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# VALIDATION REPORT

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## SAN JACINTO TIZATE GEOHERMAL PROJECT

REPORT No. 2005-1119

REVISION No. 02

DET NORSKE VERITAS



## VALIDATION REPORT

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## Summary:

Det Norske Veritas Certification Ltd. (DNV) has performed a validation of the “San Jacinto Tizate Geothermal Project” (hereafter called “the project”) in Nicaragua, 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. This validation report summarizes the findings of the validation.

The validation consisted of the following three phases: i) a desk review of the project design and the 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 San Jacinto Tizate Geothermal Project, as described in the revised PDD of October 2005, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology ACM0002. Hence, DNV will request the registration of the “San Jacinto Tizate Geothermal Project” as a CDM project activity.

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### ***Abbreviations***

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CH <sub>4</sub>	Methane
CL	Clarification request
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
INE	Instituto Nicaragüense de Energía
IPCC	Intergovernmental Panel on Climate Change
MARENA	Ministry of Environment and Natural Resources
MP	Monitoring Plan
MVP	Monitoring and Verification Plan
N <sub>2</sub> O	Nitrous oxide
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PDD	Project Design Document
UNFCCC	United Nations Framework Convention on Climate Change



## 1 INTRODUCTION

Polaris Geothermal Inc has commissioned Det Norske Veritas Certification Ltd. (DNV) to perform a validation of the “San Jacinto Tizate geothermal project“ hereafter called “the project”) in Nicaragua. This report summarises the findings of the validation of the project, performed on the basis of UNFCCC 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 Gustavo Godinez	DNV Mexico	GHG auditor and project manager
Ms Anu Chaudhary	DNV Bangalore	GHG auditor
Mr Einar Telnes	DNV Oslo	GHG Auditor, Energy 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, 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 /5/, 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 Proposed CDM Project

The proposed “San Jacinto Tizate Geothermal Project” involves the implementation and construction of a 66 MW<sub>e</sub> geothermal plant in San Jacinto, Nicaragua. The development of the project involves two phases: (1) The installation of a 20 MW<sub>e</sub> geothermal plant using combined cycle technology to be operational by early 2006 and (2) the installation of a 46 MW<sub>e</sub> expansion of the 20 MW<sub>e</sub> geothermal plant using condensing turbine generation, to be operational in mid 2007.



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After completion of both phases, the project is expected to generate around 532 000 MWh per year. The San Jacinto Tizate Geothermal Project is in line with the Nicaraguan government's objective to increase the use of renewable energy.

The project is expected to reduce 47 350 tCO<sub>2e</sub> emissions in the first year of the crediting period starting on 1 June 2005, 108 117 tCO<sub>2e</sub> in the second year and 361 891 tCO<sub>2e</sub> emissions for the next 5 years. Average annual emission reductions during the first 7 year crediting period are thus expected to be 280 703 tCO<sub>2e</sub>.

## **2 METHODOLOGY**

The validation consists of the following three phases:

- I a desk review of the project design, baseline and monitoring plan
- II follow-up interviews with project stakeholders
- III the resolution of outstanding issues and the issuance of the final validation report and opinion.

In order to ensure transparency, a validation protocol was customised for the project, according to the Validation and Verification Manual /5/. The protocol shows in 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 "San Jacinto Tizate Geothermal Project" is enclosed in Appendix A to this report.



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<b>Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities</b>			
<b>Requirement</b>	<b>Reference</b>	<b>Conclusion</b>	<b>Cross reference</b>
<i>The requirements the project must meet.</i>	<i>Gives reference to the legislation or agreement where the requirement is found.</i>	<i>This is either acceptable based on evidence provided (OK), a <b>Corrective Action Request (CAR)</b> of risk or non-compliance with stated requirements or a request for <b>Clarification (CL)</b> where further clarifications are needed.</i>	<i>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.</i>

  

<b>Validation Protocol Table 2: Requirement Checklist</b>				
<b>Checklist Question</b>	<b>Reference</b>	<b>Means of verification (MoV)</b>	<b>Comment</b>	<b>Draft and/or Final Conclusion</b>
<i>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.</i>	<i>Gives reference to documents where the answer to the checklist question or item is found.</i>	<i>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.</i>	<i>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.</i>	<i>This is either acceptable based on evidence provided (OK), or a <b>Corrective Action Request (CAR)</b> due to non-compliance with the checklist question (See below). A request for <b>Clarification (CL)</b> is used when the validation team has identified a need for further clarification.</i>

  

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

Figure 1 Validation protocol tables



## 2.1 Review of Documents

The initial PDD /1/ of March 2005 and the final PDD of October 2005 were assessed as a part of the validation. In addition, Excel workbooks containing detailed baseline and emission reduction calculations /3/ were reviewed, as well as a workbook /4/ containing detailed financial information on the project.

## 2.2 Follow-up Interviews

Follow up interviews with project stakeholders were performed in Nicaragua in the period of 28-29 June 2005 by DNV personnel. The main topics of the interviews are summarised in Table 1.

**Table 1 Interview topics**

Interviewed organisation / persons	Interview topics
<i>Polaris Geothermal</i> Walter Kruger Ricardo Arrieta Salgado Alexander Peters <i>San Jacinto Power</i> Adriana Romero <i>La Geo</i> Ramon Ramirez	Environmental impacts Compliance with legal requirements Barriers and additionality of the project Local stakeholder consultation process Emissions calculations Parties involved Starting date of project and crediting period Project operation, training, monitoring and maintenance
<i>Ministry for Environment and Natural Resources (MARENA)</i> Miriam Downs	Environmental licenses Environmental and social impacts of the project Legal compliance
<i>INE.</i> Juan José Caldera Pérez	National Electricity Sector Expansion Plan for Nicaragua Incentives for renewable energy in Nicaragua Most recent renewable sources that have been added to the grid Calculation of build margin and operating margin
<i>Nicaraguan DNA</i> Marina Stadthagen	The process of host country approval for CDM projects in Nicaragua and the process of approving this project. Environmental Impact Assessment requirements Requirement for local stakeholder consultation Official government funding

## 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.

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The initial validation identified five Corrective Action Requests (CAR) and ten requests for Clarification (CL). The response provided by the project participants during the site interviews addressed some of these CARs and CLs to DNV's satisfaction. The remaining CARs and CLs have been resolved through communications with the project proponents before DNV concluded on the validation. To guarantee the transparency of the validation process, the concerns raised and responses given are documented in Table 3 of 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 final PDD of October 2005.

