VALIDATION REPORT

"ELIANE NATURAL GAS FUEL SWITCH PROJECT" IN BRAZIL

REPORT NO. 2006-0147

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DET NORSKE VERITAS

VALIDATION REPORT

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Approved by: Michael Lehmann *Technical Director*	Organisational unit: DNV Certification, International Climate Change Services
Client: Eliane (Maximiliano Gaidzinki S.A.)	Client ref.: Jaime Batista

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Summary:
Det Norske Veritas Certification Ltd. (DNV) has performed a validation of the "Eliane Natural Gas Fuel Switch Project" 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 documents, 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 summarises the findings of the validation.
In summary, it is DNV's opinion that the "Eliane Natural Gas Fuel Switch Project" as described in the revised PDD of 07 March 2006 meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology AM0008. Hence, DNV will request the registration of the "Eliane Natural Gas Fuel Switch 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 voluntary participation from the DNA of Brazil and the United Kingdom, including the confirmation by the DNA of Brazil that the project assists in achieving sustainable development.

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Report title: "Eliane Natural Gas Fuel Switch Project" in Brazil	
Work carried out by: Luis Filipe Tavares, Vicente San Valero	
Work verified by: Cintia Dias	
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Abbreviations

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

1 INTRODUCTION

Eliane (Maximiliano Gaidzinki S.A.) has commissioned Det Norske Veritas Certification Ltd. (DNV) to perform a validation of the "Eliane Natural Gas Fuel Switch Project", at Cocal do Sul and Criciúma Municipalities; Santa Catarina State, Brazil.

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

The validation team consisted of the following personnel:

Mr. Luis Filipe Tavares	DNV Rio de Janeiro	Team leader
Ms. Cintia Dias	DNV Rio de Janeiro	CDM auditor
Mr. Vicente San Valero	DNV Rio de Janeiro	CDM auditor
Mr K. Chandrashekara	DNV Bangalore	Manufacturing industries sector expert
Mr. Michael Lehmann	DNV Oslo	Technical reviewer

1.1 Validation Objective

The purpose of a validation is to have an independent third party assess 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 (CERs).

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 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. The validation team has, based on the recommendations in the Validation and Verification Manual /4/, and employed a risk-based approach, focusing on the identification of significant risks for project implementation and the generation of CERs.

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

1.3 Description of the "Eliane Natural Gas Fuel Switch Project"

Eliane is a porcelain producer having six production units in Brazil. The company operates in a wet milling system, where the clay is mixed with water and triturated by ceramic spheres of high density, resulting in a liquid called slip. The slip is dried out (atomised) by spray dryers resulting in round particles of equal size. The project activity consists in the investments to adapt the existing equipment to the use of natural gas instead of fuel oil and coal at two production units of Eliane.

The project is restricted to the Criciúma (here after referred as Eliane IV) and Cocal do Sul units (here after referred as Eliane I, II III and V). The Criciúma and Cocal do Sul started operation in 1960. Both units have used fuel oil and cooking coal as the main energy source in all the spray dryers and the refractory tunnel kiln up to the year 2001. Since December 2000, seven spray dryers located at Criciúma and Cocal do Sul and one refractory tunnel kiln located at Cocal do Sul have been converted from fuel oil use (and coal use for one dryer) to the use of natural gas. Further two spray dryers will be converted in this year and conversion is expected to be completed in December 2006.

The estimated amount of GHG emission reductions from the project is calculated to be 138 555 tonnes CO_2 equivalents (tCO_2e) during the first renewable 7-year crediting period (with the potential of being renewed twice selected), resulting in estimated average annual emission reductions of 19 794 tCO_2e.

2 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.

In order to ensure transparency, a validation protocol was customised for the project, according to the Validation and Verification Manual /4/. 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 “Eliane Natural Gas Fuel Switch Project” is enclosed in Appendix A to this report.

Findings established during the validation can either be seen as a non-fulfilment of validation protocol 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) validation protocol 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 request for *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 PDD (version 01 of 27 December 2005) /1/ submitted by Eliane (Maximiliano Gaidzinki S.A.) and Ecosecurities on 30 December 2005 and supporting spreadsheets documenting the financial calculations and detailed emission reduction calculations /3/ were assessed by DNV. A revised version of the PDD /2/ was submitted on 07 March 2006 to address DNV's initial validation findings and was assessed by DNV.

2.2 Follow-up Interviews

On 21 February 2006, DNV performed interviews with representatives of Eliane (Maximiliano Gaidzinki S.A.) and Ecosecurities during a site visit/meeting at Eliane facilities on Concal do Sul and Críciuma, Santa Catarina State, in order to confirm and to resolve issues identified in the document review. The following topics were assessed:

- Efficiency of fuel oil, coal and natural gas consumption (receipts of combustible and steam production);
- Fuel oil, coal and natural gas prices and purchase contracts;
- Boilers, ovens, heaters and other equipments capacity;
- Additionality of the project;
- Investment made and consideration of the CDM in the decision to implement the project;
- Cash flow analysis and NPV;
- Baseline emission calculations;
- Calibration requirements.

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 1 (one) *Corrective Action Request*, and 8 (eight) requests for *Clarification.* The project participant's response to DNV's draft validation report findings, including the submission of a revised PDD on 07 March 2006, addressed the *Corrective Action Request* and requests for *Clarifications* to DNV's satisfaction.

To guarantee the transparency of the validation process, the concerns raised and the response provided are documented in more detail in Table 3 of the validation protocol in Appendix A

3 VALIDATION FINDINGS

The findings of the validation of the "Eliane Natural Gas Fuel Switch 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 final validation findings relate to the project design as documented and described in the revised PDD of 07 March 2006.

3.1 Participation Requirements

The project participants are Eliane (Maximiliano Gaidzinki S.A.) of Brazil and Ecosecurities Ltd. of the United Kingdom. The host Party Brazil and the Annex I Party the United Kingdom meet all relevant participation requirements.

