VALIDATION REPORT

AQUARIUS HYDROELECTRIC PROJECT IN BRAZIL

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DET NORSKE VERITAS

VALIDATION REPORT

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Summary:

Det Norske Veritas Certification Ltd has performed a validation of the "Aquarius Hydroelectric Project" in Brazil, 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. UNFCCC criteria refer to the Kyoto Protocol criteria and the CDM modalities and procedures, the simplified modalities and procedures for small-scale CDM project activities and 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.

In summary, it is DNV's opinion that the project, as described in the project design document of 19 April 2006, meets all relevant UNFCCC requirements for the CDM and correctly applies the approved simplified baseline and monitoring methodology AMS-I.D. Hence, DNV requests the registration of the "Aquarius Hydroelectric Project" as 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 Japan, including the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.

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Abbreviations

ANEEL	Agência Nacional de Energia Elétrica (National Electric Energy Agency)
BM	Build margin
CDM	Clean Development Mechanism
CAR	Corrective Action Request
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
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
IBAMA	Instituto Brasileiro do Meio Ambiente e Recursos Naturais Renovaveis
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producer
KP	Kyoto Protocol
MP	Monitoring Plan
NGO	Non-governmental Organisation
ODA	Official Development Assistance
OM	Operating margin
PDD	Project Design Document
PPA	Power Purchase Agreement
PROINFA	Programa de Incentivo às Fontes Alternativas de Energia Elétrica
SIESEE	Systema de Informações Empresariais do Sector Energia Elétrica
S-SE-CO	South-Southeast-Midwest (one Brazilian regional grid)
UNFCCC	United Nations Framework Convention for Climate Change

1 INTRODUCTION

MGM International, Inc. has commissioned Det Norske Veritas Certification Ltd. (DNV) to perform a validation of the "Aquarius Hydroelectric Project" at Sonora, Mato Grosso do Sul State, Brazil (hereafter called "the project"). 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.

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 Validation 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 modalities and procedures as agreed in the Marrakech Accords, the simplified modalities and procedures for small-scale CDM project activities and subsequent decisions by the CDM Executive Board. The validation team has, based on the recommendations in the Validation and Verification Manual /10/, 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 provide input for improvement of the project design.

1.3 The Aquarius Hydroelectric Project

The "Aquarius Hydroelectric Project" is a small-scale, renewable energy CDM project activity. The project is a run-of-river hydroelectric plant (with no dam or flooding) at Sonora, Mato Grosso do Sul State, Brazil, which will supply electricity – through the Sonora Substation of Empresa Energética do Mato Gosso do Sul (ENERSUL) - to the South-Southeast-Midwest (S-SE-CO) regional grid of Brazil. The project is expected to have an installed capacity of 4.2 MW and will utilize the water of the Correntes river.

Partly displacing fossil-fuel based electricity with electricity generated from a renewable source; the project is expected to reduce GHG emission by 13 436 tonnes CO_2-equivalents per year.

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.

The validation team consists of the following personnel:

Mr Michael Lehmann	DNV Oslo	Team leader, Energy sector expert
Mr Luis Filipe Aboim Tavares	DNV Rio de Janeiro	GHG auditor
Mr Einar Telnes	DNV Oslo	Technical reviewer

2.1 Review of Documents

The Project Design Document /1/ (version 01 of April 2003 and version 02 of 19 April 2006) submitted by MGM International and additional background documents /3/-/9/ related to the project design and baseline were assessed.

In order to ensure transparency, a validation protocol was customised for the project, according to PCF's Preliminary Validation Manual /10/. 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 two tables. The different columns in these tables are described in Figure 1.

2.2 Follow-up Interviews

On 30 May 2003, DNV performed interviews with the project stakeholders to confirm selected information and to resolve issues identified in the document review. Representatives of Cia Agrícola Sonora Estância Rio Correntes, Negawatt, CEMA and MGM International /11/ were interviewed. The main topics of the interviews were

- the investment barrier to demonstrate the additionality of the project activity,
- the responsibilities for project operation, monitoring and reporting,
- calibration procedures, and
- the environmental impacts of the project.

Validation Protocol Table 1: Mandatory Requirements			
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**), or a **Corrective Action Request (CAR)** of risk or non-compliance with stated requirements. The corrective action requests are numbered and presented to the client in the Validation report.*	*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). **Clarification** is used when the validation team has identified a need for further clarification.*

Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests			
Draft report clarifications and corrective action requests	***Ref. to checklist question in table 2***	***Summary of project owner response***	***Validation conclusion***
If the conclusions from the draft Validation are either a 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 Client or other 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

2.3 Resolution of Clarification and Corrective Action Requests

Findings established during the validation can either be seen as 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.

The initial validation identified three *Corrective Action Requests* and three requests for *Clarification*, and these corrective action and clarification requests were presented to MGM International. Subsequently, MGM International provided clarifications and additional information with regard to the corrective action and clarification requests were presented by DNV (see Appendix A, Table 3). The clarifications and additional information were sufficient to resolve two of the three *Corrective Action Requests* and all *Clarification Requests*. However, the *Corrective Action Request* concerning the presented investment barrier to demonstrate the additionality of the project activity was not resolved.

Eventually, on 19 April 2006 MGM International submitted a revised PDD which addressed DNV's remaining *Corrective Action Request* concerning the presented investment barrier to DNV's satisfaction.

To guarantee the transparency of the validation process, the concerns raised and responses given are documented in the validation protocol in Appendix A.

3 VALIDATION FINDINGS

The findings of the validation are stated in the following sections. The validation criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A.

The final validation findings relate to the project design as documented and described in the PDD of 19 April 2006.

3.1 Participation Requirements

The project participants are Aquarius Energética S.A. of Brazil and Electric Power Development Co., Ltd. of Japan. The Parties involved in this project are Brazil as the host Party and Japan as the participating Annex I Party. The Parties involved meet the requirements to participate in the CDM.

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 Japan, including the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.

3.2 Project Design

The project involves the construction of a grid connected run-of-river hydropower plant with approximately 4.2 MW generating capacity which will generate electricity utilizing the water of the Correntes river. The project design engineering reflects good practice.

Being a renewable energy project activity with an output capacity of less than 15 MW, the project qualifies as a small-scale CDM project activity according to category (i) defined in paragraph 6, subparagraph (c) of decision 17/CP.7 on the modalities and procedures for the CDM.

By promoting renewable energy, the project is likely to contribute to sustainable development in Brazil.

The project will be funded by equity form the project sponsor and a loan from a commercial bank. The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Brazil.

A renewable crediting period of 7 years (with the option of being renewed twice) is selected starting on 01 August 2006.