#### 3.1 Participation Requirements

There are three project participants identified for the "San Jacinto Tizate Geothermal Project": Polaris Energy Nicaragua S.A.<sup>1</sup> of Nicaragua, EcoSecurities Ltd. of the United Kingdom and Standard Bank Plc of the United Kingdom. The participating Parties, i.e. Nicaragua as host Party and the United Kingdom as Annex I Party, meet all relevant participation requirements.

A Letter of Approval from the Nicaraguan DNA has been provided to DNV, authorizing Polaris Energy Nicaragua S.A. (referring to its previous name; San Jacinto Power S.A) /2/. A Letter of Approval from the United Kingdom has been provided to DNV, authorizing EcoSecurities Ltd and Standard Bank Plc as project participants/5/.

#### 3.2 Project Design

The proposed project activity will result in emission reductions since it will displace electricity generated from fossil fuel based power plants. The emissions resulting from the use of geothermal energy are considered to be much less than those resulting from combustion of fossil fuels. On completion of both phases of the project, the project is expected to displace 531 907 MWh of electricity per year, thus generating net emission reductions of about 361 901 tCO<sub>2e</sub> per year.

The project envisages the use of renewable and sustainable energy for reliable power generation which is also in line with the policies of the Nicaraguan government. The project is also likely to create simple income and create employment especially during the construction phase. In addition the proposed project is expected to promote the use of indigenous and clean source of electricity generation displacing more carbon intensive electricity from the grid. The DNA of Nicaragua has confirmed that the project assists in achieving sustainable development /2/.

This project applies for a renewable crediting period of 7 years starting on 1 June 2005. The starting date of project construction is April 2004. The project started operation in April 2005, and an operational lifetime of 21 years is assumed. A valid construction permit and operational

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<sup>1</sup> During validation the name of the company change from San Jacinto Power, S.A. to Polaris Energy Nicaragua S.A. Legal documentation of this name change has been checked during validation /6/.



licence, which supports the selected starting date of the project activity and the operational lifetime has been verified by DNV.

### 3.3 Project Baseline and Additionality

The project applies the approved baseline methodology “ACM0002 - Consolidated baseline methodology for grid-connected electricity generation from renewable sources”.

The application of the consolidated baseline methodology for grid-connected electricity generation from renewable sources is justified as the proposed project involves an electricity capacity addition of a geothermal source providing electricity to the grid.

The project fulfils all applicability requirements of the baseline methodology and it has been convincingly demonstrated that the baseline scenario is the electricity being generated by the operation of grid-connected power plants and by the addition of new generation sources.

The simple OM methodology for calculating the operating margin is selected and the operating and build margin emission factors are calculated based on the most recent information available on plants already built at the time of PDD submission. The selection of the simple OM methodology is justified based on the following:

- low-cost/must-run resources constitute less than 50% of total grid generation and
- hourly dispatch data is not readily available from the relevant authorities i.e. the dispatch analysis – although the preferred method – would involve unreasonable costs and is a time consuming task.

The operating margin is calculated as the generation-weighted emissions per electricity unit of all generating units serving the system, excluding low-operating cost and must-run power plants, based on the fuel consumption and generation of power plants in Nicaragua during the years 2001-2003.

For the build margin, it has been demonstrated that the larger of the annual generation of either the five most recently built plants or capacity additions that comprise 20% of the system generation has been considered. The 5 most recent plants, which accounts for 51% of the total generation, have been selected for this calculation.

Clear demonstration and application of the formula from ACM0002 to arrive at the operating and build margin emission coefficients are not apparent from the PDD, but has been provided in additional worksheets submitted to DNV /3/.

It is indicated in the PDD that 72% of Nicaraguan power system is thermal energy based, and it has been established that geothermal generation constitute 4% of the total electricity generation.

The application of the baseline methodology excludes all other alternatives that could have been considered as the baseline leaving only the proposed project as alternative. However, that the project is not a likely baseline scenario has been demonstrated by using the tool for the demonstration and assessment of additionality. A step by step approach in accordance with the tool has been followed demonstrating why the project cannot be considered as a viable baseline scenario. Interviews with the DNA have confirmed that the project activity is not required by law or does not receive any favourable subsidies for electricity dispatch.

The application of the additionality tool:



**Step 0:** It has been confirmed that construction of the project activity started in April 2004. It has also been confirmed that the CDM was an integral part of the decisions to proceed with the CDM project activity, for the project developer as well as for the debt investors.

**Step 1** – It has been confirmed that the project is in compliance with existing Nicaraguan laws and legislation. Identification of project alternatives is limited to the project without carbon finance and no project at all.

**Step 2.** IRR calculations and underlying assumptions are provided for the alternatives and clearly demonstrate that the project is not likely to be a baseline scenario. This is also supported by a benchmark analysis where Central American Bond rates are used as benchmark as well as a sensitivity analysis where different CER prices are used to determine project viability.

**Step 3:** Other barriers for project implementation have also been presented and are assessed. These comprise operational and maintenance requirements, technological risk and skilled labour availability in the region. Given the lack of geothermal plant experience in Nicaragua, these barriers are deemed plausible.

**Step 4.** The only similar activity to the San Jacinto Tizate Geothermal Project in Nicaragua is the Momotombo geothermal project, a relatively unsuccessful venture for exploitation of geothermal energy.

The discussion of the project in the context of the additionality tool presents a convincing argument for the CER being instrumental in the implementation of the project.

### 3.4 Monitoring Plan

The monitoring methodology is in line with the approved monitoring methodology “ACM0002 - Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources”.

The methodology applies to electricity capacity additions from geothermal energy sources and its application is consistent with the chosen simple OM option, as prescribed in ACM0002. The CO<sub>2</sub> emission factor of the Nicaraguan grid is calculated as the weighted average of the OM and BM emission factors and is fixed *ex-ante* at 0.754 t CO<sub>2</sub>/MWh for the first crediting period. Amounts of fuel consumed in each fossil fuel plant supplying electricity to the grid and the power generated from each power source has been obtained from the power producers. The original data for the operating margin contained errors with regard to emissions from the Chinandega and Las Brisas plants, this has subsequently been corrected.

The discussion and selection of the monitoring methodology is transparent.

Details of the data to be collected, the frequency of data recording, its certainty and format are clearly described. Collection and archiving of data is in electronic form and the data is recorded at defined intervals.