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 and the United Kingdom, including the confirmation by the DNA of Brazil that the project assists in achieving sustainable development.

3.2 Project Design

The project activity is a fuel switch program that is based on the conversion of nine (09) spray dryers and one refractory tunnel kiln. The conversion allows for the consumption of natural gas instead of fuel oil and coal. The conversions will not significantly increase the lifetime of equipment or the production capacity. The equipment included in the project activity is as follows:

Eliane Code	Location	Name	Nominal capacity (litter of water vaporised/hour)	Nominal Production Capacity (kg of powder atomised/hour)	Energy Source	Fuel Switch date	Remaining Lifetime
ATM-1	Eliane I	Spray Dryer	1750	3800	Coal and Fuel oil	Dec 2006	> 20 years
ATM-2	Eliane I	Spray Dryer	2600	5500	Fuel oil	Dec 2004	> 20 years
ATM-3	Eliane I	Spray Dryer	1750	3800	Fuel oil	Dec 2006	> 20 years
FB9	Eliane I	Refractory tunnel kiln	300,000 m^2 of porcelain/month		Fuel oil	May 2001	> 20 years
ATM 1	Eliane II	Spray Dryer	6500	14000	Fuel oil	Dec 2000 Jan 2001	> 20 years
ATM 2	Eliane II	Spray Dryer	6500	14000	Fuel oil	Jan 2001	> 20 years
ATM 3	Eliane II	Spray Dryer	7700	16500	Fuel oil	Jan 2001	> 20 years
ATM 1	Eliane IV	Spray Dryer	2600	5500	Fuel oil	Feb 2001	> 20 years
ATM 2	Eliane IV	Spray Dryer	2600	5500	Fuel oil	Feb 2001	> 20 years
ATM 1	Eliane V	Spray Dryer	2600	5500	Fuel oil	Jan/ Feb 2001	> 20 years

A renewable crediting period of 7 years, with the option to be renewed twice, starting on 1 January 2001 is selected. A copy of the natural gas receipt # 027291 issued by Walshaupt do Brasil on 30 November 2000 was presented as evidence that the project was implemented before the starting date of the credit period.

3.3 Baseline Determination

The project applies the approved baseline methodology AM0008 - "*Industrial fuel switching from coal and petroleum fuels to natural gas without extension of capacity and lifetime of the facility*" /5/.

The project fulfils the applicability conditions of AM0008 with respect to the fact that there are no local regulations to constraint the use of fuel oil and coal. During the site visit DNV could verify that the dryers consist of air heaters supplying air at around 700ºC to a spray of ceramic sludge. This process is limited by the velocity of water evaporation in order to form perfect micro spheres. In the same way, the oven is used to fire tiles and the process is limited by quality restrictions. Hence, it is not likely that the facilities would have undergone major efficiency improvements during the crediting period. Moreover, the project activity does not increase the capacity of final outputs and lifetime of the existing facility during the crediting period and the proposed project activity is a fuel switching applied to element processes and does not result in integrated process change.

The claim that fuels oil is less expensive than natural gas per unit of energy in Brazil and the relevant industry sector was initially not confirmed. However, during site visit DNV verified several receipts for fuel oil purchases before the implementation of the project. The average price of fuel oil was R$0.0082/kJ and the price for Natural Gas was R$ 0.0098/kJ. Hence, DNV was able to confirm that the use of fuel oil is less expensive than natural gas per unit of energy.

The project's application of the methodology is correct and the determination of the baseline is transparent. The baseline scenario for the project is that fuel oil and coal is continued to be used in the existing facilities during the selected crediting period.

3.4 Additionality

In accordance with AM0008 /5/, the additionality of the project is demonstrated through two conditions:

a) There are no regulations/programs constraining the use of fuel oil or coal. In fact there are no restrictions to use fuel oil and coal. There are only environmental restrictions on federal level with respect to sulphur oxides emissions. However, fuel oil and coal with low sulphur content is available which attends these requirements, if applicable.

b) According to AM0008, a Net Present Value (NPV) analysis shall be carried out, and the project is additional if the NPV of the project activity is negative, considering an appropriate discount rate in Brazil. A NPV analysis was carried out using a discount rate of 18%. According to the Brazilian Central Bank the Brazilian discount rate (SELIC) reached 17.74% in the year 2000, i.e. the year in which the decision to implement the project was made. Hence, the selected discount rate is appropriate. Moreover, a sensitivity analysis using a 54% discount rate still resulted in a negative NPV. The calculations made in the "Eliane-ER-and-FA-Calculations" spreadsheets /3/ demonstrate that the NPV of the project is less attractive than the NPV of the baseline, i.e. there is a difference of –R$ 3 431 433 between the NPV of fuel oil and the NPV of

natural gas considering the average prices of fuel oil of R$0.0082/kJ and natural gas R$0.098/kJ, and the investment of R$ 263 504.

According to AM0008 the trends in fuel oil and natural gas consumption in Brazil and sector were analyzed. The analysis considers the fuel prices in 2000 only, i.e. the year in which the decision to implement the project was made. However, complementary information has been presented in which the trends in fuel prices as a result of the supply of natural gas to the Brazilian South region from Bolivia have been analysed. The analysis confirms the price of natural gas per kJ is still higher than per kJ fuel oil.

Although AM0008 does not require that evidence must be presented that Eliane (Maximiliano Gaidzinki S.A.) took into consideration CDM benefits in the decision to implement the project, DNV requested such evidence and was presented a letter from the Environment Department signed by Mrs. Mariezi Olivo de Brida to Industrial Directory, Mr Leandro Rosa Medeiros, issued on 10 May 2000, mentioning the possibility to utilise future carbon credits markets.

3.5 Monitoring Plan

The project correctly applies the approved monitoring methodology AM0008 - "*Industrial fuel switching from coal and petroleum fuels to natural gas without extension of capacity and lifetime of the facility*" /5/.

