 = 0.01$ (IPCC 2006 Guidelines) /74/
- $MW_{N_2O} = 44/28$
- $GWP_{N_2O} = 310$ (IPCC 2006Guidelines) /74/

$$N_2O_{\text{direct - fertilizer N PJ, y}} = 1\,282 \text{ tCO}_2\text{/year}$$

$$EP_{\text{Vehicle, PJ, y}} = N_{\text{PCE, PJ, y}} * AVD_{\text{PCE, PJ, y}} * EF_{\text{TRUCK, km, CO}_2, y}$$

- $N_{\text{PCE, PJ, y}} = 61\,714$ round trips /12/
- $AVD_{\text{PCE, PJ, y}} = 36$ km /14//15//16/
- $EF_{\text{TRUCK, km, CO}_2, y} = 1.12$ kgCO₂/km (according GHG protocol Brazil) /92/

$$EP_{\text{Vehicle, PJ, y}} = 2\,448 \text{ tCO}_2\text{e/yr}$$

$$PCE_{PJ, y} = 6\,970 + 1\,282 + 2\,488 = 10\,740 \text{ tCO}_2\text{e/yr}$$

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

$$RAP_{PJ, \text{charcoal, y}} = P_{PJ, y} * EF_{CH_4, \text{charcoal, PJ, y}} * FPJ_{\text{charcoal}} * GWP_{CH_4} \text{ (Option 1)}$$

- $EF_{CH_4, BL} = f(Y_{BL})$
- $EF_{CH_4, \text{charcoal, PJ, y}} = f(Y_{PJ}) = (A - B) * Y_{PJ} / 40/$
- $P_{PJ, y} = 360\,000$ tonnes of hot metal /9/
- $EF_{CH_4, \text{charcoal, PJ, y}} = 0.04397$ tCH₄/t of charcoal
- $FPJ_{\text{charcoal}} = 0.6$ t charcoal/t of hot metal /7//50/
- $GWP_{CH_4} = 21$ tCO₂e/tCH₄
- $Y_{PJ} = 0.31$ t charcoal /two wood (dry basis)



$$RAP_{PJ, RA, y} = 199\,438 \text{ tCO}_2/\text{year}$$

$$RAT_{Vehicle, PJ, y} = EP_{VEHICLE, PJ, y} = N_{RAT, PJ, y} * AVD_{RAT, PJ, y} * EF_{TRUCK, km, CO_2, y} \text{ (Option 2)}$$

- $N_{RAT, PJ, y} = 9\,391$ round trips (216 000 t charcoal/year; 23 t one truck) /80/
- $AVD_{RAT, PJ, y} = 1\,300$ km /13/
- $EF_{TRUCK, km, CO_2, y} = 1.12$ (methodology indicates IPCC source)

$$RAT_{Vehicle, PJ, y} = 13\,674 \text{ tCO}_2/\text{year}$$

$$RAE_{PJ, y} = 10\,740 + 199\,438 + 13\,674 = 223\,852 \text{ tCO}_2/\text{year}$$

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

- $EF_{Ind, PJ, y} = 0$ (carbon content of renewable reducing agent from renewable biomass dedicated plantations)
- $C_{CHM, PJ, y} = 0$ (as the pig iron is produced using renewable charcoal)

$$IRE_{PJ, y} = 0$$

$$PE_y = 223\,852 \text{ tCO}_2/\text{year}$$

4.8.3 Leakage

$$LE_y = 0$$

No leakage has been considered in the project activity. As confirmed by the Geoconsult, Land Eligibility Study for PPF project /29/ and cross checked with Brazilian Biomass Map /76/, it was confirmed that the no displacement of economic activities were occur.

4.8.4 Emission Reductions

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

As the value of $(RAE_{BL, y} - RAE_{PJ, y})$ is negative, the value was reduced to “zero” and:

$$ER_y = 460\,474 \text{ tCO}_2/\text{year}$$

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 460 474 tCO₂e 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 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 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 /26/. Also, regarding the plantation activity, the project has been granted a register certificate by the state forest entity/10/.

4.10 Comments by local stakeholders

The stakeholders were consulted according Resolution number 7 of the Brazilian DNA. Letters with CDM project description were sent to stakeholders inviting them to raise concerns and comments during a period of 30 days from the date that letters were received. All letters were sent in the second half of July.

The following comments were received:

- Environmental Secretary of Capelinha: congratulating the project implementation due to its objective of sustainability;
- São José do Goiabal City Hall: congratulating the fossil switch due to environmental issues and the increase in the regional economy;
- São Vicente de Minas City Hall: invited the PP to participate in a Industrial Exposition;
- Entity “Associação Municipal de Apoio Comunitário de Juiz de Fora”: congratulates the PP and emphasizes its social responsibility work toward sustainability;
- Carbonita City Hall: states that the Project activity improves the economic development and brings a higher level of life quality;
- Entity “Associação pelo Meio Ambiente de Juiz de Fora”: states that the project is interesting and positive. It is also commented that the institution wants to make partnerships with the PP to work with Environmental Education programs;
- Minas Novas City Hall: congratulates the PP due to the economic, social and environmental benefits of the project activity and demonstrates interest in having also industrial activities>;
- Miradouro Environmental Secretary: states that only a few farmers from Miradouro know about the forestation opportunity generated by the project activity and the marketing should be intensified.

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 16 June 2010, was made publicly available on the CDM website and Parties, stakeholders and NGOs were through the CDM website (<http://cdm.unfccc.int/Projects/Validation/DB/J8FCIF2GBXEOLBK7RXX62128L0A4Q8/vie w.html>) invited to provide comments during a 30 days period from 06 July 2010 to 04 August 2010. No comment was received

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 E.4.1 No participating Annex I Party is yet identified.
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.2.
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	No participating Annex I Party is yet identified
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
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
8. The participating Annex I Party's assigned amount shall have been calculated and	CDM Modalities and	No participating Annex I Party

Requirement	Reference	Conclusion
recorded.	Procedures §31b	is yet identified
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 16 June 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 days period from 06 July 2010 to 04

Requirement	Reference	Conclusion
		August 2010. NO comments received
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?	/1/	DR	<input checked="" type="checkbox"/> Clearly identifiable title of the project activity <input checked="" type="checkbox"/> Version number of the PDD is included <input checked="" type="checkbox"/> Date of the PDD is included.		OK
A.1.2	Is the PDD is in accordance with the applicable requirements for completing PDDs?	/1/	DR	<input checked="" type="checkbox"/> Yes		OK
A.2 Description of the project activity (VVM para 58-64)						
A.2.1	How was the design of the project assessed?	/1/	DR	<i>What type is the project?</i> <input checked="" type="checkbox"/> Project in existing facility or utilizing existing equipment(s) <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Large scale project <input type="checkbox"/> bundled small scale projects, each with emission reductions not exceeding 15 000 tCO₂e per year <input type="checkbox"/> individual small scale project activity with emission reductions not exceeding 15 000 tCO₂e per year <input checked="" type="checkbox"/> Greenfield project <i>How was the design of the project assessed?</i> <input checked="" type="checkbox"/> Physical site inspection <input type="checkbox"/> Reviewing available designs and feasibility studies		OK

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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.	/1/	DR	The proposed project activity is operating since as the integrated charcoal-based steel and iron plant of Juiz de Fora started operating in 2007.		OK
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 ₂ e per year), justify the sampling through a statistical analysis:	/1/	DR	Not applicable.		OK
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?	/1/	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.		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?	/1/	DR	No, the project activity is the implementation of a new system considering new 2 Blast Furnaces at integrated mill on Juiz de For a and restarted the reformed <i>eucalypt</i> plantations after their last rotation as source of renewable biomass and refurbishing the carbonization facilities to produce charcoal used as reducing agents on Blast Furnaces.	CL-4	OK
A.2.6	Does the project design engineering reflect current good practices?	/1/	DR	Yes, the project activity applies state of the art technology in <i>eucalypt</i> plantations, charcoal production and use charcoal as reducing agents 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?	/1/	DR	Although the project has best performance as integrated steel mill using charcoal, compared with independent pig iron producers, the technology was developed on host country.		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A.3 Participation requirements (VVM para 51-54, 123-125)						
A.3.1 Do all participating Parties fulfil the participation requirements as follows:		/1/	DR	The involved party is Brazil as the host Party. The project participants are ArcelorMittal Brasil S.A. and Instituto Totum of Brazil. The project participants are listed in Section A.3 of the PDD and the information is consistent with the contact details provided in Annex 1 of the PDD.		OK
				Brazil (host)		
	a) Party has ratified the Kyoto Protocol b) Party has designated a Designated National Authority c) The assigned amount has been determined			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No NA		
A.3.2 Do the letters of approval meet the following requirements?		/37/	DR	A letter of approval (LoA) /37/ was issued by DNA of Brazil on 17 October 2012, authorizing ArcelorMittal Brasil S.A. and Instituto Totum of host Party Brazil as project participants and confirming that the project assists in achieving sustainable development		OK
				Brazil (host)		
	a) LoA confirms that Party has ratified the Kyoto Protocol b) LoA confirms that participation is voluntary c) The LoA confirms that the project contributes to the sustainable development of the host country? d) The LoA refers to the precise project activity title in the PDD e) The LoA is unconditional with respect to (a) to (d) above f) The LoA is issued by the respective Party's DNA g) The LoA was received directly by the DNA or the PP h) In case of doubt regarding the authenticity of the letter of			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> DNA <input checked="" type="checkbox"/> PP There was no doubt		

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
approval, describe how it was verified that the letter of approval is authentic				that the letter of approval is authentic.		
A.3.3	Have all private/public project participants been authorized by an involved Party?	/1/	DR	A letter of approval (LoA) /37/ was issued by DNA of Brazil on 17 October 2012, authorizing ArcelorMittal Brasil S.A. and Instituto Totum of host Party Brazil as project participants and confirming that the project assists in achieving sustainable development		OK
A.4 Technical description of the project activity (VVM para 58-64)						
A.4.1	Is the project's location clearly defined?	/1/	DR	Yes, project activity is located in the Minas Gerais state, and the following activities are located in the following municipalities: The existent forest plantation of ArcelorMittal BioFlorestas is established mainly around Dionisio, Santa Barbara, Martinho Campos, Carbonita, Itamarandiba Municipalities. The ArcelorMittal BioFlorestas's Forest Producer Program – PPF are located mainly around Juiz de Fora, Santos Dumont, Leopoldina, Andrelandia and Lima Duarte municipalities. All in Minas Gerais State Charcoal production: Bom Despacho, Quartel Geral, Martinho Campos, Dionísio and Carbonita municipalities; Steel and iron mill: Juiz de Fora municipality. Forest plantation: Project participant is requested to include in PDD information regarding forest plantation sites details.	CL-3	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
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 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?	/1/	DR	The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Brazil.		OK
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?	/1/	DR	Yes, AM0082 version 1. The AM0041 version 1 was applied in order to calculate and demonstrate the CH ₄ emissions in the reducing agent (renewable charcoal) production process. The following tools are applied too: <ul style="list-style-type: none"> • Combined tool to identify the baseline scenario and demonstrate additionality – Version 4; • Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion-Version 2; • Estimation of direct nitrous oxide emission from nitrogen fertilization – Version 01. 		OK
B.2 Applicability of methodology (and tools) (VVM para 65-76) <i>Insert a row for each applicability criteria of the applied methodology (and tools)</i>						
B.2.1	How was it validated that project complies with the AM0082 following applicability criteria: <i>emission reductions are from partial or complete use of renewable reduction agents from dedicated plantations instead of fossil fuel?</i>	/1/	DR	DNV has verified during the site visit that just charcoal from dedicated plantations is used as iron ore reducing agents on 2 Blast Furnaces installed on ArcelorMittal Juiz de Fora facilities.		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.2.2	How was it validated that project complies with the AM0082 following applicability criteria: <i>blast furnace technology is used?</i>	/1/ /24/ /26/	DR	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.		OK
B.2.3	How was it validated that project complies with the AM0082 criteria: <i>new iron ore reduction systems (new investment)?</i>	/1/ /46/ /47/ /8/ /26/ /28/ /88/	DR	DNV has assessed the quotation regarding the implementation of two blast furnaces in the Cia. Siderurgica Belgo Mineira (ArcelorMittal Brasil S.A.) plant in Juiz de Fora, Minas Gerais state (investment type 4). Also, DNV has verified that the project comprehends investing in dedicated plantations (investment type 1) and establishment of specific long-term binding contracts for the supply of reducing agents as PPF (investment type 2).		OK
B.2.4	How was it validated that project complies with the AM0082 criteria: <i>all the corresponding land – dedicated plantations – are geographically identified and delineated?</i>	/1/		Project participant is requested to include in PDD information regarding forest plantation sites details and dedicated plantation geographical identification and delineation.	CL-3	OK
B.2.5	How was it validated that project complies with the AM0082 criteria: <i>dedicated plantations in the host country are under the control of the projects participants?</i>	/1/		The existent planted eucalyptus forests are owned of ArcelorMittal BioFlorestas, a branch of ArcelorMittal Brasil, owner of Blast Furnaces. The <i>new</i> forest plantations, which are being established under the auspices of ArcelorMittal BioFlorestas's Forest Producer Program known as PPF project is under a long term agreement and captive supplier of renewable biomass to produce charcoal.		OK
B.2.6	How was it validated that project complies with the AM0082 criteria: <i>dedicated plantations are located only in tropical conditions?</i>	/1/ /75/ /76/ /80/		The PDD states that all dedicated plantations are located only in tropical conditions, in Minas Gerais state of Brazil. Project participant is requested to include in PDD information regarding dedicated plantations located only in	CL-3	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				tropical conditions (dedicated plantations location and tropical zones in Brazil).		
B.2.7	How was it validated that project complies with the AM0082 criteria: <i>demonstrated through evidence that plantation locations are established in categories areas: grassland, forest plantation after its last rotation and degraded areas?</i>	/1/ /75/ /76/ /80/		Project participant is requested to include in PDD information regarding forest plantation after its last rotation (dates of forest plantation first establishment).	CL-3	OK
B.2.8	How was it validated that project complies with the AM0082 criteria: <i>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?</i>	/1/		<p>The dedicated plantation is composed by reformed plantations (established on the own areas of ArcelorMittal BioFlorestas, the company established by project participant to raise eucalyptus) and newly established plantations (plantations by forest farmers that produce wood in frames of ArcelorMittal BioFlorestas, named Forest Outgrowth Programme - PPF). On the moment when PPF is registered as an A/R CDM PoA, the newly established plantations as well as associated project emissions will be excluded from the boundary of this industrial project.</p> <p>However the first plantation on PPF, according annex 5 of PPF was on 2005 and considering the first harvest after 7 years, the wood would be extracted at same time of registration of present project, in conflict with para 38 EB 25 as “the first verification of this A/R CDM project activity will take place before the first harvesting of the wood takes place”</p> <p>The PP must review this applicability issue.</p>	CL-5	OK
B.2.9	How was it validated that project complies with the AM0082 criteria: <i>renewable biomass and charcoal used in the new iron ore reduction system shall not be acquired from the market?</i>	/1/		All the renewable biomass used will be provided by the reformed plantations (established on the own areas of ArcelorMittal BioFlorestas, the company established by project participant to raise eucalyptus) and newly established		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			plantations (plantations by forest farmers that produce wood in frames of ArcelorMittal BioFlorestas, named Forest Outgrowth Programme – PPF, long-term contracts).		
B.2.10 How was it validated that project complies with the AM0082 criteria: <i>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?</i>	/1/		The dedicated plantation composed by reformed plantations (established on the own areas of ArcelorMittal BioFlorestas, the company established by project participant to raise eucalyptus) and newly established plantations (plantations by forest farmers that produce wood in frames of ArcelorMittal BioFlorestas, named Forest Outgrowth Programme - PPF). On the moment when PPF is registered as an A/R CDM PoA, the newly established plantations as well as associated project emissions will be excluded form the boundary of this industrial project.		OK
B.2.11 How was it validated that project complies with the AM0082 criteria: <i>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?</i>	/1/	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 DOE will 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 the CDM project activity.		OK
B.2.12 How was it validated that project complies with the AM0082 criteria: <i>the land area of dedicated biomass plantations shall be established either through direct planting and/or seedling?</i>	/1/ /21/ /83/	DR	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 renewable biomass plantations (both in the own lands and through outgrowth) are established through seedling, as stated in the		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				Forest Management Plan of ArcelorMittal BioFlorestas (AMBio FMP)		
B.2.13	How was it validated that project complies with the AM0082 criteria: <i>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)?</i>	/1/	DR	No flood irrigation is expected to take place on the plantation sites that are not covered by the registered A/R CDM project /10/ /29/.		OK
B.2.14	How was it validated that project complies with the AM0082 criteria: <i>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)?</i>	/1/ /29/	DR	The new eucalyptus forest, to be implemented on PPF, are located mainly on southeast region of Minas Gerais state, where the main activity is production of extensive milk production and coffee, The inexistence of forest stock were confirmed by Geoconsult report: Land Eligibility Study for PPF project according CDM-UNFCCC rules		OK
B.2.15	How was it validated that project complies with the AM0082 criteria: <i>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?</i>	/1/	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 since it is a Greenfield project /7/.		OK
B.2.16	How was it validated that project complies with the AM0082 criteria: <i>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?</i>	/1/ /26/	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 /7/. Also, the environmental implementation license was granted to a blast furnace that operates with renewable charcoal /26/.		OK
B.2.17	How was it validated that project complies with the AM0082 criteria: <i>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</i>	/1/	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		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<i>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?</i>				use of fossil fuel based (see section B4).		
B.2.18	Is the selected baseline on of the baseline(s) described in the methodology and this hence confirms the applicability of the methodology?	/1/	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 B4).		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?	/1/	DR	The project boundaries includes: (i) the geographic boundaries of the reducing agents production sites (the plantation areas) and the carbonization units, (ii) the physical site of the blast furnace where the iron ore reduction process takes place and (iii) the transportation of the wood until the carbonization units and of the charcoal from the carbonization units until the blast furnace, which is in accordance with the methodologies. The reforestation activities on the lands of forest farmers participating in the PPF Program are undergoing the validation process simultaneously with the industrial component. When the A/R CDM PoA of PPF (plantations by forest farmers that produce wood in frames of ArcelorMittal BioFlorestas, named Forest Outgrowth Program – PPF) project will be registered, the upstream project emissions associated with the establishment of plantations on these areas will be discounted. Project participant is requested to include in PDD information regarding forest plantation sites	CL3	OK

