PERIODIC VERIFICATION REPORT

- 2ND PERIODIC –

TERMOELÉTRICA SANTA ADÉLIA LTDA

VERIFICATION OF THE TERMOELÉTRICA SANTA ADÉLIA COGENERATION PROJECT

MONITORING PERIOD 07/2006 – 12/2006

Report No: 4866/07-07/31 - V01

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Approved by: Mr. W. Wielpütz	Organisational unit: TÜV NORD JI/CDM Certification Program
Client: Termoelétrica Santa Adélia Ltda	Client ref.: Norberto Bellodi

Summary:

Termoelétrica Santa Adélia Ltda has commissioned the TÜV NORD JI/CDM Certification Program to carry out the 2nd periodic verification of the project: *"Termoelétrica Santa Adélia Cogeneration Project"*, with regard to the relevant requirements for CDM project activities. The project reduces GHG emissions by displacement of conventional generated electricity in the Brazilian interconnected grid by renewable power from a bagasse cogeneration plant.

This verification covers the period from 2006-07-01 to 2006-12-31.

A risk based approach has been followed to perform this verification. In the course of the verification one CAR and one FAR were raised.

The verification is based on the draft monitoring report (December 2006), the final monitoring report (July 2007), the monitoring plan as set out in the validated PDD, the validation report, the verification report from previous verification and supporting documents made available to the TÜV NORD JI/CDM CP by the project participants.

As a result of this periodic verification, the verifier confirms that:

- all operations of the project are implemented and installed as planned and described in the validated project design document.
- the installed equipment essential for generating emission reductions runs reliable and is calibrated appropriately.
- the monitoring system is in place and fully functional. The project is ready to generate GHG emission reductions.

As the result of the 2nd periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

Baseline emissions:	16,747	t CO_{2eq}
Project emissions:	0	t CO_{2eq}
Emission reductions:	**16,747**	**t CO_{2eq}**

Report No.: 4866/07-07/31-V01	Subject Group: Environment	
Report title: *Second Verification Report – Termoelétrica Santa Adélia Cogeneration Project*		
Work carried out by: Rainer Winter, M. C. C. Coelho		
Work verified by: Wolfgang Wielpütz		
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Indexing terms

Climate Change, CDM, Biomass, Efficiency, Verification, Kyoto Protocol

Abbreviations

CA	**Corrective Action / Clarification Action**
CAR	**Corrective Action Request**
CDM	**Clean Development Mechanism**
CER	**Certified Emission Reduction**
CETESB	**Companhia de Tecnologia e Saneamento Ambiental (São Paulo State Environmental Agency)**
CO_2	**Carbon dioxide**
CO_{2eq}	**Carbon dioxide equivalent**
CP	**Certification Program**
CR	**Clarification Request**
FAR	**Forward Action Request**
GHG	**Greenhouse gas(es)**
GWP	**Global Warming Potential**
KW	**Kilowatt**
MR	**Monitoring Report**
MP	**Monitoring Plan**
MW	**Megawatt**
PDD	**Project Design Document**
PPA	**Power Purchase Agreement**
QA/QC	**Quality Assurance / Quality Control**
QMS	**Quality management system**
UNFCCC	**United Nations Framework Convention on Climate Change**
VVM	**Validation and Verification Manual**

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1. INTRODUCTION

Termoelétrica Santa Adélia Ltda has commissioned the TÜV NORD JI/CDM Certification Program (CP) to carry out the 2nd periodic verification of the project: "Termoelétrica Santa Adélia Cogeneration Project", with regard to the relevant requirements for CDM project activities. The verifiers have reviewed the GHG data collected for the period between 2006-07-01 and 2006-12-31.

1.1. Objective

The objective of the periodic verification is the review and ex post determination by an independent entity of the GHG emission reductions. It includes the verification of the data given in the monitoring report by checking the monitoring records and the emissions reduction calculation.

1.2. Scope

The verification of this registered project is based on the validated project design document /PDD/, the monitoring report /MR2/, supporting documents handed over to the verifier and information got by performing interviews and during the on-site assessment. Furthermore publicly available information was considered as far as available and required.
The documents and information are reviewed against the requirements and criteria mentioned below. The TÜV NORD JI/CDM CP has, based on the recommendations in the Validation and Verification Manual /VVM/ employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generation of emission reductions.

The verification is carried out on the basis of the following requirements, applicable for this project:

- Article 12 of the Kyoto Protocol /KP/,
- guidelines for the implementation of Article 12 of the Kyoto Protocol as presented in the Marrakech Accords under decision 17/CP.7 /MA/, and the annex II to decision 21/CP.8 and subsequent decisions made by the Executive Board,
- other relevant rules, including the host country legislation,
- monitoring plan as given in the PDD /PDD/,
- CDM Large Scale Methodology AM0015 /AM/.

1.3. GHG Project Description

1.3.1. Project Characteristics

Essential data of the project is presented in the following Table 1-1

The GHG project can be classified as a large-scale CDM project in the sector given in Table 1-1 (according to UNFCCC sectoral scope numbers for CDM).