3.3 Additionality of Project Activity

A simplified baseline may be used for small-scale CDM project activities if the project participants are able to demonstrate that the project activity would otherwise not be implemented due to the existence of one or more barriers, i.e. investment barriers, technological barriers, barriers due to prevailing practice or other barriers.

An investment barrier is presented to demonstrate the additionality of the project. A benchmark analysis is applied to demonstrate that the project is not financially attractive. The project's IRR was estimated to be 21.3% without CERs. This IRR considers an electricity price of R$ 121.35 per MWh based on the Power Purchase Agreement that was signed in June 2004 with PROINFA, the Brazilian incentive program for renewable energy. This IRR is compared with the Brazilian Real benchmark interest rate (SELIC) of 16-18% (average for 2004, which is the year the decision to go ahead with the project was taken). However, it is demonstrated that the SELIC rate of 16-18% is only indicative and does not represent a project specific benchmark, i.e. the standard returns in the market considering the specific risk of small hydroelectric projects. Aquarius Energética S.A. does not have access to capital at the SELIC rate, and the expected returns in the market considering the specific risk of a small hydroelectric project are therefore likely to be higher than this.

Moreover, according to the guidance given by the CDM Executive Board at its 22nd meeting (Annex 3 of EB 22 report), PROINFA can be considered as "National and/or sectoral policies or regulations that give comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies (e.g. public subsidies to promote the diffusion of renewable energy or to finance energy efficiency programs)". In accordance with the EB guidance, since PROINFA was implemented after the adoption by the COP of the CDM modalities and procedures (decision 17/CP.7, 11 November 2001), the baseline scenario does not need not take into account PROINFA. Hence, the baseline scenario can refer to a hypothetical situation without PROINFA being in place. The spot market price of electricity in 2004 was 19 R$ per MWh. Given this electricity price, the project's IRR would be negative. It is likely that Aquarius

Energética S.A. would have negotiated a higher electricity price also in absence of PROINFA. However, to define the electricity price that Aquarius Energética S.A. would have negotiated in absence of PROINFA is challenging. Nonetheless, it is likely that the price would be significantly lower than the rate of 121 R$ per MWh offered through PROINFA and that the project's IRR would be significantly lower than 21.3%.

Given the above, it is thus DNV's opinion that it is sufficiently demonstrated that the project is not financially attractive, in particular in absence of PROINFA, and thus faces an investment barrier.

3.4 Baseline Determination

The project is a *Renewable electricity generation for a grid* project activity (Type I.D) as defined in the simplified modalities and procedures for small-scale CDM project activities. The project applies the simplified baseline methodologies proposed for this project activity category (AMS-I.D). The baseline scenario is that an equivalent of electricity would in the absence of the project activity be generated by the operation of grid-connected power plants and by the addition of new generation sources. In accordance with AMS-I.D, an electricity baseline emission factor is calculated as a combined margin, consisting of the combination of the operating margin (OM) and build margin (BM) emission factors (see section 3.6).

3.5 Monitoring Plan

The project correctly applies the simplified monitoring methodology AMS-I.D.

The monitoring plan will give opportunity for real measurements of achieved emission reductions. The electricity generated by the hydroelectric power plant, and supplied to the power utility ENERSUL, will be monitored with calibrated meters.

Detailed responsibilities and authorities for project management, procedures for monitoring and reporting, and QA/QC procedures are not yet described, but will need to be developed prior to project commencement in order to enable consistent subsequent verifications of emission reductions.

3.6 Calculation of GHG Emissions

The calculations are transparently documented and appropriate assumptions regarding expected amounts of electricity generated have been used to forecast emission reductions.

Project emissions are zero. Since the renewable energy technology does not represent equipment transfer from another activity, leakage calculations are not required for category I.D project activities.

Baseline emissions due to displacement of electricity are calculated by multiplying the electricity supplied to the grid by the project activity with an ex-ante determined baseline grid emissions factor.

The system boundary for the grid electricity system affected by the project is defined as the S-SE-CO regional grid of Brazil. The combined margin emission coefficient for the S-SE-CO grid is determined in accordance with AMS-I.D. The calculations were based on 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 grid in

the years 2002-2004. Data for the years 2002-2004 are the most recent statistics available and the data was verified against the data published on the ONS website.

For the determination of the operating margin (OM) emission coefficient, average plant efficiencies for different power plant types established in the IEA study on the Brazilian grid /5/ and IPCC carbon emission factors for specific fuels were applied to calculate plant specific emission coefficients. For the calculation of the build margin emission coefficient, the conservative plant efficiencies recommended by the CDM Executive Board at its 22nd meeting were applied.

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 plants operate either based on power purchase agreements, which are not under control of the dispatch authority, or 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 operating margin (OM) emission coefficient is calculated to be 0.9472 tCO_2e/MWh and the build margin (BM) emission coefficient is 0.0962 tCO_2e/MWh, resulting in a combined margin emission coefficient of 0.5217 tCO_2e/MWh (weighted average of the build and operating margin).

3.7 Environmental Impacts

The proposed project is a run-of-river hydropower plant, which involves no dam construction. Other environmental effects than the reduction of GHG emissions are sufficiently addressed and the project in not expected to have considerable environmental impacts. An Environmental Impact Study as required by Brazilian law has been carried out and the project has received an environmental licence by IBAMA.

3.8 Comments by Local Stakeholders

Local stakeholders, i.e. the municipality of Sonora and IBAMA, have been consulted. Both local stakeholders support the project and no modifications to the project design were necessary.

After adoption of Resolution 1 of the Brazilian DNA, 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, were invited to comment on the project in accordance with the requirements of Resolution 1 of the Brazilian DNA.

As the project in not expected to have considerable social and environmental impacts, the local stakeholder consultation process carried out for the project is deemed sufficient.

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

The PDD of April 2003 has been published on DNV's Climate Change website* on 22 April 2003. The following day Parties, stakeholders and NGOs have been invited through the Climate-L mailing list to provide comments on the validation requirement during a period of 30 days until 23 May 2003.

One 17 May 2003 the project received a comment by Axel Michaelowa, HWWA (see Appendix B). In his comment, Michaelowa questions the correctness to confine the baseline boundary to the Center-West region only, the appropriateness of the baseline emission factor for diesel and gas fuelled power plants used to determine the operational margin, and the investment barrier presented to demonstrate the additionality of the project activity.

In its validation of the Aquarius Hydroelectric Project, DNV has taken due account of the issues raised by Michaelowa. The PDD was revised and the S-SE-CO regional grid was selected and the OM and BM emission coefficient was determined in accordance with recent EB guidance. DNV has thoroughly assessed the investment barrier presented to demonstrate the additionality of the project activity (see section 3.3). In DNV's opinion, the project's additionality is sufficiently demonstrated.

Following DNV's DOE accreditation, the PDD of April 2003 was once more made publicly available on DNV's climate change website and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 5 April 2004 to 5 May 2004. No comments were received during this call.

