

**CLEAN DEVELOPMENT MECHANISM
PROJECT ACTIVITY MONITORING REPORT**

LAGES METHANE AVOIDANCE PROJECT

CDM Registration Reference Number: UNFCCC00000268CDMP

Monitoring Period: 1 Jun 2006 – 31 May 2007

Monitoring Report Number: 02

(Version 02)

June 26, 2007

History of the document

Version	Date	Nature of revision(s)
01	18 June 2007	Initial adoption
02	26 June 2007	Explanation about the use of emission factors from Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual

**CLEAN DEVELOPMENT MECHANISM
PROJECT ACTIVITY MONITORING REPORT****CONTENTS**

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SECTION A. General project activity information
A.1. Title of the project activity:

Lages Methane Avoidance Project (hereafter only Lages Project or Project).

A.2 Project participants:

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Brazil (host)	<ul style="list-style-type: none"> Lages Bioenergética Ltda. (Private Entity) as the Special Purpose Company created by Tractebel Energia S.A. to implement the Lages Project 	No
Japan	<ul style="list-style-type: none"> The Chugoku Electric Power Co., Inc. (Private Entity) 	No

A.3. Crediting period:
A.3.1. Crediting period:

The crediting period for this project activity is from 1 November 2004 to 31 October 2014.

A.3.2. Total estimated emission reductions in the PDD over the crediting period:

Years	Annual estimation of emission reductions in tonnes of CO ₂ e	Annual estimation of project emissions in tonnes of CO ₂ e
2004	36,740	512
2005	220,439	3,070
2006	220,439	3,070
2007	220,439	3,070
2008	220,439	3,070
2009	220,439	3,070
2010	220,439	3,070
2011	220,439	3,070
2012	220,439	3,070
2013	220,439	3,070
2014	183,700	2,558
Total estimated reductions / project emissions (tonnes of CO₂e)	2,204,394	30,698
Total number of crediting years	10	10
Annual average over the crediting period of estimated reductions / project emissions (tonnes of CO₂e)	220,439	3,070

A.4. Project activity description and background:

Lages Project's cogeneration facility is located in Lages, State of Santa Catarina, Brazil, whose economy is based on the wood industry using timber from planted forests. The Project is under operation since 23 December 2003 by Lages Bioenergética Ltda., a Special Purpose Company fully owned by Tractebel Energia S.A.¹, specially constituted to build, operate and maintain the Lages Project. Detailed information about the Project is provided in the Project Design Document (PDD) Version 02, dated of 21 September 2005, and other documents, which are available and can be downloaded from the UNFCCC website (<http://cdm.unfccc.int/Projects/DB/DNV-CUK1140180495.84/view.html>).

The Project is designed to avoid methane emissions from anaerobic digestion in stockpiles (biomass decay) through controlled combustion by cogeneration process, which simultaneously generates electricity and thermal energy (steam) from the wood waste produced from several timber industries that would otherwise be disposed inadequately. The major project activity milestones are presented in the table below.

Date	Milestone
23 Dec 2003	Starting date of the Project
1 Nov 2004	Starting date of the crediting period
26 Jul 2005 – 24 Aug 2005	Period for public comments to the PDD in the UNFCCC website
25 Nov 2005	Brazilian Designated National Authority (DNA) issued the Letter of Approval (LoA) to the Project
14 Feb 2006	Project is validated by Det Norske Veritas (DNV)
24 Mar 2006 – 22 Apr 2006	Period for Executive Board comments
23 Apr 2006	Project is registered
20 Sep 2006	First CER issuance (277,768 CERs)

¹ Tractebel Energia S.A. is a subsidiary of Suez Energy S.A., which with Electrabel, Distrigas, Glow, Trigen, among others, constitutes the energy division of the Suez group, resulting one of the world's key player on the energy & environment businesses.

SECTION B. Monitoring of the CDM project activity

B.1. Monitoring report:

B.1.1. Monitoring reports associated with this project activity:

This is the second monitoring report associated with this project activity.

Report number	Monitoring period		Resulting emission reductions (tonnes of CO ₂ e)	Verifying DOE
	From	To		
01	1 Nov 2004	31 May 2006	277,768	DNV
02	1 Jun 2006	31 May 2007	274,958	DNV

B.1.2. Monitoring report period:

The period covered in this monitoring report is from 1 June 2006 to 31 May 2007. The monitoring report period is within the bounds of the crediting period noted in Section A.3.1. This monitoring report does not cover any period of time covered by a previous monitoring report.

B.1.3. Emission reductions achieved over the monitoring period:

The emission reductions achieved over the designated monitoring period are **274,958 tonnes of CO₂e**.

This amount is around 25% higher than the 220,439 tonnes of CO₂e which were estimated to be reduced according to the PDD in the same period. This difference is basically due to higher load factor of the cogeneration plant during this period, consequently consuming and treating a wood waste amount higher than that estimated in the PDD.

B.2. Methodologies applied:

B.2.1. Baseline methodology applied during the monitoring period:

The Project uses Small-Scale Baseline Methodology AMS III.E (Version 07) entitled “Avoidance of methane production from biomass decay through controlled combustion”.

AMS III.E (Version 07) is applicable for Lages Project as it states that “The baseline scenario is the situation where, in the absence of the project activity, biomass or other organic matter is left to decay”. This accurately represents the baseline scenario in the Lages Project case as presented in the PDD. Furthermore, Lages Project directly emits less than 15 kilotonnes of carbon dioxide equivalent annually, as presented in the Section D.4.

B.2.2. Monitoring methodology applied during the monitoring period:

The Project uses Small-Scale Monitoring Methodology AMS III.E (Version 07) entitled “Avoidance of methane production from biomass decay through controlled combustion”.

The AMS III.E (Version 07) is applicable to project activities which avoid the production of methane from biomass or other organic matter that would have otherwise been left to decay as a result of anthropogenic activity, which is the Lages Project case.

B.3. Monitoring plan:

B.3.1. Development and appropriateness of the monitoring plan:

The “Lages Methane Avoidance Project Monitoring Plan – Version 02” from September 2005 was developed based on the approved monitoring methodology identified in the Section B.2.2.

B.3.2. Implementation of the monitoring plan:

During the monitoring period identified in the Section B.1.2, the Project entity implemented the validated Monitoring Plan that was part of the project documents evaluated by the Designated Operational Entity (DOE) during the validation process.

