VALIDATION REPORT

ELECTRIC POWER CO-GENERATION BY LDG RECOVERY – CST - BRASIL

REPORT NO. 2005-1313

REVISION NO. 01

DET NORSKE VERITAS

VALIDATION REPORT

Date of first issue: 2005-11-04	Project No.: 28624550 (04)
Approved by: Einar Telnes Technical director	Organisational unit: DNV Certification, International Climate Change Services
Client: Companhia Siderúrgica de Tubarão (CST)	Client ref.: Luiz Antonio Rossi

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Summary:
Det Norske Veritas Certification Ltd. (DNV) has performed a validation of the "Electric Power Co-Generation by LDG Recovery – CST - Brasil" project in Brazil on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board.
The validation consisted of the following three phases: i) a desk review of the project design, baseline and monitoring plan, ii) follow-up interviews with project stakeholders and iii) the resolution of outstanding issues and the issuance of the final validation report and opinion. This validation report summarizes the findings of the validation.
In summary, it is DNV's opinion that the "Electric Power Co-Generation by LDG Recovery – CST - Brasil" project, as described in the revised PDD of 17 November 2005, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology ACM0004. Hence, DNV will request the registration of the "Electric Power Co-Generation by LDG Recovery – CST - Brasil" project as a CDM project activity. Prior to the submission of this validation report to the CDM Executive Board, DNV will have to receive the written approval of the DNA of the participating Parties, including confirmation by the DNA of Brazil that the project assists in achieving sustainable development.

Report No.: 2005-1313	Subject Group: Environment	
Report title: Electric Power Co-Generation by LDG Recovery – CST - Brasil		
Work carried out by: Luis Filipe Tavares, Cintia Dias, Vicente San Valero		
Work verified by: Michael Lehmann		
Date of this revision: 2005-11-17	Rev. No.: 01	Number of pages: 12

Indexing terms

Key words Climate Change Kyoto Protocol Validation Clean Development Mechanism	Service Area Verification Market Sector Process Industry

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Abbreviations

ANEEL	Agência Nacional de Energia Elétrica (National Agency for Electric Energy)
BAU	"Business as usual"
BFG	Blast Furnace Gas
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CH_4	Methane
CL	Clarification request
CO_2	Carbon dioxide
COG	Coke Oven Gas
CO_2e	Carbon dioxide equivalent
CST	Companhia Siderurgica Tubarão
DNV	Det Norske Veritas
DNA	Designated National Authority
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IEMA	Instituto Estadual de Meio Ambiente (Environment State Institute)
IPCC	Intergovernmental Panel on Climate Change
LDG	Steel making gas
MAE	Mercado Atacadista de Energia (Brazilian Electric Energy Wholesale Market)
MP	Monitoring Plan
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PwC	PricewaterhouseCooper
PDD	Project Design Document
SELIC	"Sistema Especial de Liquidação e de Custódia" (Overnight Interest Rate)
S-SE-CO	South-Southeast-Midwest (one of two regional grids in Brazil)
UNFCCC	United Nations Framework Convention on Climate Change

1 INTRODUCTION

Companhia Siderúrgica de Tubarão (CST) and PricewaterhouseCoopers (PwC) have commissioned Det Norske Veritas Certification Ltd. (DNV) to perform a validation of the "Electric Power Co-Generation by LDG Recovery – CST - Brasil" project, located in Serra municipality, Espirito Santo State, Brazil.

This report summarises the findings of the validation of the project, performed based on UNFCCC criteria for CDM projects, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The validation team consists of the following personnel:

Mr. Luis Filipe Tavares	DNV Rio de Janeiro	Team leader
Mrs Cintia Dias	DNV Rio de Janeiro	CDM auditor
Mr. Vicente San Valero	DNV Rio de Janeiro	CDM auditor
Mr. Michael Lehmann	DNV Oslo	Energy sector expert, Technical reviewer

1.1 Validation Objective

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

1.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against Kyoto Protocol criteria for the CDM, the CDM rules and modalities as agreed in the Marrakesh Accords and relevant decisions by the CDM Executive Board. The validation team has based on the recommendations in the Validation and Verification Manual /9/ employed a risk-based approach, focusing on the identification of significant risks for project implementation and the generation of CER's.

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

1.3 The "Electric Power Co-Generation by LDG Recovery – CST - Brasil" Project

CST is an integrated steel industry based on coke, destined to the production of slabs and hot rolled coils with an installed capacity of 5.0 Mt/year. CST´s process of steel production is based on mineral coal as energy source, and the most important processes are the coke plant, the sinter plant, two blast furnaces, the pig iron desulphurization plant, the lime plant, the steel LD converters, the steel refining, the continuous casting, and the hot strip rolling mill.

The "Electric Power Co-Generation by LDG Recovery – CST - Brasil" consists of a system to recover part of LDG gas generated in the steel making plant (which is rich in CO) and to use the LDG in three existing thermoelectric plant and a newly added 4th thermoelectric plant (CTE#4). Prior to the implementation of the project, LDG was flared. The project involves significant investments into an adequate system for LDG cleaning in order to condition the gas to the requirements for adequate transportation and electric power co-generation. The additional electricity generated by CST is consumed internally, but would in the absence of the project be imported from the Brazilian South-Southeast-Midwest (S-SE-CO) grid. The project will thus avoid CO_2 emissions that would occur if the same amount of electricity would partly be produced by fossil-fuelled thermal plants connected to the S-SE-CO grid.

The estimated amount of GHG emission reductions from the project is 457 696 tCO_2e during the fixed 10 years crediting period, resulting in estimated average annual emission reductions of 45 769 tCO_2e.

2 METHODOLOGY

The validation consisted of the following three phases:

I a desk review of the project design, baseline and monitoring plan;

II follow-up interviews with project stakeholders;

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

In order to ensure transparency, a validation protocol was customised for the project, according to the Validation and Verification Manual /9/. The protocol shows, in a transparent manner, criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

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

The validation protocol consists of three tables. The different columns in these tables are described in Figure 1.

The completed validation protocol for the "Electric Power Co-Generation by LDG Recovery – CST - Brasil" project is enclosed in Appendix A to this report.

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

i) mistakes have been made with a direct influence on project results;

ii) CDM or host Party requirements have not been met; or

iii) there is a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

The term Clarification may be used where additional information is needed to fully clarify an issue.

Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities			
Requirement	***Reference***	***Conclusion***	***Cross reference***
The requirements the project must meet.	*Gives reference to the legislation or agreement where the requirement is found.*	*This is either acceptable based on evidence provided (**OK**), a **Corrective Action Request (CAR)** of risk or non-compliance with stated requirements or a request for **Clarification (CL)** where further clarifications are needed.*	*Used to refer to the relevant checklist questions in Table 2 to show how the specific requirement is validated. This is to ensure a transparent Validation process.*

Validation Protocol Table 2: Requirement Checklist				
Checklist Question	***Reference***	***Means of verification (MoV)***	***Comment***	***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 seven different sections. Each section is then further sub-divided. The lowest level constitutes a checklist question.	*Gives reference to documents where the answer to the checklist question or item is found.*	*Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.*	*The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.*	*This is either acceptable based on evidence provided (**OK**), or a **Corrective Action Request (CAR)** due to non-compliance with the checklist question (See below).A request for **Clarification (CL)** is used when the validation team has identified a need for further clarification.*

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

Figure 1 Validation protocol tables

2.1 Review of Documents

The original PDD /1/ dated 22 August 2005 submitted by Companhia Siderúrgica de Tubarão (CST) was assessed by DNV. A revised version of the PDD /2/ dated 17 November 2005 was submitted to address DNV's initial validation findings and was assessed by DNV. In addition, spreadsheets containing detailed calculations for the combined margin emission coefficient /3/, which is applied by the project, and a spreadsheet containing a detailed investment analysis for the project /5/ were assessed.