The monitoring methodology considers monitoring emission reductions resulting from switching from fuel oil (and coal) to natural gas at nine spray dryers and one refractory tunnel kiln. The monitoring plan for emission reductions occurring within the project boundary are based on measuring the natural gas consumption through individual instruments, the identification of these instruments is given in Annex 4 of the PDD.

The monitoring plan includes the determination of the fuel efficiency of natural gas as a curve of fuel efficiency vs. load factor with statistical significance in accordance with AM0008. AM0008 establishes that the calculation of the fuel efficiency factor for natural gas (project scenario) shall be measured at the early stage of each crediting period for each process with several load factors in order to get a curve with statistical significance. The PDD mentions that the curves with significant statistical values will be presented during the verification. However, the determination of the natural gas efficiencies of each equipment must be implemented during the first monitoring period and be presented in the first verification.

The determination of the fuel oil and coal efficiency was based on steam and heavy oil and coal consumption measurements of the equipment prior to the fuel switch. As observed during the site visit, the dryers and the oven do not have the capacity to operate at different load levels of production due to quality restrictions with regard to the production of micro spheres or the firing of tiles. Hence, the fuel oil ad coal efficiencies were determined as a single value only and not as a pattern (function) of load factor.

Details of the data to be collected, the frequency of data recording, its certainty, and format and storage location are described. Algorithms and formulae used have also been clearly established. The recording frequency of the data is as required by AM0008. The time for how long the data is kept archived is defined.

Eliane (Maximiliano Gaidzinki S.A.) is responsible for the project management and monitoring and reporting of emission reductions as well as for organising and training of the staff in the

appropriate monitoring, measurement and reporting techniques. These tasks will be carried out by the Internal Commission for Energy Conservation which is part of Eliane's engineering department.

The monitoring plan is straightforward and no specific procedures beyond already established procedures, including QA/QC procedures, are necessary. The established measures reflect good monitoring and reporting practices.

3.6 Calculation of GHG Emissions

Details of direct and indirect emissions are adequately discussed and calculations and their derivative formulas are referenced to internationally recognised IPCC standards. The GHG emissions consist of:

- carbon dioxide emissions (CO_2) from combustion of natural gas (project) and fuel oil and coal (baseline),
- methane (CH_4) emissions from combustion of natural gas (project) and fuel oil and coal (baseline),
- nitrous oxide (N_2O) emissions from combustion of natural gas (project) and fuel oil and coal (baseline),
- fugitive CH_4 emissions associated with natural gas production, transport and distribution (project), and
- carbon dioxide emissions (CO_2) from fuel oil and coal transportation (baseline).

Total CH_4 and N_2O emissions (from combustion and fugitive emissions) are converted to equivalent CO_2 emissions using the GWPs agreed for the first commitment period of the Kyoto Protocol. Data of pipeline leakage is not available in Brazil. Hence, estimates for fugitive CH_4 emissions associated with natural gas production, transport and distribution are established based on selecting an emission factor from the range of emission factors stated in the IPCC guidelines. In accordance with AM0008 emissions of CH_4 and N_2O associated with fuel oil, coal and natural gas combustion were determined using industrial boilers specific IPCC default emission factors. CO_2 emissions associated with fuel oil and coal transports were determined in accordance with AM0008.

The estimates on future fuel consumption are used for the *ex-ante* determination of expected project and baseline emissions. However, actual project and baseline emissions and thus actual project emission reductions are dependent on the actual natural gas consumption (dynamic baseline). Also the baseline GHG emissions are calculated by taking into account the efficiency of fuel oil, coal and natural gas. The *ex-ante* estimates made are deemed appropriate.

3.7 Environmental Impacts

Considering the nature of the project, there are no adverse environmental impacts expected. The environmental authority did not request any environmental study. During the site visit DNV reviewed the documentation submitted to renew the Environmental Licences, which included the description of the facilities and conversion of the selected equipment to natural gas. The licenses do not include any remark on the conversion of natural gas, confirming that no environmental study is required for the project activity.

3.8 Comments by Local Stakeholders

Eliane (Maximiliano Gaidzinki S.A.) and Ecosecurities invited local stakeholders, such as the Municipal Government, state and municipal agencies, Brazilian forum of NGOs, neighbouring communities and the office of the attorney general, to provide comments on the "Eliane Natural Gas Fuel Switch Project" according to Resolution 1 of the Brazilian DNA. Copies of the letters submitted to these local stakeholders were provided to DNV.

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

DNV published the PDD of 27 December 2005 on the DNV Climate Change web site (http://www.dnv.com/certification/ClimateChange) and Parties, stakeholders and UNFCCC accredited NGOs were through the UNFCCC CDM web site invited to provide comments within a 30 days period from 31 December 2005 to 29 January 2006.

One comment was received in this period. The comments (in unedited form) is given in the below text box, followed by an explanation of how DNV has taken due account of the comment received.

Comment by: Shah K J, email: kesminh@yahoo.com, Phone no.: +91-265-2282537
Inserted on: 2006-01-28
Subject: Eliane Natural Gas Project- Version nº 27 December 2005

Comment:

1. The operations at Coca do sul and Criciúma where the project activity is restricted has started in the year 1960. All the equipments have already completed its life. Hence any equipments change over, particularly after the arrival of Natural Gas pipeline , suitable to NG consumption is business as usual.
2. List of equipments do not indicate any location call Eliane III.
3. Annex 3 density of Natural gas indicated as 0.634 kg/m^3. Is it correct unit wise?
4. The data
   a. Annual Energy requirements in equipment data on Page 29,
   b. Fuel Oil Consumption of 18485495 Tonnes in E.4
   c. Natural Gas consumption of 15188877 m^3 in E.1
   d. Fuel data including burning efficiency in Annex 3
   e. price data in on page 9 in the table of fuel price

the energy cost with Fuel oil is costlier by 18.7%. Hence fuel oil is more expensive then Natural Gas. Hence AM0008 is not applicable.
5. The basis of discount rate 18% may be checked as its seems higher then required appropriate to country and sector.