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Checklist Question		Ref	MoV	Assessment by DNV				Draft Concl.	Final Concl.		
				details and dedicated plantation geographical identification and delineation.							
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.	/1/	DR			GHGs	Description		OK		
				Baseline emissions	Iron ore Reduction Process	CO ₂	Yes main source of baseline emissions				
					Reducing agents transportation	CO ₂	Existent but conservatively neglected				
					Reducing agent production	CO ₂	Yes, Coal coke production				
						CH ₄	Conservatively the emissions of coal coke was not accounted.				
					Transportation of primary carbon sources	CO ₂	Existent but conservatively neglected				
					Primary carbon source extraction	CO ₂	Existent but conservatively neglected				
						CH ₄	Existent but conservatively neglected				
						N ₂ O	Existent but conservatively neglected				
				Project emissions	Iron ore Reduction Process	CO ₂	Yes main source of project emissions				
					Reducing agents transportation	CO ₂	Fossil fuels consumption				
						CH ₄	Negligible and excluded because the differences in the baseline and project activity are not substantial				
					Reducing agent production	CO ₂	CO ₂ emissions in the carbonization process are expected to be neutral since all the wood carbonized will come from renewable sources.				
						CH ₄	Biomass carbonization process				

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Checklist Question		Ref	MoV	Assessment by DNV				Draft Concl.	Final Concl.
					Transportation of primary carbon sources	CO ₂	Fossil fuel consumption		
					Primary carbon source extraction	CO ₂	Fossil fuels combustion in forestry operations		
						CH ₄	Biomass burning in the plantation establishment will not occur		
						N ₂ O	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?	/1/	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?	/1/	DR	Baseline Alternative Scenarios: 1) Metallurgical coke iron ore reduction system; 2a) Renewable charcoal iron ore reduction system from new planted renewable biomass; 2b) Renewable charcoal iron ore reduction system from existing planted renewable biomass; 3) Non-renewable charcoal iron ore reduction system; 4) Iron ore reduction system based on the use of a mix of reducing agents. The described scenarios are related to the use of reducing agents in the iron ore reduction blast furnaces.					OK
B.4.2	How have the other baseline scenarios been eliminated in	/1/	DR	The renewable charcoal iron ore reduction system					OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
order to determine the baseline?		/55/ /60/		<p>from existing planted renewable biomass (2b) was eliminated due the lack of existing plantations to supply the renewable biomass demand (plantation deficits in Brazil, near exhaustion of the forest plantations established under the fiscal incentives, and the lack of new plantations).</p> <p>The non renewable charcoal produced from native wood is illegal on Minas Gerais State which establish the use of 90% of wood coming from planted forest /78/, as well as, the production illegal of 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 (a) scenario were eliminated.</p> <p>The Renewable charcoal iron ore reduction system from new planted renewable biomass has been removed due barriers (please see section B.5).</p>		
B.4.3	What is the baseline scenario?	/1/	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?	/1/	DR	Yes, baseline regarding the use of reducing agents in the iron ore reduction process in blast furnaces was determined through methodology AM0082 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?	/1/	DR	Yes.		OK
B.4.6	Does the baseline scenario sufficiently take into account	/1/	DR	Yes. As verified on historic records of CAF, the		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/23/		<p>company, originally supplier of renewable charcoal to Belgo Mineira Monlevade Blast Furnaces, was submitted to a condition of close this activities when the Belgo Mineira had changed the all blast furnaces o Monlevade facilities to be fuelled with coal coke in 1994. Several documents /23/ had evidenced that the CAF had reduced the amount of forest by:</p> <ul style="list-style-type: none"> sold some forest to cellulose companies, start the implementation of wood mill sold charcoal for independent pig iron producers try to export eucalyptus wood <p>Start implementation MDF mill.</p> <p>This situation was present until the change of share owner of ArcelorMittal, including the consolidation several activities of group in Brazil, and the identification the possible scenario to implement a new Blast Furnace at Juiz de Fora facilities, which until that was only steel producer using scrap on electric furnace and purchasing pig iron from the third suppliers. The possibility to implement the Blast Furnace fuelled with charcoal was possible only after the establish the program for recovered the old forest areas of CAF and complement the charcoal demand with new production of charcoal facility using new planted forest trough the Forest Producer Program (PPF).</p>		
B.4.7 Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/	DR	Yes.		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.4.8	Is the baseline determination adequately documented in the PDD? <ul style="list-style-type: none"> 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, beside the 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-6	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?	/1/ /41/	DR	The “ <i>Combined tool to identify the baseline scenario and demonstrate additionality</i> ” version 4.		OK
B.5.2	Have the regulatory requirements correctly been taken into account to evaluate the project activity and the alternatives?	/1/	DR	Yes.		OK
B.5.3	Is sufficient evidence provided to support the relevance of the arguments made?	/1/	DR	Yes.		OK
B.5.4	What is the project additionality mainly based on (Investment analysis or barrier analysis)?	/1/	DR	Barrier analysis.		OK
	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?	/1/ /4/ /25/	DR	The first CDM serious consideration is a presentation from PWC (a consultancy firm) to Arcelor France that provide insights on status, risks and opportunities of developing Clean		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			Development Mechanisms projects in Brazil in May 2002. It mentions the opportunities of developing CDM projects in some plants, including Belgo Mineira, where this project activity will be implemented (proposals of PWC services were issued in June 2003 and July 2004). Also, the possibility of using climate change mechanism as part of the company investments was assessed in the meeting of Arcelor companies in South America on September 2003. DNV assessed a contract between PWC and CAF to the assessment and development of CDM projects in CAF (Companhia Agricola e Florestal Santa Bárbara, founded with the objective to establish and manage eucalypt plantations, manufacture charcoal and manage all rural programs of Belgo-Mineira) of December 2003 .		
B.5.6 If the starting date is after 2 August 2008 and before the global stakeholder consultation, has the DNA and UNFCCC confirmed that the project participants have informed in writing of the project's intention to seek CDM status?	/1/	DR	Not applicable. The project starting date was 12 August 2005, what correspond to date of the first major investment in the industrial facility as the purchase of blast furnaces/9/.		OK
Continuous efforts to secure CDM status (only to be completed if starting date is before 2 August 2008)					
B.5.7 What initiatives were 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?	/1/ /4/ /46/ /24/	DR	The starting date of the project activity is 12 August 2005 which is the date of the investment in the blast furnace construction contract /9/. DNV has assessed a minute of meeting from August 2004 which defined the plan of action of Belgo sustainable development program (the CDM project). In September 2004, the Belgo sustainable development program was presented		OK

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			<p>to company direction in order to validate how the communication with government would happen. The EIA from October 2004 /24/ mentions that the Kyoto Protocol and the emission reductions are the base of the development of the project activity and decision making on investment. In June 2005 /20/, a meeting with ArcelorMittal Belgo and José Domingues Miguez (coordinator of the Brazilian DNA) took place in order to discuss the CDM project details. On February 2008 /4/, ArcelorMittal hired Instituto Totum to develop this CDM project in the ArcelorMittal Belgo plant.</p> <p>Therefore, DNV opinion is that it is sufficiently evidenced that continuous action were taken in order to assure CDM status.</p>		
B.5.8 When did the construction of the project activity start?	/1/ /9/	DR	Paul Wurth do Brasil Tec. Equi. Metal. Ltda contract #UJ-AC-0001-GGEP 024/05 signed on 12 August 2005		OK
B.5.9 When was the project commissioned?	/1/ /51/	DR	The second Blast furnace start up on 27 February 2007		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?	/1/	DR	<p>Yes, DNV opinion is that it is sufficiently evidenced that continuous action were taken in order to assure CDM status considering the following:</p> <ul style="list-style-type: none"> • Meeting of the directorship for monitoring of PBS on 20 February 2006 • Totum CDM Services proposal issued on 2 July 2007; • ArvelorMittal workshop of charcoal 		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<p>project according COP 13 on 18 December 2007</p> <ul style="list-style-type: none"> • Totum CDM Services Contract signed on 25 February 2008 • AM0082 submission on 2008 /39/ • Indicative Term Sheet for a Transaction of Emission Reductions Certificates between KfW and ArcelorMittal Brasil S.A. issued on 29 October 2009 /33/ 		
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.	/1/	DR	The additionality has been assessed through the “ <i>Combined tool to identify the baseline scenario and demonstrate additionality</i> ” version 4 according to the methodology AM0082 version 1. The PDD does not present a financial analysis from the project activity.		OK
B.5.12 How were the <u>investment barriers</u> assessed to be real? Are the investment barriers substantiated by a source independent of the project participants?	/1/ /59/ /61/ /67/ /68/	DR	<p>The PDD version 1 presents three investment barriers:</p> <p>1- Investment in the production expansion of iron and steel companies: the iron and steel industry based in coke and coal were encouraging through governmental incentives (1994 – 2006) and those investments aiming the production capacity increase continue happening. On the other hand, in the last 20 years prior to the project implementation (1983-2003), participation of charcoal-based pig-iron production in the total production of integrated steel and iron mills decreased from 22.8% to 5.6%, and up to now</p>		

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			<p>there is no trend of possible revert of this scenario in short term.</p> <p>However it was verified the BNDES 55% investment on charcoal blast furnace of Valorec/Sumitomo on 2010. The PP must review this barrier.</p> <p>2- Lack of attractiveness due to long-term maturity and associated risks to investment: the coal coke needs no investment and its related use implicates in minor risk. On the other hand, establishment of forest plantations requires large amounts of investment with overwhelmingly long payback periods.</p> <p>3- Lack of access to capital necessary to produce reducing agents: small farmers from Zona da Mata region are not able to access loans (Propflora – government mechanism witch aims at the implementation of livestock and forestry projects) and are not motivated to get involved in the wood production (land use resulted in exhausted and partially eroded and tradition in the production of milk and coffee).</p> <p>Although there are 7 forest financing lines in Brazil/68/ /84/, only two could be applied as follow:</p> <p>FINEN Applicable to cellulose forest and facilities</p> <p>FINAME Applicable to cellulose forest and facilities</p> <p>FConature Not applicable on Minas Gerais state</p> <p>FNOForest Not applicable on Minas Gerais state</p> <p>FNEgreen Not applicable on Minas Gerais state</p>	<p>CAR-4</p> <p>CAR-6</p> <p>CAR-7</p> <p>CAR-8</p> <p>CAR-9</p>	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<p>PRONAF– forest for industry in Brazil. PROPFLORA Energetic forest on Brazil However this 2 program have some restriction as follow:</p> <p>PRONAF have small resources and was directed to protection and reserve areas. /68/ /84/ 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 is important remark that no one program financing land.</p> <p>In addition, according the AMS /55//56/ and ABRAF /57/, 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, what considering 100 MDC/ha result on 6,558,700 MCD, which means only</p>		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			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, need 7 years to the first harvest, this and the restriction of financing, the sustainability forest activity have low attractiveness and face real barrier to be implemented.		
B.5.13 How does CDM alleviate the investment barriers?	/1/	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 investment barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	As the non-renewable (native) charcoal iron ore reduction system was considered illegal and not applied by the PP, the as metallurgical coke iron ore reduction system would the feasible baseline scenario.		OK
B.5.15 How were the <u>technological barriers</u> assessed to be real? Are the technological barriers substantiated by a source independent of the project participants?	/1/ /69/	DR	The PDD states that pig-iron reduction based on charcoal (renewable and non-renewable) in the year 1993 was 12.78% and in 2003 its participation in the pig-iron production had felt to 5.60%. Project participant is requested to explain why this is considered a technological barrier, since technological barrier is defined as skilled and/or properly trained labour to operate and maintain the technology is not available in the relevant geographical area; lack of infrastructure for implementation and logistics for maintenance of the technology; risk of technological failure; technology used in the proposed project activity	CL 7	OK