The authority and responsibility for project operation, monitoring and reporting should be described in more detail to ensure later verification of CERs. Moreover, no procedures for calibration and maintenance of monitoring equipment and training of monitoring personnel are described and should be developed and implemented to ensure later verification of CERs. Finally



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procedures should be described for review of reported results/data, internal audits, project performance reviews and corrective actions.

Chromatographic monitoring of methane in the non-condensed gas that could lead to unintended emissions will be established.

### **3.5 Calculation of GHG emissions and emission reductions**

The project will partly displace fossil fuel-based electricity generation. While the project emissions are estimated at 39 167 tCO<sub>2</sub>e per year, baseline emissions are equal to emissions of displaced fossil fuel-based electricity generation and are expected to amount to 401 058 tCO<sub>2</sub>e per year. The baseline emission coefficient calculations are based on the combined margin using the “simple OM” option of ACM0002.

The project is expected to displace 531 907 MWh of electricity per year. The combined margin emission factor of 0.754 tCO<sub>2</sub>/MWh has been determined based on fuel consumption and generation data of the years 2001-2003. Under the assumptions provided in the PDD which are deemed reasonable and conservative – the project is expected to reduce 47 350 tCO<sub>2</sub>e emissions in the first year, 108 117 t CO<sub>2</sub>e in the second year and 361 891 t CO<sub>2</sub>e/yr in the next 5 years.

### **3.6 Environmental Impacts**

As per the Nicaraguan legislation an environmental permit is required from MARENA before construction of the plant can commence. Such an environmental permit has been obtained in September 2003 upon submission of an EIA.

The environmental impacts of the project are sufficiently assessed. No significant impacts were identified. The only impacts are on air quality and noise which are expected to be satisfactorily controlled and mitigated by the project proponent.

### **3.7 Comments by Local Stakeholders**

The project proponent has organized a stakeholder consultation meeting, involving direct consultation (after announcements through newspapers and loudspeakers on the street), to inform interested stakeholders, including locals and government officials, on the environmental and socio-economic impacts of the project for the purpose of the CDM. The stakeholder consultation process was carried out as per directives from MARENA.

No major concerns were expressed in the stakeholder meeting. The project proponents have sought to minimise the risks of run-off of hydro-carbonic substances by building special tanks and containers and prevent any spills by collecting all waste and incinerating it. Afforestation activities are also being planned to prevent soil erosion.

## **4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS**

According to the modalities for the validation of CDM projects, the validator shall make publicly available the PDD and receive, within 30 days, comments on the validation requirements from Parties, stakeholders and UNFCCC accredited Non-governmental Organisations (NGOs) and make them publicly available.



The PDD was made available for public comments from 27 March 2005 until 26 April 2005 (on <http://www.dnv.com/certification/climatechange/Projects/ProjectDetails.asp?ProjectId=142>). No comments were received on this call.



## 5 VALIDATION OPINION

*Det Norske Veritas Certification Ltd. (DNV) has performed a validation of the “San Jacinto Tizate Geothermal Project” in Nicaragua. The validation was performed on the basis of UNFCCC criteria for CDM project activities and relevant Nicaraguan criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.*

*The project participants are Polaris Energy Nicaragua S.A from Nicaragua, Standard Bank London Limited and Ecosecurities, Ltd from the United Kingdom. The participating Parties – Nicaragua as the host Party and the United Kingdom as Annex I Party - meet all relevant participation requirements and have provided approval of voluntary participation.*

*The project is a renewable electricity generation project activity involving a reduction of emissions of greenhouse gases in the grid. The project consists of a geothermal plant with a total installed capacity of 66 MW, which will provide electricity to the Nicaraguan grid.*

*By promoting renewable energy, the project is in line with the current sustainable development priorities of Nicaragua, and the DNA of Nicaragua has confirmed that the project assists in achieving sustainable development.*

*The project applies the approved consolidated baseline methodology ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”. The baseline methodology has been applied correctly and the assumptions made for the selected baseline scenario are sound. It is sufficiently demonstrated that the project is not a likely baseline scenario and that emission reductions attributable to the project are additional to any that would occur in the absence of the project activity.*

*A combined margin emission coefficient of 0.754 tCO<sub>2</sub>e/MWh has been calculated ex-ante in accordance with ACM0002, i.e. the average of the approximate operating margin and the build margin. The determination of this combined margin emission coefficient is based on actual electricity generation data provided by Empresa Nacional de Transmisión Eléctrica (ENTRESA) and Centro Nacional de Despacho de Carga (CNDC) for the years 2001- 2003 for Nicaragua.*

*The monitoring methodology has been correctly applied. The monitoring plan sufficiently specifies the monitoring requirements of the main project indicators. By displacing fossil fuel-based electricity with electricity generated from a renewable source, the project results in reductions of CO<sub>2</sub> 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 stated estimated amount of emission reductions.*

*Local stakeholder comments were invited according to the instructions given by the Environmental Impacts and Evaluation Office of the Ministry for Environment and Natural Resources (MARENA) of Nicaragua. Comments made by local stakeholders in general expressed their satisfaction and agreement with the project. Public stakeholder input on the project has also been invited via the UNFCCC web-site. No comments were received on this call.*

*In summary, it is DNV’s opinion that the “San Jacinto Tizate Geothermal Project” in Nicaragua, as described in the revised project design document of October 2005, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology for ACM0002. Hence, DNV request*



*the registration of the “San Jacinto Tizate Geothermal Project” in Nicaragua as a CDM project activity.*



## REFERENCES

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

- /1/ Polaris Geothermal Inc: *Clean Development Mechanism Project Design Document – San Jacinto Tizate Geothermal” project*. March 2005, updated in October 2005
- /2/ Nicaraguan DNA: *Letter of Approval* dated March 2005
- /3/ Polaris Geothermal Inc: *Excel workbook with calculations for the OM and BM as well as emission reduction estimates (San Jacinto GeothermalCalcs.xls)*. March 2005
- /4/ Polaris Geothermal Inc: *Excel workbook with financial data for the project (San Jacinto Geothermal Financial.xls)*. March 2005
- /5/ UK DNA: *Letter of Approval* dated 19 December 2005
- /6/ Legal documentation on the name change of San Jacinto Power SA to Polaris Energy Nicaragua SA

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

- /7/ International Emission Trading Association (IETA) & the World Bank’s Prototype Carbon Fund (PCF): *Validation and Verification Manual*. <http://www.vvmanual.info>
- /8/ Approved consolidated baseline and monitoring methodology ACM0002: *Consolidated methodology for grid-connected electricity generation from renewable sources*. Version 4, 28 November 2005.