B.3.3. Revisions to the monitoring plan:

The “Lages Methane Avoidance Project Monitoring Plan” was submitted on July 2005 to the DOE for validation. The document was revised on September 2005 based on clarifications and corrective actions requested by DNV. The Version 02 of the Monitoring Plan was validated along with the entire project activity on 14 February 2006 and has not been changed since that date.

B.4. Monitored data:

The key data monitored at the project activity are listed in the Section D.3 of the PDD and in the Monitoring Plan. The project activity data were collected in accordance with the registered PDD and are shown in the following items. All necessary evidences to verify these data have been presented to the DOE for verification.

B.4.1. Fuel – Amounts of wood waste (ID1, ID2, ID3 and ID4 of the PDD Section D.3):

To accurately calculate the emission reductions (ERs) from avoided methane emissions during the operation of the Lages Project, the amounts of wood waste consumed (QC_{biomass}) and purchased are monitored continuously and totalized on an annual basis, as presented in the table below. Each source of wood waste (Battistella, Sofia and Spot Market) is treated separately and the methane emissions avoided from each source are calculated using the small-scale methodology AMS III.E (Version 07) at the end of each calendar year and each monitoring period based on the characteristics of the wood waste supplier and the wood waste piles avoided through the use by Lages Project. Additionally, the Annex 1 present the wood waste amounts consumed and purchased from each supplier during the monitoring period.

Fuel – Amounts of wood waste								
Year	Month	ID1	ID2		ID3		ID4	
		QC _{biomass}	Purchased from Battistella		Purchased from Sofia		Purchased from Spot Market	
		(tonnes) [A]	(tonnes)	(%) [B]	(tonnes)	(%) [C]	(tonnes)	(%) [D]
2006	6	19,026.00	5,850.45	28.78%	1,611.11	7.93%	12,867.11	63.29%
	7	20,343.00	6,214.10	28.69%	1,760.25	8.13%	13,683.87	63.18%
	8	18,403.00	5,199.97	25.47%	2,044.38	10.01%	13,170.23	64.52%
	9	22,350.00	4,795.95	26.25%	208.63	1.14%	13,263.64	72.61%
	10	18,004.00	5,361.00	27.47%	100.69	0.52%	14,052.27	72.01%
	11	19,819.00	4,489.33	24.32%	77.12	0.42%	13,892.96	75.26%
	12	22,021.00	4,327.37	24.20%	111.25	0.62%	13,441.03	75.18%
	Total	139,966.00	-	-	-	-	-	-
2007	1	21,538.00	5,412.32	26.42%	21.02	0.10%	15,050.16	73.48%
	2	20,006.00	4,279.61	25.58%	24.26	0.14%	12,427.44	74.28%
	3	23,983.00	3,367.42	17.31%	156.95	0.81%	15,925.28	81.88%
	4	18,064.00	2,535.55	12.21%	263.33	1.27%	17,960.08	86.52%
	5	22,442.00	4,514.87	21.79%	240.57	1.16%	15,965.73	77.05%
	Total	106,033.00	-	-	-	-	-	-

In order to calculate the annual wood waste amount consumed (QC_{biomass}) from each source (Battistella, Sofia and Spot Market) as presented in the table below, the percentages of wood waste purchased from each source in a given month are applied to the total amount consumed in the respective month (which is measured accurately by a dynamic balance installed in the entrance of the combustion chamber of the boiler) and the obtained values are totalized annually.

Fuel – Amounts of wood waste				
Year	Month	Battistella	Sofia	Spot Market
		QC _{biomass} [E=A*B]	QC _{biomass} [F=A*C]	QC _{biomass} [G=A*D]
		(tonnes)	(tonnes)	(tonnes)
2006	6 to 12	36,963.27	5,572.12	97,430.61
2007	1 to 5	22,056.68	734.34	83,241.99

The wood waste amounts effectively treated under the Project (QT_{biomass}), which is used to calculate the baseline methane emissions, is calculated discounting the wood waste amounts were previously consumed in the Battistella and Sofia old boilers and applying the discount factor of 1% due to spontaneous combustion in the Battistella pile. These values were validated by DNV and used in the registered PDD. The table below presents the wood waste amounts treated under the Lages Project.

Fuel – Amounts of wood waste							
Year	Month	Battistella			Sofia		Spot Market
		QT _{biomass} [H=E-I-J]	Wood waste burned for own consumption [I]	Wood waste burned spontaneously in the pile [J=R*(E-I)]	QT _{biomass} [K=F-L] ²	Wood waste burned for own consumption [L]	QT _{biomass} [M=G]
		(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
2006	6 to 12	17,744.03	19,040.00	179.23	0.00	8,400.00	97,430.61
2007	1 to 5	8,372.11	13,600.00	84.57	0.00	6,000.00	83,241.99

B.4.2. Default values (ID5 of the PDD Section D.3):

All of the parameters and emission factors used to calculate the emission reductions are available in the PDD and were previously validated by DNV during the validation process of the project activity. The values of these parameters and emission factors were also monitored during the monitoring period using the associated references, as presented in the table below.

Default values				
ID5				
Parameter	Value	Unit	Data source	Comment
MCF [N]	0.8 (Battistella) 0.4 (Sofia) 0.4 (Spot Market)	(fraction)	IPCC ³ , Volume 5, Chapter 3, Table 3.1, Page 3.14	Default value of 0.4 is applied to wood waste supplied by Sofia and Spot Market. IPCC default value of 0.8 for unmanaged deep waste site (≥ 5 meters of depth) is applied to wood waste supplied by Battistella.
DOC [O]	0.43	(fraction)	IPCC ³ , Volume 5, Chapter 2, Table 2.5, Page 2.16	Waste is 100% compounded by wood. IPCC default value is applied.
DOC _F [P]	0.5	(fraction)	IPCC ³ , Volume 5, Chapter 3, Page 3.13	IPCC default value is applied.
F [Q]	0.5	(fraction)	IPCC ³ , Volume 5, Chapter 3, Page 3.15	IPCC default value is applied.

² Since the wood waste amount consumed (QC_{biomass}) from Sofia was lower than the wood waste amount was previously consumed in the Sofia old boilers, the wood waste amount from Sofia effectively treated under the Project (QT_{biomass}) was considered zero. The wood waste amount consumed from Sofia was reduced mainly due to the decrease in the Sofia activities in the period.