Other documents, such as the Environmental Licences and licence requirements as well as the letters sent to local stakeholders, were reviewed during the follow up interviews in order to ensure the accuracy of the provided information.

2.2 Follow-up Interviews

On 10 November 2005, DNV performed interviews with a representative of CST and PwC.

The main topics of the interviews were:

- Environment licenses compliance,
- Consultation process with local stakeholders,
- Additionality argumentation,
- Cash flow analysis and IRR,
- Baseline emission calculations,
- Monitoring plan.

2.3 Resolution of Clarification and Corrective Action Requests

The objective of this phase of the validation was to resolve any outstanding issues, which needed to be clarified for DNV's positive conclusion on the project design.

The initial validation of the project identified 02 (two) *Corrective Action Requests* and 03 (three) *Requests for Clarification*. These were presented to the project participant in the form of a draft validation report (rev. 0 dated 04 November 2005). The project participant's response to DNV's initial findings, which also included the submission of a revised PDD on 17 November 2005, addressed the raised *Corrective Action Requests* and requests for *Clarifications* to DNV's satisfaction. To guarantee the transparency of the validation process, the concerns raised and responses given are summarised in chapter 3 below and documented in more detail in the validation protocol in Appendix A.

3 VALIDATION FINDINGS

The findings of the validation of the "Electric Power Co-Generation by LDG Recovery – CST - Brasil" project 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 validation findings relate to the project design as documented and described in the PDD of 17 November 2005.

3.1 Participation Requirements

The project participant is Companhia Siderúrgica de Tubarão (CST) of Brazil.

The host Party Brazil meets all relevant participation requirements. No participating Annex I Party is yet identified.

Prior to the submission of this validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Brazil, including confirmation that the project assists in achieving sustainable development.

3.2 Project Design

The project consists of a system to recover part of LDG, which is generated by the steel making plant, and to utilise it in thermo electrical plants for power co-generation. The LDG, which was previously flared, will be used for generating electricity at CST's existing three thermoelectric plants and a newly added 4th thermoelectric plant (CTE#4). LDG consists of CO, CO_2, N_2, and water vapour. The high CO content makes utilisation of the gas possible for electric power co-generation. The project comprises the implementation of an adequate system for the cleaning of LDG, LDG transportation and electric power co-generation.

Power generation with LDG occurs in existing generators (nominal outputs of 68 MW, 68 MW and 75 MW) and in a new generator with nominal output of 75 MW, interconnected to CST's in-house generation system.

Reduction of greenhouse gas emissions result due to avoiding CO_2 emissions that would occur if the same amount of the electricity generated by burning LDG would partly be produced by fossil-fuelled thermal plants connected to the S-SE-CO grid.

A fixed 10 crediting period is selected starting on 01 September 2004. The starting date of the project activity is 01 September 2004. The expected operational lifetime of the project is 15 years.

The project is expected to bring social (employment and improve of the electricity supply for Espírito Santo State) and economic benefits that are aligned with the environment and health policy of CST, thus contributing to the sustainable development objectives of the Brazilian Government.

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

3.3 Project Baseline

The project applies the approved baseline methodology ACM0004*:* "Consolidated *baseline methodology for waste gas and/or heat for power generation"* /10/. The project fulfils the conditions under which ACM0004 is applicable with respect to the fact that: a) the project avoids or displaces energy from the S-SE-CO Brazilian Electricity grid, b) the project will not switch fuel in order to produce electricity with LDG. However, LDG will be mixed with other gases (blast furnace gas and coke oven gas) prior to utilisation in the four thermoelectric plants in order to sustain the adequate operation of these plants. As explained in the revised PDD /2/, the amount and the utilisation of other gases than LDG is the same as before the project implementation.

3.4 Additionality

In accordance with ACM0004, the additionality of the project is demonstrated through the "*Tool for the demonstration and assessment of additionality*" /14/, which includes the following steps:

Step 0 -Preliminary screening based on the starting date of the project activity: The starting date of the CDM project activity, i.e. 01 September 2004, falls between 1 January 2000 and the date of the registration of the first CDM project activity (18 November 2004). Evidence for the project's starting date of 01 September 2004 was presented to DNV through ANEEL Resolution 304/2004, in which the 4th thermoelectric plant was authorized to start operations after 15 April 2004, and by operational reports which evidence that the 4th thermoelectric plant started stable operation on 01 September 2004 after a test period (verified by reviewing daily data log of LDG consumption and operation of the 4th thermoelectric plant).

Documented evidence that the incentive from the CDM was seriously considered in the decision to proceed with the project activity was provided by means of a study assessing CDM opportunities at CST carried out in December 2002 by PricewaterhouseCoopers /4/. Moreover, a first draft PDD for the project was developed in August 2003 and submitted to DNV in November 2003.

Step 1 - Identification of alternatives to the project activity consistent with current laws and regulations: The possible baseline scenarios are: a) Flaring LDG without utilisation for electricity generation b) Investing in the installation of a LDG treatment system and a 4th thermoelectric plant to produce additional electricity which will result in the reduction of net electricity imports from the grid. Both scenarios are in compliance with all applicable legal and regulatory requirements. Another possible baseline scenario, i.e. existing or new captive power generation on-site, using other energy sources than LDG, is not likely due the non existence of other energy source, and the use of LDF for generation of heat only is not possible as there is no demand for heat.

Step 2 - Investment analysis: An investment analysis (Option III benchmark analysis) is presented to demonstrate that in the absence of CER revenues the investments to implement the LDG treatment system and the 4th thermoelectric plant in order to utilise the LDG for electricity generation would not have been undertaken. It is demonstrated that the project IRR is 4.18% and thus much lower than the current 12% of Weighted Average Capital Cost (WACC) that was historically used as benchmark for corporate investment analysis carried out by CST. Although a corporate benchmark according to the "*Tool for the demonstration and assessment of additionality*" shall not be chosen as an indicator for the benchmark analysis, the selected

benchmark is also comparable with other benchmarks that represent standard returns in the Brazilian market, such as the SELIC rate, which was 19.17% in the year 2002 /7/ when the decision to implement the project was made.

The calculation of the IRR was done considering only part of the investment costs of the 4th thermoelectric plant since this thermoelectric plant will not utilise LDG only. Since the amount of LDG alone could only support a 16 MW thermoelectric plant, the costs of a 16 MW plant was considered (instead of the actual costs of the installed 75 MW plant). This is conservative for the purpose of the IRR calculation. Complementary information received and verified during the meeting with CST evidenced that the IRR calculation was based on the price of the electricity in the open market including the transportation cost at the time the decision to implement was taken (as verified through MAE action 2002 /6/) and on operation and maintenance costs of US$ 2 / MWh, which represent only 0.4% of the annual investment costs. The IRR was thus determined based on appropriate and conservative assumptions.