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				is not available.		
B.5.16	How does CDM alleviate the <u>technological barriers</u> ?	/1/	DR	See B.5.16	CL 7	OK
B.5.17	Is the project activity prevented by the <u>technological barriers</u> and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	See B.5.16	CL 7	OK
B.5.18	How were the <u>subsidies and taxes barriers</u> assessed to be real? Are the technological barriers substantiated by a source independent of the project participants?			It is DNV opinion that there was no incentive (subsidies or taxes reduction) regarding coal coke and charcoal use when the decision to invest in the project was taken, and therefore the subsidies and taxes barriers can not be considered.	CL 8	OK
B.5.19	How does CDM alleviate the <u>subsidies and taxes barriers</u> ?			See B.5.18	CL 8	OK
B.5.20	Is the project activity prevented by the <u>subsidies and taxes barriers</u> and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	See B.5.18	CL 8	OK
B.5.21	How were the <u>barriers due to prevailing practise</u> assessed to be real? Are the barriers due to prevailing practise substantiated by a source independent of the project participants?	/1/	DR	No barriers due prevailing practice were presented.		OK
B.5.22	How does CDM alleviate the barriers due to <u>prevailing practise</u> ?	/1/	DR	No barriers due prevailing practice were presented.		OK
B.5.23	Is the project activity prevented by the barriers due to <u>prevailing practise</u> and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	No barriers due prevailing practice were presented.		OK
B.5.24	How were the <u>regulatory barriers</u> assessed to be real? Are the other barriers substantiated by a source independent of the project participants?	/1/	DR	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	CAR 2	OK

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				<p>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.</p> <p>However the environment licensing on Minas Gerais state, trough the IEF had evidenced the established forestry licensing system. /52/. As well as, the amount of new incentive forest on Minas Gerais state was enlarged from 44,000 ha on 2000 to 199,000 on 2009 /56/.</p> <p>As the environment licensing was not demonstrated as a regulatory barrier, it must be reviewed on PDD.</p>		
B.5.25	How does CDM alleviate the other barriers?	/1/	DR	No other barrier were applied		OK
B.5.26	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?	/1/	DR	Considering the financing barrier in order to prevent the use of non renewable charcoal what is illegal and not applied by the PP, the coal coke in pig iron blast would be more feasible scenario and the project activity would not be implemented without CDM incentive.		OK
Investment analysis (VVM para 106-112) <i>The list of questions below must be adjusted to the parameters in the investment analysis relevant to the project under validation.</i>						
B.5.27	Does the project activity or any of the remaining alternatives generate revenues apart from CDM? Is this reflected in the PDD?	/1/	DR	The project had applied the step 2 of methodology: Barrier analysis.		-
B.5.28	Do any of the alternatives to the project activity involve investment? Is this reflected in the PDD?	/1/	DR	Not applicable.		-
B.5.29	Is the choice of benchmark analysis, investment comparison	/1/	DR	Not applicable.		-

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	or simple cost analysis correct?					
B.5.30	Is the benchmark/discount rate the latest available at the time of decision?	/1/	DR	Not applicable.		-
B.5.31	What is the financial indicator? Is it on equity/project basis? Before/after tax? Is the financial indicator in correspondence with the benchmark?	/1/	DR	Not applicable.		-
B.5.32	Are the underlying assumptions appropriate, e.g. what is considered as waste in the baseline is considered to have zero value?	/1/	DR	Not applicable.		-
B.5.33	Does the income tax calculation take depreciation into account? Is the depreciation year in accordance with normal accounting practice in the host country?	/1/	DR	Not applicable.		-
B.5.34	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?	/1/	DR	Not applicable.		-
B.5.35	When a feasibility study 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?	/1/	DR	Not applicable.		-
B.5.36	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.	/1/	DR	<input type="checkbox"/> 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 <input type="checkbox"/> The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company) <input type="checkbox"/> Other approach.		-

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B.5.37 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.	/1/	DR	<p>Not applicable.</p> <p><input type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices)</p> <p><input type="checkbox"/> Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants</p>		-
B.5.38 How were 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.	/1/	DR	<p>Not applicable.</p> <p><input type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices)</p> <p><input type="checkbox"/> Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants</p>		-
B.5.39 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.	/1/	DR	<p>Not applicable.</p> <p><input type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices)</p> <p><input type="checkbox"/> Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants</p>		-
B.5.40 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.	/1/	DR	<p>Not applicable.</p> <p><input type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices)</p> <p><input type="checkbox"/> Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants</p> <p>Not applicable.</p>		-

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.41	Was the financial calculation spreadsheet verified and found to be correct?	/1/	DR	Not applicable.		-
B.5.42	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?	/1/	DR	Not applicable.		-
B.5.43	Sensitivity analysis: Is the range of variations is reasonable in the project context?	/1/	DR	Not applicable.		-
B.5.44	Have the key parameters been varied to reach the benchmark and the likelihood of this to happen been justified to be small?	/1/	DR	Not applicable.		-
Common practice analysis (VVM para 117-119)						
B.5.45	What is the geographical scope of the common practice analysis? Is this justified?	/1/	DR	The Minas Gerais state, since project activity and largest pig-iron production pool in Brazil are located in this state 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 provide evidence that project activity and largest pig-iron production pool in Brazil are located in Minas Gerais state; this region has specific laws and regulations regarding forest establishment and exploitation of native forests that are quite different in other states.	CL9	OK
B.5.46	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?	/1/	DR	All scales of pig-iron production of integrated iron and steel companies were considered; all charcoal based blast-furnace technologies were considered; the investments to implement charcoal blast-furnaces in the last 10 years prior to the project activity are going to be considered	CL9	OK

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			<p>as being made in the same investment environment, which is after the sector's privatization process.</p> <p>Project participant is requested to enlarge the assessment period of the common practice analysis, since the privatization process of the sector took place between 1991 and 1993.</p>		
B.5.47 What is the data source(s) used for the common practice analysis?	/1/	DR	Project participant is requested to provide data source(s) used for the common practice analysis.	CL-9	OK
B.5.48 How many similar non-CDM-projects exist in the region within the scope?	/1/	DR	<p>This is the first project of AM0082 published on UNFCCC GSD. The second is the Plantar project also applying AM 0082.</p> <p>The Valourec-Sumitomo are implemented a new blast furnace at Jeceaba municipality, MG state, starting with coal/coke until develop new forest during first 7 years to supply the new blast furnaces with charcoal /63/.</p>		OK
B.5.49 How were possible essential distinctions between the project activity and similar activities assessed?	/1/	DR	The PDD presents an assessment of the projects regarding: being an integrated pig iron production; using of blast-furnaces based on charcoal; being located in the Minas Gerais state; investing in pig iron production based on charcoal in the last 10 years prior to the implementation of the project activity; not being a CDM project activity.		OK
B.5.50 What is the conclusion of the common practice analysis?	/1/	DR	From the eight plants presented: CSN, Cosipa, CST, Barra Mansa, Acesita, Usiminas, Açominas, Gerdau, V&M do Brasil and Arcelor Mittal Juiz de Fora (the project activity), Only Acesita, the first five do not use blast-furnaces based on charcoal, the Gerdau plant was established more than ten years before the project	CL-9	OK

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			activity start, and the last two (V&M do Brasil and Arcelor Mittal Juiz de Fora) are CDM project activities. Project participant is requested to provide data source(s) used for the common practice analysis.		
Conclusion					
B.5.51 What is the conclusion with regard to the additionality of the project activity?	/1/	DR	The analysis above shows that the Minas Gerais pig iron activity has a scarcity of renewable charcoal, what is supplied with native charcoal from Minas Gerais, Bahia, Espirito Santo and Mato Grosso States, and the financing system in Brazil is not sufficiently to enlarge the renewable charcoal. In conclusion, the investment barrier and common practice analysis have shown that the project activity is not a feasible activity without CDM incentives.	€	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?	/1/ /18/	DR	The quantity of coal coke necessary to produce one tonne of hot metal (0.522 t coal coke/t hot metal) was verified through historical fuel rate data of João Monlevade Blast furnaces /18/. However, the value had considered only the average of 2001 – 2003. In addition, the average calculation considers values out of 95% confidence level. The value adjusted reach 0,517 t coal coke/t hot metal) The PP must review the PDD	€AR-3	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.6.2	How was the $\%C_{BL,i}$ verified?	/1/ /19/	DR	The carbon content in percent of in the non-renewable reducing agent i in the baseline scenario (89%) was verified through ship cargo reports from Jan to December 2007, when Monlevade blast furnaces had used imported coal coke /19/.		OK
B.6.3	How was the $EF_{CO2e, \text{ coal coke}, y}$ verified?	/1/ /39/	DR	The emission factor to produce one tonne of coal coke in the iron ore reduction system baseline scenario was verified with the default value of Emission Factor (for conservativeness, the option “flared” was used 0.4026 tCO ₂ e/t coal coke) as established on AM0082 version 1 Annex 3, table 5. There is no operational data available.		OK
B.6.4	How was the $EF_{VF, BL}$ verified?	/1/ /71/	DR	The emission factor for vehicle type v with fuel type f (diesel) in the baseline scenario (0.00269 tCO ₂ /liter) was verified through the GHG Protocol Brazilian Program /92/.		OK
B.6.5	How was the $n_{VF, BL, y}$ verified?	/1/	DR	The number of vehicles of type v with fuel type f in year y in the baseline scenario (1) was verified considering that all the load was transported in 1 load considering 2 trips of 894 km as the distance from Juiz de Fora to Vitoria (ArcelorMittal Tubarão) /72/.		OK
B.6.6	How was the $k_{VF, BL, y}$ verified?	/1/ /72/	DR	The kilometres travelled by each of vehicle type v with fuel type f in the baseline scenario (1 788 km/year, distances between the cities Tubarão – Ouro Branco – Juiz de Fora, Tubarão is where the coke coal is received, Ouro Branco and Juiz de Fora where the plant is installed)		OK

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B.6.7 How was the $e_{VF,BL,y}$ verified?	/1/ /18/	DR	<p>The average fuel consumption of vehicle type v with fuel type f in the baseline scenario was calculated on CER calculation spreadsheet as $e_{VF,BL,y} = P_{PJ,Y} * RA_{BL,Y} * 0.00354 \text{ l/tku}$ or $360000 \text{ ton pig iron} * 0.517 \text{ ton coke/ton pig iron} * 0.00354 \text{ l/tku} = 659 \text{ liters/km}$</p> <p>The fuel rate of railway engine is according best practice of Vale. /93/, however the PDD had considered 0.00420 l/tku (Didactic Manual UFPR) and the fuel rate of Monlevade Blast Furnace was not according the conservative way. The PP must review the calculation and the PDD.</p>	CAR-3 CAR-4	OK
B.6.8 How was the v_{BL} verified?	/1/	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 scenario.		OK
B.6.9 How was the f_{BL} verified?	/1/	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?	/1/	DR	The percentage of carbon in hot metal in the project situation (0%) was verified through the AM0082 version 1 that defines zero as a conservative approach.		OK
B.6.11 How was the $Cc_{HM,BL,y}$ verified?	/1/	DR	<p>The carbon content fixed in hot metal expressed in t CO₂e per t of hot metal produced (zero) was considered as zero, as it was calculated as</p> $Cc_{HM,BL,Y} = \frac{\%C_{HM,PJ,Y}}{100}$ <p>And as the pig iron is produced using</p>		OK

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			renewable charcoal only, AM0082/Version 1 considers %C _{HM, PJ, y} as zero.		
B.6.12 How was the EF _{CO₂,i,y} verified?	/1/ /73/	DR	The average CO ₂ emission factor of fuel type i (diesel) in year y (72.6 tCO ₂ /TJ) was verified trough the National Energetic Balance of Brazil (BEN) 2009.		OK
B.6.13 How was the NCV _{DIESEL} verified?	/1/ /73/	DR	The average net calorific value of diesel (0.00003546 TJ/liter) was verified trough the National Energetic Balance of Brazil (BEN) 2009.		OK
B.6.14 How was the COEF _{i,y} verified?	/1/ /73/	DR	The parameter symbol and name should be reviewed since the methodology presents EF _{diesel,PJ} emission factor for road transportation (diesel and gasoline) in the project scenario. Value applied 0.002575 tCO ₂ /liter was verified trough the parameters EF _{CO₂,i,y} and NCV _{DIESEL} , however the EF _{VF, BL} was considered as 0.00269 tCO ₂ /liter. The PP must consolidate the information.	CAR-5	OK
B.6.15 How was the EF _{v(TRUCK), km,CO₂, y} verified?	/1/	DR	Project participant is requested to review the source of data applied to EF _{TRUCK, km,CO₂, y} , since the methodology AM0082 version 1 indicates IPCC 2006 or identify the national source.	CL-10	OK
B.6.16 How was the EF ₁ verified?	/1/ /74/	DR	The emission Factor for emissions from N inputs (0.01 tonne-N ₂ O-N /t-N input) was verified trough IPCC 2006 Guidelines.		OK
B.6.17 How was the Frac _{GASF} verified?	/1/ /43/	DR	The Fraction that volatilizes as NH ₃ and NO _x for synthetic fertilizers (0.01) was verified trough the “Fraction that volatilizes as NH ₃ and NO _x for organic fertilizers”.		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.6.18	How was the GWP _{CH₄} verified?	/1/ /74/	DR	The Global warming potential for CH ₄ (21 tCO ₂ e/tCH ₄) was verified through IPCC 2006 Guidelines.		OK
B.6.19	How was the GWP _{N₂O} verified?	/1/ /74/	DR	The Global warming potential for GWP _{N₂O} (310 tCO ₂ e/tN ₂ O) was verified through IPCC 2006 Guidelines.		OK
Baseline emissions (VVM para 88-92)						
B.6.20	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	Yes, baseline emissions are in accordance with AM0082 version 1 and clear stated in PDD.		OK
B.6.21	Have conservative assumptions been used when calculating the baseline emissions?	/1/	DR	Yes, conservative assumptions have been used (primary carbon sources extraction in the baseline scenario were considered zero).		OK
B.6.22	Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	Yes.		OK
Project emissions (VVM para 88-92)						
B.6.23	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	Yes, project emissions are in accordance with AM0082 version 1 and clear stated in PDD.		OK
B.6.24	Have conservative assumptions been used when calculating the project emissions?	/1/	DR	Yes, conservative assumptions have been used.		OK
B.6.25	Are uncertainties in the project emission estimates properly addressed?	/1/	DR	Yes.		OK
Leakage (VVM para 88-92)						
B.6.26	Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	No leakage has been considered in the project activity. Project participant is requested to explain why increased emissions from the displacement of economic activities such as harvest of fuel wood for meeting domestic energy needs and use of lands as pastures for grazing/fodder collection are not taken into	CL-11	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			account for calculation of leakage associated with production of renewable biomass resources needed for producing charcoal, presenting evidence. Leakage associated with the displacement of economic activities of households shall be assessed and if they are identified and attributable to the project activity.		
B.6.27 Have conservative assumptions been used when calculating the leakage emissions?	/1/	DR	See B.6.26	CL H	OK
B.6.28 Are uncertainties in the leakage emission estimates properly addressed?	/1/	DR	See B.6.26	CL H	OK
Emission Reductions (VVM para 88-92)					
B.6.29 Algorithms and/or formulae used to determine emission reductions: <ul style="list-style-type: none"> 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 the emission reductions and this can be replicated by the data provided in the PDD and supporting files to be submitted for registration. 	/1/ /19/ /71/ /73/ /93/	DR	<p>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).</p> <p><u>Baseline Emissions:</u></p> <p>$BE_y = RAE_{BL,y} + IRE_{BL,y}$</p> <p>$RAE_{BL,y} = PCE_{BL,y} + RAP_{BL,y} + RAT_{Vehicle,BL,y}$</p> <p>$PCE_{BL,y} = 0$ (the primary carbon sources extraction GHG emissions attributable to the coal mining related activities occur outside the host country boundaries)</p> <p>$RAP_{BL,RA,y} = RAP_{BL, coal coke, y} = P_{PJ, y} * EF_{CO2e, coal coke, y} * RA_{BL, i}$</p> <p>$EF_{CO2e, coal coke, y} = 0.4026 \text{ tCO}_2\text{e} / \text{t coal coke}$</p>		