* www.dnv.com/certificatin/ClimateChage

5 VALIDATION OPINION

Det Norske Veritas Certification Ltd (DNV) has performed a validation of the "Aquarius Hydroelectric Project" at Sonora, Mato Grosso do Sul State Brazil. The validation was performed on the basis of UNFCCC criteria for small-scale CDM project activities and relevant Brazilian criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The proposed run-of-river hydroelectric power project with a capacity of 4.2 MW will generate electricity utilizing the water of the Correntes river. The project in not expected to have considerable environmental impacts. An Environmental Impact Study as required by Brazilian law has been carried out and the project has received an environmental licence by IBAMA.

The project participants are Aquarius Energética S.A. of Brazil and Electric Power Development Co., Ltd. of Japan. The Parties involved in this project are Brazil as the host Party and Japan as the participating Annex I Party. The Parties involved meet the requirements to participate in the CDM.

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

Being a renewable energy project activity with an output capacity of less than 15 MW, the project is a "Renewable electricity generation for a grid project activity" (Type I.D) as defined in the simplified modalities and procedures for small-scale CDM project activities. The project applies one of the simplified baseline methodologies proposed for this project activity category (AMS-I.D), i.e. the average of the approximate operating margin and the build margin. The baseline methodology has been applied correctly and the assumptions made for the selected baseline scenario are sound.

By displacing fossil fuel-based electricity, the project results in reductions of CO_2 emissions that are real, measurable and give long-term benefits to the mitigation of climate change. Given that the project is implemented as designed, the project is likely to achieve the estimated amount of emission reductions.

It is sufficiently demonstrated that the project is not financially attractive, in particular in absence of PROINFA, the Brazilian incentive program for renewable energy, and thus faces an investment barrier. Emission reductions are thus additional.

The monitoring plan sufficiently specifies the monitoring requirements of the main project indicators. Detailed responsibilities and authorities for project management, procedures for monitoring and reporting, and QA/QC procedures are not yet described, but will need to be developed prior to project commencement in order to enable consistent subsequent verifications of emission reductions.

In summary, it is DNV's opinion that the project, as described in the project design document of 19 April 2006, meets all relevant UNFCCC requirements for the CDM and correctly applies the approved simplified baseline and monitoring methodology AMS-I.D. Hence, DNV requests the registration of the "Aquarius Hydroelectric Project" as 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 Japan,

including the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.

REFERENCES

Category 1 Documents:

Documents provided by MGM International that relate directly to the GHG components of the project. These have been used as direct sources of evidence for the validation conclusions.

/1/ MGM International, Inc.: *Clean Development Mechanism Project Design Document – Aquarius hydroelectric project.* Version 01 of April 2003 and version 02 of 19 April 2006

/2/ MGM International, Inc.: *Reserved Appendix to the Clean Development Mechanism Project Design Document – Aquarius hydroelectric project.* April 2003

/3/ Spreadsheet of Calculation of Combined Margin (ONS Emission Factor SSECO 2002-2004 v 2006-03-13)

Category 2 Documents:

Background documents related to the design and/or methodologies employed in the design or other reference documents. Where applicable, Category 2 documents have been used to check project assumptions and confirm the validity of information given in the Category 1 document.

/4/ CDM Executive Board: Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories - I.D. Grid connected renewable electricity generation (AMS-I.D), version 08 of 3 March 2006.

/5/ 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.

/6/ Comissão Interministerial de Mudança Global do Clima. http://www.mct.gov.br/clima/

/7/ Ministério do Meio Ambiente (MMA): *Politicas para Desenvolvimento Sustentável*. http://www.mma.gov.br/port/sds/capa/

/8/ Fórum Brasileiro de Mudanças Climáticas: *Programas Relacionados com o Desenvolvimento Sustentável promovidos pelo governo brasileiro.* http://www.forumclimabr.org.br/programas.htm

/9/ IPCC: *Good Practise Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. 2000

/10/ International Emission Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF): *Validation and Verification Manual*. http://www.vvmanual.info

Organisation/Persons interviewed:

/11/ Cia Agrícola Sonora Estância Rio Correntes/ Negawatt/ CEMA/ MGM International, Saõ Paulo, 30 May 2003:

- Manuel Araújo, Adm Director, Cia Agrícola Sonora Estância Rio Correntes
- José Roberto Moreira, Executive Director, Negawatt
- Victor Pulz Filho, Operational Director, Negawatt
- Marcia Regina Bertholdi Piacentini, CEMA Enviromental Consulting
- Marco G Monroy, President, MGM International
- Luz Dodero, Technical Researcher, MGM International
- Natsuki Tsukada, Project Manager, MGM International

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APPENDIX A

VALIDATION PROTOCOL
FOR SMALL-SCALE CDM PROJECT ACTIVITIES

Table 1 Mandatory Requirements for Small Scale Clean Development Mechanism Project Activities

Requirement	Ref	Conclusion	Reference / Comment
1. *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. *Assist non-Annex I Parties in achieving sustainable development and the project has obtained confirmation by the host country that the project assists in achieving sustainable development*	Kyoto Protocol Art. 12.2, Simplified Modalities and Procedures for Small Scale CDM Project Activities §23a	-	Table 2, Section A.3 Prior to the submission of this validation report to the CDM Executive Board, DNV will have to receive the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.
3. *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 has the written approval of voluntary participation from the designated national authorities of each party involved*	Kyoto Protocol Art. 12.5a, Simplified Modalities and Procedures for Small Scale CDM Project Activities §23a	-	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 Japan.
5. *The emission reductions should 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 must 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. 12.5.c, Simplified Modalities and Procedures for Small Scale CDM Project Activities §26	OK	Table 2, Section B.2.1
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*	Marrakech Accords (Decision 17/CP.7), CDM Modalities and Procedures Appendix B, § 2	OK	The project will be funded by equity from the project sponsor and a loan from a commercial bank. The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Brazil.