Table 1-1: Project Characteristics

Item	Data
Project title	Termoelétrica Santa Adélia Cogeneration Project
CDM registration No.	0200
Date of registration	2006–03-06
Project Scope	1: Energy Industries (renewable - / non-renewable sources)
Applied Methodology (Registered)	AM0015: “Bagasse-based cogeneration connected to an electricity grid”
Crediting period	Renewable Crediting Period (7 y)
Start of crediting period	2003-05-07 (as per PDD)
Host country	Brazil

1.3.2. Project Parties

Brazil

1.3.3. Project Participants

The following project participants are involved in the project activity as per Letter of Approval:

Project Participant:	Termoelétrica Santa Adélia Ltda Rodovia SP 326 – Km 332 Jaboticabal - São Paulo 14870-970 Brazil
Contact person:	Mr. Norberto Bellodi nbellodi@usinasantaadelia.com.br

1.3.4. Project Location

The project is located in Jaboticabal, close to Ribeirão Preto, the main city in the northeast of the state of São Paulo (Brazil). It is located in one of the main agricultural centers of the country.

1.3.5. Technical Project Description

The sugar mill produces sugar and anhydrous and hydrated alcohol, as well as generates its own electricity. The project activity consists of increasing the efficiency of the bagasse cogeneration facility at Termoelétrica Santa Adélia.

The project activity increased the efficiency and the capacity of previous generation of energy on the basis of bagasse (a renewable fuel source, residue from sugarcane processing), substituting boilers of low pressure for high-pressure boilers and installing an additional capacity of generation of 34 MW. According to ANEEL Resolutions, the total capacity installed for Santa Adélia is 42 MW.

The emission reductions are a result of the displacement of conventional generated energy in the regional South-Southeast-Midwest (S-SE-CO) grid.

2. VERIFICATION TEAM

- The Verification Team was led by **Mr. Rainer Winter**. Mr. Winter works at TÜV NORD CERT GmbH as ISO 9001 and ISO 14001 Auditor, as an environmental verifier for EMAS, and as a DEHSt-appointed emission verifier in the framework of the EU-ETS. Mr. Winter has been appointed as JI/CDM assessor and is in charge of the TÜV NORD JI/CDM CP. For this verification he was assisted by:
- **Ms. Maria Carolina Crisci Coelho**, BRTÜV-Brazil (TÜVNORD-Brazil), Mrs. Coelho is ISO 14001 Auditor and Product Manager for CDM Services for BRTÜV. She is an appointed expert of TÜV NORD JI/CDM certification program.

The final verification report is verified by

- **Mr. Wolfgang Wielpütz**. He is ISO 9001 and 14001 Auditor, environmental verifier for EMAS and DEHSt-appointed emission verifier in the framework of EU-ETS. He is appointed JI/CDM assessor. Mr. Wielpütz is the head of the department: "Integrated management systems, environmental and occupational safety" and deputy chief of TÜV NORD CERT GmbH.

As a trainee **Ms. Katja Beyer** took part in the verification of this project activity. She works as an environmental scientist for TÜV NORD CERT GmbH.

3. METHODOLOGY

The verification of the project was carried out from January to May 2007:

Preparations: *From 2007-01-20 to 2007-02-26*

On-site verification: *2007-02-26*

Reporting*:* *From 2007-02-27 to 2007-05-24*

The verification consisted of the following steps:

- A desk review of the Monitoring Report /MR2/ submitted by the client and additional supporting documents with the use of the customised verification protocol /CPM/ according to the Validation and Verification Manual /VVM/,
- On-Site assessment,
- Background investigation and follow-up interviews with personnel of the project developer and its contractors,
- Verification reporting.

3.1. Verification Protocol

In order to ensure transparency and consideration of all relevant assessment criteria, a verification protocol was used. The protocol shows, in a transparent manner, criteria and requirements, means and results of verification. The verification protocol serves the following purposes:

- It organises, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent verification process where the verification team documents how a particular requirement has been proved and the result of the verification.

The applied verification protocol consists of two Periodic Verification Checklists: Table 1 (Data Management System/Controls); Table 2 (GHG calculation procedures and management control testing / Detailed audit testing of residual risk areas and random testing) as described in figure 3-1.

The completed verification protocol is enclosed in the annex to this report.

Periodic Verification Checklist ***Table 1: Data Management Systems/Controls***			
Expectations for GHG data management system/controls	***Comments***	***Draft Conclusion***	***Final Conclusion***
The project operator's data management system/controls are assessed to identify reporting risks and to assess the data management system's/control's ability to mitigate reporting risks. The GHG data management system/controls are assessed against the expectations detailed in the table.	*Description of circumstances and further commendation to the conclusion.*	*This is either acceptable based on review of MR and supporting Documents (**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 Draft Verification report. The Initial Verification has additional **Forward Action Requests (FAR)**. FAR indicates essential risks for further periodic verifications*	*CARs and CRs raised in the Draft Conclusion have to be closed or resolved. The final conclusion determines the final statement. FARs could remain in this section as they are subject in the next consecutive verification.*