A sensitivity analysis showed that, even with a higher electricity price (R$ 92.40 per MWh and a R$/US$ exchange rate of 2.37) the IRR of the investment continues to be lower than the SELIC rate. Hence, given the prevailing circumstances, the project is deemed not to be financially attractive in absence of the CDM.

Step 3. *Barrier analysis:* No barrier analysis is carried out.

Step 4 - Common practice analysis: DNV was able to confirm that electricity generation using LDG is not common practice in steel plants in Brazil. On the total of nine integrated steel plants in Brazil, six flare LDG without utilising it and only two of the three plants recovering LDG are utilising LDG for electricity generation.

Step 5 - Impact of CDM registration: The project participants were able to demonstrate that the sale of CERs will provide complementary incentives for the project to alleviate the economic and financial hurdles the project faces.

Given the above, it is sufficiently demonstrated that the project is not a likely baseline scenario and that emission reductions are hence additional.

3.5 Monitoring Plan

The project applies the approved monitoring methodology ACM0004 “Consolidated *monitoring methodology for waste gas and/or heat for power generation”*/11/

The methodology considers monitoring emissions reductions generated from electricity generation using waste gas of the steel making plant, i.e. LDG. The monitoring of emission reductions is primarily based on monitoring the amount of electricity generated based on burning LDG and supplied to the grid and the emission factor of the S-SE-CO grid. The reliability of the former monitoring parameter is assured through the measurements carried out by Energy Centre Control of CST. The grid electricity emission factor is determined *ex-ante* based on ONS data from 2002-2004 for the *ex-ante* estimation of emission reductions, but will be determined *ex-post* on a yearly basis for the determination of actual emission reductions.

According to the ACM0004 the monitoring plan of the project is based on the monitoring of the electricity generated based on utilizing LDG in the four thermoelectric plants. However, as the thermoelectric plants also consume blast furnace gas and coke oven gas**,** the relative share of electricity generation from LDG will be calculated based on the continuously measured total net

electricity produced by the four thermoelectric plants, the total LDG use (in terms of its energy content) and the average efficiency (heat rate) of the four thermoelectric plants. The average efficiency of the four thermoelectric plants is determined by continuously monitoring the electricity output of each plant and by continuously measuring the flow and net calorific value of LDG, blast furnace gas and coke oven gas used for electricity generation.

Companhia Siderúrgica de Tubarão (CST) is responsible for the project management, monitoring and reporting as well as for organising and training of the staff in the appropriate monitoring, measurement and reporting techniques. The company is ISO 9001 and ISO 14001 certified.

The monitoring plan is straightforward and no specific procedures beyond the already established QA/QC procedures will be necessary.

3.6 Calculation of GHG Emissions

Baseline emissions due to displacement of electricity are calculated by multiplying the estimated amount of electricity generated based on LDG with an ex-ante determined emission factor of the S-SE-CO grid. The project is not expected to result in project GHG emissions as it will not use any complementary fuel. LDG will be mixed with other gases (BFG and COG) prior to the combustion in the thermoelectric plants. However, these gases are also used in the existing three thermoelectric plants and the total amount of these gases that is combusted remains the same as before the implementation of the project.

The grid emission factor is determined according to the baseline methodology ACM0002 /12/ as required by ACM0004. The project uses electricity generation data provided by the Brazilian Electricity Agency (ANEEL) and the National Electricity System Operator (ONS) for the electricity generated in the S-SE-CO regional Brazilian grid in the years 2002-2004. This data is the most recent available by the time of PDD submission. However, the grid emission factor will be updated annually based on *ex-post* monitoring.

The ONS dataset does not include power plants that dispatch locally. However, it is justified to only include plants dispatched by ONS although these represent only about 80% of the total installed capacity. Data for the remaining plants is not publicly available as these remaining plants operate either based on power purchase agreements, which are not under control of the dispatch authority, or they are located in non-interconnected systems to which ONS has no access. Hence, these plants are not likely to be affected by a CDM project and the power plants dispatched by ONS are thus representative for the operating margin.

The simple-adjusted operating margin (OM) emission coefficient is calculated to be 0.4368 tCO_2e/MWh (applying an average λ of 0.5190) and the build margin (BM) emission coefficient is 0.0937 tCO_2e/MWh, resulting in a combined margin emission coefficient of 0.2652 tCO_2e/MWh (weighted average of the build and operating margin).

It is recognised that in the absence of actual fuel consumption data, the calculated plant specific emission coefficients are sensitive to the assumed plant efficiency for each plant. Nonetheless, the applied average plant efficiencies for different power plant types established in the IEA study on the Brazilian grid /13/ are deemed to represent the best data that is currently available.

The λ was calculated by interpolating daily dispatch data for thermal power plants and daily dispatch data for hydropower plants. The λ calculations were transparently presented in spreadsheets submitted to and assessed by DNV. The selected approach for calculating λ is in accordance with ACM0002.

3.7 Environmental Impacts

The environmental impacts have been assessed. Considering the nature of the project, there are no adverse environmental impacts expected. CST has been granted the necessary environmental licenses (Operation), including the licences for the 4th thermoelectric plant and the electricity generation with LDG, by the state environmental agency (IEMA) after all possible impacts were analyzed by the State Secretary of Environment (SMA – Secretaria Estadual para Assuntos de Meio Ambiente) through a report called "Phase 5.0 Mt Environment Impact Declaration" (Declaração de Impacto Ambiental Fase 5.0 Mt).

3.8 Comments by Local Stakeholders

CST presented the "Electric Power Co-Generation by LDG Recovery – CST - Brasil" project on several seminars and congresses. In October 2003, CST announced during the 3rd Technical Seminar on Environment an invitation to comment on the project through the CST website.

Complementarily, CST invited local stakeholders, such as the Municipal Government, the state and municipal agencies, the Brazilian forum of NGOs, neighbouring communities and the office of the attorney general, to provide comments for the project, according to the Resolution 1 of the Brazilian DNA. The letters sent to the local stakeholders were verified by DNV /8/. No comments were received.

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

DNV Certification published the PDD of 22 August 2005 on the DNV Climate Change web site (http://www.dnv.com/certification/ClimateChange) and Parties, stakeholder and UNFCCC accredited NGOs were, through the UNFCCC CDM web site, invited to provide comments within a 30 days period from 20 September 2005 to 19 October 2005. No comments were received.

5 VALIDATION OPINION

Det Norske Veritas Certification Ltd. (DNV) has performed a validation of the "Electric Power Co-Generation by LDG Recovery – CST - Brasil project at Serra Municipality, Espirito Santo state, Brazil. The validation was performed on the basis of UNFCCC criteria for CDM project activities and relevant Brazilian criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The project participant is Companhia Siderúrgica de Tubarão (CST) of Brazil. The host Party Brazil meets all relevant participation requirements. No participating Annex I Party is yet identified.