³ 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Default values				
ID5				
Parameter	Value	Unit	Data source	Comment
Wood waste burned for own consumption	32,640 (Battistella) 14,400 (Sofia)	t/year	Suppliers	Wood waste amounts were consumed in the Battistella and Sofia old boilers before the Lages Project implementation.
Discount factor due to spontaneous combustion in the pile [R]	0.01 (Battistella)	(fraction)	Estimation presented in the PDD	This discount factor was assumed to be 1% of the wood waste amount that otherwise would be dumped and left to decay in the baseline scenario for Battistella, that is, the 1% of the difference between the consumed amount supplied by Battistella and what was previously burned in its old boilers to produce steam.
E_{biomass} [S]	7.746E-3	TJ/t	UNIPLAC	Considered 1,850 kcal/kg (7,746 kJ/kg), which is default value to wood waste in the Lages region, according to values reported in the UNIPLAC study, and was the value validated in the PDD. This value is more conservative than that obtained from samples analyzed periodically in laboratory.
$\text{CH}_4\text{bio_comb}$ [T]	11	kgCH ₄ /TJ	IPCC ³ , Volume 2, Chapter 2, Table 2.6, Page 2.25	Default value according to AMS III.E Version 07 is 300 kgCH ₄ /TJ, which was based on general IPCC default value. However, 11 kgCH ₄ /TJ is used since this is the specific IPCC default value to wood waste boilers.
$\text{N}_2\text{Obio_comb}$ [U]	7	kgN ₂ O/TJ	IPCC ³ , Volume 2, Chapter 2, Table 2.6, Page 2.25	Default value according to AMS III.E Version 07 is 4 kgN ₂ O/TJ, which was based on IPCC default value. However, 7 kgN ₂ O/TJ is used since this is the specific IPCC default value to wood waste boilers.
$\text{CH}_4\text{_GWP}$ [V]	21	tCO ₂ e/tCH ₄	UNFCCC ⁴	Official value.
$\text{N}_2\text{O_GWP}$ [W]	310	tCO ₂ e/tN ₂ O	UNFCCC ³	Official value.
D_{diesel} [X]	8.8E-4	t/l	ANP	According to Portaria nº 15 of Jul 17 th , 2006 of the Brazilian Petroleum Agency (ANP) the value ranges 820–880 kg/m ³ .

⁴ Climate Change 1995, The Science of Climate Change: Summary for Policymakers and Technical Summary of the Working Group I Report, pg. 22.

Default values				
ID5				
Parameter	Value	Unit	Data source	Comment
VEF_CO ₂ [Y]	1.097 3,172.31	kgCO ₂ /km kgCO ₂ /t	IPCC ⁵ , Table 1-32, Page 1.75	Default values for US heavy duty diesel vehicles, uncontrolled. These values are not presented in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
VEF_CH ₄ [Z]	6.0E-5 0.18	kgCH ₄ /km kgCH ₄ /t	IPCC ⁵ , Table 1-32, pg. 1.75	Default values for US heavy duty diesel vehicles, uncontrolled. These values are more conservative than that presented in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
VEF_N ₂ O [AA]	3.1E-5 0.09	kgN ₂ O/km kgN ₂ O/t	IPCC ⁵ , Table 1-32, pg. 1.75	Default values for US heavy duty diesel vehicles, uncontrolled. These values are more conservative than that presented in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

B.4.3. On-site transportation (ID6 of the PDD Section D.3):

The amount of diesel oil used inside the Lages Project was monthly monitored through the invoices emitted by the proper supplier and amounts already stored (initial and final inventory) and is presented in the table below.

On-site transportation		
Year	Month	ID6
		Q _{diesel} [AB]
		(liters)
2006	6	3,579.80
	7	3,643.40
	8	3,556.50
	9	4,838.70
	10	5,834.00
	11	4,878.09
	12	5,805.70
	Total	32,136.19
2007	1	5,776.20
	2	5,252.60
	3	6,388.30
	4	6,763.20
	5	5,823.20
	Total	30,003.50

⁵ Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual.

B.4.4. Off-site transportation (ID7 and ID8 of the PDD Section D.3):

The data about the round trip distance between the wood waste suppliers and the Lages Project site and the truck capacity were monitored and are presented in the tables of the Annex 1. The weighted average round trip distance and truck capacity of all active wood waste suppliers to Lages Project site which are necessary to calculate the emissions from the off-site transportation are presented below.

Off-site transportation			
Year	Month	ID7	ID8
		AVD _{biomass} [AC]	TC _{biomass} [AD]
		(km)	(tonnes)
2006	6 to 12	20.5	13.4
2007	1 to 5	21.8	14.1

B.4.5. Ash transportation (ID9 and ID10 of the PDD Section D.3):

The data about the round trip distance between the Lages Project site and ash disposal site and the truck capacity were monitored and are presented in the table below. During the monitoring period, the ash produced by the project activity was transported from Lages Project to Jorge Lacerda Thermoelectric Power Plant, in Capivari de Baixo municipality, State of Santa Catarina, to be disposed in an appropriate manner.

Ash transportation			
Year	Month	ID9	ID10
		AVD _{ash} [AE]	TC _{ash} [AF]
		(km)	(tonnes)
2006	6 to 12	680.0	28.0
2007	1 to 5	680.0	28.0

B.4.6. Ash production (ID11 of the PDD Section D.3):

The amount of ash produced and transported by Lages Project was monthly monitored and is presented in the table below.

Ash production		
Year	Month	ID11
		Q _{ash} [AG]
		(tonnes)
2006	6	744.34
	7	663.23
	8	617.08
	9	908.29
	10	1,009.92
	11	561.10
	12	983.60
	Total	5,487.56
2007	1	1,119.80
	2	939.86
	3	1,150.72
	4	1,001.65
	5	1,129.61
	Total	5,341.64

SECTION C. Equations and calculation methods

The equations presented in the AMS III.E methodology (Version 07) and in the PDD were used to determine the baseline emissions, project activity emissions, leakages and emission reductions during the monitoring period.

C.1. Baseline equations and calculation methods:

The methane emission factor is calculated as follows:

$$CH_4_IPCC_{decay} = (MCF * DOC * DOC_F * F * 16/12)$$

where,

- $CH_4_IPCC_{decay}$: IPCC CH_4 emission factor for decaying biomass in the region of the project activity (t CH_4 /t);
- MCF: Methane correction factor (fraction);
- DOC: Degradable organic carbon (fraction);
- DOC_F : Fraction DOC dissimilated to landfill gas (fraction);
- F: Fraction of CH_4 in landfill gas (fraction).