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<p>(reducing agent is not under the control of the PP, methodology AM0082 determines the use of default value - Table 3 of the Annex 1)</p> <p>$P_{PJ,y} = 360\,000\text{ t}$ (according Juiz Fora Blast Furnace specification /7/)</p> <p>$RA_{BL,y} = 0.522\text{ t coal coke/t hot metal}$ (<u>however this value is not conservative</u>)</p> <p>$RAP_{BL, \text{ coal coke, y}} = 75\,657\text{ tCO}_2/\text{yr}$ (No charcoal is used in the baseline)</p> <p>$RAT_{\text{Vehicle, BL, y}} = \sum \sum (EF_{VF, BL} * FC_{VF, BL, y})/1000$</p> <p>$EF_{VF, BL} = 0.00269\text{ tCO}_2/\text{liter}$ (<u>published paper</u>) <u>however the $EF_{\text{diesel, PJ}}$ had considered $0.002575\text{ tCO}_2/\text{liter}$</u></p> <p>$FC_{VF, BL, y} = n_{VF, BL, y} * k_{VF, BL, y} * e_{VF, BL}$</p> <p>$n_{VF, BL, y} = 1$</p> <p>$k_{VF, BL, y} = 1\,788\text{ km/year}$</p> <p>$e_{VF, BL} = 509.76\text{ liters/km}$ (The fuel rate of railway engine is according best practice of Vale. /93/, <u>however the PDD had considered 0.00420 l/tku (Manual Didatic UFPR) and the fuel rate of Monlevade Blast Furnace was not according the conservative way)</u></p> <p>$FC_{VF, BL, y} = 1\,189\,443.40\text{ litres/yr}$</p> <p>$RAT_{\text{Vehicle, BL, y}} = 3\,189\text{ tCO}_2/\text{yr}$</p> <p>$RAE_{BL, y} = 78\,845\text{ tCO}_2/\text{yr}$</p> <p>$IRE_{BL, y} = (P_{PJ, y} * EF_{\text{Ind, BL}}) - (P_{PJ, y} * C_{\text{CHM, BL, y}} * 44/12)$</p> <p>$EF_{\text{Ind, BL}} = \sum (\%C_{BL, i} * RA_{BL, i})/100 * 44/12$</p> <p>$\%C_{BL, I} = 89\%$ (verified trough ship cargo</p>	CAR-3	OK
				CAR-5	
				CAR-4	

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<p>reports from Jan to December 2007, when Monlevade blast furnaces had used imported coal coke /19/)</p> <p>$EF_{Ind,BL} = 1.703 \text{ tCO}_2\text{e/t of hot metal}$</p> <p>$CC_{HM,BL,y} = 0$</p> <p>$IRE_{BL,y} = 613\,246 \text{ tCO}_2\text{/yr}$</p> <p>$BE_y = 692\,091 \text{ tCO}_2\text{/yr}$</p> <p><u>Project emissions</u></p> <p>$PE_y = RAE_{PJ,y} + IRE_{PJ,y}$</p> <p>$RAE_{PJ,y} = PCE_{PJ,y} + RAP_{PJ,RA,y} + RAT_{Vehicle,PJ,y}$</p> <p>$PCE_{PJ,y} = EP_{PJ,y} = E_{fuelburning,PJ,y} + PE_{BB,y} + N_2O_{direct-fertilizer\,N\,PJ,y} + EP_{Vehicle,PJ,y}$</p> <p>$E_{fuelburning,PJ,y} = \sum FC_{i,j,y} * COEF_{i,y}$</p> <p>$FC_{i,j,y} = 7\,154\,790 \text{ liter/yr (255 l/ha)}$</p> <p>$COEF_{i,y} = 0.002575 \text{ tCO}_2\text{/liter (72.6 tCO}_2\text{/TJ} * 0.00003546 \text{ TJ/liter according the National Energetic Balance of Brazil (BEN) 2009)}$</p> <p>$E_{fuelburning,PJ,y} = 18\,421 \text{ tCO}_2\text{e/yr}$</p> <p>$PE_{BB,y} = 0$ (there is no biomass burning at the project activity)</p> <p>$EP_{Vehicle,PJ,y} = N_{PCE,PJ,y} * AVD_{PCE,PJ,y} * EF_{TRUCK,km,CO_2,y}$</p> <p>$N_{PCE,PJ,y} = 173\,960 \text{ round trips}$</p> <p>$AVD_{PCE,PJ,y} = 36 \text{ km}$</p> <p>$EF_{TRUCK,km,CO_2,y} = 1.12 \text{ kgCO}_2\text{/km}$ (according GHG protocol, <u>however the AM0082 version 1 indicates IPCC 2006)</u></p>		

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			$EP_{\text{Vehicle, PJ, y}} = 7\,014 \text{ tCO}_2\text{e/yr}$ $N_2O_{\text{direct - fertilizer N PJ, y}} = (F_{\text{SN,t}} + F_{\text{ON,t}}) * EF_1 * MW_{\text{N}_2\text{O}} * GWP_{\text{N}_2\text{O}}$ $F_{\text{SN,t}} = \sum M_{\text{SFi,t}} * NC_{\text{SFi}} * (1 - \text{Frac}_{\text{GASF}})$ $M_{\text{SFi,t}} = 0.180$ from the fertilizer type I; 0.270 from the fertilizer II and III $NC_{\text{SFi}} = 6 \text{ gN/100g Fertilizer I; } 8 \text{ gN/100g Fertilizer II and III.}$ $\text{Frac}_{\text{GASF}} = 0.1$ $EF_1 = 0.01$ IPCC 2006 Guidelines $MW_{\text{N}_2\text{O}} = 44/28$ $GWP_{\text{N}_2\text{O}} = 310$ IPCC Guidelines 2006 $N_2O_{\text{direct - fertilizer N PJ, y}} = 2\,657 \text{ tCO}_2\text{/year}$ $PCE_{\text{PJ, y}} = 28\,092 \text{ tCO}_2\text{e/yr}$ $RAP_{\text{PJ, RA, y}} = RAP_{\text{PJ, charcoal, y}}$ $RAP_{\text{PJ, charcoal, y}} = P_{\text{PJ,y}} * EF_{\text{CH}_4, \text{charcoal, PJ,y}} * F_{\text{PJ, charcoal}} * GWP_{\text{CH}_4}$ (Option 1) $EF_{\text{CH}_4, \text{BL}} = f(Y_{\text{BL}})$ $EF_{\text{CH}_4, \text{charcoal, PJ,y}} = f(Y_{\text{PJ}}) = (A - B) * Y_{\text{PJ}}$ $P_{\text{PJ,y}} = 360\,000$ tonnes of hot metal $EF_{\text{CH}_4, \text{charcoal, PJ,y}} = 0.04397 \text{ tCH}_4/\text{t of charcoal}$ $F_{\text{PJ, charcoal}} = 0.6 \text{ t charcoal/t of hot metal}$	CL-10	

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<p>$GWP_{CH_4} = 21 \text{ tCO}_2\text{e/tCH}_4$</p> <p>$Y_{PJ} = 0.31 \text{ t charcoal / t wood (dry basis)}$</p> <p>$RAP_{PJ, RA, y} = 199\,438 \text{ tCO}_2/\text{year}$</p> <p>$RAT_{Vehicle, PJ, y} = EP_{Vehicle, PJ, y} = N_{RAT, PJ, y} * AVD_{RAT, PJ, y} * EF_{TRUCK, km, CO_2, y}$</p> <p>(Option 2)</p> <p>$N_{RAT, PJ, y} = 9\,391 \text{ round trips (216\,000 t charcoal/year; 23 t one truck)}$</p> <p>$AVD_{RAT, PJ, y} = 1\,300 \text{ km}$</p> <p>$EF_{TRUCK, km, CO_2, y} = 1.12 \text{ (methodology indicates IPCC source)}$</p> <p>$RAT_{Vehicle, PJ, y} = 13\,674 \text{ tCO}_2/\text{year}$</p> <p>$RAE_{PJ, y} = 241\,204 \text{ tCO}_2/\text{year}$</p> <p>$IRE_{PJ, y} = (P_{PJ, y} * EF_{Ind, PJ, y}) - (P_{PJ, y} * C_{CHM, PJ, y} * 44/12)$</p> <p>$EF_{Ind, PJ, y} = 0 \text{ (carbon content of renewable reducing agent from biomass dedicated plantations)}$</p> <p>$C_{CHM, PJ, y} = 0 \text{ (as the pig iron is produced using renewable charcoal)}$</p> <p>$IRE_{PJ, y} = 0$</p> <p>$PE_y = 223,852 \text{ tCO}_2/\text{year}$</p> <p><i>Leakage</i></p> <p>$LE_y = 0$</p> <p>No leakage has been considered in the project activity. Project participant is requested to explain why increased emissions from the displacement of economic activities such as</p>		

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				<p>harvest of fuel wood for meeting domestic energy needs and use of lands as pastures for grazing/fodder collection are not taken into account for calculation of leakage associated with production of renewable biomass resources needed for producing charcoal, presenting evidence. Leakage associated with the displacement of economic activities of households shall be assessed and if they are identified and attributable to the project activity.</p> <p><u>Emission Reductions</u></p> <p>$ER_y = BE_y - PE_y - LE_y - \text{MAX}(0, RAE_{BL,y} - RAE_{PJ,y})$ As $(RAE_{BL,y} - RAE_{PJ,y})$ is negative the coefficient was considered null and:</p> <p>$ER_y = 468\,697 \text{ tCO}_2/\text{year}$</p>	CL-11	
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?	/1/	DR	Yes. According to AM0082 version 1 and AM0041 version1.		OK
B.7.2	Does the monitoring plan contains <u>all necessary parameters</u> , and are they clearly described?	/1/	DR	<p>Project participant is requested to explain why the following parameters are not monitored:</p> <ul style="list-style-type: none"> • $\%C_{HM,PJ,y}$ percentage of carbon in hot metal, v_{PJ} vehicle type in the project scenario, • f_{PJ} fuel type in the project scenario, 	CL-12	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<ul style="list-style-type: none"> • $n_{vf,PJ,y}$ number of vehicles type v with fuel type f in year y in the project scenario, • $k_{vf,PJ,y}$ distance travelled by each of vehicle type v with fuel type f in the project scenario, • $e_{vf,PJ,y}$ average fuel consumption of vehicle type v with fuel type f in the project scenario. <p>As well as, the Project participant is requested to explain why the following parameters related “Leakage emission from activity displacement under project scenario” are not monitored:</p> <ul style="list-style-type: none"> • nH_r number of sample households resident in the vicinity of the project, • NH_r total number of displaced households resident in the vicinity of the project, • B_{LB} living renewable biomass of trees (aboveground and belowground renewable biomass) per ha in the area subject to land use/cover change, • CF carbon fraction for renewable biomass in the area subject to land use/cover change, • $EF_{all-pools}$ expansion factor (1.2 to 1.5) to convert the carbon stock of living renewable biomass of trees to carbon stock representing all pools depending on vegetation density • (low vegetation density areas should use 	CL-13	

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			lower end of expansion factor and <ul style="list-style-type: none"> • vice versa), • NH_e total number of emigrant households, • FG_y annual volume of fuel wood use, • D basic wood density, • BEF_2 biomass expansion factor for converting volumes of extracted round wood to total above-ground biomass (including bark), • P_y population of the region, • HS number of persons per household, • FCA proportion of per capita fuel wood consumption from agricultural/ private lands including purchases, to the total per capita annual fuel wood consumption from all sources, • PG annual human population growth. 		
B.7.3 In case parameters are measured, is the <u>measurement equipment</u> described? Describe each relevant parameter.	/1/	DR	Project participant is requested to indicate equipment used: <ul style="list-style-type: none"> • $P_{PJ,y}$ - 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-14	OK
B.7.4 In case parameters are measured, is the <u>measurement accuracy</u> addressed and deemed appropriate? Describe each relevant parameter.	/1/	DR	project participant is requested to indicate <u>measurement accuracy pf</u> : <ul style="list-style-type: none"> • $P_{PJ,y}$ - Hot metal production in the project scenario in year y:. • $FC_{i,j,y}$ - Quantity of fuel type i 	CL-14	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.7.5	In case parameters are measured, are the requirements for <u>maintenance and calibration</u> of measurement equipment described and deemed appropriate? Describe each relevant parameter.	/1/	DR	<p>combusted in process j during the year y:</p> <p>Project participant is requested to indicate <u>calibration and maintenance</u> requirements and manufacturer calibration recommendation.</p> <ul style="list-style-type: none"> • $P_{PJ,y}$ - 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: 	CL-14	OK
B.7.6	Is the monitoring <u>frequency</u> adequate for all monitoring parameters? Describe each parameter.	/1/	DR	<p>$P_{PJ,y}$ - Hot metal production in the project scenario in year y: measured daily.</p> <p>$N_{PCE, PJ, y}$ 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 renewable biomass to the carbonization site(s) and to transport charcoal from the reducing agent production site(s) to the iron ore reduction facility: annually.</p> <p>$F_{PJ, CHARCOAL}$ - Quantity of charcoal necessary to produce one tonne of hot metal in the project scenario: monitored daily applying Standard Operational Procedures and aggregated annually.</p> <p>However, participant is requested to indicate monitoring frequency for the following parameters:</p> <ul style="list-style-type: none"> • $FC_{i,j,y}$ - Quantity of fuel type i combusted in process j during the year y: project. • $M_{SFi,t}$ - Mass of synthetic fertilizer type i 		