Companhia Siderúrgica de Tubarão (CST) is an integrated steel industry based on coke, with an installed capacity of 5.0 Mt/year. The project consists of a system to recover part of LDG gas generated in the steel making plant (which is rich in CO) and to utilise LDG in three existing thermoelectric plant and the newly added 4th thermoelectric plant. LDG was flared prior to the implementation of the project.

The baseline scenario assumes that LDG would continue to be flared during the crediting period. Emission reductions will thus be achieved through the use of LDG as fuel to produce electricity and by displacing grid electricity that is party generated by thermal units connected to the S-SE-CO Brazilian grid.

By promoting the use of a waste gas for electricity generation instead of flaring it without utilising its energy, the project is in line with the current sustainable development priorities of Brazil.

The project applies the approved baseline and monitoring methodology ACM0004, i.e. "Consolidated baseline methodology for waste gas and/or heat for power generation". The baseline methodology has been applied correctly 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 monitoring methodology has been applied correctly. The monitoring plan sufficiently specifies the monitoring requirements of the main project indicators.

The calculation of emission reductions is based on multiplying the amount of electricity generated based on combusting LDG with an emission factor for electricity generation in the Brazilian S-SE-CO grid, calculated according to ACM0002. Given that the project performs as planned, stated emission reductions are likely to be achieved.

Local stakeholder comments were invited according to the Brazilian DNA Resolution 1. No comments were received. Public stakeholder input has also been invited via the UNFCCC web-site, but no comments have been received.

In summary, it is DNV's opinion that the "Electric Power Co-Generation by LDG Recovery – CST - Brasil" project, as described in the revised and resubmitted project design document of 17 November 2005, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology ACM0004.

Hence, DNV will request the registration of the "Electric Power Co-Generation by LDG Recovery – CST - Brasil" project as a CDM project activity.

Prior to the submission of this validation report to the CDM Executive Board, DNV will have to receive the written approval of the DNA of Brazil, including confirmation that the project assists in achieving sustainable development.

REFERENCES

Documents provided by the project proponent that relate directly to the project:

/1/ CST and PricewaterhouseCoopers: *Project Design Document for the Electric Power Co-Generation by LDG Recovery – CST* - Brasil, Version 1 (22 August 2005)

/2/ CST and PricewaterhouseCoopers: *Project Design Document for the Electric Power Co-Generation by LDG Recovery – CST* - Brasil, Version 2 (17 November 2005)

/3/ Spreadsheet of Calculation of Combined Margin Emission Coefficient (ONS-Emission Factor SSECO 2001-2003 v 2005-06-22.xls).

/4/ CST and PricewaterhouseCoopers: *CDM possibilities at CST*, December 2002

/5/ CST Financial spreadsheet LDG November 2005

/6/ MAE electricity auction 2002 http://www.mae.org.br/leiloes_mae/leilao_venda/fechamento/resumo.jsp?codigo-aviso=9&codigo-

/7/ Brazilian Central Bank, SELIC: http://www.bcb.gov.br/?SELICMES

/8/ Letter sent to local stakeholder to invite comments about the project

Background documents related to the design and/or methodologies employed in the design or other reference documents:

/9/ International Emission Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF): *Validation and Verification Manual*. http://www.vvmanual.info

/10/ Approved Baseline Methodology ACM0004: "*Consolidated baseline methodology for waste gas and/or heat for power generation"*. Version 01 of 08 July 2005.

/11/ Approved Monitoring Methodology ACM0004: "*Consolidated monitoring methodology for waste gas and/or heat for power generation"*. Version 01 of 08 July 2005.

/12/ Approved Baseline and Monitoring Methodology ACM0002 *"Consolidated baseline methodology for grid-connected electricity generation from renewable sources"* Version 01 of 03 September 2004

/13/ Bosi, M., A. Laurence, P. Maldonado, R. Schaeffer, A. F. Simoes, H. Winkler and J.-M. Lukamba: *Road testing baselines for greenhouse gas mitigation projects in the electric power sector*. OECD and IEA information paper, October 2002.

/14/ CDM-EB, *"Tool for the demonstration and assessment of additionality"*, Annex 1 of the report of the EB's 16th meeting.

Persons interviewed during the validation, or persons who contributed with other information that are not included in the documents listed above:

/15/ Guilherme Correa Abreu – Environmental Engineer CST

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APPENDIX A

CDM VALIDATION PROTOCOL

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

Requirement	Reference	Conclusion	Cross Reference / Comment
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	OK	Table 2, Section E.4.1 No participating Annex I Party is yet identified
2. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	-	Table 2, Section A.3 Prior to the submission of this validation report to the CDM Executive Board, DNV will have to receive confirmation by the DNA of Brazil that the project assists in achieving sustainable development.
3. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC	Kyoto Protocol Art.12.2.	OK	Table 2, Section E.4.1
4. 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	-	Prior to the submission of this validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Brazil.
5. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change	Kyoto Protocol Art. 12.5b	OK	Table 2, Section E
6. Reduction in GHG emissions shall be additional to any that would occur in 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	OK	Table 2, Section B.2
7. 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	Decision 17/CP.7, CDM Modalities and Procedures	OK	There is no public funding involved in the project. The validation did not reveal any information that indicates

Requirement	Reference	Conclusion	Cross Reference / Comment
official development assistance and is separate from and is not counted towards the financial obligations of these Parties	Appendix B, § 2		that the project can be seen as a diversion of ODA funding towards Brazil.
8. Parties participating in the CDM shall designate a national authority for the CDM	CDM Modalities and Procedures §29	OK	The Brazilian designated national authority for the CDM is the "Comissão Interministerial de Mudança Global do Clima".
9. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol	CDM Modalities §30/31a	OK	Brazil ratified the Kyoto Protocol on 23 August 2002.
10. The participating Annex I Party's assigned amount shall have been calculated and recorded	CDM Modalities and Procedures §31b	N/A	No participating Annex I Party is yet identified.
11. 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	N/A	No participating Annex I Party is yet identified.
12. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received	CDM Modalities and Procedures §37b	OK	Table 2, Section G
13. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	OK	Table 2, Section F
14. Baseline and monitoring methodology shall be previously approved by the CDM Executive Board	CDM Modalities and Procedures §37e	OK	Table 2, Section B.1.1 and D.1.1
15. 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, Section D
16. Parties, stakeholders and UNFCCC accredited NGOs shall	CDM Modalities	OK	DNV Certification published the PDD

Requirement	Reference	Conclusion	Cross Reference / Comment
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	and Procedures §40		of 22 August 2005 on the DNV Climate Change web site (http://www.dnv.com/certification/ClimateChange) and Parties, stakeholders and NGOs were, through the UNFCCC CDM web site invited to provide comments during the period from 20 September 2005 to 19 October 2005. No comments were received.
17. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances	CDM Modalities and Procedures §45c,d	OK	Table 2, Section B.2
18. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure	CDM Modalities and Procedures §47	OK	Table 2, Section B.2
19. The project design document shall be in conformance with the UNFCCC CDM-PDD format	CDM Modalities and Procedures Appendix B, EB Decision	OK	The PDD version 2, is according PDD-CDM Guideline and Format