The baseline methane emissions from biomass decay are calculated using the formulae below:

$$BE_y = QT_{biomass} * CH_4_IPCC_{decay} * CH_4_GWP$$

where,

- BE_y : Baseline methane emissions from biomass decay (tCO₂e/year);
- $QT_{biomass}$: Quantity of biomass treated under the project activity (t/year);
- CH_4_GWP : Global Warming Potential for CH_4 (tCO₂e/t CH_4).

C.2. Project activity equations and calculation methods:

The emissions due to the project activity within the project boundary comprise:

- CH_4 emissions and N_2O emissions due to combustion of the wood waste (PE_y);
- CO_2 , CH_4 and N_2O emissions due to on-site wood waste transportation.

The formulae presented in the AMS III.E (Version 07) to calculate the emissions of CH_4 and N_2O of the project activity considers only the emissions from the wood waste combustion as presented below:

$$PE_y = QC_{biomass} * E_{biomass} (CH_4_{bio_comb} * CH_4_GWP + N_2O_{bio_comb} * N_2O_GWP) / 10^6$$

where,

- PE_y : Project activity emissions (ktCO₂e/year);
- $QC_{biomass}$: Quantity of biomass consumed by the project activity (t/year);
- $E_{biomass}$: Energy content of biomass (TJ/t);
- $CH_4_{bio_comb}$: CH₄ emission factor for biomass and waste (which includes dung and agricultural, municipal and industrial wastes) combustion (kgCH₄/TJ);
- CH_4_GWP : Global Warming Potential for CH₄ (tCO₂e/tCH₄);
- $N_2O_{bio_comb}$: N₂O emission factor for biomass and waste (which includes dung and agricultural, municipal and industrial wastes) combustion (kgN₂O/TJ);
- N_2O_GWP : Global Warming Potential for N₂O (tCO₂e/tN₂O).

Emissions from on-site transportation (OT_GHG_y) are calculated using the following equation:

$$OT_GHG_y = Q_{diesel} * D_{diesel} * (VEF_CO_2 + VEF_CH_4 * CH_4_GWP + VEF_N_2O * N_2O_GWP) / 10^6$$

where,

- OT_GHG_y : Emissions from on-site transportation (ktCO₂e/year);
- Q_{diesel} : Diesel oil consumption (l/year);
- D_{diesel} : Diesel oil density (t/l);
- VEF_CO_2 : CO₂ emission factor for trucks (kgCO₂/t);
- VEF_CH_4 : CH₄ emission factor for trucks (kgCH₄/t);
- CH_4_GWP : Global Warming Potential for CH₄ (tCO₂e/tCH₄);
- VEF_N_2O : N₂O emission factor for trucks (kgN₂O/t);
- N_2O_GWP : Global Warming Potential for N₂O (tCO₂e/tN₂O).

C.3. Leakage equations and calculation methods:

The two sources of leakage are related to the off-site wood waste transportation and ash transportation that is produced in the wood waste combustion process.

Emissions from off-site wood waste transportation are calculated using the following equation:

$$BT_GHG_y = QC_{biomass} / TC_{biomass} * AVD_{biomass} * (VEF_CO_2 + VEF_CH_4 * CH_4_GWP + VEF_N_2O * N_2O_GWP) / 10^6$$

where,

- BT_GHG_y : Emission from off-site transportation (ktCO₂e/year);
- $QC_{biomass}$: Quantity of biomass consumed by project activity (t/year);

- TC_{biomass} : Truck average capacity for biomass transportation (t);
- AVD_{biomass} : Average round trip distance to biomass supply sites (km);
- VEF_{CO_2} : CO_2 emission factor for trucks (kgCO_2/km);
- VEF_{CH_4} : CH_4 emission factor for trucks (kgCH_4/km);
- CH_4_{GWP} : Global Warming Potential for CH_4 ($\text{tCO}_2\text{e}/\text{tCH}_4$);
- $VEF_{\text{N}_2\text{O}}$: N_2O emission factor for trucks ($\text{kgN}_2\text{O}/\text{km}$);
- $\text{N}_2\text{O}_{\text{GWP}}$: Global Warming Potential for N_2O ($\text{tCO}_2\text{e}/\text{tN}_2\text{O}$).

Emissions from ash transportation are calculated using the following equation:

$$AT_GHG_y = Q_{\text{ash}}/TC_{\text{ash}} * AVD_{\text{ash}} * (VEF_{\text{CO}_2} + VEF_{\text{CH}_4} * \text{CH}_4_{\text{GWP}} + VEF_{\text{N}_2\text{O}} * \text{N}_2\text{O}_{\text{GWP}}) / 10^6$$

where,

- AT_GHG_y : Emission from ash transportation ($\text{ktCO}_2\text{e}/\text{year}$);
- Q_{ash} : Quantity of ash produced by the project activity (t/year);
- TC_{ash} : Truck average capacity for ash transportation (t);
- AVD_{ash} : Round trip distance to disposal site (km);
- VEF_{CO_2} : CO_2 emission factor for trucks (kgCO_2/km);
- VEF_{CH_4} : CH_4 emission factor for trucks (kgCH_4/km);
- CH_4_{GWP} : Global Warming Potential for CH_4 ($\text{tCO}_2\text{e}/\text{tCH}_4$);
- $VEF_{\text{N}_2\text{O}}$: N_2O emission factor for trucks ($\text{kgN}_2\text{O}/\text{km}$);
- $\text{N}_2\text{O}_{\text{GWP}}$: Global Warming Potential for N_2O ($\text{tCO}_2\text{e}/\text{tN}_2\text{O}$).

Therefore, the leakage emissions (LE_y) are the sum of the emissions from off-site transportation (BT_GHG_y) and from ash transportation (AT_GHG_y):

$$LE_y = BT_GHG_y + AT_GHG_y$$

C.4. The sum of C.2 and C.3 representing the total project activity emissions equation:

As a small-scale project activity, Lages Project shall directly emit less than 15 ktonnes $\text{CO}_2\text{e}/\text{year}$, according to established by AMS III.E (Version 07). The total project activity emissions (PE_{y_total}) are obtained by sum of PE_y with OT_GHG_y (from Section C.2) and with LE_y (from Section C.3):

$$PE_{y_total} = PE_y + OT_GHG_y + LE_y$$

C.5. Emission reductions equations and calculation methods:

The emission reductions due to the project activity (ER_y) is obtained by the difference between BE_y and PE_{y_total} in tCO₂e/year:

$$ER_y = BE_y - PE_{y_total}$$

SECTION D. Emission reductions

D.1. Baseline emissions:

The baseline emissions presented in the tables below were obtained when applying the monitored data in the Section B.4 to the equations presented in the Section C.1.

