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# VERIFICATION / CERTIFICATION REPORT

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## “LAGES METHANE AVOIDANCE PROJECT” IN BRAZIL

UNFCCC REGISTRATION REF. No. 0268

MONITORING PERIOD:  
1 JUNE 2008 TO 31 MAY 2009

REPORT No.2010-0248

REVISION No. 01

DET NORSKE VERITAS



## VERIFICATION / CERTIFICATION REPORT

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Summary:  
 DNV Climate Change Services AS (DNV) has performed the verification of the emission reductions reported for the "Lages Methane Avoidance Project" in Brazil (UNFCCC Registration Ref. No. 0268) for the period 1 June 2008 to 31 May 2009.

In our opinion, the GHG emission reductions reported for the project in the monitoring report version 3 of 16 June 2011 are fairly stated.

The GHG emission reductions were calculated correctly on the basis of the approved monitoring methodology AMS-III.E., version 7 and the monitoring plan and formulae given in the approved revised Project Design Document of February 2011. /3/

Hence DNV is able to certify that the emission reductions from the "Lages Methane Avoidance Project" in Brazil during the period from 1 June 2008 to 31 May 2009 amount to 157 914 tonne of CO<sub>2</sub> equivalent.

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**Abbreviations**

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction(s)
CH <sub>4</sub>	Methane
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
ERU	Emission Reduction Units(s)
FAR	Forward Action Request
FATMA	Fundação do Meio Ambiente do estado de Santa Catarina (Santa Catarina State Environment Foundation)
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
INMETRO	Instituto Nacional de Metrologia, Normalização e Qualidade Industrial (Metrology National Institute)
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring 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 for Climate Change



## 1 INTRODUCTION

Lages Bioenergética Ltda has commissioned DNV Climate Change Services AS (DNV) to carry out the verification and certification of emission reductions reported for the “Lages Methane Avoidance Project” for the period 1 June 2008 to 31 May 2009. This report contains the findings from the verification and a certification statement for the certified emission reductions.

### 1.1 Objective

Verification is the periodic independent review and *ex post* determination by a Designated Operational Entity (DOE) of the monitored reductions in GHG emissions that have occurred as a result of the registered CDM project activity during a defined verification period.

Certification is the written assurance by a DOE that, during a specific period in time, a project activity achieved the emission reductions as verified.

The objective of this verification was to verify and certify emission reductions reported for the “Lages Methane Avoidance Project” for the period 1 June 2008 to 31 May 2009.

### 1.2 Scope

The scope of the verification is:

- To verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan.
- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement.
- To verify that the reported GHG emission data is sufficiently supported by evidence.

The verification shall ensure that reported emission reductions are complete and accurate in order to be certified.

### 1.3 Description of the Project Activity

Project Parties:	Brazil, Japan, Canada, Finland, France, Germany, Netherlands, Norway, United Kingdom of Great Britain and Northern Ireland, Sweden and Switzerland.
Title of project activity:	“Lages Methane Avoidance Project”
UNFCCC registration No:	0268
UNFCCC registration date:	23 April 2006
Baseline and monitoring methodology	AMS-III.E., version 7
Project participants:	Lages Bioenergética Ltda and Tractebel Energia S.A. from Host Party Brazil, Bunge Emission Fund Limited from Switzerland, Government of Canada - Ministry of Foreign



Affairs & International Trade from Canada, Government of Finland - Ministry for Foreign Affairs of Finland; Fortum Corporation from Finland, GDF SUEZ from France, RWE Power AG from Germany, Chubu Electric Power Co., Inc.; Japan International Cooperation Agency (JICA); Kyushu Electric Power Co., Inc.; MIT Carbon Fund Co., Ltd.; Mitsubishi Corporation; Shikoku Electric Power Co., Inc.; Tohoku Electric Power Co., Inc.; The Tokyo Electric Power Co., Inc.; The Chugoku Electric Power Co., Inc. from Japan, Electrabel N.V.; The State of the Netherlands, acting through the Netherlands' Ministry of Housing, Spatial Planning and the Environment (VROM) from the Netherlands, Norsk Hydro ASA; Government of Norway - Ministry of Foreign Affairs; StatoilHydro ASA from Norway, BP Alternative Energy International Ltd.; Deutsche Bank AG from United Kingdom of Great Britain and Northern Ireland, and Government of Sweden-Swedish Energy Agency from Sweden.

Crediting period: 1 November 2004 to 31 October 2014

Period verified in this verification: 1 June 2008 to 31 May 2009

Location of the project activity: The project activity is located in the Lages municipality, Brazilian South region, State of Santa Catarina in Brazil.

## 1.4 Methodology for determining emission reductions

The project is in operation since 23 December 2003 by Lages Bioenergética Ltda., a Special Purpose Company fully owned by Tractebel Energia S.A., specially constituted to build, operate and maintain the “Lages Methane Avoidance Project”. The project activity avoids methane emissions from anaerobic digestion in stockpiles (biomass decay) through controlled combustion in a cogeneration process, which simultaneously generates electricity and thermal energy (steam). The project activity claims emission reductions from the methane avoidance and not for the electricity or heat generated.

The electricity generated is supplied to the local distribution company and some individual industrial customers, and the thermal energy is supplied to industrial clients in the vicinity of the projects.

The project was implemented as planned and this verification is the fourth verification and covers the monitoring period from 1 June 2008 to 31 May 2009.

The project during the conceptualisation stages envisaged the main suppliers of the wood waste to be the neighbouring wood industries of Battistella (38%) and Sofia (16%), and other distant suppliers on open market (46%).

During the current verification period, Battistella and Sofia reached its lowest level. Sofia did not deliver wood to the project and Battistella delivered only 4 253 tonne (0% and 1.78% of the purchased wood, respectively) in the period of 1 June 2008 to 31 May 2009.



Battistella and Sofia used the wood waste to generate thermal energy in the baseline and this quantity of thermal energy is now being supplied by the project plant. Hence, the baseline emissions consider that 32 640 tonne/year of wood waste from Battistella and 14 400 tonne/year of wood waste from Sofia would be combusted also in absence of the project activity. This is the amount that was previously burned by Battistella and Sofia in their old boilers before the Lages Project, as registered in the PDD (i.e. if Sofia was operating, 14 400 tonne would be combusted per year, and this amount would be discounted. If Battistella was operating, 32 640 tonne would be combusted per year, and this amount would be discounted).

The baseline also considers the spontaneous burning of wood waste in piles on the premises of Battistella, (pile has a depth of more than 5 meters) due to internal oxidation reaction. Hence, 1% of the wood waste supplied by Battistella is considered to be burnt also in absence of the project and discounted from the wood waste consumed in the year. These assumptions were validated and are conservative.

Battistella has a large old landfill of wood waste biomass, which reaches more than 5 meters depth, and was hence considered a unmanaged deep solid-waste disposal site, whereas the wood waste biomass for Sofia and spot market was considered unmanaged shallow solid-waste disposal site.

The emission factors were in the monitoring plan to be monitored annually and hence the emission factor was determined *ex-post* as 0.1147 tCH<sub>4</sub>/t for Battistella, 0.0573 tCH<sub>4</sub>/t for the Sofia and the spot market. This is lower than the estimated emission factor in the registered PDD (0.1232 and 0.0616 tCH<sub>4</sub>/t, respectively) and this is due to reduced degradable organic carbon fraction dissimilated into landfill gas and higher degradable organic carbon in wood and wood production in IPCC2006 compared to IPCC1996.

The amount of wood waste biomass received is measured through a calibrated truck scale at the entrance of Tractebel-Lages facilities and checked with the purchase receipts. The baseline emissions are calculated using the amount of biomass measured by the dynamic scale at the entrance of boiler of Tractebel-Lages. Because the condition of different MCF for Battistella wood waste biomass, the amount of carbon emission reduction due Battistella is calculated proportionally, considering the percentage of wood waste biomass from Battistella, through analysis of the delivery receipts.