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## **APPENDIX A**

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### **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	OK	Table 2, Section A.3
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	OK CAR 4	LoAs from Nicaragua and the UK received.
5. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change	Kyoto Protocol Art. 12.5b	OK	Table 2, Section E
6. Reduction in GHG emissions shall be additional to any that would occur in absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	OK	Table 2, Section B.2
7. Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance	Decision 17/CP.7	OK	No Public Funding is involved.
8. Parties participating in the CDM shall designate a national authority for the CDM	CDM Modalities and Procedures §29	OK	The DNA of Nicaragua is the Oficina Nacional de Desarrollo Limpio y Cambio Climatico, Ministerio del Ambiente y Recursos Naturales The DNA of UK is the

REQUIREMENT	REFERENCE	CONCLUSION	Cross Reference / Comment
			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	Nicaragua ratified the KP on 18/11/1999 and the UK on 31/05/2002.
10. The participating Annex I Party's assigned amount shall have been calculated and recorded	CDM Modalities and Procedures §31b	OK	The assigned amounts 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	The UK has in place a national GHG registry and reports its national inventory annually to the UNFCCC.
12. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received	CDM Modalities and Procedures §37b	OK	Table 2, Section G
13. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	OK	Table 2, Section F
14. Baseline and monitoring methodology shall be previously approved by the CDM Executive Board	CDM Modalities and Procedures §37e	OK	Table 2, Section B.1.1 and D.1.1
15. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP	CDM Modalities and Procedures §37f	OK CAR-2	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 on <a href="http://www.dnv.com/certification/Clima teChange">www.dnv.com/certification/Clima teChange</a> , and Parties, stakeholders and NGOs were invited through the UNFCCC CDM website to provide

REQUIREMENT	REFERENCE	CONCLUSION	Cross Reference / Comment
			comments on the validation requirements during a period of 30 days commencing 27 March 2005. No comments were received
17. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances	CDM Modalities and Procedures §45c,d	OK	Table 2, Section B.2
18. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure	CDM Modalities and Procedures §47	OK	Table 2, Section B.2
19. The project design document shall be in conformance with the UNFCCC CDM-PDD format	CDM Modalities and Procedures Appendix B, EB Decision	OK	PDD in conformance with version 02 of the CDM PDD of 1 July 2004.

**Table 2 Requirements Checklist**

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
<b>A. General Description of Project Activity</b> <i>The project design is assessed.</i>					
<b>A.1. Project Boundaries</b> <i>Project Boundaries are the limits and borders defining the GHG emission reduction project.</i>					
A.1.1. Are the project's spatial (geographical) boundaries clearly defined?	PDD A.4	DR	Yes, The San Jacinto Tizate Geothermal Project is located near the city of Leon, Nicaragua and is located 90 km northwest of the capital Managua.		OK
A.1.2. Are the project's system (components and facilities used to mitigate GHGs) boundaries clearly defined?	PDD A.4	DR	Yes, it is a geothermal project based on renewable energy technology. The project system boundary is assessed in terms of emission sources (which include the fugitive emissions of methane and CO <sub>2</sub> from non-condensable gases contained in the geothermal steam and CO <sub>2</sub> emissions from combustion of fossil fuels to operate the geothermal plant) and spatial extent (which includes the project site and all power plants connected to the electricity system of the region).		OK