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				<p>applied.</p> <ul style="list-style-type: none"> • 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 produce one tonne of renewable charcoal identified in the project supply chain. • M_{SFi,t} - Mass of synthetic fertilizer type i applied. 	CL-15	OK
B.7.7	Is the recording <u>frequency</u> adequate for all monitoring parameters? Describe each parameter.	/1/	DR	See B.7.6	CL-15	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?	/1/	DR	Yes, procedures have been developed based on many systems that are the base of the 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 will be used to day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation).		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
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?	/1/	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-16	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?	/1/	DR	Yes.		OK
Monitoring of sustainable development indicators/ environmental impacts						
B.7.12	Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/1/ /86/	DR	Brazil legislation does not require the monitoring of sustainable development indicators/ environmental impacts.		OK
B.7.13	Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	Not applicable.		OK
B.7.14	Are the sustainable development indicators in line with stated national priorities in the host country?	/1/	DR	Not applicable.		OK
C Duration of the project activity / crediting period						
C.1.1 Start date of project activity (VVM para 96-97, 102)						
C.1.2	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?	/1/	DR	The starting date of the project activity is 12 August 2005 which is the date of the investment in the blast furnace construction contract.		OK
C.1.3	Is the stated expected operational lifetime of the project activity reasonable?	/1/	DR	The minimum operational lifetime of the project activity is 15 years due to the fact that the blast furnaces operate at least this period of time without need of refurbishment/reformation (Parreira &		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				Santos). In case of blast furnace of ArcelorMittal CST, it operates without any major reformation during the last 22 years		
C.1.4	Is the start date, the type (renewable/fixed) and the length of the crediting period clearly defined and reasonable?	/1/	DR	The PDD latest version considered a seven years period (renewable) was chosen, starting in 1 January 2013 or the registration date, whichever occurs later.	CL 1	OK
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?	/1/ /24/ /26/ /28/ /86/	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?	/1/ /24/ /26/ /28/ /86/	DR	Yes.		OK
D.1.3	Will the project create any adverse environmental effects?	/1/ /24/ /26/ /28/ /86/	DR	No.		OK
D.1.4	Have identified environmental impacts been addressed in the project design?	/1/ /24/	DR	Yes		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
		/26/ /28/ /86/				
D.1.5	Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/ /24/ /26/ /28/ /86/	DR	Yes		OK
D.1.6	Are transboundary environmental impacts considered in the analysis?	/1/ /24/ /26/ /28/ /86/	DR	No.		OK
E Stakeholder Comments (VVM para 126-128)						
E.1.1	Have relevant stakeholders been consulted?	/1/	DR	The project boundary is not yet all identified, and therefore DNV could not assess if all relevant stakeholder were consulted. Project participant is requested to include in PDD information regarding forest plantation sites details and dedicated plantation geographical identification and delineation.	CL-2	OK
E.1.2	Have appropriate media been used to invite comments by local stakeholders?	/1/ /87/	DR	Yes, stakeholders were consulted according Resolution number 7 of the Brazilian DNA.		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?	/1/ /87/	DR	Yes, following the determination from the Brazilian DNA resolution, letters with CDM project description were sent to stakeholders inviting them to raise concerns and comments during a period of 30 days from the date that		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			letters were received. All letters were sent in the second half of July.		
E.1.4 Is a summary of the stakeholder comments received provided?	/1/ /6/	DR	<p>Yes, the following comments were received:</p> <ul style="list-style-type: none"> - Environmental Secretary of Capelinha: congratulating the project implementation due to its objective of sustainability; - São José do Goiabal City Hall: congratulating the fossil switch due to environmental issues and the increase in the regional economy; - São Vicente de Minas City Hall: invited the PP to participate in a Industrial Exposition; - Entity “Associação Municipal de Apoio Comunitário de Juiz de Fora”: congratulates the PP and emphasizes its social responsibility work toward sustainability; - Carbonita City Hall: states that the Project activity improves the economic development and brings a higher level of life quality; - Entity “Associação pelo Meio Ambiente de Juiz de Fora”: states that the project is interesting and positive. It is also commented that the institution wants to make partnerships with the PP to work with Environmental Education programs; - Minas Novas City Hall: congratulates the PP due to the economic, social and environmental benefits of the project activity and demonstrates interest in having also industrial activities>; - Miradouro Environmental Secretary: states that only a few farmers from Miradouro know about the forestation opportunity generated by the project activity and the marketing should be intensified. 		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
E.1.5	Has due account been taken of any stakeholder comments received?	/1/	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
<p>CAR 1</p> <p>Investment in the production expansion of iron and steel companies: the iron and steel industry based in coke and coal were encouraging through governmental incentives (1994 – 2006) and those investments aiming the production capacity increase continue happening. On the other hand, in the last 20 years prior to the project implementation (1983-2003), participation of charcoal-based pig-iron production in the total production of integrated steel and iron mills decreased from 22.8% to 5.6%, and up to now there is no trend of possible revert of this scenario in short term /69/.</p> <p>However it was verified the BNDES 55% investment on charcoal blast furnace of Valeorec/Sumitomo on 2010 /63/. The PP must review this barrier.</p>	B. 5.12	<p>The loan from BNDES to VSB does not affect this barrier as:</p> <ul style="list-style-type: none"> - The investment decision to implement the AMJF's project activity was taken more than four years before the VSB loan approval, that was turned public on 22/12/2009 /52/; - The evidence /52/ also states that in the beginning of operation, the VSB will use coke due the fact the renewable biomass growth will take at least 7 years and there is no renewable biomass available in the market for use in the blast furnace, as demonstrated in the section B.4 of PDD and evidence /45/, mentioned in the CAR 2. - The VSB blast-furnace technology is different from AMJF's one as VSB operates with any mix of coke and charcoal, while AMJF uses only charcoal as reducing agents, which increases the risk of reducing agents no-availability (see link below). - Even if VSB blast furnace would operate in full capacity and use only charcoal in its flex blast furnace, this would represent only 1,25% of the total installed capacity of Brazil, considering 42.1 million tons installed capacity in 2009, plus 5 million tons from CSA, plus 0.6 million tons from VSB, all operating in the year 2010. (VSB installed capacity and flex fuel blast-furnace technology article) http://www.abmbrasil.com.br/news/clipping/clipping_por_data.asp?dia=20&mes=6&ano=2007 (Installed capacity in 2009 in Brazil) 	<p>The reviewed PDD version 02.7 had provided additional clarification for the difference scenario applied to VSB project.</p> <p>DNV had considered the evidences sufficient.</p> <p>Therefore this CAR is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		http://www.acobrasil.org.br/site/portugues/numeros/numeros--mercado.asp (Start and Planned Production of CSA) http://www.thyssenkrupp-steel-europe.com/csa/en/strategie/	
<p>CAR 2</p> <p>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.</p> <p>However the environment licensing on Minas Gerais state, through the IEF had evidenced the established forestry licensing system. /52/. 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 /56/.</p> <p>The project participant is requested to review the regulatory barriers.</p>	B. 5.2.4	<p>Based on the evidence /45/, the amount of land with new plantations in 2009 was 129,120 ha, which represents 293% of increase. However, this increase was not due to the Integrated Iron & Steel Company's investment as the amount of land of these companies increased 50% while other wood based industries increased the 243% left.</p> <p>When comparing the planted area increase with the Gross Domestic Product (GDP) of the Host Country in the same period, which was 37.48%, the growth of the plantation area for iron & steel production (50%) is not significant.</p> <p>Moreover it did not change the relative trend of decrease in the use of charcoal, being replaced by coke and non-renewable charcoal in the pig iron reduction process as demonstrated in the Table "Origem Natural do Carvão Vegetal Consumido em MG" of the evidence /45/, which shows a consumption of 12,428 and 9,952 x103mdc of charcoal in the years 2000 and 2009 respectively, which means a decrease of 20% of</p>	<p>The reviewed PDD version 02.7 had evidenced the impact of farm licensing process as the project consist on renew 92 existents farms and 191 new small farmers These sites, according the environment licence regulation of Minas Gerais State /78/ need a complex environment impact assessment/report (EIA/RIMA) including flora and fauna assessment, historical assessment, waster resources impact and population impact, which means get and maintain 1238 environmental licensing only for charcoal production Hence, the implementation of the 2a option has significant higher demand on licensing process compared with the baseline.</p> <p>Therefore this CAR is closed</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>charcoal use while the non-renewable charcoal consumption increased 34% in the same time period (reaching over 50% of total charcoal consumed).</p> <p>As presented in the evidence /45/, the amount of licensed forests on Minas Gerais state was enlarged by 85.000 ha between 2000-2009, but the official Brazilian plantation agency (ABRAF) published that, during only four years (2005 – 2009), the total area of planted forests in Minas Gerais increased by 170.826 ha. This shows that a large part of the existing planted forests is not licensed to the present day. It is interesting to emphasize that the increase in the plantation's area does not mean that all the areas have a license.</p> <p>The regulatory barrier is a very difficult problem to be solved, mainly when licensing small areas which are almost not subject to environmental control, and the documentation provided to DOE demonstrated clearly that the CDM benefits were decisive in order to the environmental licenses to be issued by the environmental agency.</p> <p>(GDP of Brazil in the last decade) http://www.informes.org.br/index.php?option=c</p>	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>om_content&view=article&id=6393:pib-brasileiro-tem-crescimento-de-75-e-registra-a-maior-alta-dos-ultimos-25-anos&catid=1:latest-news&Itemid=108</p> <p>(Plantation area MG – ABRAF Table 1.01) http://www.abraflor.org.br/estatisticas/ABRAF10-EN.pdf</p> <p>Finally, to implement the Alternative Scenario 2a, the PP needed to pursue 1 license for the blast furnace (the same as in the Alternative Scenario 1) and additional licenses to the implementation of the forest plantation and carbonization units, transportation of existent 92 farms and for the 191 new small farmers properties involved in the project activity renewable biomass supply (with 6 specific licenses to obtain each one). As demonstrated in the discussion above, in Brazil the farmers has low interest in regularizing its land and follow the legislation to guarantee the Legal Reserve. The CDM project has been a important incentive to the legal barrier to be overcome by the PP. The PP provides all the technical and law assistance, free of cost to the small farmers, in order to make them able of licensing their lands. In addition, it is clear that the issuance of at least 6 environmental licenses for each of the 191 small farmers plus the licenses to itself</p>	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		(Forestry, Carbonization and Blast-Furnace) in the Alternative Scenario 2a (totalizing over 92 + 1,146 licenses) is much more difficulty and costly than the issuance of only 1 license in the Alternative Scenario 1. The PP, due to this regulatory barrier, is assuming the market-risks of pre-purchasing renewable biomass to harvest in the 7° year after the small farmers join the project activity and start their plantation.	
<p>CAR 3</p> <p>The quantity of coal coke necessary to produce one tonne of hot metal (0.522 t coal coke/t hot metal) was verified through historical fuel rate data of João Monlevade Blast Furnaces. However, the value had considered only the average of 2001 – 2003. In addition, the average calculation considers values out of 95% confidence level. The value adjusted reach 0,517 t coal coke/t hot metal) The PP must review the PDD</p>	<p>B. 6.1 B.6.7 B.6.29</p>	<p>The PP revised the PDD in order to apply the value of 0.517 instead of 0.522 tons of coal coke / ton of hot metal.</p>	<p>The reviewed PDD version 02.7 was revised accordingly and considering the average of 2001-2004 of ArcelorMittal João Monlevade Blast Furnaces /18/ and the ER were adjusted on calculation spreadsheet. Therefore this CAR is closed.</p>
<p>CAR 4</p> <p>The parameter “Average fuel consumption of vehicle type <i>v</i> with fuel type <i>f</i> in the baseline scenario” ($e_{VF,BL,y}$) was calculated on CER calculation spreadsheet as</p> $e_{VF,BL,y} = P_{PJ, Y} * RA_{BL, Y} * l/tku$ <p>The PDD version 1 apply 0.00420 l/tku (Manual Didatic UFPR), however was identified a report of EFVM (Vale) as 0.00354 l/tku</p>	<p>B.6.7</p>	<p>The $e_{VF,BL,y}$ was considered as 627,57 liters/km of train transportation considering the actual train fuel consumption data in Brazil, obtained from the Brazilian Land Transportation Agency (ANTT). As presented to DOE, the historical train fuel consumption of the Concessionaries EFVM and MRS, that control the rail flow between Vitoria/ES and Juiz de Fora/MG, are respectively 0.00337 and 0.00593 litres of diesel per tku (l.t-1.km-1). For conservativeness, the lower historical fuel</p>	<p>The reviewed PDD version 02.7 had applied The emission factor of baseline emissions from coke transportation was demonstrated according real scenario considering the present fuel consumption on actual train transportation of EFVM and MRS, both railroad companies of Vale and conservatively the emission factor consider the lower as EFMV. Therefore this CAR is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		consumption (from EFVM) was adopted in the baseline emissions calculation for the total distance.	
CAR 5 The parameter symbol and name should be reviewed since the methodology presents $EF_{\text{diesel,PJ}}$ emission factor for road transportation (diesel and gasoline) in the project scenario. Value applied 0.002575 tCO ₂ /liter was verified through the parameters $EF_{\text{CO}_2,i,y}$ and NCV_{DIESEL} , however the $EF_{\text{VF,BL}}$ was considered as 0.00269 tCO ₂ /liter. The PP must consolidate the information.	B.6.14	The value of 0.00269 tCO ₂ /liter applied in the baseline emissions calculation was replaced conservatively by the 0.002575 tCO ₂ /liter used in the project emissions calculation from fossil fuel combustion (diesel) as it is based on a national source (National Energetic Balance 2010).	The reviewed PDD version 02.7 was revised accordingly and considering Brazilian Energetic Balance /73/ and the ER were adjusted on calculation spreadsheet. Therefore this CAR is closed.
CAR 6 According AM0082 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; (ii) scientific literature and/or industry or sectoral publications; (iii) third party expert assessment. Considering that the Minas Gerais State environmental licensing regulation permit 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 (COPAM. Normative Deliberation	B. 5.12	The COPAM Normative Deliberation #49 of 28 September 2001 does not apply to the project activity due to the fact it was created to rule the “Environmental Control of Non-integrated production plants of pig-iron in the State of Minas Gerais”, in other words, to regulate the “Guseiros”. The PP’s project activity was implemented in order to transform its process from Semi-Integrated into a Integrated Iron & Steel Plant and so, in this scenario, the DN#49 is not applicable. To reinforce the explanation above, the Environmental Impact Analysis (EIA) presents all the Laws, Regulations and Normative Deliberations involved in the process of licensing the blast-furnaces and the cited DN#49 is not presented (page	Complementary information could evidence that the Environment Impact Study for 2 Blast Furnaces Implementation /24/ as well as the environmental licence issued by FEAM/COPAM for Blast Furnace Installation License #018 on 6 February 2006 and the SEMAD/COPAM for Blast Furnace Operation License #0113 ZM, on 10 December 2007 /26/ consider the use of renewable charcoal only. No coke is considered by the environmental licence. Therefore this CAR is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<p>#49 of 28 September 2001 (http://www.siam.mg.gov.br/sla/download.pdf?idNorma=132)</p> <p>And, given that ArcelorMittal has as possible source the charcoal from existent ArcelorMittal BioFlorestas, it is not obvious that the baseline is 100% coke and the possibility to use charcoal and coke at the same time, This scenario must be demonstrated its exclusion.</p>		<p>113–Table 6.1) as it does apply to project activity.</p> <p>The License of Implementation also does not mention the DN#49 or the possibility of using any other reducing agent other than charcoal as well as the Technical Specification of the Blast-furnaces purchase by the PP, which specifies in its section 3.1 that the reducing agent would be charcoal.</p>	
<p>CAR 7</p> <p>The PDD had justify the exclusion of Alternative scenario 2b (<i>Renewable charcoal iron ore reduction system from wood produced in existing dedicated plantations</i>) considering the availability of renewable biomass in the market is not enough to supply the demand of the wood sector and mainly to fulfill the increasing charcoal production needs of ArcelorMittal Juiz de Fora blast furnaces. However it was verified that the existed farms of ArcelorMittal Bioenergia, according the Annex 4 of PDD, has capacity to supply 200% of blast furnaces demand, considering the MAI of 17.2 for degraded forest. Project participant is requested to demonstrate how the cenario 2b could be excluded.</p>	B. 5.12	<p>Unfeasibility of internal charcoal supply without new investment</p> <p>The methodology AM0082 in its definitions, states that “New Iron Ore Reduction System is an iron ore reduction system that results from a new investment (see eligible types of new investments in the applicability conditions section) undertaken in at least one of its two interdependent components, i.e., the production of reducing agents (Component 1) and the iron ore reduction facility (Component 2)”, and also states in its applicability conditions that “The eligible types of new investments for projects under this methodology are:</p> <p>Type 1: Production of reducing agents to be used in the production of iron and steel by investing in dedicated plantations by the project entity;”</p> <p>The definition of dedicated plantation as per methodology is “A plantation implemented in the context of this project activity in order to supply an iron ore reduction system with renewable biomass. A</p>	<p>Complementary information could evidence the actual area of forest available by CAF/ ArcelorMittal Bioenergia as 97.605,14 hectares that without investment of fertilization and clones, and the final productivity of forest will decrease from 17.2 cubic meters per ha per year of degraded forest productivity to 12.04 cubic meters per ha per year after one rotation of 7 years that would be insufficient to fuel the ArcelorMittal Juiz de Fora blast furnaces as the forest would produce only 82,4% of charcoal demand. As well as, this situation will reduced more on the subsequent rotations. Therefore this CAR is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>dedicated plantation must be newly established as part of the project activity”.</p> <p>Also, applicability conditions of the methodology list the type of areas that are eligible as areas for newly dedicated plantation as “Grasslands; (ii) Forest plantation after its last rotation; (iii) Degraded areas”.</p> <p>The methodology defines “Forest plantation after its last rotation” as: “Lands that were previously stocked with human-induced forest plantations (e.g., pinus, palm trees, bamboo, eucalyptus, etc.) at the end of their rotation cycle (i.e., which were harvested after their last rotation).”</p> <p>Continuing the applicability conditions, the methodology states, that “In case the plantation is implemented on land previously hosting a forest plantation after its last rotation, it shall be demonstrated that this land would not be replanted in the absence of the project activity. In order to demonstrate that a forest plantation is in its last rotation, the project proponent shall refer to the plantation management practices which are common practice in the region for the considered species.”</p> <p>As informed on the 15th page of this PDD, at 3rd bullet: “Plantations established on the own areas of the project entity fall in category (ii), i.e. the forest plantations after their last rotation. The dates of their first establishment are listed in Annex 5, but majority</p>	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>of them have been planted in the 70's, during the expansion period of the predecessor Belgo (see Section A2.). According to ArcelorMittal BioFlorestas Forest Management Plan (AMBio FMP), a 14-year cycle is adopted for eucalypt production: planting followed by six years of growth, harvesting at year 7, coppicing at year 8, harvesting at year 14 followed by new planting, also called reform." The 4th bullet complements the rationale stating that: "According to the plantation management 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 (Vital, 2009)."</p> <p>The project PDD, at its step 2 - Barrier Analysis, demonstrates that plantation lands would not be replanted after its last rotation in the absence of the project activity, showing that the most plausible scenario is to use coke for pig iron production.</p> <p>Therefore, it is demonstrated that existing forest plantations of ArcelorMittal Bioflorestas can be categorized as forest in its last rotation, that is, a scenario of a new investment consequently shall be considered as a scenario 2.a. Demonstrating that scenario 2.b that involves existing plantations of ArcelorMittal Bioflorestas can be excluded.</p> <p>In order to complement the analysis, we present below a simulation of using forest plantations after its last rotation as a source of wood for charcoal</p>	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>production.</p> <p>As evidenced by the “Comodato - 22/2003” contract between Belgo and CAF signed on 01.09.2003 the total area of forest plantations used for charcoal production by the company was 97.605,14 hectares at the moment of project decision. This plantations are in a stage of “forest in exhaustion” having been managed already for 20 or 30 years for wood production. Therefore we assume a productivity of 17,2 m3 (mean annual increment) for forests in exhaustion at the end of their last rotation for this area.</p> <p>As stated by Marcus H.F. Vital (2009) p. 88, the Brazilian forest research institute (IPEF) identified a productivity loss of 30% per rotation period, for forest plantations in case no fertilization (which is one of the most important measures and expense in forest plantation management) is applied.</p> <p>As evidenced in excel sheet “Plantation supply Calculations – Juiz de Fora”, the yearly pig iron production capacity of the project blast furnace of 360.000 t can be transformed to a yearly charcoal demand of the projects industrial unit of 213.840 t applying the blast furnace consumption factor of 2,7 used in PDD. This factor can be considered as a conservative value, since Marcus H.F. Vital (2009) p. 97 indicated a higher factor of 3,8. Applying this factor a supply shortage would already occur in 2003.</p>	