Periodic Verification Checklist

Table 2: GHG calculation procedures and management control testing / Detailed audit testing of residual risk areas and random testing

Identification of potential reporting risk	**Identification, assessment and testing of management controls**	**Areas of residual risks**	**Additional verification testing performed**	**Conclusions and Areas Requiring Improvement (including *Forward Action Requests*)**
The following potential risks were identified and divided and structured according to the possible areas of occurance.	*The potential risks of raw data generation have been identified in the course of the monitoring system implementation.* *The following measures were taken in order to minimize the corresponding risks.* *The following measures are implemented:*	*Despite the measures implemented in order to reduce the occurrence probability the following residual risks remain and have to be addressed in the course of every verification.*	*The additional verification testing performed is described. Testing may include:* - *Sample cross checking of manual transfers of data* - *Recalculation* - *Spreadsheet 'walk throughs' to check links and equations* - *Inspection of calibration and maintenance records for key equipment* - *Check sampling analysis results* *Discussions with process engineers who have detailed knowledge of process uncertainty/error bands.*	*Having investigated the residual risks, the conclusions should be noted here. Errors and uncertainties are highlighted.*

Figure 3-1 : Verification protocol tables

3.2. Review of Documentation

The following documents were reviewed:

- the last revision of the PDD including the monitoring plan /PDD/,
- the last revision of the monitoring report of previous Verification/MR1/,
- the last revision of the monitoring report, including the claimed emission reductions for the project /MR2/,
- the last revision of the emission reduction calculation spreadsheet /XLS/
- the last revision of the validation report /VAL/

Other supporting documents, such as technical drawings, performance records, meter readings, installation and calibration documents and business data were also reviewed.

3.3. On-site assessment

The assessment performed during the verification enabled the verifier to arrive at a conclusion regarding the readiness of the project to generate high quality emission reductions. As such, it was indispensable to carry out an inspection on-site in order to verify that the project is implemented in accordance with the applicable criteria. Furthermore the on-site assessment is necessary to check the monitoring data with respect to accuracy to ensure the calculation of emission reductions.

- The on-site assessment included an investigation of whether all relevant equipment is installed and works as anticipated.
- The operating staff was interviewed and observed in order to check the risks of inappropriate operation and data collection procedures.
- Information processes for generating, aggregating and reporting the selected monitored parameters were reviewed.
- The duly calibration of all metering equipment was checked.
- The manager operator has provided evidence that all metering equipment was duly calibrated.
- The monitoring processes, routines and documentations were audited to check their proper application.
- The monitoring data were checked via spot sample on the level of the meter recordings.

Before and during the on-site visit on 2007-02-26, the verifier of TÜV NORD JI/CDM CP performed interviews with the project participants to confirm selected information and to resolve issues identified in the document review.

Representatives of Termoelétrica Santa Adélia Ltda. (TSA), its staff and Ecoinvest Consult (project developer) were interviewed. The main topics of the interviews are summarised in Table 3-1.

Table 3-1 Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
1. Projects & Operations Personnel, TSA 2. Consultant, Ecoinvest	- General aspects of the project - Project design and implementation - Commissioning - Technical equipment and operation - Monitoring and measurement equipment - Calibration procedures - Quality management system - Involved personnel and responsibilities - Training and practice of the operational personnel - Implementation of the monitoring plan - Monitoring data management - Data uncertainty and residual risks - GHG calculation - Procedural aspects of the verification - Maintenance - Environmental aspects - FAR issued on 1st periodic verification report

3.4. Resolution of Forward and Corrective Action Requests

Nonconformities raised during the verification can either be seen as a non-fulfilment of criteria ensuring the proper implementation of a project or where a risk to deliver high quality emission reductions is identified.

Corrective Action Requests (CARs) are issued, if:

- there is a clear deviation concerning to the above mentioned applicable criteria (esp. the monitoring plan).
- requirements set by the monitoring plan or qualifications in the validation opinion have not been met; or
- there is a risk that the project would not be able to deliver emission reductions.

Forward Action Requests (FAR) indicate essential risks for further periodic verifications. Forward Action Requests are issued, if:

- the actual status requires a special focus on this item for the next consecutive verification, or
- an adjustment of the monitoring plan is recommended.

The verification team may also use the term Clarification Request (CR), which would be issued if:

- additional information is needed to fully clarify an issue.

4. VERIFICATION FINDINGS

In the following paragraphs the findings from the desk review of the monitoring report /MR2/, the PDD /PDD/, the first Verification Report/VER/ and other supporting documents, as well as from the on-site assessment and the interviews are summarised.

The summary of CAR, FAR and CR issued are shown in Table 4-1:

Table 4-1: Summary of CAR, FAR and CR

Verification topic	No. of CAR	No. of FAR	No. of CR
Remaining issues	0	0	0
Completeness of Monitoring	1	0	0
Accuracy of emission reduction calculations	0	0	0
Quality of Evidence to Determine Emission Reductions	0	0	0
Management system and quality assurance	0	1	0
SUM	**1**	**1**	**0**

For an in depth evaluation of all verification items it should be referred to the verification protocols (see Annex).