How DNV has taken due account of the comment:

The project participants provided the below response to the comments made by Shah K J. The response given by the project participants is given below:

1. The start up and refurbishing date of Spray dryers are:

E1A start up 1971 refurbish 2000	*E2A start up 1976 refurbish 2001*
E1B start up 1974 refurbish 1997	*E2B start up 1981 refurbish 2001*
E1C start up 1976 refurbish 1995	*E2C start up 1998*
E5 start up 1976 refurbish 1995	

2. Although the project mention Eliane III, this unit is included only on condition of use of product of spry dryers of Eliane II, with has capacity to supply Eliane I, II and III.

3. This figure is referred relative density of natural gas with respect air. The actual density was included on PDD, although this figure doesn't have influence, once it is used twice in opposite way.

4. The price of fuel oil and natural gas was mentioned wrongly on page 9, in fact during the site visit was confirmed the price of R$ 0.0082/kJ for fuel oil and R$ 0.0099/kJ, confirmed the applicability of AM0008 and the additionality of project.

5. In fact, on Brazilian economic market, the reference of loan is the SELIC (Brazilian Central Bank the Brazilian discount rate) which reached 17.74% in the year 2000 and 22,3 on 1999, i.e. the year in which the decision to implement the project was made, the selected discount rate is appropriate. Moreover, a sensibility analysis using a 54% discount rate still resulted in a negative NPV.

In DNV's opinion, this response sufficiently addressed the comments made.

1. All equipment that is converted to natural gas has undergone recent refurbishments. During the site visit DNV could verify that the dryers consist of air heaters supplying air at around 700ºC to a spray of ceramic sludge. This process is limited by the velocity of water evaporation in order to form perfect micro spheres. In the same way, the oven is used to fire tiles and the process is limited by quality restrictions. Hence, it is not likely that the facilities would have undergone major efficiency improvements during the crediting period. Moreover, the project activity does not increase the capacity of final outputs and lifetime of the existing facility during the crediting period and the proposed project activity is a fuel switching applied to element processes and does not result in integrated process change.

2. The project participant's response clarified that the Eliana III unit is not part of the project activity.

3. The PDD was revised to clarify this figure.

4. During site visit DNV verified several receipts for fuel oil purchases before the implementation of the project. The average price of fuel oil was R$0.0082/kJ and the price for Natural Gas was R$ 0.0098/kJ. Hence, DNV was able to confirm that the use of fuel oil is less expensive than natural gas per unit of energy.

5. According to the Brazilian Central Bank the Brazilian discount rate (SELIC) reached 17.74% in the year 2000, i.e. the year in which the decision to implement the project was made. Hence, the selected discount rate is appropriate.

5 VALIDATION OPINION

Det Norske Veritas Certification Ltd. (DNV) has performed a validation of the "Eliane Natural Gas Fuel Switch Project" at Cocal do Sul and Criciúma Municipalities, Santa Catarina 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 participants are Eliane (Maximiliano Gaidzinki S.A.) of Brazil and Ecosecurities Ltd. of the United Kingdom. The host Party Brazil and the Annex I Party the United Kingdom meet all relevant participation requirements.

The project activity consists of the conversion of nine spray dryers and refractory tunnel kiln from fuel oil and coal use to the use of natural gas.

By promoting the use of a cleaner fuel, the project is in line with current sustainable development priorities of Brazil.

The project applies the approved baseline and monitoring methodology AM0008, i.e. "Industrial fuel switching from coal and petroleum fuels to natural gas without extension of capacity and lifetime of the facility". The baseline methodology has been applied correctly and the assumptions made for the selected baseline scenario are sound. The baseline scenario assumes that fuel oil and coal would continue to be used during the crediting period. Emission reductions will thus be achieved through the use of natural gas, a fuel with a carbon emission factor that is lower than the carbon emission factor of the previously used fuel oil and coal.

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 calculation of the fuel oil and coal efficiency was based on steam and heavy oil and coal consumption measurements of the equipment prior to the fuel switch. Appropriate estimates on future natural gas consumption and the natural gas efficiencies are used for the ex-ante determination of expected project and baseline emissions. However, actual project and baseline emissions and thus actual project emission reductions are dependent on the actual natural gas consumption (dynamic baseline).

The monitoring methodology has been applied correctly. The monitoring plan sufficiently specifies the monitoring requirements of the main project indicators. The fuel efficiency of natural gas will have to be determined as a curve of fuel efficiency vs. load factor with statistical significance once at an early stage of the project in accordance with AM0008.

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-sit.,One comment has been received and was taken into account during the validation.

In summary, it is DNV's opinion that the "Eliane Natural Gas Fuel Switch Project", as described in the revised project design document of 07 March 2006, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology AM0008. Hence, DNV will request the registration of the "Eliane Natural Gas Fuel Switch 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 voluntary participation from the DNA of Brazil and the United Kingdom, including the confirmation by the DNA of Brazil that the project assists in achieving sustainable development.

REFERENCES

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

/1/ Eliane (Maximiliano Gaidzinki S.A.) and Ecosecurities: *Project Design Document for the "Eliane Natural Gas Fuel Switch Project"*, Version 1 (27 December 2005);

/2/ Eliane (Maximiliano Gaidzinki S.A.) and Ecosecurities: *Project Design Document for the "Eliane Natural Gas Fuel Switch Project",* Version 2 (07 March 2006);

/3/ Ecosecurities: *Spreadsheet "Eliane-ER-and-FA-Calculations vf (LFKPF).xls - 2006-05-12*

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

/4/ International Emission Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF): *Validation and Verification Manual*. http://www.vvmanual.info

/5/ Approved Baseline and Monitoring Methodology AM0008: "*Industrial fuel switching from coal and petroleum fuels to natural gas without extension of capacity ad lifetime of the facility"*. Version 01 of 15 June 2004.