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

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
<p><b>A.2. Technology to be employed</b></p> <p><i>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.</i></p>					
A.2.1. Does the project design engineering reflect current good practices?	PDD A.4	DR	Yes, The project design reflects good practices by installing back-pressure steam turbo generators and associated equipment for electricity generation.		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 technologies in the host country?	PDD A.4	DR	Yes, the project proposes to use state of the art technology and is expected to generate 531 907 MWh of electricity per year, sold under a 20 year PPA with Union Fenosa.		OK
A.2.3. Is the project technology likely to be substituted by other or more efficient technologies within the project period?	PDD A.4	DR	Not likely, at least not within the crediting period of the project		OK
A.2.4. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period?	PDD A.4	DR	Yes, since the project involves technology transfer from other countries, the skills and expertise in developing geothermal power plants is missing in the host country. The PDD does not specifically address requirement of initial training and maintenance efforts during the project period.	CL-1	OK
A.2.5. Does the project make provisions for meeting training and maintenance needs?	PDD A.4	DR	Yes, the responsibility of successful project management and implementation has been subcontracted to a team from Sinclair Knight Merz Ltd. from New Zealand and LaGeo from El Salvador.	CL-1	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
			However, confirmation in the form of an agreement / contract is to be provided.		
<b>A.3. Contribution to Sustainable Development</b> <i>The project's contribution to sustainable development is assessed.</i>					
A.3.1. Is the project in line with relevant legislation and plans in the host country?	PDD F	DR, I	An environmental permit from MARENA is required before construction of the plant can commence, This has been obtained per Nicaraguan legislation in Sep 2003 following the submission of an EIA.  This has been confirmed during follow up interviews.		OK
A.3.2. Is the project in line with host-country specific CDM requirements?	PDD F	DR, I	Confirmation from the Govt. of Nicaragua regarding fulfilment of host country CDM requirements has been obtained.		OK
A.3.3. Is the project in line with sustainable development policies of the host country?	PDD	DR	Written confirmation regarding the project's contribution to sustainable development has been obtained from the host DNA .		OK
A.3.4. Will the project create other environmental or social benefits than GHG emission reductions?	PDD	DR	Yes, the project is expected to create various environmental and social benefits such as providing clean electricity which will in turn bring up more local industries, providing low cost electricity in the area, increase foreign investment in the country, use of indigenous and clean source for electricity generation displacing more carbon intensive electricity from the grid, reduction of air based pollutants due to reduction in fossil fuel consumption, increasing skills and expertise of		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
			Nicaraguans in developing geothermal power projects and then generating employment for locals in the area.		
<p><b>B. Project Baseline</b></p> <p><i>The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.</i></p>					
<p><b>B.1. Baseline Methodology</b></p> <p><i>It is assessed whether the project applies an appropriate baseline methodology.</i></p>					
<p>B.1.1. Is the baseline methodology previously approved by the CDM Executive Board?</p>	PDD B	DR	Yes, The project applies the approved baseline methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources".		OK
<p>B.1.2. Is the baseline methodology the one deemed most applicable for this project and is the appropriateness justified?</p>	PDD B	DR	Yes, the use of the approved baseline methodology is justified as the proposed project involves electricity generation using geothermal energy sources providing power to the grid.		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
<p><b>B.2. Baseline Determination</b></p> <p><i>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.</i></p>					
<p>B.2.1. Is the application of the methodology and the discussion and determination of the chosen baseline transparent?</p>	PDD B	DR, I	<p>Yes. The project fulfils all applicability requirements of the baseline methodology and it has been convincingly demonstrated that the baseline scenario is the electricity being generated by the operation of grid-connected power plants and by the addition of new generation sources. The simple OM methodology for calculating the operating margin is selected and the operating and build margin emission factor are calculated based on the most recent information available on plants already built at the time of PDD submission.</p> <p>It has been confirmed during the interviews that the dispatch analysis can not be applied because of lack of hourly data. It is also confirmed that although the project is on the indicative list of power expansion in Nicaragua, there is no obligation from the authorities to implement this plan. This is entirely left to the market actors and the market forces.</p>		OK
<p>B.2.2. Has the baseline been determined using conservative assumptions where possible?</p>	PDD B	DR, I	<p>For the build margin, it remains to be demonstrated that the larger of the annual generation of either the five most recently</p>	CL-2	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
			<p>built plants or capacity additions that comprise 20% of the system generation has been considered.</p> <p>Clear demonstration and application of the formula from ACM0002 to arrive at the carbon coefficients are made through presentations in excel workbooks.</p> <p>The source of data in Annex 3 underlying the baseline calculations has been confirmed through the same workbooks.</p> <p>Geothermal generation comprises only 4% of the electricity generation in Nicaragua.</p>		
B.2.3. Has the baseline been established on a project-specific basis?	PDD B	DR	Yes		OK
B.2.4. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	PDD B	DR, I	<p>National policies of Nicaragua favour renewable energy based projects. However, there has no practical implication, as the development of new generation sources is left to market actors.</p> <p>There is insignificant net import of electricity to Nicaragua. Exclusion of this is deemed reasonable.</p>		OK
B.2.5. Is the baseline determination compatible with the available data?	PDD B	DR	<p>To be assessed when additional information is made available. (Refer to B.2.2).</p> <p>It remains to be confirmed whether hourly dispatch data is not readily available from the relevant authorities.</p>	CL-2 CL-9	OK
B.2.6. Does the selected baseline represent the most likely scenario among other possible and/or discussed scenarios?	PDD B	DR	Yes		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
B.2.7. Is it demonstrated/justified that the project activity itself is not a likely baseline scenario?	PDD B	DR, I	<p>The application of the baseline methodology excludes all other alternatives that could have been considered as the baseline leaving only the proposed project as alternative. That the project is not a likely baseline scenario has been demonstrated by using the tool for the demonstration and assessment of Additionality.</p> <p>It needs to be confirmed by either the DNA or another agency in charge that the project activity is not required by law or does not get favourable prices.</p> <p>Also, we would like to confirm with the DNA that the proposed project type is not common practice in Nicaragua.</p> <p>Finally, DNV would like to assess the IRR calculation and assumptions used for as input for this.</p>	CAR-3	OK
B.2.8. Have the major risks to the baseline been identified?	PDD B	DR	No major risks are foreseen.		OK
B.2.9. Is all literature and sources clearly referenced?	PDD B	DR	The sources of information are missing for certain data (as in B.2.2).	GL-2	OK
<p><b>C. Duration of the Project/ Crediting Period</b>  <i>It is assessed whether the temporary boundaries of the project are clearly defined.</i></p>					
C.1.1. Are the project's starting date and operational lifetime clearly defined and reasonable?	PDD C	DR, I	<p>Yes, The project starting date (start of operation) is indicated to be April 2005 and its operational lifetime is 21 years.</p> <p>However, we would like to see a copy of a</p>	GL-3	OK