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		<p>The simulated scenario below, where the exhausted plantations of the company would be used in order to supply the charcoal demand of the blast furnaces of Juiz de Fora, is shown in table 1 for one rotation period of 7 years, from 2003 (project decision) on, until 2009. The productivity loss without fertilization leads to a supply capacity for the blast furnaces assuring still 106,0 % of the demand in 2006 (year of industrial operation start) but decreasing to 82.4 % of the demand in 2009 leaving a supply deficit of 37,565 tons of charcoal.</p> <p>Therefore the simulation clearly shows, that even if the companies forests in exhaustion would be used to supply the blast furnaces, considerable additional investment would be necessary in plantation management (fertilization, ant combat, replanting, etc) as well as investments in additional plantations, configuring the scenario 2.a.</p> <p>Table 1 - Supply simulation of company forest plantations</p> <table> <tr> <th>Charcoal production capacity (ton)**</th><th>Year</th><th>Supply capacity of 97.605 ha</th><th>Yearly de without l</th></tr> <tr> <td>251.821</td><td>2003</td><td>117,8%</td><td></td></tr> <tr> <td>239.230</td><td>2004</td><td>111,9%</td><td></td></tr> <tr> <td>226.639</td><td>2005</td><td>106,0%</td><td></td></tr> <tr> <td>214.048</td><td>2006</td><td>100,1%</td><td></td></tr> <tr> <td>201.457</td><td>2007</td><td>94,2%</td><td></td></tr> <tr> <td>188.866</td><td>2008</td><td>88,3%</td><td></td></tr> <tr> <td>176.275</td><td>2009</td><td>82,4%</td><td></td></tr> </table>	Charcoal production capacity (ton)**	Year	Supply capacity of 97.605 ha	Yearly de without l	251.821	2003	117,8%		239.230	2004	111,9%		226.639	2005	106,0%		214.048	2006	100,1%		201.457	2007	94,2%		188.866	2008	88,3%		176.275	2009	82,4%		
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		<p>** Calculation considering: Wood density = 0.5 (ton/m³) and Gravimetric yield = 0.3 tonne charcoal/ tonne wood</p> <p>References: Marcos H.F. Vital; Florestas Independentes no Brasil. Publicação “Produtos Florestais” BNDES Setorial Rio de Janeiro, 2009.</p>	
<p>CAR 8 The PDD need demonstrate comparing other investments including the plantation itself, that the investment in the blast furnace construction is the earliest among all alternatives</p>	B. 5.12	<p>As discussed in the PDD and presented to DOE, there were investments in renewable biomass plantations in 2004, 2005 and continue investing on planting and reforming its dedicated areas. However, a plantation investment may not be considered a industrial project activity starting date as the coke substitution would only occur allied with the existence of a blast-furnace where the coal coke would be replaced.</p> <p>If the PP plants renewable biomass for charcoal production but there is no blast-furnace to use it, this wood can be coppiced for other purposes. To support this argument, the PP provided to DOE a charcoal supply contract from 2003 where the PP compromises to supply charcoal to an independent iron ore producer (guseiro).</p> <p>When the charcoal blast-furnace was purchased there was no turning back point, the company's money was invested and it would need renewable biomass (under lack - as per PDD section B.4) in order to run the iron ore production. Then it justifies the past and the future plantation's investment, including in out growing farmers, in order to supply the project</p>	<p>The reviewed PDD version 02.7 and complementary information had evidenced that according the Glossary of CDM terms (EB66 annex 63), the construction of ArcelorMittal Juiz de Fora blast furnaces was the actual real action of CDM project activity as an irreversible process. DNV had confirmed that the old forests were involved to supply wood to cellulose manufacturers and charcoal to independent pig iron producers. The own blast furnace construction was the inequivoque eligible new investment for projects under AM0082.As well as, the paragraph of methodology with respect the Barriers Analysis, was established that “Considering the long-term maturity period associated with the establishment of plantation resources, a minimum period of 10 years prior to the start of the project</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>activity needs.</p> <p>The starting date of the project activity could be brought to a previous date, as ArcelorMittal (former Belgo) identified and has considered its implementation since 2002 (when the PriceWaterCoopers CDM Report was elaborated), planting 60,000 ha in 2004 and 13,650 ha in 2005 taking into account the possibility of implementing the project activity. However, as the starting date of a project activity is “the earliest date at which either the implementation or construction or real action of a project activity begins”, the PP understand that under this methodology, the PP believes the starting date shall be the blast furnace purchase date, as stated above.</p>	<p>activity shall be considered”</p> <p>Therefore this CAR is closed.</p>
<p>CAR 9</p> <p>The PDD need to assess how CDM alleviates the barriers.</p> <p>If there is no investment analysis used, the PDD need to use guidelines for objective demonstration of claimed barriers.</p>	B. 5.12	<p>The CDM alleviates the Barrier of Investment as the CERs revenues represents 19% of all investment made by the PP in both dedicated plantations (R\$ 490.86 mi) and in the new blast-furnace (R\$ 77.28 mi). According to the Guidelines 2 of Annex 13 of the EB50, the PP have to demonstrate that the “CDM revenues have helped overcome the increased risk associated with the barrier. For this, they have to transparently demonstrate that the expected revenues from the CDM are significant when put into relation with the risk(s) caused by the barrier(s) and/or total cost of the project”, the project activity risks in the investment were overcome due to CDM financial and brand gains for the PP.</p> <p>To be more accurate in the analysis, if considering only the risk of investing in the dedicated plantations (as PP could use coal coke in the blast-furnace</p>	<p>The reviewed PDD version 02.7 and complementary information had evidenced that beyond the CDM project activity reduce the impact to invest in forest with consequent avoiding use of coal coke on new blast furnace of ArcelorMittal Juiz de Fora, also had evidenced that the project activity had developed a new activity on Minas Gerais State that is incentive several farmer to implement renewable forest on degraded or pasture areas. Hence the impact to avoid CO2 emissions on blast furnace activity is real and significant.</p> <p>Therefore this CAR is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>instead of charcoal), the CERs revenue is going to represent 22% of this investment and was decisive in the decision as it “alleviates the identified barriers that prevent the proposed project activity from occurring”.</p> <p>The CDM was so important for the project activity to occur, that the methodology applied (AM0082) was first submitted by the Brazilian Iron & Steel sector on 10th April 2003 and reapproved by the Meth Panel. Then it was resubmitted on 2nd July 2008, obtaining the EB final approval on 22nd July 2009. During this while, the Brazilian Iron & Steel sector grew mostly (not to say exclusively) based on coal coke, including a plant controlled by ArcelorMittal Brasil S.A. (Monlevade / MG) that switched from charcoal to coal coke for financial and environmental reasons in 2000. The environmental reasons were due to the deficit of renewable biomass available in the market for charcoal production, which raises the pressure of deforestation over the native forestry</p> <p>Under this scenario of wood exhaustion associated with deforestation, the PP reached the renewable biomass sustainability through the implementation of the “Small Farmers Program”, as part of the “Belgo Sustainability Program”, which has the CDM as one of its main pillar. Since the first step, the PP considered the CDM and used it in order to alleviate the identified Regulatory Barriers, as presented in the PDD (B.4–pages 33-37) that prevent that 93% of all Brazilian farmers own irregular lands and only 4% of</p>	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>them knows what Legal Reserve is (PDD section B.4 - page 34).</p> <p>The PP presented to DOE the “Small Farmers Program”, launched in 2004, a folder explaining, using an accessible language, the following topics:</p> <ul style="list-style-type: none"> - Concept of sustainability and its benefits; - The greenhouse gases and the global warming; - The CDM and carbon credit concept; - The advantages of joining the program (including their participation in the carbon credits revenues and the PP’s wood purchase guarantee); - How environment and farmers would gain with the project activity. <p>This folder was developed with the consultancy advisory of the company PricewaterCoopers, which emitted a commercial proposal in 01st July 2004 and was contracted by the PP to implement the “Belgo Sustainability Program” in a forecast time sequency in which the project should be registered (Module V) before the “Belgo Sustainability Program” is implemented (Module VI) as the carbon credits (CERs) are the financial pillar of the program.</p> <p>Workshops were organized by the PP to convince the local population to adhere the program and the farmers land have been regularized since then in order to the PP to acquire the authorization for</p>	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>harvesting the area (this legalization and then the authorization processes are not required for a coke based company). City majors replied the local stakeholders' consultation letter congratulating and thanking ArcelorMittal Brasil for the Project activity, which is the responsible for the first cooperative of farmers created with focus on the Emission Reductions Certificate - CER's management, in Brazil.</p> <p>The methodology ACM0082, approved in the EB48 (July 2009) had not been approved when the Small Farmers Program started and plantation contracts were signed between the PP and the farmers. Due to the CDM revenue, the PP pursued and kept implementing the project activity as it had been advertised.</p> <p>The farmers' mobilization process started on 2004, the first investment on out growing plantation was taken in 2005 and the juridical foundation of the COOPFLOS occurred on 9th April 2010². As presented to DOE, the local farmers that made this project activity technically possible (lending their lands for renewable biomass plantation) are an objective barrier overcome with the CDM help.</p>	