Requirement	Ref	Conclusion	Reference / Comment
8. Parties participating in the CDM shall designate a national authority for the CDM	Marrakesh Accords (CDM modalities§ 29)	OK	The Brazilian designated national authority for the CDM is the Comissão Interministerial de Mudança Global do Clima. The DNA of Japan is the The Liaison Committee for the Utilization of the Kyoto Mechanisms
9. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol	Marrakesh Accords (CDM modalities§ 30)	OK	Brazil has ratified the Kyoto Protocol on 23 August 2002. Japan ratified the Kyoto Protocol on 4 June 2002
10. The proposed project activity shall meet the eligibility criteria for small scale CDM project activities set out in § 6 (c) of the Marrakesh Accords and shall not be a debundled component of a larger project activity	Simplified Modalities and Procedures for Small Scale CDM Project Activities §12a,c	OK	Table 2, Section A.1
11. The project design document shall conform with the Small Scale CDM Project Design Document format	Simplified Modalities and Procedures for Small Scale CDM Project Activities, Appendix A	OK	
12. The proposed project activity shall confirm to one of the project categories defined for small scale CDM project activities and uses the simplified baseline and monitoring methodology for that project category	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22e	OK	Table 2, Section A.1.3 and B.1
13. Comments by local stakeholders are invited, and a summary of these provided	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22b	OK	Table 2, Section G
14. If required by the host country, an analysis of the environmental impacts of the project activity is carried out and documented	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22c	OK	Table 2, Section F
15. Parties, stakeholders and UNFCCC accredited NGOs have been invited to comment on the validation requirements and comments have been made publicly available	Simplified Modalities and Procedures for Small Scale CDM Project Activities §b,c,d	OK	The PDD of April 2003 was made publicly available on DNV's climate change website and Parties, stakeholders and NGOs were through the CDM website invited to provide comments

Requirement	Ref	Conclusion	Reference / Comment
			during a 30 days period from 5 April 2004 to 5 May 2004. No comments were received during this call. However, as part of the pre-validaion of the project one comment was received on 17 May 2003 during a 30 days stakeholder consultation from 22 April 2003.until 23 May 2003.

Table 2 Requirements Checklist

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
A. Project Description *The project design is assessed.*					
A.1. Small scale project activity *It is assess whether the project qualifies as small scale CDM project activity.*					
A.1.1. Does the project qualify as a small scale CDM project activity as defined in paragraph 6 (c) of decision 17/CP.7 on the modalities and procedures for the CDM?	/1/	DR	Being a renewable energy project activity with an output capacity of less than 15 MW, i.e. 4.2 MW, the project qualifies as a small-scale CDM project activity according to category (i) defined in paragraph 6, subparagraph (c) of decision 17/CP.7 on the modalities and procedures for the CDM.		OK
A.1.2. The small scale project activity is not a debundled component of a larger project activity?	/1/	DR	The project is not a debundled component of a larger project activity. The nearby Ponte de Pedra hydropower plant is developed by another company.		OK
A.1.3. Does proposed project activity confirm to one of the project categories defined for small scale CDM project activities?	/1/	DR	The project is a "Renewable electricity generation for a grid project activity" (Type I.D) as defined in the simplified modalities and procedures for small-scale CDM project activities.		OK
A.2. Project Design *Validation of project design focuses on the choice of technology and the design documentation of the project.*					
A.2.1. Are the project's spatial (geographical) boundaries clearly defined?	/1/	DR	The projected is located in the Sonora Municipality in the Mato Grosso do Sul State in Brazil.		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
A.2.2. Are the project's system (components and facilities used to mitigate GHG's) boundaries clearly defined?	/1/	DR	The project comprises a 350 m conduction channel with a 60 m head and two turbines/generators to produce electricity which will supply electricity to the national grid.		OK
A.2.3. Does the project design engineering reflect current good practices?	/1/	DR	The project design engineering reflects good practice.		OK
A.2.4. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period? Does the project make provisions for meeting training and maintenance needs?	/1/	DR	No extensive initial training and maintenance efforts are necessary.		OK
A.3. Contribution to Sustainable Development *The project's contribution to sustainable development is assessed*					
A.3.1. Will the project create other environmental or social benefits than GHG emission reductions?	/1/	DR	The project is likely to reduce pollution from fossil-based electricity generation.		OK
A.3.2. Will the project create any adverse environmental or social effects?	/1/	DR	The proposed project is a run-of-river hydropower plant, which involves no dam construction. The project is hence not expected to have significant environmental or social effects.		OK
A.3.3. Is the project in line with sustainable development policies of the host country?	/1/	DR	The project is in line with current sustainable development priorities in Brazil. Nevertheless, prior to the submission of this validation report to the CDM Executive Board, DNV will have to receive the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.		-

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 selected baseline methodology in line with the baseline methodologies provided for the relevant project category ?	/1/	DR	The project applies one of the simplified baseline methodologies proposed for this project activity category, i.e. the average of the approximate operating margin and the build margin.		OK
B.1.2. Is the baseline methodology applicable to the project being considered?	/1/	DR	Yes		OK
B.2. Baseline Determination *It is assessed whether the project activity itself is not a likely baseline scenario and whether the selected baseline represents a likely baseline scenario.*					OK
B.2.1. Is it demonstrated that the project activity itself is not a likely baseline scenario due to the existence of one or more of the following barriers: investment barriers, technology barriers, barriers due to prevailing practice and other barriers?	/1/ /2/	DR I	The justification of the projects additionality is not based on an explanation that shows that the project would not have occurred anyway due to barriers. A cash flow analysis that compares the internal rate of return of the project with and without CER revenues, 21.0% and 19.8%, respectively, has been presented. In the view of the validation team, the presented cash flow analysis does not sufficiently demonstrate that the CER revenues overcome an investment barrier. It remains to be more clearly demonstrated that the project would not have occurred anyway due to barriers.	CAR 1	