Baseline emission due to methane avoidance are determined in line with AMS-III.E. (Version 7), and corresponds to the product of a) quantity of biomass used in the project activity ( $Q_{\text{biomass}}$ ) b) default IPCC value for emission factor for decaying biomass (CH<sub>4</sub>\_IPCC\_decay, which is 0.1232 tCO<sub>2</sub>e/tCH<sub>4</sub>) in the region of the project and c) the GWP of methane (21 tCO<sub>2</sub>e/tCH<sub>4</sub>). According to the revised PDD, 47 040 tonne (32 640 tonne from Battistella and 14 400 tonne from Sofia) of biomass consumed yearly in the baseline scenario are discounted from the total biomass consumed in the monitoring period to obtain  $Q_{\text{biomass}}$ .

The project emissions due to the project activity are calculated by the formulae  $Q_{\text{biomass}} * E_{\text{biomass}} * [(CH_{4\text{bio\_comb}} \times GWP_{\text{CH}_4}) + (N_2O_{\text{bio\_comb}} \times GWP_{\text{N}_2O})]/10^6$ , where  $Q_{\text{biomass}}$  corresponds to the amount of biomass consumed in the project activity,  $E_{\text{biomass}}$  is the energy content of biomass (0.007746 TJ/tonne as per UNIPLAC /19/ study),  $CH_{4\text{bio\_comb}}$  and  $N_2O_{\text{bio\_comb}}$  are the CH<sub>4</sub> emission factor (30 kgCH<sub>4</sub>/TJ as per specific IPCC default value to energy industry) and N<sub>2</sub>O emission factor for biomass and waste combustion (4 kgN<sub>2</sub>O/TJ as per AMS-III.E version 07).



The GWP of CH<sub>4</sub> is 21 tonne CO<sub>2</sub>e/tonne CH<sub>4</sub> and the GWP of N<sub>2</sub>O is 310 tonne CO<sub>2</sub>e/tonne N<sub>2</sub>O. Except for the Q<sub>biomass</sub> all other parameters are fixed *ex-ante* in the registered PDD.

Associated to the project, there are also leakage emissions from emissions from on-site wood waste transportation and from off-site wood waste transportation and ash transportation.

The leakage emissions from on-site wood waste transportation are calculated by the formulae  $Q_{\text{diesel}} \cdot D_{\text{diesel}} \cdot (\text{VEF\_CO}_2 + \text{VEF\_CH}_4 \cdot \text{CH}_4\_GWP + \text{VEF\_N}_2\text{O} \cdot \text{N}_2\text{O\_GWP}) / 10^6$ , where  $Q_{\text{diesel}}$  corresponds to the amount of diesel consumed in the project activity per year,  $D_{\text{diesel}}$  corresponds to the density of the diesel oil (880 kg/m<sup>3</sup> as per Brazilian Petroleum Agency), VEF\_CO<sub>2</sub> is the CO<sub>2</sub> emission factor for trucks (3 172.31 kgCO<sub>2</sub>/tonne as per IPCC default values), VEF\_CH<sub>4</sub> is CH<sub>4</sub> emission factor for trucks (0.18 kgCH<sub>4</sub>/tonne as per IPCC default values) and VEF\_N<sub>2</sub>O is N<sub>2</sub>O emission factor for trucks (0.09 kgN<sub>2</sub>O/tonne as per IPCC default values).

The leakage emissions from off-site wood waste transportation are calculated by the formulae  $Q_{\text{C}_{\text{biomass}}} / \text{TC}_{\text{biomass}} \cdot \text{AVD}_{\text{biomass}} \cdot (\text{VEF\_CO}_2 + \text{VEF\_CH}_4 \cdot \text{CH}_4\_GWP + \text{VEF\_N}_2\text{O} \cdot \text{N}_2\text{O\_GWP}) / 10^6$ , where  $Q_{\text{C}_{\text{biomass}}}$  corresponds to the amount of biomass consumed in the project activity per year,  $\text{TC}_{\text{biomass}}$  corresponds to the truck average capacity for biomass transportation (10 tonne),  $\text{AVD}_{\text{biomass}}$  is the average round trip distance to biomass supply sites (5.2 km); VEF\_CO<sub>2</sub> is the CO<sub>2</sub> emission factor for trucks (1 097 kgCO<sub>2</sub>/km as per IPCC default values), VEF\_CH<sub>4</sub> is CH<sub>4</sub> emission factor for trucks ( $6.05 \cdot 10^{-5}$  kgCO<sub>2</sub>/km as per IPCC default values) and VEF\_N<sub>2</sub>O is N<sub>2</sub>O emission factor for trucks ( $3.1 \cdot 10^{-5}$  kgN<sub>2</sub>O/km as per IPCC default values).

The leakage emissions from ash transportation are calculated by the formulae  $Q_{\text{ash}} / \text{TC}_{\text{ash}} \cdot \text{AVD}_{\text{ash}} \cdot (\text{VEF\_CO}_2 + \text{VEF\_CH}_4 \cdot \text{CH}_4\_GWP + \text{VEF\_N}_2\text{O} \cdot \text{N}_2\text{O\_GWP}) / 10^6$ , where  $Q_{\text{ash}}$  corresponds to the amount of ash produced by the project activity per year,  $\text{TC}_{\text{ash}}$  corresponds to the truck average capacity for ash transportation (28 tonne),  $\text{AVD}_{\text{ash}}$  is the average round trip distance to disposal sites (680 km); VEF\_CO<sub>2</sub> is the CO<sub>2</sub> emission factor for trucks (1 097 kgCO<sub>2</sub>/km as per IPCC default values), VEF\_CH<sub>4</sub> is CH<sub>4</sub> emission factor for trucks ( $6.05 \cdot 10^{-5}$  kgCO<sub>2</sub>/km as per IPCC default values) and VEF\_N<sub>2</sub>O is N<sub>2</sub>O emission factor for trucks ( $3.1 \cdot 10^{-5}$  kgN<sub>2</sub>O/km as per IPCC default values).





## 2 METHODOLOGY

The verification of the emission reductions has assessed all factors and issues that constitute the basis for emission reductions from the project. These reductions were assessed for the methane avoidance of wood waste biomass, and included:

- i) Lages emission reduction spreadsheet of 2008 and 2009 with the amount of wood waste biomass purchased and consumed by the boiler, including the average distance of wood waste biomass transport, distance of ash transport to the disposal site and the consumption of diesel oil on internal transport of wood waste biomass;
- ii) List of delivery receipts of biomass bought by Lages Bioenergética Ltda from Battistella, Sofia and suppliers on the open market from June 2008 to May 2009 /11/;
- iii) Monthly report of wood waste biomass consumed as fuel on boiler/turbo generator set from June 2008 to May 2009 /12/;
- iv) Calibration certificates of scales /13//14//15/;

### *Verification team*

The verification team consisted of the following personnel:

<i><b>Role/Qualification</b></i>	<i><b>Last Name</b></i>	<i><b>First Name</b></i>	<i><b>Country</b></i>	<i><b>Type of involvement</b></i>					
				Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	TA 13.1 competence
GHG auditor (applicant)	Baines	Gabriel	Brazil	x	x	x			
CDM verifier / Technical team leader	Antunes	Felipe	Brazil	x	x	x	x		x
Sector Expert	Tavares	Luis Filipe	Brazil	x		x			x
Technical reviewer	Brinks	Hendrik	Norway					x	x
Technical reviewer (applicant)	Wong	Simon	Malaysia					x	x
Technical reviewer (applicant)	Govindarajulu	Murali	India					x	
Technical reviewer (applicant)	Godinez	Gloria	Mexico					x	x

### *Duration of verification*

Monitoring report publication:	04 February 2010
Preparations:	05 February 2010
On-site verification:	08 – 09 February 2010
Reporting/QA:	09 February 2010 – 20 June 2011



## 2.1 Review of Documentation

The monitoring report of 16 June 2011 /1/ corresponding to the emission reductions for the period of 1 June 2008 to 31 May 2009 was assessed with the following support documentation: a) Lages emission reduction spreadsheet of 2008 and 2009 /10/, b) List of delivery receipts of biomass bought by Lages Bioenergética Ltda from Battistella, Sofia and suppliers on open market from June 2008 to May 2009 /11/, c) Monthly report of diesel consumption as fuel on boiler/turbo generator set and on-site transportation from June 2008 to May 2009 /12/, d) Operating Environmental License, issued by FATMA /5/

In addition, the project's Project Design Documents (PDD), versions 1 /4/ and 3 /3/, in particular the monitoring plan contained in the PDDs, the validation report (DNV Report No. 2005-0935, Rev 3 of 14 February 2006 /6/), the previous verification reports No. 2006-1233 Rev 1 of 25 August 2006 /7/, report No. 2007-1084 Rev 1 of 17 September 2007 /8/, and report No. 2008-112 Rev 1a of 29 July 2009 /9/ were assessed.