Table 2 Requirements Checklist

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
A. General Description of Project Activity *The project design is assessed.*					
A.1. Project Boundaries *Project Boundaries are the limits and borders defining the GHG emission reduction project.*					
A.1.1. Are the project's spatial (geographical) boundaries clearly defined?	/1/	DR	The project is located inside the Companhia Siderurgica Tubarão (CST) Steel Plant in the municipality of Serra, Espirito Santo State.		OK
A.1.2. Are the project's system (components and facilities used to mitigate GHGs) boundaries clearly defined?	/1/	DR	Yes. The project system's boundary comprises the 4th thermoelectric plant. The system boundary for the determination of the grid electricity emission factor is the South-Southeast and Midwest (S-SE-CO) section of the interconnected subsystem of the Brazilian grid, to which the project is connected to.		OK
A.2. Technology to be employed *Validation of project technology focuses on the project engineering, choice of technology and competence/ maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.*					
A.2.1. Does the project design engineering reflect current good practices?	/1/	DR	Yes, the project design engineering reflects good practice trough the treatment of waste gas (i.e. LDG) from the steel making plant		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			and its utilisation in a thermoelectric plant. Only 3 integrated steel plants in Brazil, of a total of 9, recover LDG and only two utilise LGD for electricity generation.		
A.2.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	/1/	DR	The project involves expanding the generation capacity through the use of waste gas (i.e. LDG), which will allow for the generation of additional electricity to be consumed internally.		OK
A.2.3. Is the project technology likely to be substituted by other or more efficient technologies within the project period?	/1/	DR	No. The project is unlikely to be replaced by other more efficient technologies, at least within the crediting period.		OK
A.2.4. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period?	/1/	DR	The project requires training for operation and maintenance which is similar to the training for operation of the other 3 thermoelectric plants of CST. The management system for quality (ISO 9001 certified) and Environment (ISO 14001 certified) is deemed sufficient to identify the necessary training.		OK
A.2.5. Does the project make provisions for meeting training and maintenance needs?	/1/	DR	The management system for quality (ISO 9001 certified) and Environment (ISO 14001 certified) will ensure that provisions are made for training and maintenance needs.		OK
A.3. Contribution to Sustainable Development *The project's contribution to sustainable development is assessed.*					
A.3.1. Is the project in line with relevant legislation and plans in the host country?	/1/	DR	As per ANEEL Resolution 556/2002 (authorization to implement the #4 thermoelectric plant). The environmental impacts have been		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			assessed. Considering the nature of the project, there are no adverse environmental impacts expected. CST has been granted environmental licenses (Operation), which include the #4 thermoelectric plant and the electricity generation with LDG, by the state environmental agency (IEMA) after all possible impacts were analyzed by the State Secretary of Environment (SMA – Secretaria Estadual para Assuntos de Meio Ambiente) through a report called "Phase 5.0 Mt Environment Impact Declaration" (Declaração de Impacto Ambiental Fase 5.0 Mt).		
A.3.2. Is the project in line with host-country specific CDM requirements?	/1//8/ /15/	DR	Local stakeholders, as identified in Resolution 1 of the Brazilian DNA, were invited. Evidence of the letters sent was verified by DNV.		OK
A.3.3. Is the project in line with sustainable development policies of the host country?	/1/	DR	By using a waste gas as fuel to produce electricity and by improving the electricity supply for Espírito Santo State, which is located at the end of the interconnected grid and has small electricity generation capacity, the project is in line with current sustainable development priorities in Brazil.		OK
A.3.4. Will the project create other environmental or social benefits than GHG emission reductions?	/1/	DR	See A.3.3		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
B. Project Baseline *The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.*					
B.1. Baseline Methodology *It is assessed whether the project applies an appropriate baseline methodology.*					
B.1.1. Is the baseline methodology previously approved by the CDM Executive Board?	/1//10/	DR	Yes. The project applies the approved baseline methodology ACM0004 "Consolidated baseline methodology for waste gas and/or heat for power generation"		OK
B.1.2. Is the baseline methodology the one deemed most applicable for this project and is the appropriateness justified?	/1//10/	DR	The project fulfils the conditions under which ACM0004 methodology is applicable: a) The project reduces net electricity imported from the S-SE-CO Brazilian electricity grid, b) The project will not switch fuel in order to produce electricity with LDG.		OK
B.2. Baseline Determination *The choice of baseline will be validated with focus on whether the baseline is a likely scenario, whether the project itself is not a likely baseline scenario, and whether the baseline is complete and transparent.*					
B.2.1. Is the application of the methodology and the discussion and determination of the chosen baseline transparent?	/1/	DR	The application of the methodology is correct and transparent. However as LDG has a low heat content, it will be mixed with other gases (blast furnace	~~CL 1~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			gas and coke oven gas) prior to combustion in the four thermoelectric plants in order to sustain the adequate operation of these plants. This condition is not clearly explained in the PDD, and DNV requests more information on this.		
B.2.2. Has the baseline been determined using conservative assumptions where possible?	/1/	DR	The baseline emission calculations are according to the baseline methodology ACM0004. The project uses electricity generation data provided by the Brazilian Electricity Agency (ANEEL) and the National Electricity System Operator (ONS) for the electricity generated in the S-SE-CO regional Brazilian grid in the years 2001-2003. However, this data is not the most recent available by the time of PDD submission. 2004 data is available. DNV requests the grid emission factor to be recalculated based on the most recent available data. Average plant efficiencies for different power plant types established in the IEA study on the Brazilian grid and IPCC carbon emission factors for specific fuels were applied to calculate plant specific emission coefficients, which is considered appropriate	~~CAR 1~~	OK
B.2.3. Has the baseline been established on a project-specific basis?	/1/	DR	See.B.2.1		OK
B.2.4. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/	DR	The project takes into account the tendency of the electricity generation scenario in Brazil at the time the decision for project implementation (2002) was made.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
B.2.5. Is the baseline determination compatible with the available data?	/1/	DR	The baseline considers the emission factor calculated based on electricity generation in the years 2001 to 2003. DNV requests a recalculation based on 2002 to 2004 data.	~~CAR 2~~	OK
B.2.6. Does the selected baseline represent the most likely scenario among other possible and/or discussed scenarios?	/1/	DR	The possible baseline scenarios are: a) Flaring LDG without utilisation for electricity generation b) Investing in the installation of a LDG treatment system and a 4th thermoelectric plant to produce additional electricity which will result in the reduction of net electricity imports from the grid. Both scenarios are in compliance with all applicable legal and regulatory requirements. However, another possible baseline scenario identified by ACM0004, i.e. existing or new captive power generation on-site, using other energy sources than LDG, such as coal, diesel, natural gas, hydro, wind, etc, is not discussed. DNV requests a discussion on this possible baseline scenario.	~~CL 2~~	OK
B.2.7. Is it demonstrated/justified that the project activity itself is not a likely baseline scenario?	/1/	DR	In accordance with ACM0004, the additionality of the project is demonstrated through the "Tool for the demonstration and assessment of additionality" /14/, which includes the following steps: Step 0 -Preliminary screening based on the starting date of the project activity: The starting date of the CDM project activity, i.e. 01 September 2004, falls between 1 January 2000 and the date of the	~~CL 2~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			registration of the first CDM project activity (18 November 2004). Evidence for the project's starting date of 01 September 2004 was presented to DNV through the Dispatch ANEEL 304/2004 (where the 4th thermoelectric plant was authorized to start operations after 15 April 2004) and by operational reports which evidence that the 4th thermoelectric plant started stable operation on 01 September 2004 after a test period (verified by reviewing daily data log of LDG consumption and operation of the 4th thermoelectric plant). Documented evidence that the incentive from the CDM was seriously considered in the decision to proceed with the project activity was provided by means of a study assessing CDM opportunities at CST carried out in December 2002 by PricewaterhouseCoopers /4/. Moreover, a first draft PDD for the project was developed in August 2003 and submitted to DNV in November 2003. Step 1 - Identification of alternatives to the project activity consistent with current laws and regulations: The possible baseline scenarios are: a) Flaring LDG without utilisation for electricity generation b) Investing in the installation of a LDG treatment system and a 4th thermoelectric plant to produce additional electricity which will result in the reduction of net electricity imports from the grid. Both scenarios are in		