4.1. Periodic Verification Findings

4.1.1. Remaining Issues from previous Verification

During the initial and 1st periodic verification two FARs were raised:

Forward Action Request 1
"The local power utility-CPFL is responsible for the calibration of the electronic meter ELO 2180SP. It was presented to the verification team a Calibration Certificate, dated April 16, 2004, as an evidence of the last calibration made.
According to the Clause 10a, Chapter VI of the PPA, the local power utility- CPFL is responsible for the continuous monitoring of the performance of the meter and, at least once every 12 months, proceed to a calibration. There is no evidence that a calibration has occurred after April 16, 2004".

During the on-site visit, it was evidenced that for the monitoring period (July to December 2006) the main meter was ELO2180SP #40072316-6 as mentioned in procedure IT-ID-01-01-0010 rev.01 – 2006/04/03. A calibration certificate (#6MW7070) of this meter, dated 2006/02/24, was presented to the verification team.
In January 2007 Termoelétrica Santa Adélia changed the main meter (ELO 2180SP serial number 40080015-2) and the backup meter (ELO 2180SP serial number 40074502-0). For both meters calibration certificates were presented (main meter: #7MW02018 issued 2007/01/19, backup meter: #6MW12136 issued 2007/01/19).

FAR is checked and resolved.

Forward Action Request 2
"There are two Water-Impounding permits for two wells, number 1 and number 3, utilized for the Project.
Permit for well number 3 is valid up to August 11, 2009, but Permit for well number 1 was valid until May 14, 2006."

It was evidenced that the Water Impounding Permit according to DAEE Resolution #152 for well number 1 was issued on January 29, 2007 and is valid up to January 29, 2012.

FAR is checked and resolved.

4.1.2. Completeness of Monitoring

The only relevant parameter to monitor is the electricity fed into the grid. This is done by calibrated meters. The reporting procedures reflect the requirements of the monitoring plan. All relevant data is collected continuously and stored during the whole monitoring period. The monitoring consists of using meter equipment projected to registry and verifies the energy generated by the facility. All invoices issued by Termoelétrica Santa Adélia Ltda. were checked against the confirmation of receipt of energy dispatched to the grid from CPFL.

Methodology AM0015 requires the monitoring of data required to calculate CO_2 emissions from fossil fuels combusted due to the project activity at the project site, where relevant. The equipment in operation to produce electricity at the project activity is not appropriate to combust fossil fuels. This was verified during the on-site visit. Moreover there were no evidences like a stockyard for fossil fuels, a natural gas connection or records of fossil fuel delivery at the project site that indicate any use of fossil fuels for combustion. Therefore it can be concluded that no emissions from the consumption of the fossil fuel have been generated in the project activity and monitoring of this data is not applicable. This issue should be addressed in subsequent verifications.

During the verification process no significant lacks of evidence were detected, only some editorial mistakes. Hence CAR1 was raised and has been corrected during the verification process.

4.1.3. Accuracy of Emission Reduction Calculations

According to the selected approved methodology (AM0015 version 1), the baseline emission factor (*EFy)* is calculated as a combined margin (*CM*), consisting of the combination of operating margin (OM) and build margin (BM) factors. Determining the build margin and the operating margin emission factors, a project electricity system is defined by the spatial extent of the power plants that can be dispatched without significant transmission constraints. The ex-ante calculated grid emission factor as per registered PDD is fixed with 0.2677 tCO_2e/MWh and this is the value used in the monitoring report /MR2/.

According to the MP and the applied methodology the only parameter that has to be measured and calculated is the electricity supplied to the grid. The electricity meters used are well known and state of the art. Termoelétrica Santa Adélia performs the measurements in the sub-station and the collected data is transferred via remote data transmission. All measured data is collected continuously during the whole monitoring period.

Calculation of the emission reductions is based on validated and registered parameters fixed in the PDD for the Brazilian South-Southeast-Midwest interconnected grid.

4.1.4. Quality of Evidence to Determine Emission Reductions

The key parameter "power output" was measured by calibrated meters. CPFL/Metrowatt Comércio e Manutenção Ltda provided the power meters and is responsible for the calibration.

The verification team got access to all relevant documentation regarding the monitoring of the emission reduction calculation, like:

- technical data of the measuring equipment,
- meter readings by Termoelétrica Santa Adélia,
- confirmation of receipt,
- calibration plan,
- calibration certificate,
- measurement devices stock list,
- quality management system
- calculation spreadsheets.

All these documentation were checked and found to be consistent and of high quality. Furthermore all needed information is traceable and appropriately archived.

All used parameters were of sufficient and appropriate quality to assure an accurate monitoring.

It could be evidenced that the whole monitoring system was fully operational during the entire monitoring period.

4.1.5. Management System and Quality Assurance

The management system for the monitoring of the CDM Project is in place. The organizational structure with the responsibilities has been properly identified. The key parameters are measured and reviewed periodically as per the procedures.

The data of supplied energy is sent to the power utility -CPFL and checked there by competent personnel. CPFL issues a confirmation of receipt every month. Based on this information Termoelétrica Santa Adélia exposes the invoice.