## 2.2 Site Visit

On 08 – 09 February 2010, DNV carried out a site visit at Lages Bioenergética Ltda in Lages municipality, Santa Catarina State. During the visit, DNV verified that the actual implementation of the project was as described in the PDD.

On-site inspection included review of performance records, interviews with assistant plant manager, operations and maintenance personnel, confirming all data sources and constants used in the monitoring report.

## 2.3 Assessment

The verification of reported data was carried out by means of reviewing the project documentation specifically the monitoring report for the period 1 June 2008 to 31 May 2009 the registered PDD of 21 September 2005 and the revised PDD of February 2011 - accepted by the EB on 30 March 2011 - and was carried out by means of:

- Verification of compliance of the monitoring plan through the verification of the calibrations of the feeding treadmill and effectiveness of consumption of biomass /13//14//15/, i.e. that all consumed biomass is fed into the boiler.
- Checking of report of Lages emission reduction spreadsheet of 2008 and 2009 with the amount of wood waste biomass purchased and consumed on the boiler, including the average distance of wood waste biomass transport, and the consumption of diesel oil on internal transport of wood waste biomass, and transport of ash to landfill of Jorge Lacerda Thermoelectric Power Plant in Capivari de Baixo municipality (until July 2008) and other locations in Lages Region (from August 2008 onwards) /10/.
- Checking of the list of delivery receipts of biomass bought by Lages Bioenergética Ltda from Battistella, Sofia and suppliers of biomass on the open market from June 2008 to May 2009 /11/. Samples were taken to verify the compliance of the biomass supplies with the commercial legislation. Measurements of truck capacity were witnessed at the site when new loads were being delivered. The scale used to weigh the trucks and biomass from open market mills is calibrated by INMETRO.



- Checking of the monthly report of wood waste biomass consumed as fuel on boiler/turbo generator set from June 2008 to May 2009 /12/;
- Determination of the accuracy of the GHG emissions reduction calculations and effectiveness of data quality assurance and control.
- During the site visit the DNV has verified the use of renewable biomass analysing samples of the biomass invoices, checking the results of the laboratory analysis used to evaluate the biomass heating value and performing visual inspections in the wood waste inventory of the project.
- Location of stockpiles of wood waste and ashes were verified and photographed at the site.

Details of all findings are recorded in the verification protocol in Appendix A to this report.

## 2.4 Reporting of Findings

Findings established during the verification may be that:

- i) the verification is not able to obtain sufficient evidence for the reported emission reductions or part of the reported emission reductions. In this case these emission reductions shall not be verified and certified;
- ii) the verification has identified material misstatements in the reported emission reductions. Emission reductions with material misstatements shall be discounted based on the verifier's *ex-post* determination of the achieved emission reductions.

A corrective action request (CAR) is issued, where:

- i. Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- ii. Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- iii. Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants.

A clarification request (CL) shall be raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

A forward action request (FAR) is issued for actions if the monitoring and reporting require attention and/or adjustment for the next verification period or an adjustment of the monitoring plan (MP) is recommended. As a consequence, such aspects should receive a special focus during the next consecutive verification.

The verification was able to verify that the GHG emission reductions reported for the project in the monitoring report of 16 June 2011 are fairly stated. Two Corrective Action Requests (CAR) were identified. No Forward Action Requests (FAR) were identified. One Clarification Request (CL) was identified regarding typing errors of calibration certificates, which were corrected in a new version of the monitoring report, dated 16 June 2011.



### 3 VERIFICATION FINDING

This section summarises the findings from the verification of the emission reductions reported for the “Lages Methane Avoidance Project” in Brazil for the period 1 June 2008 to 31 May 2009.

#### 3.1 Remaining Issues, FARs from Previous Validation or Verification

No previous FAR were identified with regards to remaining issues from the third verification report.

#### 3.2 Project Implementation

The project was implemented as described in the PDD and consists of a boiler AZ 200 MAX manufactured by Dedini with capacity of 120 tonne/h steam, feed with wood waste biomass, and a generator manufactured by Alston Power Brasil Ltda, Model SGHW 1250 C4 BA with capacity of 28 MW, at 13.8 kV. The boiler has installed a scrubber system in the stack to remove suspended particulate matter. The ash sludge from the scrubber was sent, until July 2008, to landfill of Jorge Lacerda Thermoelectric Power Plant on Capivari de Baixo municipality, 680 km way (round trip), and from August 2008 onwards, to other locations in Lages Region, nearer to the project site.

Since 2006, many wood industries that export their production in the Lages region have faced an economic crisis which has obliged them to reduce or even to interrupt their activities. This was the specific case for Sofia and Battistella wood industries, two of the main wood residues suppliers of the Lages Methane Avoidance Project. During the present monitoring period, the supply of wood waste for the project suffered changes due to the influence of US dollars currency and the operation of the Battistella and Sofia wood mill operations. The wood waste supply from these two mills got reduced (after reduction of baseline quantities) and currently most the wood waste (98.22%) is sourced from more distant suppliers. Only 1.78% - the fraction bought from Battistella in 2008 - was from small distances. These amounts represent 79.53% of the total biomass consumed in the monitoring period of 1 June 2008 to 31 May 2009, and 20.47% was composed of “torettes”.

Sofia closed down its activities in September 2007 and therefore no waste wood has been obtained from this mill in the monitoring period. During the monitoring period the amount of wood waste supplied by Battistella reached only 4 253 tonne, less than the validated amount of baseline consumption – therefore Battistella contribution is null and hence no biomass supplied from Battistella was considered for emission reductions, but considered for estimating project emissions calculations. This situation has triggered, in 2008, an increasing and unexpected demand of wood residues from the spot market in order to secure the project activity with the necessary amount of fuel to produce and deliver energy to the grid and honor the PPAs signed with regional distribution companies.

Also, the baseline considers the spontaneous burn of wood waste biomass on the Battistella pile, due to oxidation internal reaction, the amount of 1% is discounted from the amount of waste biomass available to use as fuel on boiler.

The boilers and turbo generator control system is automated and assure continuous operation, but because of the situation of Battistella and Sofia, the steam produced at the project is no longer



delivered to these two industries. When both industries are not operating, the steam is used only to produce electricity, which is sold to the local distribution company and/or to industrial clients.

A Notification of Change /24/ in the PDD was sent to the Executive Board and approved on 30 March 2011 regarding a change in the project activity related to the additional use of fine branches smaller than 15 cm diameter (called “torettes”) as wood waste to generate electricity to be supplied to the Brazilian grid and steam to be supplied to the wood industries Batistella and Sofia. The registered PDD did not envisage the use of this kind of wood waste and no methane avoidance can be claimed from the anaerobic digestion of this wood waste variety. The revised PDD /3/ also clarified that when both industries are not operating, the steam is used to produce electricity, which is sold to the local distribution company and/or to industrial clients.