/6/ IPCC/NGGIP: *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook – Module 1 Energy, Table 1-3 Selected Net Calorific Values*

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

/7/ Jaime Batista – Eliane Engineering

/8/ Tales Alfredo Cittadin – Eliane Engineering

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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
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 the written approval of voluntary participation from the DNA of Brazil and the United Kingdom, including the 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 the participating Parties.
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

Requirement	Reference	Conclusion	Cross Reference / Comment
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 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	OK	The validation did not reveal any information that indicates 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. The DNA of the United Kingdom is the Department for Environment, Food and Rural Affairs.
9. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol	CDM Modalities §30/31a	OK	Brazil has ratified the Kyoto Protocol on 23 August 2002. The UK has ratified the Kyoto Protocol on 31 May 2002.
10. The participating Annex I Party's assigned amount shall have been calculated and recorded	CDM Modalities and Procedures §31b	OK	The assigned amount units of the UK are 92% of the emissions in 1990.
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	OK	UK has in place a national registry and reports its GHG inventory to the UNFCCC on an annual basis.
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

Requirement	Reference	Conclusion	Cross Reference / Comment
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 have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available	CDM Modalities and Procedures §40	OK	The PDD was published for public comments in the period of 31 December 2005 to 29 January 2006 on www.dnv.com/certification/ClimateChange and comments were invited via the UNFCCC CDM website. One comment was received, made publicly available and considered in the validation of the project.
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	PDD is in accordance with CDM-PDD (version 02 of 1 July 2004).

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 boundaries are defined and limited to Eliane (Maximiliano Gaidzinki S.A.) porcelain production units at Cocal do Sul and Criciúma.		OK
A.1.2. Are the project's system (components and facilities used to mitigate GHGs) boundaries clearly defined?	/1/	DR	The project system boundaries are limited to 9 spray dryers, one refractory tunnel kiln and the natural gas distribution and control system.		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	The project contemplates the conversion of existing equipments from fuel oil and coal to natural gas and includes complementary safety measures.		OK
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	/1/	DR	The use of natural gas is environmentally friendly and represents state of the art technology.		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
technologies in the host country?					
A.2.3. Is the project technology likely to be substituted by other or more efficient technologies within the project period?	/1/	DR	The project technology is unlikely to be superseded by other more efficient technologies at least within the first 7-years 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 will require minimal additional training for project operation and maintenance since the fuel change is only a modification of the currently used technology, and Eliane (Maximiliano Gaidzinki S.A.) already has a technical department at the Cocal do Sul and Criciúma plant in charge of the equipment maintenance, including the Internal Commission for Energy Conservation.		OK
A.2.5. Does the project make provisions for meeting training and maintenance needs?	/1/	DR	The PDD only mentions that Eliane (Maximiliano Gaidzinki S.A.) has a complete set of maintenance and operation procedures that can be used for training and maintenance. For reasons indicated in A.2.4, this is reasonable.		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	The Eliane – Cocal do Sul and Criciúma Plant Operational Environment Licences for each equipment has to be presented. Considering the nature of the project, there are no adverse environmental impacts expected. Although the PDD states that the environmental authority did not request any	~~CL 6~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			environmental study, DNV requests evidences of approval of the fuel switching activities.		
A.3.2. Is the project in line with host-country specific CDM requirements?	/1/	DR/I	Brazil established Resolution 1. The project invited stakeholder comments according to this resolution. DNV requests evidence of the letters sent.	~~CL 7~~	OK
A.3.3. Is the project in line with sustainable development policies of the host country?	/1/	DR	Confirmation by the DNA of Brazil that the project assists in achieving sustainable development is pending.		-
A.3.4. Will the project create other environmental or social benefits than GHG emission reductions?	/1/	DR	The use of Natural gas in substitution of fuel oil will reduce the emissions of sulphur to atmosphere.		OK
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/ /5/	DR	The project applies the approved baseline methodology AM0008 - "Industrial fuel switching from coal and petroleum fuels to natural gas without extension of capacity and lifetime of the facility".		OK
B.1.2. Is the baseline methodology the one deemed most applicable for this project and is the appropriateness justified?	/1/	DR/I	The project fulfils the first applicability conditions of AM0008: a) There are no local regulations to constraint the use of fuel oil	~~CL 1~~ ~~CL 2~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			and coal. The compliance with the others conditions. i.e. b) the facility would not have major efficiency improvements during the crediting period, c) the project activity does not increase the capacity of final output and lifetime of the existing facility during the crediting period and d) the project activity does not result in an integrated process change, needs to be demonstrated during the site visit at the Cocal do Sul and Criciúma plants. The claim that fuels oil is less expensive than natural gas per unit of energy in the country and sector was initially not confirmed. Receipts of fuel oil and natural gas are requested to be presented during the site visit. The project's application of the methodology is correct and the determination of the baseline is transparent considering IPCC default emission factors.		
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/ /5/	DR	The application of the methodology is correct and the baseline determination is transparent.		OK
B.2.2. Has the baseline been determined using	/1/	DR/I	The methodology establishes that the fuel	~~CL 3~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
conservative assumptions where possible?	/5/		efficiency factor for natural gas (project scenario) should be measured at the early stage of the project for each process and should be calculated based on measurements with several load factors in order to get a curve for fuel efficiency values with statistical significance. AM0008 also establishes that the fuel efficiencies of the fuel used, i.e. fuel oil, should be measured once prior to the fuel switch for each process with several load factors in order to get a curve of fuel efficiency values with statistical significance. It remains to be clarified whether the natural gas, fuel oil and coal efficiencies have been determined as required by AM008.		
B.2.3. Has the baseline been established on a project-specific basis?	/1/	DR	The baseline has been specifically designed for this project.		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	There are no regulations/programs constraining the use of fuel oil or coal. In fact, there are no restrictions to use fuel oil or coal. There are only environmental restrictions on the federal level with respect to sulphur oxide emissions. However, fuel oil and coal with low sulphur content is available which would attend this restriction.		OK
B.2.5. Is the baseline determination compatible with the available data?	/1/	DR	See B.2.2		
B.2.6. Does the selected baseline represent the most likely scenario among other possible and/or discussed scenarios?	/1/	DR	See B.1.2		OK
B.2.7. Is it demonstrated/justified that the project	/1/	DR/I	According to AM0008 a Net Present Value	~~CL 2~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
activity itself is not a likely baseline scenario?			(NPV) analysis of the project shall demonstrate that the project has a negative NPV, considering a discount rate appropriate in Brazil. A NPV analysis was carried out using a discount rate of 18%. Given that according to the Brazilian Central Bank the Brazilian discount rate (SELIC) was 17.74% in the year 2000, i.e. the year the decision to implement the project was made, the selected discount rate is appropriate. Moreover, a sensitivity analysis using a 54% discount rate still results in a negative NPV. The calculations transparently presented in the "Eliane-ER-and-FA-Calculations" spreadsheets demonstrated that the NPV of the project is less attractive than the NPV of the baseline, i.e. there is a difference of –R$ 1 959 774 between the NPV of fuel oil and NPV of natural gas considering the average prices of fuel oil of R$ 0.0066/kj and natural gas R$ 0.077/kj. Evidence for these figures figures is requested to be presented during the site visit. According to AM0008 the trends in fuel oil and natural gas consumption in Brazil and sector were analyzed. However, only the fuel prices in 2000, i.e. the year in which the decision to implement the project was made, have been presented without analysing any trends. DNV requests that the trend in fuel prices are analysed, in particular given that two spray driers will	~~CAR 1~~ ~~CL 4~~	