As the plant has installed a Quality Management System ISO 9001:2000 (not certified yet) there are internal audits, management reviews and the utilization of preventive and corrective actions for all the processes, including the energy generation system.

However, the following FAR3 has been raised and needs clarification during next periodic verification:

Forward Action Request 3

The CETESB operation license 40000482 (dt. 2006/06/30) is only valid for 180 days. Thus, for the next monitoring period it has to be checked whether the limitation of this license will be extended before start of seasonal operation.

4.1.6. Summary of Findings and Conclusions

The findings of the Periodic Verification process are summarized in the table 4-2 below.

Table 4-: Periodic Verification Findings

Topic	#					
Remaining issues	.	Classification	☐ CAR	☐ FAR	☐ CR	☒ None
		Findings				
		Corrective Action	-			
		Conclusion	☐ To be checked during next periodic verification ☐ Appropriate action was taken ☐ MR was corrected correspondingly ☐ Appropriate action was **not** taken ☒ The project complies with the requirements			
Completeness of monitoring	**CAR 1**	Classification	☒ CAR	☐ FAR	☐ CR	☐ None
		Findings	The date of the document (version 1) in section A.2. is before the monitoring period and ID number 5 in section B.3. is missing.			
		Corrective Action	Corrections has been done			
		Conclusion	☐ To be checked during next periodic verification ☐ Appropriate action was taken ☒ MR was corrected correspondingly ☐ Appropriate action was **not** taken ☐ The project complies with the requirements			
Accuracy of emission reduction calculations	.	Classification	☐ CAR	☐ FAR	☐ CR	☒ None
		Findings	-			
		Corrective Action	-			
		Conclusion	☐ To be checked during next periodic verification ☐ Appropriate action was taken ☐ MR was corrected correspondingly ☐ Appropriate action was **not** taken ☒ The project complies with the requirements			
determine	'	Classification	☐ CAR	☐ FAR	☐ CR	☒ None

Topic	#		
		Findings	-
		Corrective Action	-
		Conclusion	☐ To be checked du-ring next periodic verification ☐ Appropriate action was taken ☐ MR was corrected correspondingly ☐ Appropriate action was **not** taken ☒ The project complies with the requirements

Management system and quality assurance	**FAR 3**	Classification	☐ CAR	☒ FAR	☐ CR	☐ None
		Findings	The CETESB operation license 40000482 (dt. 2006/06/30) is only valid for 180 days. Thus, for the next monitoring period it has to be checked whether the limitation of this license will be extended before start of seasonal operation.			
		Corrective Action	-			
		Conclusion	☒ To be checked during next periodic verification ☐ Appropriate action was taken ☐ MR was corrected correspondingly ☐ Appropriate action was **not** taken ☐ The project complies with the requirements			

5. PROJECT SCORECARD

Risk Areas		Conclusions			Summary of findings and comments
		Baseline Emissions	Project Emissions	Calculated Emission Reductions	
Completeness	• Source coverage/ boundary definition	✓	✓	✓	All relevant sources are covered by the monitoring plan. The project boundaries are defined correctly and transparently.
Accuracy	• Physical Measurement and Analysis	✓	✓	✓	The key parameters were measured by duly calibrated measurement equipment with a high accuracy.
	• Data calculations	✓	✓	✓	The emission reductions are calculated correctly.
	• Data management & reporting	✓	✓	✓	The procedures and instructions are updated.
Consistency	• Changes in the project	✓	✓	✓	The project has been implemented as described in the PDD. The main power meter has been displaced. All installation and calibration works were carried out acc. to the corresponding procedures.

6. VERIFICATION STATEMENT

Termoelétrica Santa Adélia Ltda has commissioned the TÜV NORD JI/CDM Certification Program to carry out the 2nd periodic verification of the project: *"Termoelétrica Santa Adélia Cogeneration Project"*, with regard to the relevant requirements for CDM project activities. The project reduces GHG emissions by displacement of conventional generated electricity in the Brazilian interconnected grid by renewable power from a bagasse-based cogeneration plant.

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Baseline emissions:	16,747	t CO_{2eq}
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Emission reductions:	**16,747**	**t CO_{2eq}**