IPCC CH ₄ emission factor for decaying biomass (CH ₄ IPCC _{decay})						
Wood waste suppliers	IPCC CH ₄ emission factor for decaying biomass (CH ₄ IPCC _{decay}) [AH=N*O*P*Q*AI]	Methane correction factor (MCF) [N]	Degradable organic carbon (DOC) [O]	Fraction DOC dissimilated to landfill gas (DCO _F) [P]	Fraction of CH ₄ in landfill gas (F) [Q]	16/12 [AI]
	(tCH ₄ /t)	(fraction)	(fraction)	(fraction)	(fraction)	(fraction)
Battistella	0.1147	0.8	0.43	0.5	0.5	1.33
Sofia	0.0573	0.4	0.43	0.5	0.5	1.33
Spot Market	0.0573	0.4	0.43	0.5	0.5	1.33

BATTISTELLA SUPPLY				
Baseline methane emissions from biomass decay (BE _y)				
Year	Baseline methane emissions from biomass decay (BE _y) [AJ=H*AH*V]	Quantity of biomass treated under the project activity* (QT _{biomass}) [H]	IPCC CH ₄ emission factor for decaying biomass (CH ₄ IPCC _{decay}) [AH]	GWP for CH ₄ (CH ₄ GWP) [V]
	(tCO ₂ e/year)	(t/year)	(tCH ₄ /t)	(tCO ₂ e/tCH ₄)
2004	0	0.00	0.1232	
2005	0	0.00	0.1147	
2006	42,728	17,744.03	0.1147	21
2007	20,160	8,372.11	0.1147	21
2008	0	0.00	0.1147	
2009	0	0.00	0.1147	
2010	0	0.00	0.1147	
2011	0	0.00	0.1147	
2012	0	0.00	0.1147	
2013	0	0.00	0.1147	
2014	0	0.00	0.1147	
Total	62,888	26,116.14	-	-

*The annual wood waste treated under the project activity is the total of wood waste consumption of the Lages Project less the wood waste burned by Battistella and Sofia for own consumption in their old boilers and less the wood waste burned spontaneously in the Battistella pile.

SOFIA SUPPLY				
Baseline methane emissions from biomass decay (BE _y)				
Year	Baseline methane emissions from biomass decay (BE _y) [AK=K*AH*V]	Quantity of biomass treated under the project activity* (QT _{biomass}) [K]	IPCC CH ₄ emission factor for decaying biomass (CH ₄ IPCC _{decay}) [AH]	GWP for CH ₄ (CH ₄ GWP) [V]
	(tCO ₂ e/year)	(t/year)	(tCH ₄ /t)	(tCO ₂ e/tCH ₄)
2004	0	0.00	0.0616	
2005	0	0.00	0.0573	
2006	0	0.00	0.0573	21
2007	0	0.00	0.0573	21
2008	0	0.00	0.0573	
2009	0	0.00	0.0573	
2010	0	0.00	0.0573	
2011	0	0.00	0.0573	
2012	0	0.00	0.0573	
2013	0	0.00	0.0573	
2014	0	0.00	0.0573	
Total	0	0.00	-	-

SPOT MARKET SUPPLY				
Baseline methane emissions from biomass decay (BE _y)				
Year	Baseline methane emissions from biomass decay (BE _y) [AL=M*AH*V] (tCO ₂ e/year)	Quantity of biomass treated under the project activity* (Q _T ^{biomass}) [M] (t/year)	IPCC CH ₄ emission factor for decaying biomass (CH ₄ -IPCC _{decay}) [AH] (tCH ₄ /t)	GWP for CH ₄ (CH ₄ -GWP) [V]
2004	0	0.00	0.0616	
2005	0	0.00	0.0573	
2006	117,306	97,430.61	0.0573	21
2007	100,223	83,241.99	0.0573	21
2008	0	0.00	0.0573	
2009	0	0.00	0.0573	
2010	0	0.00	0.0573	
2011	0	0.00	0.0573	
2012	0	0.00	0.0573	
2013	0	0.00	0.0573	
2014	0	0.00	0.0573	
Total	217,530	180,672.60	-	-

Baseline methane emissions from biomass decay (BE _y)				
Year	Baseline methane emissions from biomass decay (BE _y) [AM=AJ+AK+AL] (tCO ₂ e/year)	Battistella Supply [AJ] (tCO ₂ e/year)	Sofia Supply [AK] (tCO ₂ e/year)	Spot Market Supply [AL] (tCO ₂ e/year)
2004	0	0	0	0
2005	0	0	0	0
2006	160,034	42,728	0	117,306
2007	120,383	20,160	0	100,223
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	0	0
2012	0	0	0	0
2013	0	0	0	0
2014	0	0	0	0
Total	280,417	62,888	0	217,530

D.2. Project activity emissions:

The project activity emissions presented in the tables below were obtained when applying the monitored data in the Section B.4 to the equations presented in the Section C.2.

Project activity emissions (PE _y)							
Year	Project activity emissions (PE _y) [AN=A*S*(T*V+U*W)/10^6] (ktCO ₂ e/year)	Quantity of biomass consumed by project activity (Q _C ^{biomass}) [A] (t/year)	Energy content of biomass (E _{biomass}) [S] (TJ/t)	CH ₄ emission factor for biomass and waste combustion (CH ₄ bio_comb) [T] (kgCH ₄ /TJ)	GWP for CH ₄ (CH ₄ -GWP) [V]	N ₂ O emission factor for biomass and waste combustion (N ₂ O _{bio_comb}) [U] (kgN ₂ O/TJ)	GWP for N ₂ O (N ₂ O-GWP) [W]
2004	0.000	0.00					
2005	0.000	0.00					
2006	2.603	139,966.00	7.746E-03	11	21	7	310
2007	1.972	106,033.00	7.746E-03	11	21	7	310
2008	0.000	0.00					
2009	0.000	0.00					
2010	0.000	0.00					
2011	0.000	0.00					
2012	0.000	0.00					
2013	0.000	0.00					
2014	0.000	0.00					
Total	4.575	245,999.00	-	-	-	-	-