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
B.2.2. Is the application of the baseline methodology and the discussion and determination of the chosen baseline transparent and conservative?	/1/	DR	The selected baseline is the average of the build margin and the approximate operating margin. The baseline determination is well elaborated and detailed calculations are provided to arrive at an appropriate baseline emission factor. The baseline boundaries are confined by the Center-West region of Brazil, i.e. the states of Goias, Mato Grosso and Mato Grosso do Sul. Given the small size of the project, it is appropriate to assume that the project will displace electricity generation in this area only and will not affect other plants within the Brazilian electricity grid.		OK
B.2.3. Are relevant national and/or sectoral policies and circumstances taken into account?	/1/	DR	Yes, the developments in the Brazilian power sector are sufficiently taken into account. The PROINFA program requires federal power company Eletrobras to buy 3,300 MW of electric power from three main sources of renewable power: small-scale hydroelectric, biomass and wind power. The PROINFA law published in December 2003 states that Eletrobras must sign related power purchase agreements before April 29, 2004. When the PDD was first presented (Version 1, April 2003), PROINFA had not yet established purchase prices. Hence, validation could not be finished at the time. The financial incentive offered through PROINFA further raised uncertainties with respect to the additionality of the proposed project. Subsequently, the CDM EB (Annex 3 of 22nd Meeting Report) clarified the situation and showed that national and/or sectoral policies had been taken into consideration and did not affect project additionality.		OK
B.2.4. Is the baseline selection compatible with the	/1/	DR	Data used to determine the baseline have been verified		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
available data?	/3/		against ONS data for 2002-2004.		
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?	/1/	DR	The project's starting date is July 2006 and the expected operation lifetime of the project is 30 years.		OK
C.1.2. Is the crediting period clearly defined (seven years with two possible renewals or 10 years with no renewal)?	/1/	DR	A crediting period of 7 years starting on 1 August 2006 with two possible renewals is selected.		OK
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.*					
D.1. Monitoring Methodology *It is assessed whether the project applies an appropriate monitoring methodology.*					
D.1.1. Is the selected monitoring methodology in line with the monitoring methodologies provided for the relevant project category?	/1/	DR	Net electricity generation of the Aquarius Hydroelectric plant will be monitored.		OK
D.1.2. Is the monitoring methodology applicable to the project being considered?	/1/	DR	The proposed monitoring methodology complies with the monitoring methodology proposed for category I.D projects.		OK
D.1.3. Is the application of the monitoring methodology transparent?	/1/	DR I	The monitoring plan proposes to monitor the electricity generation of power plants of the current generation mix. However, the monitoring plan does currently not describe how this data is used to establish/update the baseline emission factors. Hence, DNV requests a clarification with regard to how data on the electricity	Clari-fication 1	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
			generation of power plants in the current generation mix will be applied to estimate emission reductions.		
D.1.4. Will the monitoring methodology give opportunity for real measurements of achieved emission reductions?	/1/	DR I	It must be clarified whether project intends to monitor baseline emission factors or whether fixed baseline emission factors are applied for the first crediting period.	See D.1.3	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. Are the choices of project emission indicators reasonable?	/1/	DR	Being a hydropower plant, the project has no direct GHG emission. Indirect emissions are mainly related to the construction phase of the project and can be regarded immaterial.		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. If applicable, are the choices of leakage indicators reasonable?	/1/	DR	Since the renewable energy technology does not represent equipment transfer from another activity, no leakage calculations are required for category I.D project activities.		NA
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. Is the choice of baseline indicators, in particular for baseline emissions, reasonable?	/1/	DR I	The monitoring plan proposes to monitor the electricity generation of power plants of the current generation mix. However, the monitoring plan does currently not describe how this data is used to establish/update the	See D.1.3	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
			baseline emission factors.		
D.4.2. Will it be possible to monitor / measure the specified baseline emission indicators?	/1/	DR	Electricity generation data of power plants in the current generation mix are available from SIESEE.		OK
D.4.3. Do the measuring technique and frequency comply with good monitoring practices?	/1/	DR	Daily monitoring represents good monitoring practise.		OK
D.4.4. Are the provisions made for archiving baseline emission data sufficient to enable later verification?	/1/	DR	A 10 year archiving period for baseline emission data is sufficient.		OK
D.5. Project Management Planning *It is checked that project implementation is properly prepared for and that critical arrangements are addressed.*					
D.5.1. Is the authority and responsibility of project management clearly described?	/1/	DR I	The project was originally developed by Cia Agricola Sonora Estância, and now owned by a new company called Aquarius Energética S.A., who will operate the hydropower plant. The authority and responsibility for project operation, monitoring and reporting must be described to ensure later verification of CERs.	CAR 2	OK
D.5.2. Is the authority and responsibility for registration monitoring measurement and reporting clearly described?	/1/	DR I	The MP does not include a description of the authorities and responsibilities for monitoring and reporting.	see D.5.1	OK
D.5.3. Are procedures identified for training of monitoring personnel?	/1/	DR	No procedures for training of monitoring personnel are described, but the project only requires limited monitoring, which is part of normal operations.		OK
D.5.4. Are procedures identified for emergency preparedness?	/1/	DR	No GHG emission relevant emergency situations are expected to occur.		NA
D.5.5. Are procedures identified for calibration of equipment?	/1/	DR I	The MP does not describe procedures for calibration of electricity meters. Procedures for calibration must be defined to ensure later verification of CERs.	CAR 3	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
D.5.6. Are procedures identified for monitoring of maintenance needs for equipment and installations?	/1/	DR	No procedures for maintenance of equipment are described, but the project only requires limited maintenance which is part of normal operations.		(OK)
D.5.7. Are procedures identified for monitoring, taking measurements and reporting?	/1/	DR	No detailed procedures for monitoring are described, but the project only requires limited monitoring which is part of normal operations.		(OK)
D.5.8. Are procedures identified for day-to-day records handling including what records to keep storage of records and how to process performance documentation and possible data sensitivities?	/1/	DR	The project only requires limited monitoring, which is part of normal operations. Electricity generation of the Aquarius hydropower plant is recorded daily and data are achieved electronically.		OK
D.5.9. Are procedures identified for review of reported results/data?	/1/	DR	No procedures for review of reported results/data are described, but such procedures are not imperative to the project.		(OK)
D.5.10. Are procedures identified for internal audits of GHG project compliance with operational requirements?	/1/	DR	No procedures for internal audits are described, but such procedures are not imperative to the project.		(OK)
D.5.11. Are procedures identified for project performance reviews?	/1/	DR	No procedures for project performance reviews are described, but such procedures are not imperative to the project.		(OK)
D.5.12. Are procedures identified for corrective actions?	/1/	DR	Procedures for project corrective actions should be developed prior to project commencement.		(OK)

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
E. Calculation of GHG emission *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 predicted project GHG emissions focuses on transparency and completeness of calculations.*					
E.1.1. Are all aspects related to direct and indirect project emissions captured in the project design?	/1/	DR	The project does not result in direct GHG emissions. Indirect GHG emissions related to the construction of the hydropower plant are immaterial.		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 leakage calculation required for the selected project category and if yes, are the relevant leakage effects assessed?	/1/	DR	Since the renewable energy technology does not represent equipment transfer from another activity, no leakage calculations are required for category I.D project activities.		OK
E.3. Baseline GHG Emissions *The validation of predicted baseline GHG emissions focuses on transparency and completeness of calculations.*					
E.3.1. Are the baseline emission boundaries clearly defined and do they sufficiently cover sources for baseline emissions?	/1/	DR	Baseline emissions due to displacement of electricity are calculated by multiplying the electricity supplied to the grid by the project activity with an ex-ante determined		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
			baseline grid emissions factor. The system boundary for the grid electricity system affected by the project is defined as the S-SE-CO regional grid of Brazil. The combined margin emission coefficient for the S-SE-CO grid is determined in accordance with AMS-I.D. The calculations were based on 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 grid in the years 2002-2004. Data for the years 2002-2004 are the most recent statistics available and the data was verified against the data published on the ONS website. For the determination of the operating margin (OM) emission coefficient, 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. For the calculation of the build margin emission coefficient, the conservative plant efficiencies recommended by the CDM Executive Board at its 22nd meeting were applied. It is justified to only include plants dispatched in the ONS although these represent only about 80% of the total installed capacity. Data for the remaining plants is not publicly available, as these plants operate either based on power purchase agreements, which are not under control of the dispatch authority, or 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.		