Essen, 2007-07-06

Rainer Winter

TÜV NORD JI/CDM Certification Program

Verification Team Leader

7. REFERENCES

Table 7-1: Documents provided by the project proponent

Reference	Document
/**ANEEL**/	ANEEL Resolution number 198, of April 09, 2002 – Giving authorization to Termoelétrica Santa Adélia Ltda to be an independent electrical energy producer, with installed capacity of 42 MW, with an existing 8 MW generator and a new 34 MW generator.
/**CC**/	Calibration Certificate of ELO 2180 SP electronic energy meter.
/**CPFL**/	Confirmation of receipt from CPFL and Invoices of the energy sales
/**DAEE**/	Water Impounding Permit according to DAEE Resolution # 1279, issued on August 11, 2004, valid up to August 11, 2009 – for well #03. Water Impounding Permit according to DAEE Resolution # 152, issued on January 29, 2007, valid up to January 29, 2012 – for well #01.
/**EX**/	Periodic readings of the electricity exported to the grid
/**JMR**/	Joint meter readings
/**MR1**/	Monitoring Report "Termoelétrica Santa Adélia Cogeneration Project" for the period 2003 May 07 to 2006 June 30, version 03, August 03, 2006
/**MR2**/	Draft Monitoring Report "Termoelétrica Santa Adélia Cogeneration Project" for the period 2006 July 01 to 2006 December 31, version 01 – 26th December, 2006 Monitoring Report "Termoelétrica Santa Adélia Cogeneration Project" for the period 2006 July 01 to 2006 December 31, version 02 – 14th May, 2007 Monitoring Report "Termoelétrica Santa Adélia Cogeneration Project" for the period 2006 July 01 to 2006 December 31, version 03 – 5th July, 2007
/**OL**/	CETESB's Operation License #4000482 (2006/06/30) – valid 180 days
/**PDD**/	Final Project Design Document for CDM project "Termoelétrica Santa Adélia Cogeneration Project", registered March 2006
/**VAL**/	Validation Report "Termoelétrica Santa Adélia Cogeneration Project (TSACP)", revision 02, December 22, 2005, issued by DNV Det Norske Veritas
/**VER**/	Verification Report "Termoelétrica Santa Adélia Cogeneration Project" (Brazil), version 01, August 03, 2006, issued by BVQI Bureau Veritas Quality

Reference	Document
	International
/**XLS**/	Emission reduction calculation sheet

Table 7-2: Background investigation and assessment documents

Reference	Document
/**AM** /	AM0015, version 1: "Bagasse-based cogeneration connected to an electricity grid"
/**CPM**/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)
/**KP**/	Kyoto Protocol (1997)
/**MA**/	Decision 17/CP.7 (Marrakech Accords): Guidelines for the implementation of Article 12 of the Kyoto Protocol
/**VVM**/	IETA, PCF Validation and Verification Manual (V. 4)

Table 7-3: Websites used

Reference	Link	Organisation
/**unfccc**/	http://cdm.unfccc.int	UNFCCC

Table 7-4: Interviewed Persons

Reference		Name	Organisation / Function
/**IM01**/	☐ Mr. ☒ Ms.	K. M. Nagai	Ecoinvest, consultant
/**IM01**/	☐ Mr. ☒ Ms.	M. A. Lucas	TSA, Organization psycologist
/**IM01**/	☒ Mr. ☐ Ms.	Mr. L. D. Souza	TSA, Human resource supervisor
/**IM01**/	☒ Mr. ☐ Ms.	Mr. W. J. de Araújo	TSA, Recruitment and training assistant

Reference		Name	Organisation / Function
/**IM01**/	☐ Mr. ☒ Ms.	Mrs. E. C. de Souza	TSA, Human resource analyst
/**IM01**/	☐ Mr. ☒ Ms.	Mrs. I. T. Spina	TSA, Quality assurance coordinator
/**IM01**/	☒ Mr. ☐ Ms.	Mr. J. L. F. Godoy	TSA, Quality assurance coordinator
/**IM01**/	☒ Mr. ☐ Ms.	Mr. J. E. Braz	TSA, Instrumentation electric supervisor
/**IM01**/	☒ Mr. ☐ Ms.	Mr. C. A. Pita	TSA, Vapor generation supervisor
/**IM01**/	☒ Mr. ☐ Ms.	Mr. E. Lima	TSA, Operator

ANNEX

Verification Protocol

ANNEX: VERIFICATION PROTOCOL

Periodic Verification Checklist

Table 1: Data Management System/Controls

Expectations for GHG data management system/controls	Verifiers Comments	Draft Concl.	Final Concl.
1. Defined organisational structure, responsibilities and competencies			
1.1. Position and roles *Position and role of each person in the GHG data management process is clearly defined and implemented, from raw data generation to submission of the final data. Accountability of senior management must also be demonstrated.*	The overall responsibility of the project is with the Superintendent Director, Mr. Bellodi. Mr. Braido is in charge of contract, purchase and sell of energy. Mr. Mazzoco is the process manager. There are two supervisors: Mr. Pita (steam generation) and Mr. Braz (electric maintenance). Mrs. Spina and Mr. Godoy are the quality assurance coordinators. In total, there are 19 persons involved into the steam generation sector, being boiler operator, mechanic and sewer treatment station operator; 4 persons involved in electric maintenance and generation operation.	OK	OK
1.2. Responsibilities *Specific monitoring and reporting tasks and responsibilities are included in job descriptions or special instructions for employees.*	The responsibilities of all the persons related to the project activity are formalized in specific procedures and working instructions. Respective documents were presented to the verification team during the on-site visit.	OK	OK