Emissions from on-site transportation (OT_GHG _y)								
Year	Emissions from on-site transportation (OT_GHG _y) [AO=AB*X*(Y+Z*V+AA*W)/10^6] (ktCO ₂ e/year)	Diesel oil consumption (Q _{diesel}) [AB] (l/year)	Diesel oil density (D _{diesel}) [X] (t/l)	CO ₂ emission factor for trucks (VEF_CO ₂) [Y] (kgCO ₂ /t)	CH ₄ emission factor for trucks (VEF_CH ₄) [Z] (kgCH ₄ /t)	GWP for CH ₄ (CH ₄ _GWP) [V] (tCO ₂ e/tCH ₄)	N ₂ O emission factor for trucks (VEF_N ₂ O) [AA] (kgN ₂ O/t)	GWP for N ₂ O (N ₂ O_GWP) [W] (tCO ₂ e/tN ₂ O)
2004	0.000							
2005	0.000							
2006	0.091	32,136.19	8.80E-04	3,172.31	0.18	21	0.09	310
2007	0.085	30,003.50	8.80E-04	3,172.31	0.18	21	0.09	310
2008	0.000							
2009	0.000							
2010	0.000							
2011	0.000							
2012	0.000							
2013	0.000							
2014	0.000							
Total	0.175	62,139.69						

D.3. Leakage emissions:

The leakage emissions presented in the tables below were obtained when applying the monitored data in the Section B.4 to the equations presented in the Section C.3.

Emissions from off-site transportation (BT_GHG _y)									
Year	Emissions from off-site transportation (BT_GHG _y) [AP=A/AD*AC*(Y+Z*V+AA*W)/10^6] (ktCO ₂ e/year)	Quantity of biomass consumed by project activity (QC _{biomass}) [A] (t/year)	Truck average capacity for biomass transportation* (TC _{biomass}) [AD] (t)	Average round trip distance to biomass supply sites* (AVD _{biomass}) [AC] (km)	CO ₂ emission factor for trucks (VEF_CO ₂) [Y] (kgCO ₂ /km)	CH ₄ emission factor for trucks (VEF_CH ₄) [Z] (kgCH ₄ /km)	GWP for CH ₄ (CH ₄ _GWP) [V] (tCO ₂ e/tCH ₄)	N ₂ O emission factor for trucks (VEF_N ₂ O) [AA] (kgN ₂ O/km)	GWP for N ₂ O (N ₂ O_GWP) [W] (tCO ₂ e/tN ₂ O)
2004	0.000	0.00							
2005	0.000	0.00							
2006	0.236	139,966.00	13.4	20.5	1.097	6.0E-05	21	3.1E-05	310
2007	0.182	106,033.00	14.1	21.8	1.097	6.0E-05	21	3.1E-05	310
2008	0.000	0.00							
2009	0.000	0.00							
2010	0.000	0.00							
2011	0.000	0.00							
2012	0.000	0.00							
2013	0.000	0.00							
2014	0.000	0.00							
Total	0.418	245,999.00							

Emissions from ash transportation (AT_GHG _y)									
Year	Emissions from ash transportation (AT_GHG _y) [AQ=AG/AF*AE*(Y+Z*V+AA*W)/10^6] (ktCO ₂ e/year)	Quantity of ash produced by the project activity (Q _{ash}) [AG] (t/year)	Truck average capacity for ash transportation (TC _{ash}) [AF] (t)	Round trip distance to disposal site (AVD _{ash}) [AE] (km)	CO ₂ emission factor for trucks (VEF_CO ₂) [Y] (kgCO ₂ /km)	CH ₄ emission factor for trucks (VEF_CH ₄) [Z] (kgCH ₄ /km)	GWP for CH ₄ (CH ₄ _GWP) [V] (tCO ₂ e/tCH ₄)	N ₂ O emission factor for trucks (VEF_N ₂ O) [AA] (kgN ₂ O/km)	GWP for N ₂ O (N ₂ O_GWP) [W] (tCO ₂ e/tN ₂ O)
2004	0.000								
2005	0.000								
2006	0.148	5,487.56	28.0	680.0	1.097	6.0E-05	21	3.1E-05	310
2007	0.144	5,341.64	28.0	680.0	1.097	6.0E-05	21	3.1E-05	310
2008	0.000								
2009	0.000								
2010	0.000								
2011	0.000								
2012	0.000								
2013	0.000								
2014	0.000								
Total	0.291	10,829.20							

Leakage emissions (LE _y)			
Year	Leakage emissions (LE _y) [AR=AP+AQ] (ktCO ₂ e/year)	Emissions from off-site transportation (BT_GHG _y) [AP] (ktCO ₂ e/year)	Emissions from ash transportation (AT_GHG _y) [AQ] (ktCO ₂ e/year)
2004	0.000	0.000	0.000
2005	0.000	0.000	0.000
2006	0.384	0.236	0.148
2007	0.326	0.182	0.144
2008	0.000	0.000	0.000
2009	0.000	0.000	0.000
2010	0.000	0.000	0.000
2011	0.000	0.000	0.000
2012	0.000	0.000	0.000
2013	0.000	0.000	0.000
2014	0.000	0.000	0.000
Total	0.710	0.418	0.291

D.4. The sum of D.2 and D.3 representing the total project activity emissions:

The total project activity emissions presented in the table below were obtained when applying the values calculated in the Sections D.2 and D.3 to the equation presented in the Section C.4.

Total project activity emissions ($PE_{y, total}$) [sum of D.2 and D.3]				
Year	Total project activity emissions ($PE_{y, total}$) [AS=AN+AO+AR]	Project activity emissions (PE_y) [AN]	Emissions from on-site transportation (OT_GHG_y) [AO]	Leakage emissions (LE_y) [AR]
	(ktCO ₂ e/year)	(ktCO ₂ e/year)	(ktCO ₂ e/year)	(ktCO ₂ e/year)
2004	0.000	0.000	0.000	0.000
2005	0.000	0.000	0.000	0.000
2006	3.078	2.603	0.091	0.384
2007	2.382	1.972	0.085	0.326
2008	0.000	0.000	0.000	0.000
2009	0.000	0.000	0.000	0.000
2010	0.000	0.000	0.000	0.000
2011	0.000	0.000	0.000	0.000
2012	0.000	0.000	0.000	0.000
2013	0.000	0.000	0.000	0.000
2014	0.000	0.000	0.000	0.000
Total	5.460	4.575	0.175	0.710

D.5. The difference between D.1 and D.4 representing the project activity emission reductions:

The project activity emission reductions presented in the table below were obtained when applying the values calculated in the Sections D.1 and D.4 to the equation presented in the Section C.5.