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
			The operating margin (OM) emission coefficient is calculated to be 0.9472 tCO_2e MWh and the build margin (BM) emission coefficient is 0.0962 tCO_2e/MWh, resulting in a combined margin emission coefficient of 0.5217 tCO_2e/MWh (weighted average of the build and operating margin).		
E.3.2. Are all aspects related to direct and indirect baseline emissions captured in the project design?	/1/	DR	All direct baseline emissions are captured. Indirect baseline emissions are immaterial.		OK
E.3.3. Do the methodologies for calculating baseline emissions comply with existing good practice?	/1/	DR	The methodology complies with one of the approaches proposed for category I.D project activities.		Ok
E.3.4. Are the calculations documented in a complete and transparent manner?	/1/	DR	The calculations are documented in a complete and transparent manner.		OK
E.3.5. Have conservative assumptions been used?	/1/	DR I	It remains to be clarified whether a capacity factor of 70% for estimating expected annual electricity generation is conservative. The average capacity factor of hydropower plants in Center-West regions is less than 50%.	Clari-fication 2	OK
E.3.6. Are uncertainties in the baseline emissions estimates properly addressed?	/1/	DR	Uncertainties are addressed where applicable.		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 case?	/1/	DR	The project will partly displace fossil fuel-based electricity generation. While the project emissions are zero, baseline emissions are expected to be 0.5217 kg CO_2 per kWh.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
F. Environmental Impacts *It is assessed whether environmental impacts of the project are sufficiently addressed.*					
F.1.1. Does host country legislation require an analysis of the environmental impacts of the project activity?	/1/	DR	Environmental effects of the project have been assessed as required by Brazilian legislation.		OK
F.1.2. Does the project comply with environmental legislation in the host country?	/1/	DR	The project has already received two licenses from IBAMA.: previous license and installation license.		OK
F.1.3. Will the project create any adverse environmental effects?	/1/	DR I	It needs to be clarified to which extent the project diverts water from the Correntes river and the impacts of such a diversion.	Clari-fication 3	OK
F.1.4. Have environmental impacts been identified and addressed in the PDD?	/1/	DR	The environmental impacts of the project are sufficiently assessed.		OK
G. Comments by Local Stakeholder *Validation of the local stakeholder consultation process.*					
G.1.1. Have all relevant stakeholders been consulted?	/1/	DR	The municipality of Sonora, and IBAMA and other stakeholders as required by Brazilian government requirements for CDM projects have been consulted.		OK
G.1.2. Is a summary of the comments received provided?	/1/	DR	Comments received are summarised.		OK
G.1.3. Has due account been taken of any comments received?	/1/	DR	In general, all stakeholders support the project and no modifications to the project design were necessary.		OK

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report corrective action (CAR) and clarification requests	Reference to Requirements Checklist (Table 2)	Summary of project owner response	Validation team conclusion
CAR 1: It remains to be more clearly demonstrated that the project would not have occurred anyway due to barriers.	B.2.1	Spreadsheets showing cash flow are attached: "An. Economica-PCH Aquárius FCO2.xls" for the case without CERs, and "An. Economica-PCH Aquárius FCO2 with CERs.xls" for the case with CERs. The IRRs are 19.8% and 21.0% for the assumptions of the calculations. Neither value is high. The rate of return of Brazilian government bonds was 22%. (Source: Ecosecurities, "NovaGerar Landfill Gas to Energy Project. Project Design Document", presented to The World Bank as Trustees for the Netherlands Clean Development Facility, April 2003, p. 11. and it was for public comments until 2003-01-20 in DNV website) Moreover, the income from the power plant depends on the electricity sale price, which in turn depends on the level of incentive provided by PROINFA (Alternative Energy Sources Incentive Program). While PROINFA was legislated in April 2002, the specific rules of application of PROINFA were delayed for another 90 days on May 2003. When the PROINFA Law was created, Brazil was suffering from a major power shortage. In 2003, however, Brazil is facing excess capacity, so that power prices are likely to be lower than anticipated. The cash flow assumes electricity sales at 110 R$ per kWh. If the price were 90 R$ per kWh, the IRR	Based on the financial calculations provided by the project proponent, DNV could verify that CER revenues (at 4 USD per tonne CO_2) will increase the IRR of the Aquarius project from 19.8% to 21.0% (with a electricity price of R$ 110 per kWh) or from 15.4% to 16.6% (with a electricity price of R$ 90 per kWh).

Draft report corrective action (CAR) and clarification requests	Reference to Requirements Checklist (Table 2)	Summary of project owner response	Validation team conclusion
		without CERs would fall to 15.4%, as can be readily seen by modifying the spreadsheet attached. Thus the project faces significant uncertainties as far as revenues to be generated from electricity sales, thus creating a significant investment barrier. Hopefully, this would be overcome if the project is approved as CDM.	
To conclude on the presented investment barrier, we will need to compare the IRR of the Aquarius project with expected IRR from similar projects in the Brazilian electricity sector, as we see this is a more relevant reference point for comparison.		There are huge uncertainties in the Brazilian power sector because of which meaningful evaluation of IRR is difficult. We are enclosing a collection of news stories, where certain lines have been highlighted. The basic situation is that the spot market price is very low, a few US$ per kWh. At this rate, the market will not induce any new generation capacity. All power purchase agreements are made at higher prices. And it is expected that the PROINFA law to promote renewable energy will set an appropriate value. However, PROINFA has not set any rates, so the uncertainties continue. Thus, there is a major reduction in investment in small hydro, and only one company (CELESC, Santa Catarina) is investing "against the tide". With such uncertainty, there is a huge risk for any decisions made today on any power sector investments in Brazil today.	The collection of news articles gives a very good overview on the current situation in the Brazilian power sector. DNV acknowledges that the current price uncertainties in the Brazilian electricity sector have brought investments for renewable energy projects to a halt. On the other hand, the news articles also show that an annual return of 18% is considered sufficient for another project developer (CndPCH) to invest in small-scale hydropower projects.
Before DNV can conclude on the presented barrier for investment, we would need to know whether there is an power purchase agreement (PPA) for the Aquarius project. , As a price given in a PPA has a big		Aquarius does not have a PPA. It is awaiting a decision on PROINFA, which would set electricity prices for renewable electricity for 15 years. Thus, Aquarius is exposed to the same risks as other potential investors in renewable energy projects.	When the PDD was first submitted for validation, no PPA had been signed with the federal power company Eletrobras. At this time, the Brazilian government had not yet announced the prices to be paid and postponed the publication of electric power