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			only be converted to the use of natural gas by December 2006. It needs to be demonstrated that there is no trend toward lower fuel costs for natural gas vs. fuel oil. Although AM0008 does not require evidence that Eliane (Maximiliano Gaidzinki S.A.) took into consideration CDM benefits in the implementation of the project, DNV requests such evidence since the project has already been implemented.		
B.2.8. Have the major risks to the baseline been identified?	/1/	DR	See B.2.7		
B.2.9. Is all literature and sources clearly referenced?	/1/	DR/I	The source of fuel oil and natural gas price is requested to be presented during the site visit	~~CL 2~~	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	Yes, the project start date is 01/12/2000 with an expected lifetime of more than 20 years. A copy of the natural gas receipt # 027291 issued by Walshaupt do Brasil on 30 November 2000 was presented as evidence that the project was implemented before the starting date of the credit period.		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 renewable 7-year crediting period starting on 01/01/2001 is selected.		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/ /5/	DR	The project applies the approved monitoring methodology AM0008 - "Industrial fuel switching from coal and petroleum fuels to natural gas without extension of capacity and lifetime of the facility".		OK
D.1.2. Is the monitoring methodology applicable for this project and is the appropriateness justified?	/1/ /5/	DR	Yes		OK
D.1.3. Does the monitoring methodology reflect good monitoring and reporting practices?	/1/	DR	The monitoring plan for emissions reductions occurring within the project boundary is based on measuring the natural gas consumption through gas company receipts and field instruments. However, the identification of these instruments is not provided in the PDD. The recording frequency of the data seems appropriate for the project. The time for how long the data is kept archived is defined in Annex 4.	~~CL 5~~	OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D.1.4. Is the discussion and selection of the monitoring methodology transparent?	/1/	DR/I	The monitoring plan includes the measurement of fuel efficiency of natural gas used at the process. It is mentioned in the PDD that a curve of fuel efficiencies vs. load factor will be presented during the verification. However, the methodology AM0008 establishes that it shall be presented at the early stage of the project. DNV requests more information about that curve.	~~CL 3~~	OK
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 monitoring plan provides a detailed description of how natural gas consumption data will be used to calculate emissions. The algorithms used follows well recognised formulas.		OK
D.2.2. Are the choices of project GHG indicators reasonable?	/1/	DR/I	Fuel consumption provides an accurate mechanism for measuring GHG reductions, when used with a well recognised GHG formula. However, Table D.2.1.1 item 1 of PDD mentions that the sum of natural gas consumption of several equipments does not equal to the consumption of natural gas of Eliane units. DNV requests more information about that statement.	~~CL 5~~	OK
D.2.3. Will it be possible to monitor / measure the specified project GHG indicators?	/1/	DR	See D.1.3		OK
D.2.4. Will the indicators give opportunity for real	/1/	DR	See D.1.3		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
measurements of project emissions?					
D.2.5. Will the indicators enable comparison of project data and performance over time?	/1/	DR	See D.1.3		OK
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	Considering that safety procedures will be applicable, no leakage of CH_4 is likely to occur at the project site. For leakage due to production and transportation of natural gas an IPCC factor will be used.		OK
D.3.2. Are the choices of leakage indicators reasonable?	/1/	DR	Yes, according to the IPCC guidelines.		OK
D.3.3. Will it be possible to monitor / measure the specified leakage indicators?	/1/	DR	See D.3.1		OK
D.3.4. Will the indicators give opportunity for real measurements of leakage effects?	/1/	DR	See D.3.1		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 monitoring plan is according to the requirements in AM0008.		OK
D.4.2. Is the choice of baseline indicators, in particular for baseline emissions, reasonable?	/1/	DR	See B.2.2		OK
D.4.3. Will it be possible to monitor / measure the	/1/	DR	Baseline indicators will be indirectly		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
specified baseline indicators?			monitored through measuring natural gas consumption and through monitoring equipment efficiencies. The model assumes that the equivalent amount of energy provided by fuel oil is being displaced by the same amount of energy provided by natural gas (including efficiency improvements resulting from the fuel switch).		
D.4.4. Will the indicators give opportunity for real measurements of baseline emissions?			See D.4.3		OK
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 AM0008 nor Resolution 1 of the Brazilian DNA requires 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	Eliane (Maximiliano Gaidzinki S.A.) is responsible according to the operation and management structure of Eliane.		OK
D.6.2. Is the authority and responsibility for registration, monitoring, measurement and reporting clearly described?	/1/	DR	Eliane (Maximiliano Gaidzinki S.A.) has in place, in line with company policies and engineering best practices, a complete set of maintenance and operations procedures, which include the monitoring of process		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			variable, instruments calibration and quality control. These practices are assured by the Internal Commission for Energy Conservation.		
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 monitoring equipment?	/1/	DR	See D.6.2		OK
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	/1/	DR	See D.6.2		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
in order to provide for more accurate future monitoring and reporting?					
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. Project GHG Emissions *The validation of ex-ante estimated 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	Details of direct and indirect emissions are sufficiently discussed in the PDD. Project emissions include CO_2, CH_4 and N_2O emissions from combusting natural gas in the spray dryers and refractory tunnel kiln.		OK
E.1.2. Are the GHG calculations documented in a complete and transparent manner?	/1/	DR	Calculations and their derivative formulas are referenced to IPCC standards.		OK
E.1.3. Have conservative assumptions been used to calculate project GHG emissions?	/1/	DR	See E.1.2		OK
E.1.4. Are uncertainties in the GHG emissions estimates properly addressed in the documentation?	/1/	DR	Uncertainties are minimal given the nature of the project.		OK
E.1.5. Have all relevant greenhouse gases and source categories listed in Kyoto Protocol Annex A been evaluated?	/1/	DR	Yes. Carbon dioxide (CO_2), nitrous oxide (N_2O) and methane (CH_4) are discussed in the project design document.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