The bulk of the wood waste bought (98.22%) was sourced from the open market and needs to be transported over large distances by trucks, only 1.78% - the fraction bought from Battistella - was from small distances. The truck transportation represents the leakage of the project and was considered at 0.002787 and 0.003106 tonne CO<sub>2</sub>/tonne biomass transported in 2008 and 2009 respectively, considering the weight average round trip distance to biomass supply sites of 39.5 km in 2008 and 45.1 km in 2009, weight average truck capacities of 15.7 tonne in 2008 and 16.1 tonne in 2009 and wood sourced based on the supply receipts.

In addition to the normal wood waste from more distant suppliers, the project also sourced and used tree branches (the “torettes”), contributing with 20.47% of the total amount of biomass on a weight basis in the monitoring period. However, since this is not disposed to anaerobic decay in the baseline, the monitoring report excluded this quantity for baseline emission and included for the leakage and calculation of project emissions, in line with the revised PDD version 03.

The baseline emissions will be reduced compared to the baseline emissions forecasted in the original PDD. The use of fine branches from the regular thinning of planted pinus (“torete”) was not foreseen in the original PDD.

The fraction of fine branches is not fixed for the crediting period and varies in accordance with market conditions (i.e.; availability of normal residues and price of the fine branches). Moreover, since the use of the fine branches as an additional wood residue in the cogeneration facility is a recent activity in the cogeneration plant’s operational history, the baseline emission was reduced proportionally to the average use of fine branches in the last 4 years (since the beginning of the practice of using this wood waste variety). Based on the consumption levels of the fine branches over the total cogeneration plant’s consumption of biomass residues, an average of 10% has been defined for recalculating the baseline emission reductions forecasted in the original PDD. Considering that short period of analysis (only 4 years), this amount cannot be considered permanent and may present yearly variations as a result of market conditions. For instance, in the case that Sofia and Batistella return to operate, reaching the original industrial production, the fine branches might not to be used and the baseline emissions foreseen in the original PDD might be achieved again.

Although, the fine branches are not considered in the determination of the baseline (MCF=0), the use of this biomass residues have been conservatively included in the calculation of project emissions without changing the estimations on the original PDD

As verified by DNV, the impacts that USD devaluation had in wood supplying market in 2008 has triggered a modification of purchasing activities of the Lages Project. The reduction in the wood residues amount available kept the spot market wood residues prices high and required an



alternative to assure a continuous provision of residues for project's operation. Two options available for the purchasing of wood residues from: (a) some more distant suppliers (since the lower wood waste prices from these suppliers compensated the higher transportation costs) and (b) suppliers of "torettes". These branches are provided from spot market suppliers that are in the same region covered by the remaining suppliers. Since these branches would be left in the forests, no methane avoidance is considered.

The monitoring report of 16 June 2011 identifies a list of supplier of biomass around the Lages facilities. Lages get wood waste from 148 open market suppliers. 34 suppliers were responsible by 95% of total additional demand and 114 suppliers responsible by the others 5%.

During the site visit the DNV confirmed that the waste wood biomass used by the project consisted mainly of bark, saw dust and small wood pieces from the renewable *pinus* forests, the main raw material for wood industry of Santa Catarina State, supplied by the Battistella and specially by the open market suppliers mentioned above, through visual inspections in the wood waste inventory of the project.

In addition, it has checked the use of renewable biomass through analysing reports of the biomass invoices, especially from the 148 open market suppliers mentioned above, which supplied wood wastes during this monitoring period. The identification of wood waste and respective results of the laboratory analysis used to evaluate the biomass heating values, and it was confirmed that Lages Project uses only wood waste from renewable biomass, specifically from *pinus* (*pinus taeda* and *pinus elliottii*). a specie used in reforested plantations in the Lages region. Additionally, the use of native species is constantly assessed by the state environmental authority (called FATMA) forbidding the use of non-renewable biomass in the region /18/.

Even though the baseline of the biomass residues were fixed during validation DNV confirmed it by assessing some of the wood industries around the Lages during the site visit, and was capable to confirm the situation of dumping wood waste and leaving it for decay as evidenced by significant areas with sawdust mill and bark dumped inside areas of wood facilities. This waste wood could not be used in the project due to its advanced state of rottenness. This was also evidenced by the aerial pictures /16/. In addition, DNV could assess some public documents about the restriction of wood products exportation, and the reduction of industrial activity due country currency restrictions /17/ /18/.

Furthermore, the project was registered 23 April 2006, i.e. before the requirement from EB28 in December 2006 to annually monitor competing use of biomass and establish a 25% excess of biomass. From the project operation and the implementation of logistics systems to the wood waste transportation (initially a barrier), as expected, was created a wood waste local market originally not existent, giving a better destination to the residues, aggregating value to them, attracting other wood waste consumers to the Lages region and completely changing the original scenario used as baseline. This is the reason to the increase of the number of suppliers in the open market. Hence, and also considering that the Attachment C (*General guidance on leakage in biomass project activities*) was not yet adopted at the time the Lages Project was submitted for registration and the baseline scenario shall be defined only *ex-ante* at the beginning of each crediting period, it is possible to conclude that in the absence of the project activity, at least 276 000 tonne/year would have been left to decay in the Lages region, not being necessary to verify each wood waste supplier separately. As the total wood waste consumed by Lages Project in this monitoring period (01 June 2008 to 31 May 2009 - equivalent to 1 year) was 238 802 tonne and





79.53% of this amount is the waste wood without branches. Thus 189 919 tonne would have been piled and left to decay in the absence of the project.

### 3.3 Information (data and variables) provided in the monitoring report that is different from that stated in the registered PDD

There are no differences in the monitoring report that increase the reduction emissions stated in the registered PDD.

### 3.4 Compliance of monitoring plan with monitoring methodology

DNV is able to confirm that the monitoring plan contained in the revised PDD of February 2011, accepted by the EB on 30 March 2011, is in accordance with the approved methodology applied by the project activity, i.e. AMS-III.E., version 7.

### 3.5 Compliance of monitoring with the monitoring plan

The monitoring has been carried out in accordance with the monitoring plan contained in the revised PDD of February 2011, accepted by the EB on 30 March 2011.

All parameters as stated in the validated monitoring plan and the monitoring methodology AMS-III.E., version 7 are properly monitored and reported. Monitoring parameters include the amount of wood waste purchased, consumed and the proportion that would be left for decay. In addition, the leakage of wood waste transport was monitored considering the weighted average distance and truck capacities. The project emission is monitored considering the total of wood waste burned. IPCC default values are yearly verified. The monitoring plan requires the monitoring of the following data:

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	#1 Fuel – Amount of wood waste combusted
Measuring frequency:	Continuously
Reporting frequency:	Monthly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Type of monitoring equipment:	The wood waste fed into the boiler is measured through dynamic scale at entrance and automatically register in the Lages/Tractebel Electronic Planning Production Control System
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Yes. The scale has accuracy of 99%, which complies with the maximum uncertainty of $\pm 1\%$ defined by INMETRO.
Calibration frequency /interval:	The PDD does not establish the calibration frequency. According to the general guidelines to SSC CDM methodologies, the calibration



	interval has to be a maximum of three years.
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Boiler feeding scale Toledo mod 9270 # 3092000123 calibration certificate 080677 issued 06 May 2008 and calibration certificate 080839 issued 17 June 2009.
Company performing the calibration:	Toledo
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes
Is(are) calibration(s) valid for the whole reporting period?	Yes. The calibration certificates from Toledo did not contain any validity. However, the regulations of the host country sets the validity for such calibrations to the end of the following year, as established in item 11.3 of the Technical Metrological Regulation approved by Disclosure 236 INMETRO 1994 /20/ /21/. The calibration was in line with this.
If applicable, has the reported data been cross-checked with other available data?	The reported amounts were cross checked with the amounts reported in earlier monitoring periods.
How were the values in the monitoring report verified?	The reported data was compared with the data in the Lages/Tractebel Electronic Planning Production Control System and was cross checked with purchase receipts.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please see 3.5 and 3.6