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			compliance with all applicable legal and regulatory requirements. However, another possible baseline scenario identified by ACM0004, i.e. existing or new captive power generation on-site, using other energy sources than LDG, such as coal, diesel, natural gas, hydro, wind, etc, is not discussed. DNV request a discussion on this possible baseline scenario. Step 2 - Investment analysis: An investment analysis (Option III benchmark analysis) is presented to demonstrate that in the absence of CER revenues the investments to implement the LDG treatment system and the 4th thermoelectric plant in order to utilise LDG for electricity generation are not financially attractive. It is demonstrated that the project IRR is 4.18% and thus much lower than the current 12% of Weighted Average Capital Cost (WACC) that was historically used as benchmark for corporate investment analysis carried out by CST. Although a corporate benchmark shall according to the "Tool for the demonstration and assessment of additionality" not be chosen as an indicator for the benchmark analysis, the selected benchmark is comparable with other benchmark that represent standard returns in the Brazilian market, such as the SELIC rate, which was 19.17% in the year 2002 /7/ when the decision to implement the project was made.		

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			The calculation of the IRR was done considering only part of the investment costs of the 4th thermoelectric plant generation since this thermoelectric plant will not only utilise LDG. Since the amount of LDG alone could only support a 16 MW thermoelectric plant, the costs of a 16 MW plant was considered (instead of the actual costs of the installed 75 MW plant). This is conservative for the purpose of the IRR calculation. Complementary information received and verified during the meeting with CST evidenced that the IRR calculation was based on the price of electricity in the open market including the transportation cost at the time the implementation decision was taken (as verified through MAE action 2002 /6/) and based on operation and maintenance costs of US$ 2/MWh, which represent only 0.4% of the yearly investment costs. The IRR was thus determined based on appropriate and conservative assumptions. A sensitivity analysis showed that, even with a higher electricity price (R$ 92.40 per MWh and an R$/US$ exchange rate of 2.37) the IRR of the investment continues to be lower than the SELIC rate. Hence, given the prevailing circumstances, the project is not deemed financially attractive. Step 3 - Barrier analysis: No barrier analysis is carried out. Step 4 - Common practice analysis: DNV		

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			was able to confirm that electricity generation using LDG is not common practice at steel plants in Brazil. On the total of nine integrated steel plants in Brazil, six flare LDG without utilising it and only two of the three plants recovering LDG are utilising LDG for electricity generation. Step 5 - Impact of CDM registration: The project participants were able to demonstrate that the sale of CERs will provide complementary incentives for the project to alleviate the economic and financial hurdles the project faces. Given the above, it is sufficiently demonstrated that the project is not a likely baseline scenario and that emission reductions are hence additional.		
B.2.8. Have the major risks to the baseline been identified?	/1/	DR	Yes		OK
B.2.9. Is all literature and sources clearly referenced?	/1/	DR	Yes		OK
C. Duration of the Project/ Crediting Period *It is assessed whether the temporary boundaries of the project are clearly defined.*					
C.1.1. Are the project's starting date and operational lifetime clearly defined and reasonable?	/1/	DR	The project's starting date is 01 September 2004. The expected operational lifetime is 15 years.		OK
C.1.2. Is the assumed crediting time clearly defined (renewable crediting period of seven years with two possible renewals or fixed crediting period of 10 years with no renewal)?	/1/	DR	A fixed 10 years credit period was selected, starting on 01 September 2004.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D. Monitoring Plan *The monitoring plan review aims to establish whether all relevant project aspects deemed necessary to monitor and report reliable emission reductions are properly addressed ((Blue text contains requirements to be assessed for optional review of monitoring methodology prior to submission and approval by CDM EB).*					
D.1. Monitoring Methodology *It is assessed whether the project applies an appropriate baseline methodology.*					
D.1.1. Is the monitoring methodology previously approved by the CDM Executive Board?	/1/	DR	The project applies the approved monitoring methodology ACM0004 "Consolidated monitoring methodology for waste gas and/or heat for power generation"		OK
D.1.2. Is the monitoring methodology applicable for this project and is the appropriateness justified?	/1/	DR	Yes. The monitoring methodology is applicable as established on ACM0004.		OK
D.1.3. Does the monitoring methodology reflect good monitoring and reporting practices?	/1/	DR	The grid electricity emission factor is determined ex-ante based on ONS data from 2001-2003 and will be determined ex-post on a yearly basis, although this is not clearly mentioned in the PDD.	~~CL 3~~	OK
D.1.4. Is the discussion and selection of the monitoring methodology transparent?	/1/	DR	The monitoring plan of the project is according to ACM0004 and is based on the monitoring of the electricity generated based on utilizing LDG in the four thermoelectric plants. However, as observed during interviews with CST /15/, the thermoelectric plants also consume	~~CAR 3~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			blast furnace gas and coke oven gas, the relative share of electricity generation from LDG will be calculated based on the continuously measured total net electricity produced by the four thermoelectric plants, the total LDG use (in terms of its energy content) and the average efficiency (heat rate) of the four thermoelectric plants. The average efficiency of the four thermoelectric plants is determined by continuously monitoring the electricity output of each plant and by continuously measuring the flow and net calorific value of LDG, blast furnace gas and coke oven gas used for electricity generation. This is not mentioned in the PDD and is considered a deviation of methodology, which requires the direct measurement of the electricity generated from utilising LDG. This deviation of the methodology needs to be clearly described in the PDD.		
D.2. Monitoring of Project Emissions *It is established whether the monitoring plan provides for reliable and complete project emission data over time.*					
D.2.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period?	/1/	DR	The project emissions are considered zero, since no complementary fuel is used. However, as LDG has low heat content, it will be mixed with other gases (blast furnace gas and coke oven gas) prior to combustion in the four thermoelectric plants in order to sustain the adequate operation of these	~~CL 1~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			plants. This condition is not clearly explained in the PDD. DNV requests more explanation on this.		
D.3. Monitoring of Leakage *It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.*					
D.3.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	/1/	DR	In accordance with ACM0004 no leakage is foreseen.		OK
D.4. Monitoring of Baseline Emissions *It is established whether the monitoring plan provides for reliable and complete project emission data over time.*					
D.4.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	/1/	DR	The grid electricity emission factor is determined ex-ante based on historic ONS data in order to estimate emission reductions. However, the grid electricity emission factor used to determine actual emissions reductions will be determined ex-post on a yearly basis. This is not clearly mentioned in the PDD.	~~CL 3~~	OK
D.4.2. Is the choice of baseline indicators, in particular for baseline emissions, reasonable?	/1/	DR	See D.4.1		
D.4.3. Will it be possible to monitor / measure the specified baseline indicators?	/1/	DR	See D.4.1		
D.4.4. Will the indicators give opportunity for real measurements of baseline emissions?	/1/		See D.4.1		