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			valid construction permit and operational licence which supports the stated starting date for the project activity and operational lifetime.		
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)?	PDD C	DR	The project applies for a renewable crediting period of 7 years with two possible renewals. In accordance with the modalities and procedures for the CDM, the start of the crediting date must be after the project's registration date for projects starting after the registration of the first CDM project (18 November 2004).	CL-8	OK
<p><b>D. Monitoring Plan</b></p> <p><i>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).</i></p>					
<p><b>D.1. Monitoring Methodology</b></p> <p><i>It is assessed whether the project applies an appropriate baseline methodology.</i></p>					
D.1.1. Is the monitoring methodology previously approved by the CDM Executive Board?	PDD D	DR	Yes, the approved monitoring methodology ACM0002 – which is the consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources – has been used in this project.		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
D.1.2. Is the monitoring methodology applicable for this project and is the appropriateness justified?	PDD D	DR	Yes, the formulae in the approved methodology represent emissions for every source in the baseline and project scenario and are compatible with the project characteristics.		OK
D.1.3. Does the monitoring methodology reflect good monitoring and reporting practices?	PDD D	DR	The project applies the monitoring methodology consistent with the chosen 'Simple OM' baseline method, as prescribed in ACM0002. The CO <sub>2</sub> emission factor of the Nicaraguan grid is calculated as the weighted sum of OM and BM emission factors. Amounts of fuel consumed in each fossil fuel plant on the grid and the power generated from each power source is obtained from the power producers.  The table however does not reflect the column addressing "data type" and "for how long is the archived data kept?", as called-for in the approved methodology.	<del>CL-4</del>	OK
D.1.4. Is the discussion and selection of the monitoring methodology transparent?	PDD D	DR	Yes, with the exception of the choice of data for CO <sub>2</sub> emission coefficient of each type of fuel.  The source of data is missing for calculations such as: <ul style="list-style-type: none"> <li>■ For Project Emissions: The values for average mass fractions of CO<sub>2</sub> &amp; methane in the produced steam.</li> <li>■ Value of Carbon Coefficient of fuel for each type of fuel.</li> </ul>	<del>CL-5</del>	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
<b>D.2. Monitoring of Project Emissions</b> <i>It is established whether the monitoring plan provides for reliable and complete project emission data over time.</i>					
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?	PDD D	DR	Yes, collection and archiving of data is in both electronic and paper form.		OK
D.2.2. Are the choices of project GHG indicators reasonable?	PDD D	DR	Yes, Fugitive emissions of CO <sub>2</sub> and methane due to release of non-condensable gases from produced steam have been considered		OK
D.2.3. Will it be possible to monitor / measure the specified project GHG indicators?	PDD D	DR	Yes		OK
D.2.4. Will the indicators give opportunity for real measurements of achieved emission reductions?	PDD D	DR	Yes		OK
D.2.5. Will the indicators enable comparison of project data and performance over time?	PDD D	DR	Yes.		OK
<b>D.3. Monitoring of Leakage</b> <i>It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.</i>					
D.3.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	PDD D	DR	No sources of leakage have been identified in accordance with ACM0002.		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
<b>D.4. Monitoring of Baseline Emissions</b> <i>It is established whether the monitoring plan provides for reliable and complete project emission data over time.</i>					
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?	PDD D	DR	Yes, collection and archiving of data is in both electronic and paper form.		OK
D.4.2. Is the choice of baseline indicators, in particular for baseline emissions, reasonable?	PDD D	DR	Yes		OK
D.4.3. Will it be possible to monitor the specified baseline indicators?	PDD D	DR	Yes, it'll be possible to monitor the data at regular intervals.  However, the PDD pg 34 indicates that the baseline emission factor will be updated on a three year average basis, but this is not included in the monitoring plan. The monitoring plan does not address the need for the related monitoring.	GL-10	OK
<b>D.5. Monitoring of Sustainable Development Indicators/ Environmental Impacts</b> <i>It is checked that choices of indicators are reasonable and complete to monitor sustainable performance over time.</i>					
D.5.1. Does the monitoring plan provide the collection and archiving of relevant data concerning environmental, social and economic impacts?	PDD D	DR I	No, the monitoring plan does not provide for collection and archiving of Sustainable Development indicators. It needs to be clarified whether the DNA of Nicaragua requires monitoring of sustainable development indicators.	GL-6	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
D.5.2. Is the choice of indicators for sustainability development (social, environmental, economic) reasonable?	PDD D	DR	As in D.5.1	<del>CL-6</del>	OK
D.5.3. Will it be possible to monitor the specified sustainable development indicators?	PDD D	DR	As in D.5.1	<del>CL-6</del>	OK
D.5.4. Are the sustainable development indicators in line with stated national priorities in the Host Country?	PDD D	DR	As in D.5.1	<del>CL-6</del>	Ok
<b>D.6. Project Management Planning</b> <i>It is checked that project implementation is properly prepared for and that critical arrangements are addressed.</i>					
D.6.1. Is the authority and responsibility of project management clearly described?	PDD D	DR	While the project proponent is Polaris Geothermal Inc. the authority and responsibility for project operation, monitoring and reporting must be described to ensure later verification of CERS.	<del>CAR-2</del>	OK
D.6.2. Is the authority and responsibility for registration, monitoring, measurement and reporting clearly described?	PDD D	DR	The MP does not include a description of the authorities and responsibilities for monitoring and reporting	<del>CAR-4</del>	OK
D.6.3. Are procedures identified for training of monitoring personnel?	PDD D	DR	No procedures for training of monitoring personnel are described.	<del>CAR-4</del>	OK
D.6.4. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	PDD D	DR	The CH <sub>4</sub> content in the non-condensed gas could be considered as a case where unintended GHG emissions can take place, and sufficient monitoring of this, e.g. via chromatographic analysis should be established.	<del>CL-7</del>	OK
D.6.5. Are procedures identified for calibration of	PDD	DR	No procedures have been described for	<del>CAR-4</del>	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
monitoring equipment?	D		calibration and maintenance of monitoring equipment.		
D.6.6. Are procedures identified for maintenance of monitoring equipment and installations?	PDD D	DR	As in D.6.5	CAR 4	OK
D.6.7. Are procedures identified for monitoring, measurements and reporting?	PDD D	DR	Yes. NCG emissions can be estimated either from the mass flow coming from the production wells or from the flow to each of the discharge points. Well head pressure and NCG content and composition are also determined periodically.		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)	PDD D	DR	While data is archived in electronic form at required recording frequency, it is not clear for how long and where the archived data is to be stored.	CAR 4	OK
D.6.9. Are procedures identified for dealing with possible monitoring data adjustments and uncertainties?	PDD D	DR	Uncertainties are expected to be minimum, considering the nature of the project. Such procedures are not imperative to the project.		OK
D.6.10. Are procedures identified for review of reported results/data?	PDD D	DR	No procedures for review of reported results / data are described.	CAR 4	OK
D.6.11. Are procedures identified for internal audits of GHG project compliance with operational requirements where applicable?	PDD D	DR	No procedures for internal audits are described.	CAR 4	OK
D.6.12. Are procedures identified for project performance reviews before data is submitted for verification, internally or externally?	PDD D	DR	No procedures for project performance reviews are described.	CAR 4	OK
D.6.13. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	PDD D	DR	No.	CAR 4	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
<p><b>E. Calculation of GHG Emissions by Source</b></p> <p><i>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.</i></p>					
<p><b>E.1. Predicted Project GHG Emissions</b></p> <p><i>The validation of predicted project GHG emissions focuses on transparency and completeness of calculations.</i></p>					
E.1.1. Are all aspects related to direct and indirect GHG emissions captured in the project design?	PDD E	DR	Yes, for this geothermal project activity the project emissions are the fugitive emissions of CO <sub>2</sub> and methane due to release of non-condensable gases from produced steam.		OK
E.1.2. Are the GHG calculations documented in a complete and transparent manner?	PDD E	DR	As in D.1.4	<del>GL-5</del>	OK
E.1.3. Have conservative assumptions been used to calculate project GHG emissions?	PDD E	DR	Yes		OK
E.1.4. Are uncertainties in the GHG emissions estimates properly addressed in the documentation?	PDD E	DR	Yes		OK
E.1.5. Have all relevant greenhouse gases and source categories listed in Kyoto Protocol Annex A been evaluated?	PDD E	DR	Yes. CO <sub>2</sub> and CH <sub>4</sub>		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
<b>E.2. Leakage</b> <i>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.</i>					
E.2.1. Are potential leakage effects beyond the chosen project boundaries properly identified?	PDD E	DR	No sources of leakage have been identified in accordance with ACM0002.		OK
<b>E.3. Baseline Emissions</b> <i>The validation of predicted baseline GHG emissions focuses on transparency and completeness of calculations.</i>					
E.3.1. Have the most relevant and likely operational characteristics and baseline indicators been chosen as reference for baseline emissions?	PDD E	DR	Yes. The baseline emissions are mainly the CO <sub>2</sub> emissions arising from fossil fuel based electricity generation.		OK
E.3.2. Are the baseline boundaries clearly defined and do they sufficiently cover sources and sinks for baseline emissions?	PDD E	DR	Yes		OK
E.3.3. Are the GHG calculations documented in a complete and transparent manner?	PDD E	DR	Some data sources need to be mentioned as explained in B.2.3	GL-2	OK
E.3.4. Have conservative assumptions been used when calculating baseline emissions?	PDD E	DR	The PDD pg 34 indicates that the baseline emission factor will be updated on a three year average basis, but this is not included in the monitoring plan. The monitoring plan does not address the need for the related monitoring. This needs be explicitly concluded.	GL-10	OK
E.3.5. Are uncertainties in the GHG emission	PDD	DR	Yes		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
estimates properly addressed in the documentation?	E				
E.3.6. Have the project baseline(s) and the project emissions been determined using the same appropriate methodology and conservative assumptions?	PDD E	DR	Yes		OK
<b>E.4.Emission Reductions</b> Validation of baseline GHG emissions will focus on methodology transparency and completeness in emission estimations.					
E.4.1. Will the project result in fewer GHG emissions than the baseline scenario?	PDD E	DR	Yes. The project is expected to reduce 47 350 tCO <sub>2</sub> e emissions in the first year, 108 117 tCO <sub>2</sub> e in the second year and 361 891 tCO <sub>2</sub> e/yr for the next 5 years.  It appears that the calculation of OM is incorrect, as the numbers for fuel consumption at the Chinandega plant for 2002 is clearly understated. This must be corrected and the BM/OM average calculation updated accordingly.	<del>CAR-5</del>	OK
<b>F. Environmental Impacts</b> <i>Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.</i>					
F.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?	PDD F	I	As per the Nicaraguan legislation an environmental permit is required from MARENA before construction of the plant can commence. Such a permit has been obtained in Sep 2003 upon submission of		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
			an EIA. This was confirmed during the site visit and the interviews with MARENA.		
F.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	PDD F	DR	As above in F.1.1		OK
F.1.3. Will the project create any adverse environmental effects?	PDD F	DR	No significant impacts were identified. The only impacts are on air quality and noise which are expected to be satisfactorily controlled and mitigated by the project proponent.		OK
F.1.4. Are transboundary environmental impacts considered in the analysis?	PDD F	DR	No major impacts are foreseen		OK
F.1.5. Have identified environmental impacts been addressed in the project design?	PDD F	DR	As in F.1.3		OK
F.1.6. Does the project comply with environmental legislation in the host country?	PDD F	DR	Yes, an Environmental Permit has been obtained from MARENA.		OK
<b>G. Stakeholder Comments</b> <i>The validator should ensure that a stakeholder comments have been invited and that due account has been taken of any comments received.</i>					
G.1.1. Have relevant stakeholders been consulted?	PDD G	DR	As indicated in the PDD, a public stakeholder consultation was organised and was attended by 87 people including locals and govt. officials, as per directives from MARENA.		OK
G.1.2. Have appropriate media been used to invite comments by local stakeholders?	PDD G	DR	Through direct consultations after announcements through newspapers and		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
			loudspeakers.		
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?	PDD G	DR, I	The stakeholder consultation process was carried out as per directives from MARENA.		OK
G.1.4. Is a summary of the stakeholder comments received provided?	PDD G	DR	Yes. The questions raised during the meeting were primarily on impact of the project on drinking water.		OK
G.1.5. Has due account been taken of any stakeholder comments received?	PDD G	DR	No major concerns were expressed in the stakeholder meeting. The project proponents have sought to minimise the risks of run-off of hydro-carbonic substances by building special tanks and containers and prevent any spills by collecting all waste and incinerating it. Afforestation activities are also being planned to prevent soil erosion.		OK