	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	#2 – Amount of wood waste obtained from Battistela
Measuring frequency:	Each truck
Reporting frequency:	Monthly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. Entrance truck scale records and list of biomass official receipts bought by Lages Bioenergética Ltda from Battistella. It was sampled to verify the compliance with the commercial legislation
Type of monitoring equipment:	Entrance truck scales Toledo mod 820-J # 03077001101 and # 03077001100
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Yes. The accuracy is proper for truck and validated by INMETRO
Calibration frequency /interval:	Yearly
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Calibration certificates INMETRO # 6340216 issued on 02 October 2008 and # 2271704 issued on 03 July 2009 for 03077001101 Calibration certificates INMETRO # 6340217 issued on 02 October 2008 and #2271703 issued on 03 July 2009 for 03077001100
Company performing the calibration:	INMETRO
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes
Is(are) calibration(s) valid for the whole reporting period?	Yes
If applicable, has the reported data been cross-checked with other available data?	The reported amounts were cross checked with the amounts reported in earlier monitoring periods.
How were the values in the monitoring report verified?	The reported data was compared with the data in the Lages/Tractebel Electronic Planning Production Control System and cross checked with purchase receipts.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please see 3.5 and 3.6



	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	#3 – Amount of wood waste obtained from Sofia. It was zero for the period.
Measuring frequency:	Each truck
Reporting frequency:	Monthly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. Entrance truck scale records and list of biomass official receipts bought by Lages Bioenergética Ltda from Sofia. Wood waste obtained from Sofia in this period was zero.
Type of monitoring equipment:	Entrance truck scales Toledo mod 820-J # 03077001101 and # 03077001100
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Yes. The accuracy is proper for truck and validated by INMETRO
Calibration frequency /interval:	Yearly
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Calibration certificates INMETRO # 6340216 issued on 02 October 2008 and # 2271704 issued on 03 July 2009 for 03077001101 Calibration certificates INMETRO # 6340217 issued on 02 October 2008 and #2271703 issued on 03 July 2009 for 03077001100
Company performing the calibration:	INMETRO
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes
Is(are) calibration(s) valid for the whole reporting period?	Yes
If applicable, has the reported data been cross-checked with other available data?	The reported amounts were cross checked with the amounts reported in earlier monitoring periods. Wood waste obtained from Sofia in this period was zero.
If applicable, has the reported data been cross-checked with other available data?	The reported data was compared with the data in the Lages/Tractebel Electronic Planning Production Control System and cross checked with purchase receipts. Wood waste obtained from Sofia in this period was zero.
How were the values in the monitoring report verified?	The reported data was compared with the data in the Lages/Tractebel Electronic Planning Production Control System and cross checked with purchase receipts.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission	Please see 3.5 and 3.6



reductions and are necessary QA/QC processes in place?	
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	Wood waste obtained from Sofia in this period was zero.

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	#4 – Amount of wood waste obtained from suppliers on the open market
Measuring frequency:	Each truck
Reporting frequency:	Monthly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Each truck
Type of monitoring equipment:	Entrance truck scales Toledo mod 820-J # 03077001101 and # 03077001100
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Yes. Entrance truck scale records and list of biomass official receipts bought by Lages Bioenergética Ltda from suppliers on the open market. It was sampled to verify the compliance with the commercial legislation
Calibration frequency /interval:	Yearly
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Calibration certificates INMETRO # 6340216 issued on 02 October 2008 and # 2271704 issued on 03 July 2009 for 03077001101 Calibration certificates INMETRO # 6340217 issued on 02 October 2008 and #2271703 issued on 03 July 2009 for 03077001100
Company performing the calibration:	INMETRO
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes
Is(are) calibration(s) valid for the whole reporting period?	Yes
If applicable, has the reported data been cross-checked with other available data?	The reported amounts were cross checked with the amounts reported in earlier monitoring periods.
How were the values in the monitoring report verified?	The reported data was compared with the data in the Lages/Tractebel Electronic Planning Production Control System and cross checked with purchase receipts
Does the data management (from	Please see 3.5 and 3.6



monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	
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	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	#6 – Diesel oil purchase
Measuring frequency:	Daily
Reporting frequency:	Monthly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Type of monitoring equipment:	Diesel feed pump at internal gas station
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	It is registered daily for each equipment and accounted into the Lages/Tractebel Electronic Planning Production Control System. The last record was checked with actual figure on the diesel feed pump.
Calibration frequency /interval:	According to commercial regulation
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Yes
Company performing the calibration:	Internal maintenance
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes
Is(are) calibration(s) valid for the whole reporting period?	Yes
If applicable, has the reported data been cross-checked with other available data?	The reported amounts were cross checked with the amounts reported in earlier monitoring periods.
How were the values in the monitoring report verified?	The reported data was compared with the data in the Lages/Tractebel Electronic Planning Production Control System and cross checked with purchase receipts
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please see 3.5 and 3.6



	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	#7 – Location of wood waste suppliers compared to Lages site
Measuring frequency:	Each purchase receipt, address on purchase receipts
Reporting frequency:	Monthly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Type of monitoring equipment:	Not applicable
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Not applicable
Calibration frequency /interval:	Not applicable
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Not applicable
Company performing the calibration:	Not applicable
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Not applicable
Is(are) calibration(s) valid for the whole reporting period?	Not applicable
If applicable, has the reported data been cross-checked with other available data?	The reported amounts were cross checked with the amounts reported in earlier monitoring periods.
How were the values in the monitoring report verified?	The reported data was compared with the data in the Lages/Tractebel Electronic Planning Production Control System and cross checked with purchase receipts
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please see 3.5 and 3.6



	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	#8 Wood waste transportation – Truck capacity
Measuring frequency:	Each transportation receipt
Reporting frequency:	Monthly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	The wood waste truck is specific.
Type of monitoring equipment:	Entrance truck scales Toledo mod 820-J # 03077001101 and # 03077001100
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	The receipts of wood waste are registered at entrance of Lages, including the actual weight of each truck. The information from the Lages/Tractebel Electronic Planning Production Control System was used to calculate the average.
Calibration frequency /interval:	Yearly
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Calibration certificates INMETRO # 6340216 issued on 02 October 2008 and # 2271704 issued on 03 July 2009 for 03077001101 Calibration certificates INMETRO # 6340217 issued on 02 October 2008 and #2271703 issued on 03 July 2009 for 03077001100
Company performing the calibration:	INMETRO
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yearly
Is(are) calibration(s) valid for the whole reporting period?	Yes
If applicable, has the reported data been cross-checked with other available data?	The report was cross checked with second verification period's report
How were the values in the monitoring report verified?	The reported data was compared with the data in the Lages/Tractebel Electronic Planning Production Control System
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please see 3.5 and 3.6



	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	#9 Ash transportation – Location of ash disposal site
Measuring frequency:	Each transport
Reporting frequency:	Monthly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. All trucks transportation are registered into the Lages/Tractebel Electronic Planning Production Control System
Type of monitoring equipment:	Not applicable
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Not applicable
Calibration frequency /interval:	Not applicable
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Not applicable
Company performing the calibration:	Not applicable
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Not applicable
Is(are) calibration(s) valid for the whole reporting period?	Not applicable
If applicable, has the reported data been cross-checked with other available data?	Not applicable
How were the values in the monitoring report verified?	The reported data was compared with the data in the Lages/Tractebel Electronic Planning Production Control System
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please see 3.5 and 3.6



