POLARIS ENERGY NICARAGUA

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San Jacinto - Tizate Geothermal Project

UNFCCC Clean Development Mechanism Monitoring Report

CDM Registration Number 0198
Monitoring Period 1 Jan 2007 up to 30 Jun 2007
25 July 2007

1. Project Background

The San Jacinto – Tizate geothermal project was registered as a CDM project by the UNFCCC on 8 April 2006 under reference number 0198.

Further background on this project can be found in the Project Design Document (PDD) and associated documents, which are available on the UNFCCC website: http://cdm.unfccc.int/Projects/DB/DNV-CUK1135673240.22/view.html.

Parties involved are Nicaragua (Host Country) and the United Kingdom of Great Britain and Northern Ireland (Other Parties). Private entities involved are Polaris Energy Nicaragua S.A. (Geothermal Operator and Project Developer, formerly San Jacinto Power S.A., see footnote 1 of PDD), Standard Bank Plc. and Ecosecurities Ltd.

2. Monitoring Background

The basis for the calculation of emission reductions is the monitoring plan in the PDD. The calculation of emission reductions applies methodology ACM0002, version 04. The validated monitoring plan has been made operational by the Project Developer in the Monitoring Protocol (Monitoring Protocol for San Jacinto – Tizate Geothermal Project, version 6, dated 28 December 2006). This document is deemed necessary to make the monitoring plan operational, but is not an official document in the CDM project cycle.

This is the third monitoring period for this project. The previous monitoring period was from 1 July 2006 up to 30 December 2006. A monitoring report, dated 8 January 2007, was prepared by Ecosecurities Ltd and a verification report was issued by TÜV SÜD Industrie Service GmbH on 10 February 2007 (report number 955 695).

3. Monitoring Results

3.1 Emission Reduction

The calculated emission reductions amount to 22,817 tonne CO_2 eq.

3.2 Monitoring Period Covered

This is the third monitoring report of this project. It covers the period 1 January 2007 up to 30 June 2007. Monitoring data were collected and verified over the entire period.

3.3 Presentation of Monitoring Results

All monitoring data have been included in an Excel workbook, “Carbon Credit Data Analysis to 30 Jun 07.xls”. This includes:

1. Summary. This worksheet contains a monthly overview of the calculation of net power delivered to the grid, steam production, project emissions and net emission reductions.
2. Steam System Start-Stop. This shows the dates and times during the period when the steam gathering system (steamfield) was started and stopped. The data is manually transferred to the Carbon Credit Analysis sheet, where it is used to calculate the occasional discharge of steam and non-condensable gases associated with starting up the steamfield.
3. CO_2 & CH_4. This shows CO_2 & CH_4 content of the steam obtained from periodic analysis of the steam at the inlet scrubber to each unit. As the steam for each unit has been derived from the same source, the average values are determined for each portion of the monitoring period and these values are manually transferred to the Carbon Credit Analysis sheet.
4. Carbon Credit Analysis. This sheet contains the detailed emission reduction calculations on an hour-by-hour basis, corresponding to the project data gathering routines. The input data is extracted from the project's operational data base and pasted into this spreadsheet, along with the manually input date for steam system start-stop and CO_2 & CH_4 content. Detailed algorithms have been established to estimate the project emissions.

3.4 Project Status

The project currently operates 2 units of 5 MWe. A capacity extension to 66 MWe is planned.

3.5 Calculation Methodology

1. Record data. During this monitoring period the data was manually recorded into the operational data base system and subsequently output into a series of Excel spreadsheet reports. A data quality review was undertaken of these reports with the raw data being corrected as required to eliminate obviously incorrect data (outside of predetermined parameters) and inconsistencies between the data recorded. The data was then pasted into the analysis spreadsheet.
2. Estimate steam discharges. This is done using bespoke algorithms to estimate discharges from the steam vent valve, the vent valve bypass, failed steam traps and start-up procedures. There were no new well drilling or testing operations which involved discharges of non-condensable gases (estimations of these discharges will be prepared for use during the next monitoring period). To these discharges are added the directly measured steam flow passing through the turbines to arrive at the total steam consumption and discharge for the project.
3. Sample and analyse the non-condensable gas content of the steam. This gives the CO_2 and CH_4 mass fractions in the steam.
4. The project actual emissions are calculated by multiplying the total steam production (steam to generating units plus other discharges per point 2) above) by the mass fractions of CO_2 and CH_4. The mass fraction of CH_4 is multiplied by 21 in order to produce the CO_2 equivalent.

5. Electricity supplied (delivered) to the grid is obtained from the revenue metering system. This system also records electricity taken (imported) from the grid, which is subtracted from the delivered electricity to arrive at the net energy delivery, which is used to calculate the baseline emission from which a reduction is possible. The net energy delivered in each hour is multiplied by the emission factor to produce the baseline emission. The emission factor is 0.754 tCO_2 as per the validated PDD.
6. The net emission reduction is the baseline emission (point 5) minus the actual emissions (point 4).