² The foundation of COOPFLOS (Cooperative of Sustainable Forestry Producers of the Mata Zone) occurred in a Assembly of Associates (farmers), which defined the Cooperative roles, its Board of Directors and its President. The Statute of Constitution is registered in the local Public Notary.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CL 1 Project participant is requested to review crediting period starting date	C.1.4	The crediting period starting date was reviewed to 01/01/2013.	The reviewed PDD version 02.7 had updated the starting credit period.; Therefore this CL is closed.
CL 2 Project participant is requested to review projects applicability criteria in PDD, presenting beside each methodology criteria how such applicability was demonstrated (e.g. references, maps).	E.1.1	The PDD version 2 had demonstrated each applicability criteria according AM0082.	The reviewed PDD version 02.7 had demonstrated each applicability criteria according AM0082. Therefore this CL is closed.
CL 3 Project participant is requested to include in PDD information regarding forest plantation sites details and dedicated plantation geographical identification and delineation. Project participant is requested to include in PDD information regarding dedicated plantations located only in tropical conditions (dedicated plantations location and tropical zones in Brazil).	A.4.1 B.2.4 B.2.6 B.2.7 B.3.1	The existent forest plantation of ArcelorMittal BioFlorestas is established mainly around Dionisio, Santa Barbara, Martinho Campos, Carbonita, Itamarandiba Municipalities. The ArcelorMittal BioFlorestas's Forest Producer Program – PPF are located mainly around Juiz de Fora, Santos Dumont, Leopoldina, Andrelandia and Lima Duarte municipalities. All in Minas Gerais State. The Forest Cadastre is an internal databank of ArcelorMittal BioFlorestas that contains all information on forestry operations, occurrences and harvesting/transportation provided by regional supervisors. The Forest Cadastre makes part of the System of Forest Register, an "all-inclusive" database centralized in ArcelorMittal Headquarters in Belo Horizonte. Supply Chain Control is conducted according to the provisions of procedure PS S01 4.4.6 03 based on FSC Standard for Chain of Custody Certification - FSC-STD-40-004 (Version 2-0). The trucks with charcoal are weighed at the industrial facility upon arrival. The internal procedure of AM Juiz de Fora GAAFO 0001 is applied and the results are inserted into the MES System.	As verified during site visit, all forest area are registered in ArcelorMittal BioFlorestas system and linked with Forest Environment Licences, properties certificates registered on Official Land Register of Minas Gerais State, which could confirm the location, area, and first plantation. DNV has assessed through the documents Embrapa report /80/ that the common practice in Brazil regarding eucalyptus production system is to have three rotations of 7 years, and as verified on the land registration, all old farms were implemented before 1980. As complementary evidence of last rotation, several evidences dated from 1993 to 1996 had demonstrated the declination of charcoal activity of CAF and intention to sell the eucalyptus forests to cellulose companies or implement wool mills. DNV has assessed through land use

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>The Charcoal loaded into the blast furnaces is monitored according to the internal GAAFO PO 0008 and its weight is registered in the MES System and the hot metal produced is monitored according to the internal procedure and registered in the MES System</p> <p>The annex 4 of PDD had described the monitoring system for renewable biomass, charcoal and hot metal.</p> <p>The annex 5 of PDD had included all planted forest of ArcelorMittal BioFlorestas, including the geographic location, planted area, distance from the carbonization facilities and the dates of forest first plantation establishment. All planted are linked with GIS and Forest Environment Licences issued by IEF. The Carbonita, Itamarandiba Municipalities are located on northeast of Minas Gerais State, with predominant dry weather, and the predominant vegetation is grass called “cerrado”. The Dionisio, Santa Barbara, Martinho Campos municipalities had established eucalyptus dedicated plantations installed on the years 60’s under Fiset incentive. The PPF will be implemented on Juiz de Fora, Santos Dumont, Leopoldina, Andrelandia and Lima Duarte municipalities, with the main activity was extensive milk production on grassland.</p>	<p>maps and land eligibility study that new plantations are established on grasslands. The description of categories areas was confirmed through Biomass Brazilian Maps /75//76/. As well as the Minas Gerais State are located between 14°S and 23°S with rain between 1000 and 1500 mm/y /77/.</p> <p>A cross check of some forests sampled on Annex 5 of PDD version 02.7 dated 21 June 2012, verified during site visit, on Buritis area of Center West Region of Minas Gerais State were identified on GIS cartography system and confirmed through Google Earth internet system.</p> <p>Therefore, this CL is closed.</p>
<p>CL 4</p> <p>Project participant is requested to include in PDD information regarding forest plantation after its last rotation (dates of forest plantation first establishment).</p>	A.2.5	<p>Several evidences were included in PDD version 02.7 including documentation dated from 1993 to 1996 had demonstrated the declination of charcoal activity of CAF and intention to sell the eucalyptus forests to cellulose companies or implement wool mills and consequently the confirmation the last rotation of old</p>	<p>DNV has assessed through the documents Brazilian Enterprise for Agricultural Research - Embrapa Forest report /80/ and Infobios that the common practice in Brazil regarding eucalyptus production system is to</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>forest.</p> <p>The dates of their first establishment are listed in Annex 5, but majority of them have been planted in 70's, during the expansion period of former Belgo (see Section A2.). According to ArcelorMittal BioFlorestas Forest Management Plan (AMBio FMP), the 14-year cycle of eucalypt production is adopted: planting followed by six years of growth, harvesting at year 7, coppicing at year 8, harvesting at year 14 followed by new planting, also called reform." The 4th bullet complements the rationale stating that: "According to the plantation management 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 (Vital, 2009)."</p>	<p>have three rotations of 7 years, and as verified on the land registration, all old farms were implemented before 1980. As complementary evidence of last rotation, several evidences dated from 1993 to 1996 had demonstrated the declination of charcoal activity of CAF and intention to sell the eucalyptus forests to cellulose companies or implement wool mills /23/. Therefore this CL is closed.</p>
<p>CL 5</p> <p>The project participant must clarify why the first plantation on PPF, according annex 5 of PFF was on 2005 and considering the first harvest after 7 years, the wood would be extracted at same time of registration of present project, in conflict with para 38 EB 25 as "the first verification of this A/R CDM project activity will take place before the first harvesting of the wood takes place"</p>	B.2.8	<p>The applicability condition in reference states:</p> <ul style="list-style-type: none"> 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 [9]. 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 ICERs at the time of verification of the CDM project activity under this methodology (i.e., the change of reducing agents in an iron ore reduction system.) If this condition is not met the corresponding renewable biomass shall not be eligible for the generation of CERs in the context of this methodology. 	<p>Clarifications were provided to support the applicability of A/R CDM project activity. DNV had considered the evidences sufficient.</p> <p>Therefore this CL is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>[9] This condition ensures that before the first harvest for the purpose of supply of renewable biomass to the steel plant, the plantation has already generated tCERs and ICERs.</p> <p>The PPF Project is not yet started the validation under the CDM and it is possible that it will undergo validation under the VCS, i.e. the project is not registered as A/R CDM project, and therefore the applicability condition in reference is not applicable. Considering that renewable biomass from PPF project is a dedicated plantation under control of PP and is not a registered A/R CDM project, the following condition applies:</p> <p>In case the dedicated plantation is covered under a registered A/R CDM project activity, the dedicated plantation shall not be included in the project boundary as per paragraph 38 EB 25. The demonstration that the biomass originates from renewable source is not required in such a situation. In case only a part of the dedicated plantation is covered under a registered A/R project activity this condition is applicable only to this part of the plantations.</p> <p>According to this condition, the dedicated plantation shall be included in the project boundary.</p>	
<p>CL 6 Project participant is requested to, beside the reference number provided in the PDD, add the document name, author and date.</p>	B.4.8	A reference list in alphabetic order was included on PDD version 2	The PDD version 02.7 evidence all references in tractable way. Therefore this CL is closed.
<p>CL 7 The PDD states that pig-iron reduction based on charcoal (renewable and non-renewable) in the</p>	B.5.15 To	The PDD version 2 had excluded the technological barrier.	The PDD version 02.7 had excluded the technological barrier. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants		Validation conclusion
year 1993 was 12.78% and in 2003 its participation in the pig-iron production had felt to 5.60%. Project participant is requested to explain why this is considered a technological barrier, since technological barrier is defined as skilled and/or properly trained labour to operate and maintain the technology is not available in the relevant geographical area; lack of infrastructure for implementation and logistics for maintenance of the technology; risk of technological failure; technology used in the proposed project activity is not available.	B.5.17			
CL 8 It is DNV opinion that there was no incentive (subsidies or taxes reduction) regarding coal coke and charcoal use when the decision to invest in the project was taken, and therefore the subsidies and taxes barriers can not be considered.	B.5.18 To B.5.20	The PDD version 2 had excluded the subsidies or taxes barrier.		The PDD version 02.7 had excluded the subsidies or taxes barrier. Therefore this CL is closed.
CL 9 Project participant is requested to provide evidence that largest pig-iron production pool in Brazil are located in Minas Gerais state; 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 enlarge the assessment period of the common practice analysis, since the privatization process of the sector took place between 1991 and 1993. Project participant is requested to provide data source(s) used for the common practice analysis.	B.5.45 To B.5.47 B.5.50	The PDD version 2 had consider the follow criteria used to analyze the common practice at project level:		According the AMS /55//56/, 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, what considering 100 mcd/ha results 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.
		Criteria	Rationale	
		Integrated and non-integrated iron and steel companies	Due to large differences in compliance of current laws, working conditions and information unavailability, scales of production and others.	
		Charcoal or coal based blast-furnace technologies	Subjected to distinct set of barriers as demonstrated in the Barrier Analysis, depending on the reducing agent used.	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants		Validation conclusion
		The state of Minas Gerais as geographical location	The project activity as well as the largest pig-iron production pool in the host country are both located in this state ³ . Besides, this region has specific laws and regulations regarding forest establishment and exploitation of native forests that are quite different in other states.	Considering the pig iron register of Sindifer at Minas Gerais State /70/ were verified that 75% were cited by IBAMA about use of non renewable charcoal, 10% were implemented reforestation program to get auto sustainability on next 7 years and 2% had own supply of charcoal for blast furnace activities /53/.
		Sector's privatization process	This criterion is used to guarantee that the analyzed practices have been taken place, in terms of decision making, in the same investment environment that the current project activity (as explained in sub-step 1b, alternative 1).	In addition, for the integrated steel companies was verified that: ArcelorMittal inox (Acesita) have 1 blast furnace with coal coke and one small with charcoal from external suppliers /90/
		CDM project activities	If the project activity also required the CDM benefits, it must be excluded from the common practice analysis.	Gerdau Barão de Cocais and Divinópolis facilities five blast furnaces fueled with charcoal from external suppliers /91/
		The criteria chosen in the previous table were used to analyze all integrated plants in Brazil. The Second National Anthropogenic Emissions Inventory, made by Instituto Aço Brasil (Brazil Steel Institute) and its Associates, provided a list of all these plants, including their location (MCT, 2010). All identified plants were analyzed concerning their similarities		ArcelorMittal Monlevade have blast furnaces fueled with coal coke V&M have blast furnaces fueled with charcoal, however had applied to CDM on 2002 . Hence, considering the scarcity of renewable charcoal to fueled the blast furnaces on Minas Gerais state and the practice of steel plants to use the coal