	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	#10 Ash transportation – truck capacity
Measuring frequency:	Each transportation receipt
Reporting frequency:	Monthly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	The ash truck is specific.
Type of monitoring equipment:	Entrance truck scales Toledo mod 820-J # 03077001101 and # 03077001100
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	The ash transportation receipts are registered at exit of Lages facilities, including the actual weigh of each truck. The information from the Lages/Tractebel Electronic Planning Production Control System was used to calculate the average. Truck scale has an accuracy of 99%.
Calibration frequency /interval:	Yearly
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Calibration certificates INMETRO # 6340216 issued on 02 October 2008 and # 2271704 issued on 03 July 2009 for 03077001101 Calibration certificates INMETRO # 6340217 issued on 02 October 2008 and #2271703 issued on 03 July 2009 for 03077001100
Company performing the calibration:	INMETRO
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yearly
Is(are) calibration(s) valid for the whole reporting period?	Yes
If applicable, has the reported data been cross-checked with other available data?	The reported amounts were cross checked with the amounts reported in earlier monitoring periods.
How were the values in the monitoring report verified?	The reported data was compared with the data in the Lages/Tractebel Electronic Planning Production Control System
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please see 3.5 and 3.6





	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	#11 Ash production – amount of ash produced
Measuring frequency:	Each weight of transported ash
Reporting frequency:	Monthly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	All ash trucks are weighed and the weight is registered into the Lages/Tractebel Electronic Planning Production Control System
Type of monitoring equipment:	Entrance truck scales Toledo mod 820-J # 03077001101 and # 03077001100
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Yes. the accuracy is proper for truck and validated by INMETRO
Calibration frequency /interval:	Yearly
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Calibration certificates INMETRO # 6340216 issued on 02 October 2008 and # 2271704 issued on 03 July 2009 for 03077001101 Calibration certificates INMETRO # 6340217 issued on 02 October 2008 and #2271703 issued on 03 July 2009 for 03077001100
Company performing the calibration:	INMETRO
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yearly
Is(are) calibration(s) valid for the whole reporting period?	Yes
If applicable, has the reported data been cross-checked with other available data?	The reported amounts were cross checked with the amounts reported in earlier monitoring periods.
How were the values in the monitoring report verified?	The reported data was compared with the data in the Lages/Tractebel Electronic Planning Production Control System
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please see 3.5 and 3.6



### 3.6 Assessment of data and calculation of emission reductions

CO<sub>2</sub> emissions reductions for the project and the baseline scenario were correctly calculated using the amount of methane avoided by wood waste biomass available for controlled burning. The emission factor of 0.1147 tCH<sub>4</sub>/tonne biomass sourced from Battistella and 0.0573 tCH<sub>4</sub>/tonne biomass sourced from Sofia and suppliers on the open market are calculated considering the default IPCC factors and as per the registered PDD. Since the wood waste amount consumed from Sofia and Battistella were lower than the wood waste amount previously consumed in these two mills' old boilers (baseline), the wood waste amount combusted from Sofia and Battistella during the monitoring period was considered as zero which is conservative.

The project emissions from the project activity include the methane and N<sub>2</sub>O emissions from wood waste biomass burning, calculated using formulae provided in the AMS-III.E., version 7 and default IPCC factors, emissions due to diesel consumption in the boiler and internal transportation of wood waste biomass. The emissions due to the transportation of wood biomass from suppliers on the open market to the project plant and ash transportation have been considered as leakages.

The total project emission was 2 312 tCO<sub>2</sub> and 1 658 tCO<sub>2</sub> for the years of 2008 (7 months) and 2009 (5 months) respectively, evidencing the compliance with the requirement of small scale criteria.

The emission reduction being claimed during the period 1 June 2008 to 31 May 2009 are 20% lower than the estimated emission reductions in the registered PDD, as given in the table below.

Period	As per PDD	Monitoring report
Emission Reductions	196 689	157 914
% Deviation	0	- 20%

The reason for the lower emission reduction is the lower industrial activity in the region of the cogeneration unit, to a higher "torete" consumption, consequently consuming and treating a wood waste amount lower than that estimated in the PDD and to a lower emission factor due to reduced degradable organic carbon fraction dissimilated into landfill gas and higher degradable organic carbon in wood and wood production in IPCC2006 compared to IPCC1996..

### 3.7 Quality of evidence to determine emission reductions

Lages Bioenergética Ltda has an automated control system where the operation including the wood waste biomass consumed on monitoring system. At 00:00 hrs every day the Tractebel-Lages turbo generator operator manually reads the record of the totalized accumulated wood waste biomass and include on management report to be analysed by Operation Manager.

These figures are inserted in a daily report, and consolidated on monthly report. As the feed scale record is cumulative, the sum of all waste biomass since start up is the same of actual reading.

The accounting methane avoidance from biomass is constituted by the receipts of wood waste bought from open market mills, registered on Electronic Planning Production Control program.



### 3.8 Management system and quality assurance

Data is collected according to well defined data collection procedures:

- i) The biomass bought from open market suppliers is registered on Electronic Planning Production Control System, and has good traceability and consistency.
- ii) The biomass consumed on boiler is recorded on dynamic scale on feeding system of the boiler and record cumulatively Electronic Planning Production Control System.
- iii) Data is processed by the electronic datasheet to calculate emission reductions and to produce the monitoring report.
- iv) Lages Bioenergética Ltda has a Quality Management System Certified as ISO 9001:2000 and a Environmental Management System Certified as ISO 14001:2004;
- v) The monitoring report is carried out by CDM Support Engineer based on reviewed records from the Electronic Planning Production Control System.



#### 4 CERTIFICATION STATEMENT

*DNV Climate Change Services AS (DNV) has performed the verification of the emission reductions that have been reported for the “Lages Methane Avoidance Project” (UNFCCC Registration Reference No. 0268) for the period 1 June 2008 to 31 May 2009.*

*The project participants are responsible for the collection of data in accordance with the validated monitoring plan and the reporting of GHG emissions reductions from the project.*

*It is DNV's responsibility to express an independent verification statement on the reported GHG emission reductions from the project. DNV does not express any opinion on the selected baseline scenario or on the validated and registered PDD.*

*DNV conducted the verification on the basis of the monitoring methodology AMS-III.E., version 7, the monitoring plan included in the PDD of February 2011 the project and the monitoring report of 16 June 2011. The verification included i) checking whether the provisions of the monitoring methodology AMS-III.E., version 7 and the monitoring plan in the PDD were consistently and appropriately applied and ii) the collection of evidence supporting the reported data.*

*DNV's verification approach draws on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. DNV planned and performed the verification by obtaining evidence and other information and explanations that DNV considers necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.*

*In DNV's opinion, the GHG emissions reduction for the “Lages Methane Avoidance Project” (UNFCCC Registration Reference No. 0268) as reported in the Monitoring Report (version 3) issued on 16 June 2011 are fairly stated.*

*The GHG emission reductions were correctly calculated on the basis of the approved monitoring methodology of AMS-III.E., version 7 and the monitoring plan contained in the validated Project Design Document for the project (version 3 of February 2011).*

*DNV Climate Change Services AS is able to certify that the emission reductions from the “Lages Methane Avoidance Project” during the period 1 June 2008 to 31 May 2009 amount to 157 914 tonne of CO<sub>2</sub> equivalent.*

Rio de Janeiro, 2011-06-27

Felipe Lacerda Antunes

CDM Verifier

DNV Rio de Janeiro, Brazil

Oslo, 2011-06-27

Hendrik W. Brinks

Technical Director for CDM

DNV Climate Change Services AS



## 5 REFERENCES

*Documents provided by the Project Participants that relate directly to the GHG components of the project. These have been used as direct sources of evidence for the periodic verification conclusions, and are usually further checked through interviews with key personnel.*