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D.5. Monitoring of Sustainable Development Indicators/ Environmental Impacts *It is checked that choices of indicators are reasonable and complete to monitor sustainable performance over time.*					
D.5.1. Does the monitoring plan provide the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	Neither ACM0004 nor Resolution 1 of the Brazilian DNA require the monitoring of social or environmental indicators.		OK
D.6. Project Management Planning *It is checked that project implementation is properly prepared for and that critical arrangements are addressed.*					
D.6.1. Is the authority and responsibility of project management clearly described?	/1/	DR	CST is responsible as established in the operational and management structure.		OK
D.6.2. Is the authority and responsibility for registration, monitoring, measurement and reporting clearly described?	/1/	DR	CST, under the responsibility of Environment Division, prepared the "Monitoring of Carbon Credits Generation – Basic Procedures to Obtaining, Management and Storing Data" procedures according to CST's ISO 9001 certified management systems for quality ISO 14001 certified and environmental management system.		OK
D.6.3. Are procedures identified for training of monitoring personnel?	/1/	DR	See D.6.2		OK
D.6.4. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR	See D.6.2		OK
D.6.5. Are procedures identified for calibration of	/1/	DR	See D.6.2		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
monitoring equipment?					
D.6.6. Are procedures identified for maintenance of monitoring equipment and installations?	/1/	DR	See D.6.2		OK
D.6.7. Are procedures identified for monitoring, measurements and reporting?	/1/	DR	See D.6.2		OK
D.6.8. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/	DR	See D.6.2		OK
D.6.9. Are procedures identified for dealing with possible monitoring data adjustments and uncertainties?	/1/	DR	See D.6.2		OK
D.6.10. Are procedures identified for review of reported results/data?	/1/	DR	See D.6.2		OK
D.6.11. Are procedures identified for internal audits of GHG project compliance with operational requirements where applicable?	/1/	DR	See D.6.2		OK
D.6.12. Are procedures identified for project performance reviews before data is submitted for verification, internally or externally?	/1/	DR	See D.6.2		OK
D.6.13. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/	DR	See D.6.2		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
E. Calculation of GHG Emissions by Source *It is assessed whether all material GHG emission sources are addressed and how sensitivities and data uncertainties have been addressed to arrive at conservative estimates of projected emission reductions.*					
E.1. Predicted Project GHG Emissions *The validation of predicted project GHG emissions focuses on transparency and completeness of calculations.*					
E.1.1. Are all aspects related to direct and indirect GHG emissions captured in the project design?	/1/	DR	Project emissions are considered zero as no complementary fuel is used. However, as LDG has a low heat content, it will be mixed with other gases (blast furnace gas and coke oven gas) prior to combustion in the four thermoelectric plants in order to sustain the adequate operation of these plants. This condition is not clearly explained in the PDD. DNV requests more information on this.	~~CL 1~~	OK
E.2. Leakage *It is assessed whether there leakage effects, i.e. change of emissions which occurs outside the project boundary and which are measurable and attributable to the project, have been properly assessed.*					
E.2.1. Are potential leakage effects beyond the chosen project boundaries properly identified?	/1/	DR	In accordance with ACM0004, no leakage is foreseen		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
E.3. Baseline Emissions *The validation of predicted baseline GHG emissions focuses on transparency and completeness of calculations.*					
E.3.1. Have the most relevant and likely operational characteristics and baseline indicators been chosen as reference for baseline emissions?	/1/	DR	The simple-adjusted operating margin (OM) emission coefficient is calculated to be 0.4043 tCO_2e/MWh (applying an average λ of 0.519) and build margin (BM) emission coefficient of 0.0937 tCO_2e/MWh, resulting in a combined margin emission coefficient of 0.2490 tCO_2e/MWh (weighted average of the build and operating margin). The emission coefficient calculations were transparently presented in spreadsheets /2/ submitted to and verified by DNV. The baseline emission calculations are according to the baseline methodology ACM0002 as required by ACM0004. However, 2001-2003 data is not the most recent available data by the time of PDD submission. 2004 data is available. DNV requests the grid emission factor to be recalculated based on the most recent available data.	~~CAR 1~~	OK
E.3.2. Are the baseline boundaries clearly defined and do they sufficiently cover sources and sinks for baseline emissions?	/1/	DR	The baseline emission calculations are according to the baseline methodology ACM0002. The project uses electricity generation data provided by the Brazilian Electricity Agency (ANEEL) and the National Electricity System Operator (ONS) for the electricity generated in the S-SE-CO regional Brazilian grid in the years 2001-	~~CAR 1~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			2003. However this is not the most recent available data by the time of PDD submission. DNV requests the updating of these figures. Average plant efficiencies for different power plant types established in the IEA study on the Brazilian grid and IPCC carbon emission factors for specific fuels were applied to calculate plant specific emission coefficients, which is considered appropriate		
E.3.3. Are the GHG calculations documented in a complete and transparent manner?	/1/	DR	See E.3.1		OK
E.3.4. Have conservative assumptions been used when calculating baseline emissions?	/1/	DR	See E.3.1		OK
E.3.5. Are uncertainties in the GHG emission estimates properly addressed in the documentation?	/1/	DR	See E.3.1		OK
E.3.6. Have the project baseline(s) and the project emissions been determined using the same appropriate methodology and conservative assumptions?	/1/	DR	For project baseline, see E.3.1. For project emissions, see E.1.1.		OK
E.4. Emission Reductions Validation of baseline GHG emissions will focus on methodology transparency and completeness in emission estimations.					
E.4.1. Will the project result in fewer GHG emissions than the baseline scenario?	/1/	DR	The project is expected to reduce CO_2 emissions to the extent of 457 696 tCO_2e (45 769 tCO_2e / year on average) during the fixed 10-year crediting period.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
F. Environmental Impacts *Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.*					
F.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/		The environmental impacts have been assessed. Considering the nature of the project, there are no adverse environmental impacts expected. CST has been granted environmental licenses (Operation) that include the #4 thermoelectric plant and the electricity generation with LDG, by the state environmental agency (IEMA) after all possible impacts were analyzed by the State Secretary of Environment (SMA – Secretaria Estadual para Assuntos de Meio Ambiente) through a report called "Phase 5.0 Mt Environment Impact Declaration" (Declaração de Impacto Ambiental Fase 5.0 Mt).		OK
F.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/	DR	See F.1.1		OK
F.1.3. Will the project create any adverse environmental effects?	/1/	DR	See F.1.1		OK
F.1.4. Are transboundary environmental impacts considered in the analysis?	/1/	DR	See F.1.1		OK
F.1.5. Have identified environmental impacts been addressed in the project design?	/1/	DR	See F.1.1		OK
F.1.6. Does the project comply with environmental legislation in the host country?	/1/	DR	See F.1.1		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
G. Stakeholder Comments *The validator should ensure that a stakeholder comments have been invited and that due account has been taken of any comments received.*					
G.1.1. Have relevant stakeholders been consulted?	/1/	DR	CST presented the project at several seminars and congresses. In October 2003, CST announced during the 3rd. Technical Seminar on Environment an invitation to comments on the project through the website of CST. Complementarily, CST invited local stakeholders, such as the Municipal Government, the state and municipal agencies, the Brazilian forum of NGOs, neighbouring communities and the office of the attorney general, to provide comments for the project, according to Resolution 1 of the Brazilian DNA. DNV verified copies of the letters sent /8/. No comments were received.		OK
G.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/	DR	See G.1.2		OK
G.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/	DR	See G.1.2		OK
G.1.4. Is a summary of the stakeholder comments received provided?	/1/	DR	See G.1.2		OK
G.1.5. Has due account been taken of any stakeholder comments received?	/1/	DR	See G.1.2		OK