³ Some forest plantations of ArcelorMittal BioFlorestas are located in Bahia but their size correspond to less than 10% of the total area used by the project entity for wood production, therefore they are considered not representative.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>and differences to the proposed project activity, in order to evaluate common practices in the sector.</p> <p>The table 8 on PDD version 2 had evidenced that that similar activities are observed but essential distinctions between the proposed CDM project activity and similar activities can reasonably be explained, therefore it can be concluded that the proposed project is not common practice and is additional</p>	<p>coke, the common practice could evidenced that the project activity is not a feasible scenario.</p> <p>Therefore this CL is closed.</p>
<p>CL 10</p> <p>Project participant is requested to review the source of data applied to $EF_{TRUCK, km, CO_2, y}$, since the methodology AM0082 version 1 indicates IPCC 2006 or identify the national source</p>	<p>B.6.5</p> <p>B.6.29</p>	<p>The GHG Protocol Brasil, which was the source of the parameter value, is the most reliable source of data in the Host Country in the GHG field.</p> <p>This value was applied as neither the IPCC nor official data presents the Emission Factor in the unit $kgCO_2/km$ which is the most accurate manner to calculate the:</p> <ul style="list-style-type: none"> - Emissions due to transportation of renewable biomass to carbonization sites ($EP_{Vehicle, PJ, y}$); and - Project emissions in the transportation of reducing agents to the industrial facility ($RAT_{Vehicle, PJ, y}$). <p>It is interesting to emphasize in here, that the source of data (GHG Protocol Brasil) was audited by a third DOE (Lloyd's Register Quality Assurance) in order to certify its calculation methods and default/source data applied.</p> <p>(http://www.ghgprotocolbrasil.com.br/index.php?r=site/conteudo&id=5&idmenu=8)</p>	<p>Clarifications were provided clarifying the applicability of GHG Protocol Brasil . DNV had considered the evidences sufficient.</p> <p>Therefore this CL is closed.</p>
<p>CL 11</p> <p>No leakage has been considered in the project</p>	<p>B.6.26</p>	<p>The leakage assessment includes procedures to evaluate the change in emissions associated with the</p>	<p>As confirmed by the Geoconsult, Land Eligibility Study for PPF project /29/</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<p>activity. Project participant is requested to explain why increased emissions from the displacement of economic activities such as harvest of fuel wood for meeting domestic energy needs and use of lands as pastures for grazing/fodder collection are not taken into account for calculation of leakage associated with production of renewable biomass resources needed for producing charcoal, presenting evidence. Leakage associated with the displacement of economic activities of households shall be assessed and if they are identified and attributable to the project activity.</p>	to B.6.29	<p>primary carbon extraction activity (eucalypt plantations establishment) outside the project boundary. This change happens due to the displacement of economic activities such as harvest of fuel wood for meeting domestic energy needs and use of lands as pastures for grazing/fodder collection. As explained above, there are two types of plantation areas: reformed and newly established. The reformed plantations have been established back in 80's (Timeline CAF 2000), and since they have been only reformed. Therefore, no displacement of economic activities will happen due to the proposed project activity. The new plantations will be established on the degraded pastures of Zona da Mata region. According to the requirements of the PPF project (PPF Manual), only pasture lands are eligible for reforestation activities (condition evidenced by land eligibility study according the UNFCCC rules, (ID 8). Another condition of this program is that no more than 50% of the farm's area can be reforested, i.e. the farmer will continue grazing and/or agricultural activities on another half of the property.</p> <p>Due to the above reasons, it can be concluded that no leakage in form of displacement of economic activities will occur due to implementation of the proposed project activity</p>	<p>and cross checked with Brazilian Biomass Map /76/, it was confirmed that the no displacement of economic activities were occur. Therefore this CL is closed.</p>
<p>CL 12 Project participant is requested to explain why the following parameters are not monitored:</p> <ul style="list-style-type: none"> • $\%C_{HM,PJ,y}$ percentage of carbon in hot metal, • V_{PJ}, 	B.7.2	<p>The PDD version 2 could evidenced the monitoring plan as follow:</p> <p>$\%CHM,PJ,y$ - It is noteworthy that, if pig iron is produced using renewable charcoal only, AM0082/Version 01 considers $\%C_{HM, PJ, y}$ as</p>	<p>The PDD version 02.7 had complete the monitoring plan according AM0082 version 1. Therefore this CL is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<ul style="list-style-type: none"> • 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, • $k_{vf,PJ,y}$ distance travelled by each of vehicle type v with fuel type f in the project scenario, • $e_{vf,PJ,y}$ average fuel consumption of vehicle type v with fuel type f in the project scenario, 		<p>zero</p> <p>v_{PJ} - The transport of wood to carbonization units and charcoal to blast furnace will use only trucks. No other transportations way is available.</p> <p>f_{PJ}- The truck transport is considered only diesel. No biodiesel was considered conservatively.</p> <p>$n_{vf,PJ,y}$ – The transportation was considered Number of round trips (to and from) of the trucks in the project activity during the year y to transport renewable biomass to the carbonization site(s) and transport charcoal from the reducing agent production site(s) to the iron ore reduction facility and $EF_{v,km,CO_2,PJ,y}$ - the specific emission as kgCO2/km.</p> <p>$e_{vf,PJ,y}$- considered as $EF_{v,km,CO_2,PJ,y}$ the specific emission as kgCO2/km</p>	
<p>CL 13</p> <p>The Project participant is requested to explain why the following parameters related “Leakage emission from activity displacement under project scenario” are not monitored:</p> <ul style="list-style-type: none"> • nH_r number of sample households resident in the vicinity of the project, • NH_r total number of displaced households resident in the vicinity of the project, • BLB living renewable biomass of trees (aboveground and belowground renewable biomass) per ha in the area subject to land use/cover change, • CF carbon fraction for renewable biomass in the area subject to land use/cover change, 	B.7.2	<p>The leakage assessment includes procedures to evaluate the change in emissions associated with the primary carbon extraction activity (eucalypt plantations establishment) outside the project boundary. This change happens due to the displacement of economic activities such as harvest of fuel wood for meeting domestic energy needs and use of lands as pastures for grazing/fodder collection. As explained above, there are two types of plantation areas: reformed and newly established. The reformed plantations have been established back in 80’s (Timeline CAF 2000), and since them have been only reformed. Therefore, no displacement of economic activities will happen due to the proposed project activity. The new plantations will be</p>	<p>As confirmed by the Geoconsult, Land Eligibility Study for PPF project /29/ and cross checked with Brazilian Biomass Map /76/, it was confirmed that the no displacement of economic activities were occur. Therefore this CL is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<ul style="list-style-type: none"> • EFall-pools expansion factor (1.2 to 1.5) to convert the carbon stock of living renewable biomass of • trees to carbon stock representing all pools depending on vegetation density • (low vegetation density areas should use lower end of expansion factor and • vice versa), • NHe total number of emigrant households, • FG_y annual volume of fuelwood use, • D basic wood density, • BEF2 biomass expansion factor for converting volumes of extracted roundwood to total above-ground biomass (including bark), • Py population of the region, • HS number of persons per household, • FCA proportion of per capita fuelwood consumption from agricultural/ private lands including purchases, to the total per capita annual fuelwood consumption from all sources, • PG annual human population growth. 		<p>established on the degraded pastures of Zona da Mata region. According to the requirements of the PPF project (PPF Manual), only pasture lands are eligible for reforestation activities (condition evidenced by land eligibility study according the UNFCCC rules, (ID 8). Another condition of this program is that no more than 50% of the farm's area can be reforested, i.e. the farmer will continue grazing and/or agricultural activities on another half of the property.</p> <p>Due to the above reasons, it can be concluded that no leakage in form of displacement of economic activities will occur due to implementation of the proposed project activity</p>	
<p>CL 14</p> <p>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</p>	<p>B.7.3 to B.7.5</p>	<p>The parameter PPJ,y– “Hot metal production in the project scenario in year y” will be:</p> <ul style="list-style-type: none"> - measured by weight, per batch, recorded continuously and aggregated daily (Internal Procedure GAAFO NS 0001); - the accuracy of the equipment is < 5%; - the manufacture's recommendation is to calibrate annually (Internal Procedure GE LEI PO 0229); 	<p>The PDD version 02.7 and specifically the Annex 4 had completed the monitoring plan according AM0082 version 1.</p> <p>Therefore this CL is closed</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<p>requirements, $P_{PJ,y}$ - Hot metal production in the project scenario in year y for:</p> <p>$P_{PJ,y}$ - Hot metal production in the project scenario in year y;</p> <p>$FC_{i,j,y}$ - Quantity of fuel type i combusted in process j during the year y.</p>		<p>The parameter $FC_{i,j,y}$ – “Quantity of fuel type i combusted in process j during the year y” will be calculated applying a conservative default value of diesel consumption of 333.4 liters per hectare is adopted due to the impossibility of controlling the fuel consumption of the sub-contractors operations.</p> <p>In the case, the default value of fuel combusted per hectare applied is 435% higher than average diesel consumption internally registered by the project entity, which historically was 76,53 liters/ha/year between 2006 and 2009. The default value will be multiplied by the area (in ha) harvested to producing iron ore.</p> <p>Follow file attached “Historical data 2006-09_Fuel Consumption BioFlorestas.xls”</p> <p>(Moreira C. et al. Avaliação energética de cultivo de eucalipto, com e sem composto de lixo urbano. Accessed 18/11/2010)</p> <p>http://200.145.140.50/html/CD_REVISTA_ENERGIA_vol4/vol20n42005/artigos/Carlos%20Roberto%20Moreira.pdf.</p>	
<p>CL 15</p> <p>The project participant is requested to indicate monitoring frequency for the following parameters:</p> <p>$FC_{i,j,y}$ - Quantity of fuel type i combusted in process j during the year y: project.</p>	<p>B.7.6</p> <p>B.7.7</p>	<p>The monitoring frequency of each parameter requested is:</p> <ul style="list-style-type: none"> • $FC_{i,j,y}$ – Calculated. • $MSFi,t$ - Continuously monitored through the quantity of fertilizer applied in the plantation area, 	<p>The PDD version 02.7 specially annex 4 with the procedure PS S01 4.4.6 03 had completes the monitoring plan according AM0082 version 1. Therefore this CL is closed</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<p>$M_{SFi,t}$ - Mass of synthetic fertilizer type i applied.</p> <p>$AVD_{PCE, PJ, y}$ 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.</p> <p>Y_{PJ} - Tonne of charcoal / tonne of wood on dry basis.</p> <p>$EF_{CH4, charcoal, PJ, y}$ - Emission Factor to produce one tonne of renewable charcoal identified in the project supply chain.</p> <p>$M_{SFi,t}$ - Mass of synthetic fertilizer type i applied.</p>		<p>which is registered in the Forest Cadastre System.</p> <ul style="list-style-type: none"> • $AVD_{PCE, PJ, y}$ and $AVD_{RAT, PJ, Y}$ – Monitored continuously by the transportation invoices and the system which registers the trips and its respective points of departure and destination of cargo (Internal Procedure PS S01 4.4.6 03 – Supply Chain Control). • Y_{PJ} – Calculated. • $EF_{CH4, charcoal, PJ, y}$ – Calculated. 	
<p>CL 16</p> <p>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.</p>	B.7.10	<p>All the activities involved in monitoring the project activity have a internal procedure to guide and control the data generation.</p> <p>These procedures are connected by a specific procedure that was developed in order to manage the project activity and collect the data from the parameters defined in the PDD annex 4, which defines all the monitoring plan, including the specific internal procedures of each activity:</p> <ul style="list-style-type: none"> - The Forest Cadastre is an internal databank of ArcelorMittal Bionergia that contains all information on forestry operations, occurrences and harvesting/transportation provided by regional supervisors; - Wood Transportation is conducted according to the 	<p>The PDD version 02.7 specially annex 4 with the procedure PS S01 4.4.6 03 had completed the monitoring plan according AM0082 version 1.</p> <p>Therefore this CL is closed</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>provisions of procedure PS S01 4.4.6 03 and FSC Standard for Chain of Custody Certification - FSC-STD-40-004 (Version 2-0);</p> <ul style="list-style-type: none"> - Reducing Agent production is conducted following the internal procedure PO13-0003; - Reducing Agent transportation is conducted according to procedure PS S01 PPO S03 A02 008 of the Supply Chain Control (PS S01 4.4.6 03) of AM BioFlorestas; - Reducing Agent consumption is conducted according to internal procedure GAAFO PO 0008; - Reducing Agent origin is conducted following the internal procedure GAAFO NS 0001; - Hot metal production is conducted following the internal procedure GAAFO NS 0001; 	
<p>CL 17</p> <p>It is not clear in PDD what is being claimed from the existing plantations, used for the charcoal production. Since the area already owned by ArcelorMittal the timber of these plantations will both in the baseline and with the project go to the charcoal production (i.e. no change) consequently with the fertilization the production is going up per ha but that would only mean that this increase can be claimed as emission reduction. However in the report the whole biomass is being claimed.</p> <p>The same is considered for the use of clones to replace existing plantations that have been harvested for a 3rd time. Normal practice is that after 3 rotations the trees are removed and replanted with new tree seedlings and normally</p>	B.5.51	<p>The PP developed the project activity according to the methodology AM0082 version 01, as it stated that: "the eligible types of new investments for projects under this methodology are:</p> <p>Type 1: Production of reducing agents to be used in the production of iron and steel by investing in dedicated plantations by the project entity; (...)</p> <p>Type 3: Establishment/acquisition of blast-furnace"</p> <p>As demonstrated, the PP fulfilled the applicability conditions above, however, in the absence of the project activity would use coke instead of charcoal and the existing plantations (including the land) or only the wood (which faces a market lack that is leading Brazil to deforestation - as PDD section B.4), could be sold to charcoal producers or to the paper industry. Due to the fact above, it does not matter if the trees are a clone, if they in their 1st, 2nd or 3rd</p>	<p>Complementary information could evidence that the baseline is considered only to switch the fossil fuel by renewable charcoal in new ArcelorMittal blast furnaces.</p> <p>As the new blast furnace was the main component of CDM project and without this facility the old forest would be used to different purpose or degraded to grass land to grow cows, one of main activity of Minas Gerais, the existence of degraded forest was not considered to discount the baseline as was evidenced that is not feasible fuel the blast furnace partially with charcoal and coal coke, and the Minas Gerais charcoal market have a</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<p>that would mean that it also is a new clone as the cloning is a continuous process and quite advanced in Brazil so the likely hood that they use the same clone type that they used 21 year ago is very unlikely. The proof that the new clone is generating more biomass per rotation then the old clone and claim that increase is not clear. The only claim the whole biomass is possible if it was likely that the baseline was going to be that no plantation would not be replanted which in the current baseline described in the PDD.</p>		<p>rotation, and any other technical details on plantation as the PP do not claim emission reductions from the biomass carbon absorption, but from the replacement of coke by charcoal in the industry.</p> <p>As presented in the section B.6.1 of the PDD v.2.7, there is the possibility that "the dedicated plantation covered under a registered A/R CDM project activity, the GHG emissions related to the corresponding area of land shall are not accounted in the project upstream emissions, in compliance with the paragraph 38 of the twenty-fifth meeting of the Board decision". As the dedicated plantations are still not registered as an A/R CDM, the emissions from fuel consumption and fertilizers will be accounted, but conservatively it will not be accounted the carbon stocked in the trees</p>	<p>significant deficit to complement the fuel balance.</p> <p>Therefore this CL is closed.</p>

Table 4 Forward action requests

Forward action request	Reference to Table 2	Response by project participants
NA	NA	NA

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APPENDIX B

CURRICULA VITAE OF THE VALIDATION TEAM MEMBERS



CERTIFICATE OF COMPETENCE

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, certifying 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.



CERTIFICATE OF COMPETENCE

Jan Van Evercooren

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.



CERTIFICATE OF COMPETENCE

Fabiana Philipi

Holds a Degree in Environmental Engineering and has been working as a Greenhouse Gas – GHG Auditor in the Climate Change Services – CCS Business Area of Det Norske Veritas – DNV, since April 2009.

Since the end of 2006, Fabiana has been working with Green House Gas reduction projects. Her first experience was in the Brazilian Mercantile and Future Exchange, where worked in the intern position doing researches of the UNFCCC methodologies. After it, she moved to SGS where she participated of the validation and verification of CDM projects, including hydro and wind energy and landfill. Then she moved to Rio de Janeiro, where worked in Voltalia developing the PDDs (Project Design Documents) of the small hydro projects, assisting them until getting registered in the UNFCCC.

She is a bachelor of environmental engineering by the Escola Politecnica da Universidade de São Paulo. Her paper was the "Economic viability of energy generation projects from renewable resources in Brazil in the CDM Programme". She speaks Portuguese (native) and English.

Astakala Vidyacharan

Astakala Vidyacharan is a chemical engineer and prior to joining DNV in 2005, has had 11 years of direct work experience in various chemical industries. His work experience covers 4 years in project implementations in pesticide and fine chemical industries, including environment management activities; 7 years in process operations of pesticide, natural products and fine chemical industries.

He has received extensive training in the CDM validation and verification process. He is an appointed validator for the CDM validation and verification program of DNV and has performed validation of several CDM projects. He is also a trained auditor for GHG accounting standards and involved audit of Corporate GHG accounting. He is a qualified ISO9001, ISO 14001 Lead auditor and OHSAS 18001 auditor who has performed several audits for various industrial sectors under these management systems.

His qualification, industrial experience and experience in CDM facilitate him to assess renewable energy based on Hydro and Biomass, Energy Efficiency sectors, in particular to sufficient degree."