- /1/ Lages Bioenergética Ltda: *Monitoring Report – “Lages Methane Avoidance Project”*: 1 June 2008 to 31 May 2009, version 3 of 16 June 2011.
- /2/ Lages Bioenergética Ltda: *Monitoring Report – “Lages Methane Avoidance Project”*: 1 June 2008 to 31 May 2009, version 1 of 23 November 2009.
- /3/ Lages Bioenergética Ltda: *Project Design Document of the “Lages Methane Avoidance Project”*, version 3 of February 2011.
- /4/ Lages Bioenergética Ltda: *Project Design Document of the “Lages Methane Avoidance Project”*, version 1 of 21 September 2005.
- /5/ Lages Bioenergética Ltda: *Operating Environmental License – issued by FATMA on 23 December 2008 and valid until 23 December 2012*.
- /6/ Det Norske Veritas Certification Ltd. – DNV: *Validation Report – “Lages Methane Avoidance Project”*. Report 2005-0935 Rev 3 of 14 February 2006.
- /7/ Det Norske Veritas Certification Ltd. – DNV: *Verification Report – “Lages Methane Avoidance Project”*. Report 2006-1233 Rev 1 of 25 August 2006
- /8/ Det Norske Veritas Certification Ltd. – DNV: *Verification Report – “Lages Methane Avoidance Project”*. Report 2007-1084 Rev 1 of 17 September 2007
- /9/ Det Norske Veritas Certification Ltd. – DNV: *Verification Report – “Lages Methane Avoidance Project”*. Report 2008-1182 Rev 1a of 29 July 2009
- /10/ Lages Monitoring Plan Workbook of 2008 and 2009 with the amount of waste biomass purchased and consumed on the boiler, including the distance average of wood waste biomass transport, and the consumption of diesel oil on internal transport of wood waste biomass and transport of ash to the disposal site in Capivari de Baixo municipality and other sites in the Lages Region.
- /11/ List of delivery receipts of biomass bought by Lages Bioenergética Ltda from suppliers on open market from June 2008 to May 2009
- /12/ Monthly report of wood waste biomass consumed as fuel on boiler/turbo generator set from June 2008 to May 2009;
- /13/ Entrance Scale Toledo mod 820-J # 03077001101 calibration certificates INMETRO # 6340216 issued on 02 October 2008 and # 2271704 issued on 03 July 2009
- /14/ Entrance scale Toledo mod 820-J # 03077001100 calibration certificates INMETRO # 6340217 issued on 02 October 2008 and #2271703 issued on 03 July 2009
- /15/ Boiler feeding scale Toledo mod 9270 # 3092000123 calibration certificate 080677 issued 06 May 2008 and calibration certificate 080839 issued 17 June 2009
- /16/ Aerial pictures Battistella and Sofia facilities  
[http://maps.google.com.br/maps?hl=pt-BR&rlz=1G1GGLO\\_PT-BRBR332&um=1&ie=UTF-8&q=Lages+santa+catarina+sofia&fb=1&split=1&gl=br&cid=0,0,11757047425992018315&ei=qK8vSuiQN8aMtgfN9tmJDA&sa=X&oi=local\\_result&ct=image&resnum=1](http://maps.google.com.br/maps?hl=pt-BR&rlz=1G1GGLO_PT-BRBR332&um=1&ie=UTF-8&q=Lages+santa+catarina+sofia&fb=1&split=1&gl=br&cid=0,0,11757047425992018315&ei=qK8vSuiQN8aMtgfN9tmJDA&sa=X&oi=local_result&ct=image&resnum=1)



- /17/ [http://maps.google.com.br/maps?f=q&source=s\\_q&hl=pt-BR&geocode=&q=battistella,+Lages++SC,+brasil&mrt=yp&sl=-27.837976,-50.319314&sspn=0.018557,0.038452&ie=UTF8&ll=-27.810801,-50.365834&spn=0.017613,0.038452&t=h&z=15](http://maps.google.com.br/maps?f=q&source=s_q&hl=pt-BR&geocode=&q=battistella,+Lages++SC,+brasil&mrt=yp&sl=-27.837976,-50.319314&sspn=0.018557,0.038452&ie=UTF8&ll=-27.810801,-50.365834&spn=0.017613,0.038452&t=h&z=15)  
Brazilian wood exportation statistics – Issued by the Brazilian Association of Processed Wood. Depicts the decline of the exportation since 2007 and further diminishment due to the economic crisis of 2008, resulting in 45% decrease from the 1<sup>st</sup> Quarter of 2008 to the 1<sup>st</sup> Quarter of 2009. Available at:  
[http://www.google.com.br/url?sa=t&source=web&cd=4&sqi=2&ved=0CCoQFjAD&url=http%3A%2F%2Fwww.abimci.com.br%2Findex.php%3Foption%3Dcom\\_docman%26task%3Ddoc\\_download%26gid%3D46%26Itemid%3D37&ei=geEITpyEJ6Li0QHz\\_d2CCw&usq=AFQjCNHNEyQuqdz2hvo2K\\_XJ4iu3dtkDjw&sig2=VFrFvY9UME2Ro4vuAHwXWQ](http://www.google.com.br/url?sa=t&source=web&cd=4&sqi=2&ved=0CCoQFjAD&url=http%3A%2F%2Fwww.abimci.com.br%2Findex.php%3Foption%3Dcom_docman%26task%3Ddoc_download%26gid%3D46%26Itemid%3D37&ei=geEITpyEJ6Li0QHz_d2CCw&usq=AFQjCNHNEyQuqdz2hvo2K_XJ4iu3dtkDjw&sig2=VFrFvY9UME2Ro4vuAHwXWQ)
- /18/ Brazilian wood environment regulation  
[http://www.mp.sc.gov.br/portal/site/conteudo/cao/cme/atividades/floresta\\_sustentavel/reflorestadoras\\_pinus\\_eucalipto.doc](http://www.mp.sc.gov.br/portal/site/conteudo/cao/cme/atividades/floresta_sustentavel/reflorestadoras_pinus_eucalipto.doc)  
[http://www.fatma.sc.gov.br/index.php?option=com\\_content&task=view&id=68&Itemid=144](http://www.fatma.sc.gov.br/index.php?option=com_content&task=view&id=68&Itemid=144)
- /19/ UNIPLAC, *Study about amount of biomass in Lages region*, dated December 2001.
- /20/ INMETRO (Metrology National Institute) – *Disclosure n° 236*, dated 22 December 2004 about the validity of scale certifications:  
<http://www.inmetro.gov.br/legislacao/rtac/pdf/RTAC000180.pdf>
- /21/ INMETRO (Metrology National Institute) – *Frequently asked questions*, about the validity of scale certifications:  
<http://www.inmetro.gov.br/ouvidoria/faqs.asp#balanca>

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

- /22/ CDM Executive Board: Validation and Verification Manual. Version 01.2
- /23/ CDM Executive Board: *Baseline and monitoring methodology AMS-III.E.*, version 7
- /24/ Notification of changes approved by the EB on 30 March 2011 for project UNFCCC Registration Ref. No. 0268

*Persons interviewed during the initial verification, or persons contributed with other information that are not included in the documents listed above.*

- /25/ Marcio Daian Neves – Lages Operation Manager – Tractebel Energia
- /26/ Pablo B. Becker – Commercial Department - Tractebel Energia
- /27/ Diego M. Silveira – Business Developer - Tractebel Energia
- /28/ Ligia B. Silva – Environment Specialist - Tractebel Energia
- /29/ Gabriel Mann dos Santos – CDM Specialist – Tractebel Energia

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## **APPENDIX A**

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### **CORRECTIVE ACTION REQUESTS, CLARIFICATION REQUESTS AND FORWARD ACTION REQUESTS**

<b>CAR ID</b>	<b>Corrective action request</b>	<b>Response by Project Participants</b>	<b>DNV's assessment of response by Project Participants</b>
<b>CAR 1</b>	In addition to the normal wood waste, the project also sourced and used tree branches, contributing with 19% of the total amount of biomass on a weight basis. However, since this is not disposed to anaerobic decay in the baseline, the monitoring report excluded this quantity for baseline emission and included for the leakage and calculation of project emissions. Since this is a change on the project design and influences on additionality, a notification for change of project design is necessary.	A notification of change was requested. It was approved in 30 March 2011.	Ok. DNV was able to check that the notification was approved by the EB on 30 March 2011.  The value of 19% of use of branches in the period of monitoring (1 June 2008 to 31 May 2009) was revised to 20.47%.  Therefore, the CAR is closed.
<b>CAR 2</b>	It is stated that project also sourced and used tree branches, contributing with 19% of the total amount of biomass on a weight basis. Calculations that lead to this amount are not transparent.	Calculations were demonstrated in the excel sheets sent to the DOE.	The value of 19% of use of branches in the period of monitoring (1 June 2008 to 31 May 2009) was revised to 20.47%. It was calculated in Lages Monitoring Plan Workbook of 2008 and 2009 /10/.  Therefore, the CAR is closed.