Draft report corrective action (CAR) and clarification requests	Reference to Requirements Checklist (Table 2)	Summary of project owner response	Validation team conclusion
effect on the IRR, such an agreement is important to conclude on this issue.			prices to be used in the PROINFA renewable power sources program. The electricity price the Aquarius project obtains in the PPA is a crucial factor for the project's IRR, and the project's IRR of the project with and without CER revenues is the main argument used to demonstrate the project's additionality. In the absence of an agreed electricity price for the Aquarius project, DNV could not conclude on whether the presented investment barrier is a real obstacle to investment in the absence of the CDM. Hence, DNV needed to await the publication of prices to be paid for renewable energy projects and the electricity price obtained by the Aquarius project through its PPA. DNV acknowledges that the price uncertainties in the Brazilian electricity sector had brought investments for renewable energy projects to a halt and that the CER revenues may help to overcome this uncertainty. However, the price uncertainty was expected to be removed shortly after the PDD was first submitted for validation. As such, the uncertainty can not be used as argument for project additionality for the first project crediting period of 2005-2012.
The electricity price the Aquarius project obtains in the PPA is a		We analyse this based on 2004 data, considering that the investment decision to go ahead with the project	The project's IRR was estimated to be 21.3% without CERs. This IRR considers an

Draft report corrective action (CAR) and clarification requests	Reference to Requirements Checklist (Table 2)	Summary of project owner response	Validation team conclusion
crucial factor for the project's IRR, and the project's IRR of the project with and without CER revenues is the main argument used to demonstrate the project's additionality.		were taken then. On June 2004, a Power Purchase Agreement was signed with PROINFA at a purchase price of R$ 121.35 (From PDD 8Apr2006, p. 13). At the time, Project IRR was estimated to be 21.3% without CERs and 22.6% with CERs (considered to be US$ 4). Again citing the PDD (p. 14): *Brazilian Real benchmark interest rate (SELIC) was 26.3% from February to April 2003 when the PDD was originally formulated. The SELIC value varied between 15.79% and 17.74% during 2004 when the PDD was revised. If there were no additional risks, the minimum hurdle rate for investment in Brazil would thus be 16 to 18%.* SELIC (Mercado de títulos públicos) is a reference interest rate for public financing. In this sense it is similar to LIBOR or the interest rate set by the US Treasury. It is not the interest rate available to small private companies such as Aquarius. Again quoting from the PDD: *Moreover, Brazilian electricity prices are set in Reais, and while they are revised periodically, they cannot be construed as an investment made in US dollars with returns in the same currency.* *Finally, the cost of capital for small companies and investments is substantially higher than for larger projects, such as large power plants.* *Thus, considering the overall investment risks in the Brazilian economy, compounded by additional risks in*	electricity price of R$ 121.35 per MWh based on the Power Purchase Agreement that was signed in June 2004 with PROINFA, the Brazilian incentive program for renewable energy. This IRR is compared with the Brazilian Real benchmark interest rate (SELIC) of 16-18% (average for 2004, which is the year the decision to go ahead with the project was taken). However, it is demonstrated that the SELIC rate of 16-18% is only indicative and does not represent a project specific benchmark, i.e. the standard returns in the market considering the specific risk of small hydroelectric projects. Aquarius Energética S.A. does not have access to capital at the SELIC rate, and the expected returns in the market considering the specific risk of a small hydroelectric project are therefore likely to be higher than this. Moreover, according to the guidance given by the CDM Executive Board at its 22nd meeting (Annex 3 of EB 22 report), PROINFA can be considered as "National and/or sectoral policies or regulations that give comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies (e.g. public subsidies to promote the diffusion of renewable energy or to finance energy efficiency programs)". In accordance with the EB guidance, since PROINFA was

Draft report corrective action (CAR) and clarification requests	Reference to Requirements Checklist (Table 2)	Summary of project owner response	Validation team conclusion
		the power sector, and uncertainties in the sale price of renewable electricity, it is highly unlikely that the computed project IRR 21.3% (without CERs) or indeed the IRR of 22.6% with CERs provides sufficient incentive to justify investment. *In the final analysis, given uncertainties, investment decisions are not based strictly on estimates of IRRs. In this case, the project sponsor and investor (Aquarius Energética S.A.) is a special purpose company (SPC) dedicated to generate and sell electricity. The main Shareholder, Companhia Agrícola Sonora Estância, is a company whose core business is processing sugar cane to produce sugar and alcohol and besides that, produces electricity for self consumption. The site chosen for the small hydro plant is located close to their sugar cane operations. The project was contemplated many years ago, in name of the Companhia Agricola Sonora Estância, which later on was authorized by ANEEL to transfer the project to the new SPC, which started its implementation in may 2005. The municipality of Sonora supports the project as being of social benefits to the community, creating jobs, improving power quality, etc. For the sponsor this project is an opportunity to contribute to the process, while diversifying its operations, learning by doing a small hydro project. All of these factors influence the company's decision to go ahead with the project. Within this context, being able to contribute to mitigate climate change is another social benefit that motivates the project sponsor. The small margin in IRR is only*	implemented after the adoption by the COP of the CDM modalities and procedures (decision 17/CP.7, 11 November 2001), the baseline scenario does not need not take into account PROINFA. Hence, the baseline scenario can refer to a hypothetical situation without PROINFA being in place. The spot market price of electricity in 2004 was 19 R$ per MWh. Given this electricity price, the project's IRR would be negative. It is likely that Aquarius Energética S.A. would have negotiated a higher electricity price also in absence of PROINFA. However, to define the electricity price that Aquarius Energética S.A. would have negotiated in absence of PROINFA is challenging. Nonetheless, it is likely that the price would be significantly lower than the rate of 121 R$ per MWh offered through PROINFA and that the project's IRR would be significantly lower than 21.3%. Given the above, it is thus DNV's opinion that it is sufficiently demonstrated that the project is not financially attractive, in particular in absence of PROINFA, and thus faces an investment barrier.

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<tr><th>Draft report corrective action (CAR) and clarification requests</th><th>Reference to Requirements Checklist (Table 2)</th><th>Summary of project owner response</th><th>Validation team conclusion</th></tr>
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one of many motivating factors in their decision to implement the project.

We cannot improve on this argument to show that SELIC is indicative but not strictly the hurdle rate for investments in small, renewable energy projects.

Profitability of small hydro without PROINFA

The average spot market electricity prices in Brazil for 2004 is 19R$ per MWh (Source: CCEE (Camara de Comercializacao de Energia Eletrica) Relatório de Informações ao Público, 2004 Annual Report).

At a price of 19R$ per MWh, the project IRR would be negative. While the spot price is the market clearing price, transactions are also based on contractual basis. However, those prices are not publicly available. At other prices, project IRR would be as shown in the table below.