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 and estimated ex-ante.*					
E.2.1. Are potential leakage effects beyond the chosen project boundaries properly identified?	/1/	DR	Leakage beyond the project boundaries have been identified as methane emissions from natural gas production and transportation (project) and CO_2 emissions from transportation of fuel oil and coal (baseline). These emissions will be estimated using an appropriate IPCC methodology and IPCC emission factors.		OK
E.2.2. Have these leakage effects been properly accounted for in calculations?	/1/	DR	Calculated using IPCC recommendations.		OK
E.2.3. Does the methodology for calculating leakage comply with existing good practice?	/1/	DR	The leakage calculation is according to the AM0008.		OK
E.2.4. Are the calculations documented in a complete and transparent manner?	/1/	DR	See E.2.2		OK
E.2.5. Have conservative assumptions been used when calculating leakage?	/1/	DR	See E.2.2		OK
E.2.6. Are uncertainties in the leakage estimates properly addressed?	/1/	DR	See E.2.2		OK
E.3. Baseline Emissions *The validation of ex-ante estimated baseline GHG emissions focuses on transparency and completeness of calculations.*					
E.3.1. Have the most relevant and likely operational	/1/	DR/I	Baseline emissions are determined based	~~CL 3~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
characteristics and baseline indicators been chosen as reference for baseline emissions?			on the amount of fuel oil and coal displaced by natural gas. The amount of this fuel displaced is calculated from the natural gas (monitored ex-post) consumption, the equipment efficiency using natural gas (monitored ex-post) and the equipment efficiency using fuel oil and coal (determined ex-ante). However, the efficiency of natural gas was estimated considering the efficiency of fuel oil and coal. DNV requests more information about that matter.		
E.3.2. Are the baseline boundaries clearly defined and do they sufficiently cover sources and sinks for baseline emissions?	/1/	DR	Baseline boundaries are clearly defined. The baseline boundary comprises the current 9 spray dryers and one refractory tunnel kiln. Emissions included in the baseline analysis are representative of the project.		OK
E.3.3. Are the GHG calculations documented in a complete and transparent manner?	/1/	DR	All formulas are described and derivative inputs appropriately referenced.		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/I	According to the methodology both the natural gas and fuel oil/coal equipment efficiency should not be a single value but a pattern (function) of "load factor" at the process. Preferable a graph as a function of load factor should be drawn. DNV requests information about the equipments efficiency variation according to the load factor.	~~CL 3~~	OK
E.3.6. Have the project baseline(s) and the project	/1/	DR	See E.3.1		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
emissions been determined using the same appropriate methodology and conservative assumptions?					
E.4. Emission Reductions *Validation of ex-ante estimated emission reductions*.					
E.4.1. Will the project result in fewer GHG emissions than the baseline scenario?	/1/	DR	The project is expected to abate CO_2 emissions to the extent of 138 555 tCO_2e over the first renewable 7-year crediting period.		OK
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/	DR/I	Considering the nature of the project, there are no adverse environmental impacts expected. Although the PDD states that the environmental authority did not request any environmental study, DNV requests evidences of approval of the fuel switching activities.	~~CL 6~~	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/I	See F.1.1		OK
F.1.3. Will the project create any adverse environmental effects?	/1/	DR/I	See F.1.1		OK
F.1.4. Are transboundary environmental impacts considered in the analysis?	/1/	DR/I	See F.1.1		OK
F.1.5. Have identified environmental impacts been addressed in the project design?	/1/	DR/I	See F.1.1		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
F.1.6. Does the project comply with environmental legislation in the host country?	/1/	DR/I	See F.1.1		OK
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	Eliane (Maximiliano Gaidzinki S.A.) and Ecosecurities invited local stakeholders, such as the Municipal Government, state and municipal agencies, Brazilian forum of NGOs, neighbouring communities and the office of the attorney general, to provide comments for "Eliane Natural Gas Fuel Switch Project" according to the Resolution 1 of the Brazilian DNA. DNV requests evidence of the letters sent.	~~CL 7~~	OK
G.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/	DR	See G.1.1		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.1.1		OK
G.1.4. Is a summary of the stakeholder comments received provided?	/1/	DR	See G.1.1		OK
G.1.5. Has due account been taken of any stakeholder comments received?	/1/	DR	See G.1.1		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 According to AM0008 the trends in fuel oil and natural gas consumption in Brazil and sector were analyzed. However, only the fuel prices in 2000, i.e. the year in which the decision to implement the project was made, have been presented without analysing any trends. DNV requests that the trend in fuel prices are analysed, in particular given that two spray driers will only be converted to the use of natural gas by December 2006. It needs to be demonstrated that there is no trend toward lower fuel costs for natural gas vs. fuel oil.	B.2.7	The price level of Natural Gas on Brazilian market still higher than fuel oil until recent figures. This matrix is due the South region of Brazil is supplied 100% with Bolivian natural gas, and the contract between Petrobras which is in charge to by the gas and supply the local distributors) and Bolivian YPFB make the natural gas price linked with a basket of main kind of petroleum, in dollar. So as the tendency of petroleum price increase, the natural gas will follow.	Complementary information evidenced the trends analyze and was considered adequate. This CAR is therefore closed.
CL 1 The compliance with the others conditions. i.e. b) the facility would not have major efficiency improvements during the crediting period, c) the project activity does not increase the capacity of final output and lifetime of the existing facility during the crediting period and d) the project activity does not result in an integrated process change, needs to be demonstrated during the site visit at the Cocal do Sul and Criciúma plants.	B.1.2	This information was verified during validation trip	During the site visit DNV could verify that the dryers consist of air heaters supplying air at around 700ºC to a spray of ceramic sludge. This process is limited by the velocity of water evaporation in order to form perfect micro spheres. In the same way, the oven is used to fire tiles and the process is limited by quality restrictions. Hence, it is not likely that the facilities would have undergone major efficiency improvements during the crediting period. Moreover, the project activity does not increase the capacity of final outputs and lifetime of the existing facility during the crediting period and