### Clarification requests from this verification

<b>CAR ID</b>	<b>Corrective action request</b>	<b>Response by Project Participants</b>	<b>DNV's assessment of response by Project Participants</b>
<b>CL</b>	Typographical errors on calibration certificates were observed in the Monitoring Report dated 23 November 2009 /2/.	Corrected in a new version of the Monitoring Report, dated 16 June 2011 /1/.	Ok. DNV assessed the revised PDD and checked that the calibration certificates were corrected.  Therefore, the CL is closed.



**Forward action requests from previous verification**

<b>FAR ID</b>	<b>Forward action request</b>	<b>Response by Project Participants</b>	<b>DNV's assessment of response by Project Participants</b>
	<i>No FAR was issued</i>		

**Forward action requests from this verification**

<b>FAR ID</b>	<b>Forward action request</b>	<b>Summary of how FAR has been addressed in this reporting period</b>	<b>Assessment of how FAR has been addressed</b>
	<i>No FAR was issued</i>		

## **APPENDIX B**

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### **CURRICULA VITAE OF THE VERIFICATION TEAM MEMBERS**

***Luis Filipe Aboim Tavares***

**Mr. Luis Filipe Tavares** holds a Technician's Degree in Chemistry and Bachelor's Degree in Metallurgical Engineering having an overall experience of thirty tree years.

Prior to joining DNV having around twenty tree years experience in steel production industry covering utilities (water, steam, wastewater treatment), environment control (atmosphere emissions, water emission and waste dumping).

His experience also covers the development of nitrification biological wastewater station as well as other activities as head of Utilities and Environmental Laboratory control.

He has also been actively involved in implementation of Management Systems such as ISO 9001 standard on coke oven department of steel industry as well as the ISO 140001 standard in all steel plant (the second steel company certified in the world) for more than three years.

He has experience of around 8 years in validation and verification of numerous CDM projects in DNV, both in Brazil & South America.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in Iron and Steel; Metal production; Oil and Gas industry, CMM recovery and use; Generation from renewable energy sources; Waste handling and disposal and Animal waste management.

***Felipe Antunes***

**Mr. Felipe Antunes** holds a Master's Degree in Production Engineering (Quality) and a Post Graduate Diploma in Environmental Management and Industrial Waste Management and Treatment. Possesses an International experience of more than 10 years in the field of quality and environmental auditing, working two years as the responsible of the QMS of Rede Metrológica RS and since 1999 as a QMS and EMS auditor in DNV.

He has experience of more than 3 years in validation and verification of numerous CDM projects in DNV, both in South America & abroad. He has also been actively involved in Management System Audits such as ISO 9001, ISO 140001 and OHSAS 18001 standards in various industrial sectors for more than 10 years in DNV.

His qualification and experience in CDM demonstrate him sufficient sectoral competence in energy generation from renewable energy sources, waste handling and disposal, and animal waste management.

### ***Gabriel Baines***

**Mr. Gabriel Baines** holds a Bachelor's Degree in Environmental Engineering in the University of São Paulo (Brazil) and has done a short term course in the Environmental School of the University of Leeds (England), having an overall work experience of around 5 years. Prior to joining DNV, has had two and a half years experience in the aluminium industry covering the areas of production and environment. His experience also covers the fields of environmental management and management systems such as ISO 14.001.

He has experience of around 1 year in validation and verification of numerous CDM projects in DNV, both in Brazil and abroad.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in 9.1. metal production.

### ***Hendrik W. Brinks***

**Mr. Hendrik Brinks** holds a Master Degree in Inorganic Chemistry & Material Science and a Dr. Scient Degree in Inorganic Chemistry & Material Science. He has an overall experience of around 16 years. Prior to joining DNV, he has 7 years of working experience at a research institute by scientific research on future energy systems with hydrogen as an energy carrier and project management for monitoring system design. He has published >50 papers in international journals with peer reviews. His experience also covers teaching and research at University of Oslo, Norway.

He has 4 years extensive experience in validation and verification of >400 CDM projects worldwide and also experience from other 3rd party validation/verification schemes. Technical Director for CDM, Hendrik W. Brinks is the service line responsible for CDM in DNV and is qualified for approval of CDM projects.

His qualification and experience in CDM demonstrate his sufficient sectoral competence in “Waste Handling and Disposal” and quality control (technical review) competence for projects within renewable energy, biomass power, waste heat recovery, energy efficiency, waste handling, wastewater, coal mine methane, transport, charcoal and flare reduction.

### ***Simon Wong***

**Mr. Simon Wong** holds a Bachelor's Degree in Chemical Engineering with Environmental Engineering, with a year experience in the field of design and operation/maintenance of wastewater treatment as part of working in wastewater design & equipment supply services. His experience in designing and maintaining the wastewater treatment systems covers the fields of various manufacturing and chemical industries in Malaysia.

He has experience of more than 3 years in validation and verification of numerous CDM projects in DNV, both in Malaysia and abroad. His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in Energy Generation from Renewable Energy Sources, Waste Handling and Disposal and Animal Waste Management System.

### ***Gloria Godínez***

**Ms. Gloria Godínez** holds a degree in Environmental Engineering. She has 10 years of experience in the cement sector, working in sustainability projects such as bio-fuels, biomass, fuel switching, operation and maintenance of wastewater treatment, energy efficiency, waste management and waste heat recovery.

Her experience also covers the fields of sustainability and environmental management systems, corporate social responsibility and sustainable buildings. During her experience in the industrial sector, she performed a several number of ISO 14001/9000 audits to cement plants, aggregate plants, quarries, ready mix plants and waste management plants including the following facilities: waste water, biomass and fuel switching installations.

In addition, she has experience in corporate GHG inventories, Carbon Footprint and Climate Change policies as she worked at the World Business Council for Sustainable Development (WBCSD) based in Geneva, during 1.5 years in the Energy and Climate project. As part of her activities in DNV, she has performed several validations and verifications of CDM, VCS and Gold Standard projects in Latin America and Caribbean, South America, US, China, Pakistan and Africa.

Her qualification, industrial practical experience and knowledge in CDM demonstrate her sufficient sector competence in Cement, Waste Management and Energy Demand technical areas.

### ***Murali Govindarajulu***

**Mr. Murali Govindarajulu** holds a Bachelor's Degree in Chemical Engineering and has done a Short term diploma course in Management. Having an overall experience of around eleven years. Prior to joining DNV having around seven years experience in Chemical process industry covering production, energy efficiency improvement and equipment design erection and commissioning. His experience also covers the fields of environmental management and resource conservation including identification of alternative fuels. He has also been actively involved in implementation of Management Systems such as ISO 140001 and OHSAS 18001 standards in chemical process industry for more than three years.

He has experience of around 4 years in validation and verification of numerous CDM projects in DNV, both in India & abroad. His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in energy generation from renewable energy sources.