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
CAR 1 The project uses electricity generation data provided by the Brazilian Electricity Agency (ANEEL) and the National Electricity System Operator (ONS) for the electricity generated in the S-SE-CO regional Brazilian grid in the years 2001-2003. This data is not the most recent available by the time of PDD submission. There is data for 2002-2004. DNV thus requests that the applied grid emission factor is recalculated based on the most recent data available.	B.2.2 E.3.1 E.3.2	The calculations considered the emission factor determined on 2001 / 2002 / 2003 once the project activities had initiated at September 2004. However, once the emission factor determination for 2004 is already concluded, it was considered on the PDD. Thus the emission factor is calculated based on 2002, 2003 and 2004, and it is equal to 0,2783 tCO_2/MWh	The reviewed PDD considers the most recent figures for electricity generated in the S-SE-CO grid, i.e. generation data for the years 2002-2004. This CAR is therefore closed
CAR 3 The monitoring plan of the project is according to ACM0004 and is based on the monitoring of the electricity generated based on utilizing LDG in the four thermoelectric plants. However, as observed during interviews with CST /15/, the thermoelectric plants also consume blast furnace gas and coke oven gas**,** the relative share of electricity generation from LDG will be calculated based on the continuously measured total net electricity produced by the four thermoelectric plants, the total LDG use (in terms of its energy content) and the average efficiency (heat rate) of the four thermoelectric plants. The average efficiency of the four thermoelectric plants is determined by continuously monitoring the electricity output	D.1.4	The electricity co-generated (EGyear) is determined using the following parameters, through on line measurements on the site: - Amount of LDG recovered; - LDG Net Calorific Value, - Power Plants #1, #2, #3 and #4 average efficiency. $EGyear = \frac{Q_{LDG} \times NCV_{LDG} \times 8760}{10^6 \times Hr}$ Where: EGyear: Total electricity Generated (MWh/y) QLDG: Amount of LDG recovered (Nm3/h) NCVLDG: Net Calorific Value of LDG	The deviation from the monitoring methodology ACM0004 is clearly described. The proposed approach to determine additional electricity generation based on combusting LDG is reasonable and the monitoring plan included in section D has been amended to represent actual monitoring conditions. This CAR is therefore closed.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
of each plant and by continuously measuring the flow and net calorific value of LDG, blast furnace gas and coke oven gas used for electricity generation. This is not mentioned in the PDD and is considered a deviation of methodology, which requires the direct measurement of the electricity generated from utilising LDG. This deviation of the methodology needs to be clearly described in the PDD. DNV may have to seek approval by the CDM Executive Board for this deviation before the project can be submitted for registration.		(kcal/Nm3) Hr: Average Power Plants Efficiency Rate (Gcal/MW). This information is included on D.2.1.3 and E.1.	
CL 1 As LDG has a low heat content, it will be mixed with other gases (blast furnace gas and coke oven gas) prior to the combustion in the four thermoelectric plants in order to sustain the adequate operation of them. This condition is not clearly explained in the PDD. DNV request more explanation on this	B.2.1 D.2.1 E.1.1	The fact for the use of LDG at the Power Plants #1 through #4 is not the LDG low calorific value. The Blast Furnace gas is used as the most important fuel on that site, and it has a NCV of 860 kcal/Nm3 approximately, which is lower compared with 2000 kcal/Nm3 of LDG. The main reason for the LDG use with other fuels on the four power plants is the operational flexibility on electricity co-generation, due to maintenance shut down periods and others, making possible to increase the operational ratio of the power plant system. This clarification was included on A.4.3 and B.1.1.	The explanation of LDG use conditions is pertinent as well as appropriate; and it is adequately explained in the revised PDD. This CL is therefore closed.
CL 2 The possible baseline scenarios are: a) Flaring the LDG without utilising for electricity	B.2.6	The other possibility for the LDG use at the plant is for heat source. In fact, this situation would be possible only with	Section B.3 sub-step 1a of the revised PDD identifies all possible baselines scenarios and adequately justifies the

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generation b) Investing in the installation of LDG treatment system and a 4th thermoelectric plant to produce additional electricity which will result in the reduction of net electricity imports from the grid. Both scenarios are in compliance with all applicable legal and regulatory requirements. However, another possible baseline scenario identified by ACM0004, i.e. existing or new captive power generation on-site, using other energy sources than LDG, such as coal, diesel, natural gas, hydro, wind, etc, is not discussed. DNV requests a discussion on this possible baseline scenario.		new investments on the plant, and it is foreseen for the future, but not decided yet, thus it is not mentioned on PDD. Nevertheless, the amount of emission reductions is obtained exactly through the amount of recovered LDG for electric energy co-generation. It was inserted on item B.3 (sub-step 1) that this option was not considered since there was no effective demand for this usage, and the real demand was the electric energy amount to fulfil CST operational needs.	selection of the baseline scenario and project scenario as possible baseline scenarios. This CL is therefore closed
CL 3 The grid electricity emission factor is determined *ex-ante* based on ONS data from 2001-2003 and will be determined *ex-post* on a yearly basis; nonetheless, this is not clearly mentioned in the PDD.	D.1.3 D.4.1	The emission factor is determined ex-post for the verification; it means it will be updated each year, according to table for Baseline Emission Factor for grid power (D.2.1.3).	Section D.2.1.3. of the revised PDD clearly mentions that the grid emission factor is calculated *ex-post* on a yearly basis. This CL is therefore closed.
CL4 The section D.2 of monitoring methodology is not according to the PDD-CDM Guideline and Format.	Table 1 - 19	The section D.2 for monitoring methodology was reformatted according PDD-CDM Guideline. This project doesn't use captive power or other energy source, so the captive power is 0 and does not affect the results. It will be excluded from the table at D.2.1.3.	Section D.2. of the revised PDD is according to the PDD-CDM template. This CL is therefore closed.

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