Expectations for GHG data management system/controls	Verifiers Comments	Draft Concl.	Final Concl.
1.3. *Competencies needed* *Competencies needed for each aspect of the GHG determination process are analysed. Personnel competencies are assessed and training programme implemented as required.*	Competencies needed for each aspect of the GHG determination process are formally defined and training procedures for the monitoring personnel has been documented. Training records have been submitted to the verification team.	OK	OK
2. Conformance with monitoring plan			
2.1. Reporting procedures *Reporting procedures should reflect the monitoring plan content. Where deviations from the monitoring plan occur, the impact of this on the data is estimated and the reasons justified.*	According to the monitoring plan and the applied methodology the only parameter that has to be measured is the electricity supplied to the grid. The electricity meters used are well known and state of the art. During the on-site visit the installation of meters as well as the reporting procedures were evidenced. The monitoring report was developed by ECOINVEST CARBON, which is responsible for the calculations of the emissions reductions, considering the monitoring plan indicated in the PDD. The remaining FARs (FAR 1 and 2) from the previous verification could be resolved. One new FAR has been raised: The CETESB operation license 40000482 (dt. 2006/06/30) is only valid for 180 days. Thus, for the next monitoring period it has to be checked whether the limitation of this license will be extended before start of seasonal operation according to operational licenses. The following CAR has been raised and could be	OK FAR3	OK FAR3

Expectations for GHG data management system/controls	Verifiers Comments	Draft Concl.	Final Concl.
	corrected during the verification process: The date of the document (version 1) in section A.2. is before the monitoring period and ID number 5 in section B.3. is missing.	~~CAR1~~	OK
2.2. Necessary Changes *Necessary changes to the monitoring plan are identified and changes are integrated in local procedures as necessary.*	No changes to the monitoring plan are identified.	OK	OK
3. Application of GHG determination methods			
3.1. Methods used *There are documented description of the methods used to determine GHG emissions and justification for the chosen methods. If applicable, procedures for capturing emissions from non-routine or exceptional events are in place and implemented.*	The GHG emissions have been determined according to AM0015, version 1 – "Bagasse-based cogeneration connected to an electricity grid". The energy supplied to the grid is recorded by reading of the meter located at the sugar mill's substation. In case of failure of the main meter, the measurement will be done by the backup meter. The electricity exported to the grid is multiplied with the predetermined carbon emission factor (as per registered PDD) to result in the actual emissions reductions. There is an internal control system installed by the sugar mill. A daily control is done by comparing the data of the supervision system with the meter readings.	OK	OK

Expectations for GHG data management system/controls	Verifiers Comments	Draft Concl.	Final Concl.
3.2. Information/process flow *An information/process flow diagram, describing the entire process from raw data to reported totals is developed.*	The total energy generated by the mill and its distribution to the power utility-CPFL is given in monthly tables. The procedure for recording the power exported to the grid has been indicated in the Power Purchase Agreement. The monitoring report includes the monitoring of the power supplied to the grid, the emission factor used and the calculations of the emissions reductions.	OK	OK
3.3. Data transfer *Where data is transferred between or within systems/spreadsheets, the method of transfer (automatic/manual) is highlighted - automatic links/updates are implemented where possible. All assumptions and the references to original data sources are documented.*	The procedure for recording the power exported to the grid has been indicated in the Power Purchase Agreement. From June 01, 2006 to December 31, 2006, the measurements of the energy exported to the grid were done by means of ELO 2180SP meter of the power utility-CPFL. Termoelétrica Santa Adélia performs the measurements in the sub-station. The data of supplied energy is sent to the power utility -CPFL and checked there by competent personnel. CPFL issues a confirmation of receipt every month. Based on this information Termoelétrica Santa Adélia exposes the invoice. The internal validation of the data is carried out by the QA Coordinators and the responsible person for the applied software PINSPI. Based on the checked data the emission reductions are calculated.	OK	OK

Expectations for GHG data management system/controls	Verifiers Comments	Draft Concl.	Final Concl.
3.4. Data trails *Requirements for documented data trails are defined and implemented and all documentation are physically available.*	The requirements for documented data traceability are fulfilled and tested on a random sample basis during the site visit.	OK	OK
4. Identification and maintenance of key process parameters			
4.1. Identification of key parameters *The key physical process parameters that are critical for the determination of GHG emissions (e.g. meters, sampling methods) are identified.*	The key parameter with significant influence on the calculation of emission reductions is the power output. This parameter was measured with high accuracy by calibrated meters during the 2nd monitoring period.	OK	OK
4.2. Calibration/maintenance *Appropriate calibration/maintenance requirements are determined.*	The local power utility-CPFL is responsible for the calibration of the electronic meters. The meters are calibrated by CPFL/Metrowatt Comércio e Manutenção Ltda. A calibration certificate (#6MW7070) of the main meter (ELO2180SP serial number 40072316-6), dated 2006/02/24, was presented to the verification team. In January 2007 Termoelétrica Santa Adélia changed the main meter (ELO 2180SP serial number 40080015-2) and the backup meter (ELO 2180SP serial number 40074502-0). For both meters calibration certificates were presented (main meter: #7MW02018 issued 2007/01/19, backup meter: #6MW12136 issued 2007/01/19). The calibration is also validated by Termoelétrica Santa Adélia. The calibration interval is kept during the 2nd monitoring period.	OK	OK