Emission reductions due to the project activity (ER_y) [difference between D.1 and D.4]			
Year	Emission reduction due to the project activity (ER_y) [AT=AM-AS]	Baseline methane emissions from biomass decay (BE_y) [AM]	Total project activity emissions ($PE_{y, total}$) [AS]
	(tCO ₂ e/year)	(tCO ₂ e/year)	(tCO ₂ e/year)
2004	0	0	0
2005	0	0	0
2006	156,957	160,034	3,078
2007	118,001	120,383	2,382
2008	0	0	0
2009	0	0	0
2010	0	0	0
2011	0	0	0
2012	0	0	0
2013	0	0	0
2014	0	0	0
Total	274,958	280,417	5,460

Annex 1 – Wood waste by supplier

CONSUMED AMOUNTS IN 2006

Wood waste suppliers	Status (Active/Non-active)	Round trip distance to Lages Project (km) [AW]	Truck Capacity (tonnes) [AX]	Consumed wood waste amount (tonnes/month)												Total consumed amount (tonnes/year) [A]	Travels (un./year) [AY=A/AX]	Total travelled distance (km/year) [AZ=AW*AY]
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Lages region																		
Battistella	Active	2.0	12.0						5,475.55	5,836.74	4,687.58	5,867.54	4,946.17	4,819.98	5,329.69	36,963.27	3,080	6,161
Sofia	Active	4.0	10.0						1,507.87	1,653.36	1,842.93	255.25	92.90	82.80	137.02	5,572.12	557	2,229
Boa Esperança Paiquerê	Active	140.0	15.0						2,871.47	3,144.98	2,402.17	2,673.83	1,691.99	1,681.47	1,891.40	16,357.31	1,090	152,668
Edeschons	Active	5.0	4.0						76.08	60.82	21.16	0.00	0.00	20.38	23.55	201.98	50	252
Janderson	Active	16.0	0.0						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Madbras	Active	40.0	0.0						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Madebampi	Active	10.0	9.0						119.73	121.72	195.68	266.31	230.22	226.81	176.38	1,336.85	149	1,485
Madeira Lajes	Active	4.0	13.0						17.09	0.00	0.00	69.10	55.02	94.76	34.93	270.89	21	83
Madepar	Active	5.0	12.0						1,782.09	1,740.00	1,718.40	2,206.41	1,745.59	1,609.22	1,675.54	12,477.26	1,040	5,199
MJ Madeiras	Active	5.0	11.0						276.45	679.34	877.32	1,504.71	1,094.51	1,174.61	1,079.24	6,686.17	608	3,039
Pandolfo	Active	3.0	7.0						346.21	425.12	410.68	486.73	420.36	409.51	569.83	3,068.44	438	1,315
Pinusbras	Active	5.0	0.0						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Polese	Active	26.0	0.0						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Righez	Active	50.0	0.0						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Araupel	Active	160.0	0.0						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Claudio Paes	Active	30.0	15.0						124.80	242.33	331.55	150.62	147.56	36.74	246.63	1,280.23	85	2,560
Flora Pinus	Active	6.0	35						58.48	61.49	34.99	0.00	0.00	0.00	0.00	154.97	44	266
Indupinho	Active	100.0	0.0						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Indusflora	Active	20.0	17.0						296.73	430.81	261.06	610.38	211.28	430.88	520.23	2,761.37	162	3,249
Jose Altenir	Active	60.0	0.0						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Lopes	Active	100.0	14.0						0.00	0.00	0.00	0.00	51.94	15.42	0.00	67.36	5	481
Martins	Active	16.0	0.0						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Mengatto	Active	5.0	14.0						939.27	1,085.11	1,294.68	1,883.27	1,551.78	1,888.39	1,928.56	10,571.05	755	3,775
Multiform	Active	2.0	20.0						3,860.56	3,646.27	2,864.13	4,712.02	4,445.92	5,782.31	6,526.38	31,837.59	1,592	3,184
Pisani	Active	18.0	14.0						0.00	0.00	0.00	40.48	328.44	128.98	38.67	536.58	38	690
Sart	Active	60.0	16.0						0.00	8.19	166.34	211.91	16.86	69.67	62.18	535.15	33	2,007
Tributto	Active	30.0	13.0						274.76	205.59	178.76	108.16	216.50	296.18	285.90	1,565.85	120	3,613
Turbina	Active	130.0	0.0						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Alceir de Jesus	Active	60.0	22.0						182.16	91.41	0.00	0.00	0.00	0.00	221.31	494.88	22	1,350
Jaquirana	Active	360.0	0.0						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Madebins	Active	180.0	0.0						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Boa Esperança Matriz	Active	50.0	15.0						621.51	634.77	653.48	793.72	577.29	661.39	840.77	4,782.93	319	15,943
Madeira Santa Paulina	Active	14.0	11.0						195.20	218.99	259.37	287.81	0.00	193.22	220.40	1,374.99	125	1,750
Vilso Isidoro	Active	30.0	16.0						0.00	55.95	112.30	182.52	90.38	36.55	0.00	477.69	30	896
Antonio Amarante	Active	70.0	17.0						0.00	0.00	31.04	0.00	0.00	0.00	0.00	31.04	2	128
Sérgio Bochart	Active	50.0	16.0						0.00	0.00	59.36	39.24	0.00	17.53	96.39	212.52	13	664
Extrapac	Active	10.0	5.0						0.00	0.00	0.00	0.00	3.88	39.26	9.88	53.02	11	106
Laminadora Catarinense	Active	3.0	12.0						0.00	0.00	0.00	0.00	85.41	71.45	31.06	187.92	16	47
Pinus Forte	Active	3.0	14.0						0.00	0.00	0.00	0.00	0.00	31.51	75.07	106.58	8	23
-									0.00	0.00						0.00	0	0
-									0.00	0.00						0.00	0	0
Total				0.00	0.00	0.00	0.00	0.00	19,026.00	20,343.00	18,403.00	22,350.00	18,004.00	19,819.00	22,021.00	139,966.00	10,415	213,163

Weighted average round trip distance to Lages Project [AC=AZ/AY]

= 20.5 km

Weighted average truck capacity [AD=A/AY]