<table>
<tr><th>Electricity sale price R$ /MWh</th><th>IRR without CERs</th><th>IRR with CERs @US$ 4</th></tr>
<tr><td>50</td><td>5.7%</td><td>7.6%</td></tr>
<tr><td>70</td><td>10.8%</td><td>12.3%</td></tr>
<tr><td>90</td><td>15.4%</td><td>16.7%</td></tr>
<tr><td>100</td><td>17.6%</td><td>18.9%</td></tr>
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Draft report corrective action (CAR) and clarification requests	Reference to Requirements Checklist (Table 2)	Summary of project owner response	Validation team conclusion
CAR 2: The authority and responsibility of project operation, monitoring and reporting must be described to ensure later verification of CERs.	D.5.1	MGM International has prepared a monitoring plan in order to fill this requirement. The technical staff or Cia. Agricola Sonora will be responsible of project operation, monitoring and reporting in order to ensure later verification of CERs. The Companhia Agricola Sonara Estância Rio Corrente is the process of creating a new company, who will be responsible for operating the plant. The new company that would manage the Aquarius PCH in future is "Aquarius Energética Ltda."	The monitoring plan, including a spreadsheet for monitoring, and the additional information provided by MGM includes the necessary information on the authority and responsibility of project operation, monitoring and reporting.
CAR 3: Procedures for calibration must be defined to ensure later verification of CERs.	D.5.5	The equipment to measure generated energy will be defined by the energy distribution concessionary in the connection agreement. Since the distribution company will be purchasing the power, and electricity is their core business, we can expect that measurements will be accurate. Once the project is approved under CDM and an agreement is reached with the power purchaser, an adequate documentation on calibration can be provided to ensure an adequate verification of CERs. Referring to energy meter calibration, we (Negawatt) spoke to a local digital measuring instrument manufacturer, ESB – Electronic Services, who informed that this instruments are delivered calibrated and should be checked every two years, what can be done by the instrument manufacturer or by independent and recognized services companies; in some cases, the utility that purchases the energy, takes care of this particular.	The information provided by MGM sufficiently identifies the necessary procedures for calibration. Nonetheless, DNV recommends that detailed procedures for calibration of meters are developed prior to project commencement in order to enable consistent subsequent verifications of emission reductions.
Clarification Request 1: DNV requests a clarification with		Indeed, data on the electricity generation of power plants in the current generation of power plants is not	An ex-ante determination of baseline emission factors is in line with the latest

Draft report corrective action (CAR) and clarification requests	Reference to Requirements Checklist (Table 2)	Summary of project owner response	Validation team conclusion
regard to how data on the electricity generation of power plants in the current generation mix will be applied to estimate emission reductions.	D.1.3	required. This monitoring will be eliminated in the revised PDD.	recommendations by the Methodology Panel. Monitoring of the generation mix of power plants in the Center-West region of Brazil is hence not required.
An ex-ante determination of baseline emission factors raises the question whether the use of 2001 data only to determine the baseline emission factor is appropriate or whether average data for the years 1999-2001 should be used instead. Using average data, for example, would reduce the emission factor for diesel from 1.19 to 1.04 kg CO_2 per kWh, which is closer to the Brazilian average (1999-2001) of 1.08 kg CO_2 per kWh and to the small-scale CDM project default value for diesel of 0.8 kg CO_2 per kWh.		A combined margin emission coefficient for the S-SE-CO grid was eventually determined in accordance with AMS-I.D. The calculations are based on 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 grid in the years 2002-2004.	The proposed changes to the PDD sufficiently address our clarification request. Data for the years 2002-2004 are the most recent statistics available and the data was verified against the data published on the ONS website.
Clarification Request 2: It remains to be clarified whether a capacity factor of 70% for estimating expected annual electricity generation is conservative.	E.3.5	The proposed Aquarius power plant is on a stretch of Correntes River located between an existing dam of Ponte de Pedra (owned and operated by another company) and its powerhouse tailrace. Aquárius's intake is about 7 km downstream from the Ponte de Pedra dam. About 97% of the flow used by Aquarius comes from Ponte de Pedra's minimum spilled flow, which was established by the environmental agency, as a requirement for that project to be issued an	The additional information provided by MGM is sufficiently sustains an expected capacity factor of 70%.

Draft report corrective action (CAR) and clarification requests	Reference to Requirements Checklist (Table 2)	Summary of project owner response	Validation team conclusion
		environmental license. That continuous flow available to Aquarius allows it to have a high capacity factor. Keep in mind that the emissions reductions credited will be determined by monitoring of actual generation, this assumption does not affect emissions credited in the course of the project.	
Clarification Request 3: It needs to be clarified to which extent the project diverts water from the Correntes river and the impacts of such a diversion.	F.1.3	The proposed project is a run of river hydroelectric power plant. There is no reservoir, thus there is no eutrophication and no methane generation. A small dam deviates some water away from the natural fall, passes the water through the generating equipment and feeds it back to the original course of the river immediately downstream. This the only affected area is the immediate area of the falls, which is rocky and steep, without a complex ecosystem. We believe that, together with wind power, run-of-river hydro is a power generation option with exceptionally low environmental impact.	The additional information provided by MGM sufficiently addresses potential environmental impacts of the run-of-river hydroelectric power plant. The project is not likely to significantly affect the natural habitat of the Correntes river.

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APPENDIX B

COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

Comment by: Axel Michaelowa, Hamburg Institute of International Economics (HWWA)

Inserted On: 2003-05-17

Subject: Aquarius project

The baseline methodology used is appropriate as the project can apply small scale project rules. However, the data used are not covering the entirety of the grid served by the plant. Taking a subset of the Brazilian South-Southeast grid (here only Goias, Mato Grosso and Mato Grosso de Sul) leads to a bias. This is reflected by the low capacity factor of the plants in the sample as the baseload plants are found in other states.

It is unclear which data are taken from the IPCC guidelines and which ones from actual operation of the power stations.

The emissions factors calculated for the operating margin raise doubts. 1.19 kg for the diesel plants are astonishingly high as even small systems with less than 1 MW installed usually have emissions factors of about 0.8 kg CO_2/kWh (see default values for diesel generators in small scale project baseline rules). Likewise the emissions factor for the (new!) natural gas power plants seems overestimated as combined cycle plants usually have emissions factors of 0.45 kg CO_2/kWh. Thus emission factors should be recalculated or their elevated level – which is almost 50% above comparable values - has to be explained convincingly.

The OECD data for the entire South-Southeast grid are 0.719 kg for the operating margin. The build margin is 0.569 kg (OECD 2002, p. 21), resulting in a combined margin of 0.644 kg.

The determination of additionality is not convincing as there have to be substantial barriers if an IRR of 19.8% is not sufficient to get the project operative without the CDM incentive. The discussion in B.3 does not assess barriers in a systematic way.

References:
OECD (2002): Road testing baselines for GHG mitigation projects in the electric power sector, Paris

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