<table>
<tr><th>Draft report corrective action requests and requests for clarifications</th><th>Ref. to Table 2</th><th>Summary of project participants' response</th><th>Final conclusion</th></tr>
<tr><td></td><td></td><td></td><td>the proposed project activity is a fuel switching applied to element processes and does not result in integrated process change.
This CL is therefore closed.</td></tr>
<tr><td>CL 2
The claim that fuels oil is less expensive than natural gas per unit of energy in the country and sector was initially not confirmed. Receipts of fuel oil and natural gas are requested to be presented during the site visit.</td><td>B.1.2</td><td>This information was verified during validation trip<table><tr><td>Fuel oil price</td><td>R$/kcal</td><td>0,035</td></tr><tr><td>Natural Gas price</td><td>R$/kcal</td><td>0,041</td></tr></table></td><td>During site visit DNV verified several receipts of fuel oil prices before the implementation of the fuel switching activities and natural gas prices after that. The average fuel oil price was R$0.0082/kJ and the price for natural gas is R$ 0.0098/kJ.
This CL is therefore closed.</td></tr>
<tr><td>CL 3
The methodology establishes that the fuel efficiency factor for natural gas (project scenario) should be measured at the early stage of the project for each process and should be calculated based on measurements with several load factors in order to get a curve for fuel efficiency values with statistical significance.
AM0008 also establishes that the fuel efficiencies of the fuel used, i.e. fuel oil and coal, should be measured once prior to the fuel switch for each process with several load factors in order to get a curve of fuel efficiency values with statistical significance.
It remains to be clarified whether the natural gas and fuel oil efficiencies have been determined as required by AM0008.</td><td>B.2.2
D.1.4
E.3.1
E.3.5</td><td>See sheet "consolidado" in spreadsheet attached. The value of 20.000kcal/m^2 of ceramic is constant from 2000 until 2002.</td><td>As verified by reviewing the provided spreadsheet, the fuel oil and coal efficiency was calculated considering the consumption of one year of fuel oil and coal consumption and the tile production (m^2) of the same period.
AM0008 establishes that the calculation of the fuel efficiency factor for natural gas (project scenario) shall be measured at the early stage of each crediting period for each process with several load factors in order to get a curve with statistical significance. The PDD mentions that the curves with significant statistical values will be presented during the verification. However, the determination of the natural gas efficiencies of each equipment must be implemented during</td></tr>
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Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
			the first monitoring period and be presented in the first verification. This CL is therefore closed.
CL 4 Although AM0008 does not require evidence that Eliane (Maximiliano Gaidzinki S.A.) took into consideration CDM benefits in the implementation of the project, DNV requests such evidence since the project has already been implemented.	B.2.7	Letter de Mrs. Mariezi Olivo de Brida – Environment Dept to Mr. Leandro Rosa Medeiros - Industrial Dir issued on 10 maio 2000, mentioning the switch energy source with possibility of application on Carbon Credit Market.	Copy of letter were sent to DNV. This CL is therefore closed.
CL 5 The monitoring plan for emissions reductions occurring within the project boundary is based on measuring the natural gas consumption through gas company receipts and field instruments. However, the identification of these instruments is not given in the PDD.	D.1.3 D.2.2	See annex 4	A list of natural gas measurement instruments was included in Annex 4 of the PDD. This CL is therefore closed.
CL 6 Although the PDD states that the environmental authority did not request any environmental study, DNV requests evidences of approval of the fuel switching activities.	A.3.1 F.1.1	Operational Licence was verified during visit Eliane I - LAO 1919/04 Emitida 10/12/2004 valid 24 meses - Caracterização Prot 03151/04 29/09/2004. Eliane II – LAO 1921/04 emitida 10/12/2004 val 24 meses – Caracterização Prot 03152/04 29/09/2004 Eliane IV - LAO 1459 emitida 29/7/2004 valida 36 meses – Caract Proto01016/04 20/5/04	During the site visit DNV reviewed the documentation submitted to renew the Environmental Licences, which included the description of the facilities and conversion of the selected equipment to natural gas. The licenses do not include any remark on the conversion of natural gas, confirming that no environmental study is required for the project activity. This CL is therefore closed.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
		Eliane V - Transferida para Eliane II	
CL 7 Eliane (Maximiliano Gaidzinki S.A.) and Ecosecurities invited local stakeholders according to the Resolution 1 of the Brazilian DNA. DNV requests evidence of letters sent.	A.3.2 G.1.1	Letters sent on 30/01/06 AR´s were showed during visit	Copy of letters were provided to DNV and considered adequate. This CL is therefore closed.

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