Expectations for GHG data management system/controls	Verifiers Comments	Draft Concl.	Final Concl.
5. GHG Calculations			
5.1. Use of estimates and default data *Where estimates or default data are used, these are validated and periodically evaluated to ensure their ongoing appropriateness and accuracy, particularly following changes to circumstances, equipment etc. The validation and periodic evaluation of this is documented.*	The key parameter power output was measured. The emission factor was fixed ex-ante at the real stage, according to AM0015.	OK	OK
5.2. Guidance on checks and reviews *Guidance is provided on when, where and how checks and reviews are to be carried out, and what evidence needs to be documented. This includes spot checks by a second person not performing the calculations over manual data transfers, changes in assumptions and the overall reliability of the calculation processes.*	An internal auditing procedure is in place. The responsible persons are aware about the accuracy requirements for the data. Moreover a comparison of both metering systems was carried out in order to determine the accuracy, consistency and correctness of the measured values (see also comment 3.3).	OK	OK
5.3. Internal validation and verification *Internal verifications include the GHG data management systems, to ensure consistent application of calculation methods.* *Data reported from internal departments should be validated visibly (by signature or electronically) by an employee who is able to assess the accuracy and completeness of the data. Supporting information on the data limitations, problems should also be included in the data trail.*	The internal verification is accomplished at the plant manager level. Adequate evidences were provided to the verification team.	OK	OK

Expectations for GHG data management system/controls	Verifiers Comments	Draft Concl.	Final Concl.
5.4. Data protection measures *Data protection measures for databases/spreadsheets should be in place (access restrictions and editor rights).*	The key parameters are being measured and recorded in the respective documents/ registers in electronic and paper form. All software solutions are protected with standard PC protection measures and work within the limitation of user authorisation.	OK	OK
5.5. IT systems *IT systems used for GHG monitoring and reporting should be tested and documented.*	The IT system is based on standard PC solutions. All calculations necessary for purpose of emissions reduction monitoring can be done on the basis of MS – Excel (or comparable solutions), as well as with a special software (PINSPI), as intern control for data collected. See comment 5.4.	OK	OK

Periodic Verification Checklist Table 2: GHG calculation procedures and management control testing / Detailed audit testing of residual risk areas and random testing

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks	Additional verification testing performed	Conclusions and Areas Requiring Improvement (including *Forward Action Requests*)
Raw data generation				
• Installation of measuring equipment • Dysfunction of installed equipment • Maloperation by operational personnel • Downtimes of equipment • Exchange of equipment • Capacity additions • Change of technology	• Installation of modern and state of the art equipment • On line meter readings / independent counter-checks • Regular visual inspect-ions of installed equip-ment • Only skilled and trained personnel operates the relevant equipment • Immediate exchange of dysfunctional equipment • Stand-by duty is organized • Training • Internal counterchecks	• Capacity additions • Inadequate installation / operation of the monitoring equipment. • Inadequate exchange of equipment. • Change of personnel • Undetected measurement errors	• Check of equipment • Check of technical data sheets • Site – visit • Counter-check of meter readings and commercial data	• **OK**

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks	Additional verification testing performed	Conclusions and Areas Requiring Improvement (including *Forward Action Requests*)
Raw data collection				
• Metering records • Operational log sheets • Calibration and maintenance data • Accuracies • Manuals and other manufacturer data • Accounting records	• Exclusive installation and operation of duly calibrated equipment • Cross-check of data • Redundant manual meter readings • Appropriate archiving system • Appointment of competent external measurement institutes for calibration holding the corresponding accreditations • International as well as national calibration standards • Clear allocation of responsibilities	• Unintended usage of old data that has been revised • Incomplete documentation • Ex-post corrections of accounting records • Ambiguous sources of information	• Check of calibration records • Check of individual (raw data) figures	**OK**

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks	Additional verification testing performed	Conclusions and Areas Requiring Improvement (including *Forward Action Requests*)
Data aggregation				
• IT Systems • Spread sheet programming • Manual data transmission • Data protection • Responsibilities	• Clear allocation of responsibilities • Usage of standard software solutions (Spreadsheets) • Limited access to IT systems • Data protection procedures	• Manual data transfer mistakes • Unintended change of spread sheet programming or data base entries • Problems caused by updating/upgrading or change of applied software	• Check of data aggregation • Counter-calculation	**OK**
Other calculation parameters				
• Data sources • Emission factors • Accuracies	• Ex ante calculation of baseline • All used values and data sources applied are defined in the monitoring plan.	• No significant residual risks	• No significant uncertainties or errors regarding the other calculation parameters were observed in the course of this verification.	• **OK**

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks	Additional verification testing performed	Conclusions and Areas Requiring Improvement (including *Forward Action Requests*)
Calculation Methods				
• Calculation approach • Applied formulae • Lack of clarity in the monitoring plan	• Appropriate IT and archiving system • Usage tested Excel spreadsheets	• The danger of miscalculation can only be minimized.	Countercheck on the basis of own calculation.	• **OK**
Monitoring reporting				
• Data transfer to the author of the monitoring report • Issuance of the monitoring report	• An experienced consultant is responsible for monitoring reporting	• The danger of data transfer mistakes can only be minimized	• Counter check with evidence provided.	• **OK**