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**Table 3 Resolution of Corrective Action and Clarification Requests**

Draft report clarifications and corrective action requests by validation team	Ref. to Table 2	Summary of project participants' response	Validation team conclusion
<p>OK CAR 4</p> <p>The project must have written approval of voluntary participation from the DNA's of each Party. Annex I approval is awaited.</p>	Table 1	The Nicaraguan letter of no objection is received.	The written approval from Nicaragua and UK are received, authorizing the project participants. CAR is closed.
<p>OK CAR 2</p> <p>Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords.</p>	Table 1	This information has been added in Annex 4 of the PDD.	Information in the PDD is now deemed sufficient. CAR is closed.
<p>CAR 3</p> <p>The project additionality has been demonstrated by using the tool for the demonstration and assessment of additionality.</p> <p>It needs to be confirmed by either the DNA or another agency in charge that the project activity is not required by law.</p> <p>Also, we would like to confirm with the DNA that the proposed project type is not common practice in Nicaragua.</p>	B.2.7	This is not a common practice but recently the government is trying to promote renewable energy generation. Hence there is a law in order to promote renewable energy (Law 443). The proposed project type is confirmed not to be common in Nicaragua, as it constitutes only 4 % of the total generation capacity.	Although the Nicaraguan recently tries to promote renewable energy generation, the project activity is not required by law and geothermal projects are not common practice in Nicaragua.. CAR is closed.
<p>CAR 4</p> <p>Detailed monitoring and reporting procedures must be described at the latest before the starting of the crediting period, in order to</p>	D.6.1, 6.2, 6.3, 6.5, 6.6, 6.8, 6.10, 6.11,	A monitoring plan (Annex 4) has been designed addressing all the issues regarding this point.	Information included in the PDD of October 2005 is now deemed sufficient. CAR is closed.

Draft report clarifications and corrective action requests by validation team	Ref. to Table 2	Summary of project participants' response	Validation team conclusion
ensure later verification of CERs.	6.12, 6.13		
<p>CAR 5</p> <p>The calculation of OM seems to be incorrect, as the numbers for fuel consumption at the Chinandega and Las Brisas plants for 2002 is clearly understated. This must be corrected and the BM/OM average calculation updated accordingly.</p>	Baseline data	The fuel consumption at the Chinandega and Las Brisas plants has been corrected according with the information provided by the Government of Nicaragua. In consequence, sections A.4.4.1, E.4 and E.5 as well as table E.6.2 have been updated.	Corrections accepted. CAR is closed.
<p>CL 1</p> <p>The PDD does not specifically address requirements for initial training and maintenance efforts during the project period.</p> <p>Confirmation in the form of an agreement / contract is to be provided, between Sinclair Knight Merz Ltd. from New Zealand and LaGeo from El Salvador.</p>	A.2.4, A.2.5	There is established a contract with LaGEO which is a company with experience in geothermal plant in El Salvador, in fact, the operators come from El Salvador.	A copy of the training and maintenance contract is received. CL is closed.
<p>CL 2</p> <p>For the build margin, it remains to be demonstrated that the larger of the annual generation of either the five most recently built plants or capacity additions that comprise 20% of the system generation has been considered.</p> <p>Clear demonstration and application of the formula from ACM0002 to arrive at the coefficients are not apparent.</p> <p>While simple OM can be used only if low-cost must run resources constitute &lt;50% of the total grid generation in average of the five</p>	B.2.2, 2.5	Source data on other power plants are provided in excel workbooks. There is no net import power to Nicaragua. For grid composition look at the provided Excel workbooks.	<p>For the build margin, it has been demonstrated that the largest of the annual generation of either the five most recently built plants or capacity additions that comprise 20% of the system generation has been considered. The five most recently built plants were selected.</p> <p>The provided workbooks give a good overview of the national generation. However, it is evident that the calculation of OM is incorrect, as the numbers for fuel consumption at the Chinandega plant for 2002 is clearly</p>

Draft report clarifications and corrective action requests by validation team	Ref. to Table 2	Summary of project participants' response	Validation team conclusion
<p>most recent years, the data substantiated in the PDD is for only three years.</p> <p>72% of Nicaraguan power system is Thermal energy based, what is the power source for the rest 28%? Are there any import power sources?</p>			understated. This must be corrected and the BM/OM average calculation updated accordingly (see CAR 5).
<p>CL 3</p> <p>DNV would like to see a copy of a valid construction permit and operational licence, to support the project activity and operational lifetime.</p>	C.1.1	A copy of the PPA and the concession for use of the resource (geothermal well) for 20 years is enclosed.	Documents reviewed and OK. CL closed.
<p>CL 4</p> <p>The monitoring table does not reflect the column addressing "data type" and "for how long is the archived data kept?", as called-for in the approved methodology.</p>	D.1.3	The columns addressing "data type" and "for how long is the achieved data kept" have been added and filled according with the methodology ACM0002 in table D.2.2.1. Furthermore, the same columns have been added to table D.2.1.1 but the table is not applicable.	Information is updated and considered acceptable. CL is closed.
<p>CL 5</p> <p>The source of data is missing for calculations such as:</p> <ul style="list-style-type: none"> <li>- For Project Emissions : The values for average mass fractions of CO<sub>2</sub> &amp; methane in the produced steam.</li> <li>- Value of Carbon Coefficient of fuel for each type of fuel.</li> </ul>	D.1.4, E.1.2	The sources data for the values for the average mass fractions of CO <sub>2</sub> and CH <sub>4</sub> in the produced steams and carbon coefficient factor for type of fuel have been added to the PDD (see footnote 4 and 5).	The excel sheet contains sufficient data to sustain these calculations. Sources are now referenced. CL is closed.
<p>CL 6</p> <p>The monitoring plan does not provide for</p>	D.5.1	At present, no Nicaraguan sustainable development indicators are developed.	Neither ACM0002 nor the Nicaraguan DNA requires the monitoring and reporting of Sustainable Development

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collection and archiving of Sustainable Development indicators. It needs to be clarified whether the DNA of Nicaragua requires monitoring of sustainable development indicators.			criteria. CL is closed.
CL 7 The CH <sub>4</sub> content in the non-condensed gas could be considered as a case where unintended GHG emissions can take place, and sufficient monitoring of this, e.g. via chromatographic analysis should be established.	D 6.4	The point 3 ("NCG Analyses") within the Note 2 of Table D.2.2.1 (see page 27) clearly states a chromatographic analysis will be used to monitor unintended CH <sub>4</sub> gas emissions.	This monitoring is sufficient when established. CL is closed.
CL 8 In accordance with the modalities and procedures for the CDM, the start of the crediting date must be after the project's registration date for projects starting after the registration of the first CDM project (18 November 2004).	C.1.2	The starting date of the project activity has been confirmed with the developer and changed accordingly in Section C.1.1. of the PDD.	Sufficient evidence has been presented that the starting date (project construction) is April 2004. A crediting period prior to the date of registration can thus be applied. CL is closed.
CL 9 It remains to be confirmed whether hourly dispatch data is not readily available from the relevant authorities.	B.2.5	Regarding the electricity dispatch data, on 18th August, 2004 (10:00AM) Sonia Medina, member of Ecosecurities, and Oscar Saenz, developer representative, met Mr. Rodolfo Lopez, General Director of the National Centre of Power Dispatch (in Spanish: Centro Nacional de Despacho de Cargas). In this meeting Mr. Lopez mentioned that the dispatch information was not available for the public. Moreover, on 17th October, 2005,	The information is deemed sufficient to conclude on this issue. CL is closed.

Draft report clarifications and corrective action requests by validation team	Ref. to Table 2	Summary of project participants' response	Validation team conclusion
		<p>Polaris Energy Nicaragua, SA representative talked to Rolando Perez (Dispatcher of CNDC) asking again for the power dispatch information. He said dispatch data varies on daily bases and historic data is not available for the public domain, according with Issaias Barrios' (Planning Operator of CNDC), explicit instructions. Consequently, it was concluded that the electricity dispatch data is not available.</p>	
<p>CL 10. The PDD indicates that the baseline emission factor will be updated on a three year average basis, but this is not included in the monitoring plan. This needs be explicitly concluded in the PDD.</p>	<p>PDD</p>	<p>The summary Table E.6.1 in page 34 has only illustrative purposes. It does not mean the baseline emission factor will not be calculated on a three-year basis. Find attached the spreadsheet for baseline calculation according with methodology for your reference.</p>	<p>As the revised PDD demonstrates, the baseline emission factor is now fixed ex-ante. The three year basis is not relevant under ACM 0002. Given that the fixed baseline emission factor is applied over the crediting period, the CL is closed.</p>

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