= 13.4 tonnes

PURCHASED AMOUNTS IN 2006

Wood waste suppliers	Purchased wood waste amount (tonnes/month)																								Total purchased amount (tonnes/year)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec														
Lages region																										
Battistella	0.00%	0.00%	0.00%	0.00%	0.00%	5,850.45	28.78%	6,214.10	28.69%	5,199.97	25.47%	4,795.95	26.25%	5,361.00	27.47%	4,489.33	24.32%	4,327.37	24.20%	36,238.17	26.54%					
Sofia	0.00%	0.00%	0.00%	0.00%	0.00%	1,611.11	7.93%	1,760.25	8.13%	2,044.38	10.01%	208.63	1.14%	100.69	0.52%	77.12	0.42%	111.25	0.62%	5,913.43	4.33%					
Boa Esperança Paiquerê	0.00%	0.00%	0.00%	0.00%	0.00%	3,068.07	15.09%	3,348.31	15.46%	2,664.74	13.05%	2,185.51	11.96%	1,833.89	9.40%	1,566.12	8.48%	1,535.70	8.59%	16,202.34	11.87%					
Edeschons	0.00%	0.00%	0.00%	0.00%	0.00%	81.29	0.40%	64.75	0.30%	23.47	0.11%	0.00	0.00%	0.00	0.00%	18.98	0.10%	19.12	0.11%	207.61	0.15%					
Janderson	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%					
Madbras	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%					
Madebampi	0.00%	0.00%	0.00%	0.00%	0.00%	127.93	0.63%	129.50	0.60%	217.07	1.06%	217.67	1.19%	249.53	1.28%	211.25	1.14%	143.21	0.80%	1,296.25	0.95%					
Madeira Lajes	0.00%	0.00%	0.00%	0.00%	0.00%	18.26	0.09%	0.00	0.00%	0.00	0.00%	56.48	0.31%	59.63	0.31%	88.26	0.48%	28.36	0.16%	250.99	0.18%					
Madepar	0.00%	0.00%	0.00%	0.00%	0.00%	1,904.10	9.37%	1,852.50	8.55%	1,906.24	9.34%	1,803.45	9.87%	1,891.99	9.70%	1,498.83	8.12%	1,360.43	7.61%	12,217.54	8.95%					
MJ Madeiras	0.00%	0.00%	0.00%	0.00%	0.00%	295.38	1.45%	723.26	3.34%	973.22	4.77%	1,229.90	6.73%	1,186.30	6.08%	1,094.03	5.93%	876.27	4.90%	6,378.37	4.67%					
Pandolfo	0.00%	0.00%	0.00%	0.00%	0.00%	369.92	1.82%	452.61	2.09%	455.57	2.23%	397.84	2.18%	455.61	2.33%	381.42	2.07%	462.67	2.59%	2,975.62	2.18%					
Pinusbras	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%					
Polese	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%					
Righez	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%					
Araupel	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%					
Claudio Paes	0.00%	0.00%	0.00%	0.00%	0.00%	133.34	0.66%	258.00	1.19%	367.79	1.80%	123.11	0.67%	159.94	0.82%	34.22	0.19%	200.25	1.12%	1,276.65	0.94%					
Flora Pinus	0.00%	0.00%	0.00%	0.00%	0.00%	62.48	0.31%	65.47	0.30%	38.82	0.19%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	166.77	0.12%					
Indupinho	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%					
Indusflora	0.00%	0.00%	0.00%	0.00%	0.00%	317.05	1.56%	458.64	2.12%	289.64	1.42%	498.91	2.73%	229.00	1.17%	401.32	2.17%	422.39	2.36%	2,616.93	1.92%					
Jose Altair	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%					
Lopes	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	56.30	0.29%	14.36	0.08%	0.00	0.00%	70.66	0.05%					
Martins	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%					
Mengatto	0.00%	0.00%	0.00%	0.00%	0.00%	1,003.58	4.94%	1,155.26	5.33%	1,436.20	7.04%	1,539.33	8.43%	1,681.92	8.62%	1,758.85	9.53%	1,565.86	8.76%	10,141.00	7.43%					
Multiform	0.00%	0.00%	0.00%	0.00%	0.00%	4,124.88	20.29%	3,882.01	17.92%	3,177.20	15.56%	3,851.46	21.08%	4,818.79	24.69%	5,385.64	29.18%	5,299.00	29.64%	30,538.99	22.37%					
Pisani	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	33.09	0.18%	355.99	1.82%	120.13	0.65%	31.40	0.18%	540.61	0.40%					
Sart	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	8.72	0.04%	184.52	0.90%	173.21	0.95%	18.27	0.09%	64.89	0.35%	50.49	0.28%	500.10	0.37%					
Tributto	0.00%	0.00%	0.00%	0.00%	0.00%	293.57	1.44%	218.88	1.01%	198.30	0.97%	88.41	0.48%	234.66	1.20%	275.86	1.49%	232.13	1.30%	1,541.81	1.13%					
Turbina	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%					
Aleceir de Jesus	0.00%	0.00%	0.00%	0.00%	0.00%	194.63	0.96%	97.32	0.45%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	179.69	1.00%	471.64	0.35%					
Jaquirana	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%					
Madebins	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%					
Boa Esperança Matriz	0.00%	0.00%	0.00%	0.00%	0.00%	664.06	3.27%	675.81	3.12%	724.91	3.55%	648.76	3.55%	625.71	3.21%	616.02	3.34%	682.65	3.82%	4,637.93	3.40%					
Madeira Santa Paulina	0.00%	0.00%	0.00%	0.00%	0.00%	208.57	1.03%	233.15	1.08%	287.72	1.41%	235.25	1.29%	0.00	0.00%	179.96	0.97%	178.95	1.00%	1,323.60	0.97%					
Vilso Isidoro	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	59.57	0.28%	124.58	0.61%	149.19	0.82%	97.96	0.50%	34.02	0.18%	0.00	0.00%	465.32	0.34%					
Antonio Amarante	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	0.00	0.00%	34.43	0.17%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	34.43	0.03%					
Sérgio Bochert	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	0.00	0.00%	65.85	0.32%	32.07	0.18%	0.00	0.00%	16.33	0.09%	78.26	0.44%	192.51	0.14%					
Extrapac	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	4.20	0.02%	36.57	0.20%	8.02	0.04%	48.79	0.04%					
Laminadora Catarinense	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	92.57	0.47%	66.55	0.36%	25.22	0.14%	184.34	0.14%					
Pinus Forte	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	29.35	0.16%	60.95	0.34%	90.30	0.07%					
-	0.00%	0.00%	0.00%	0.00%	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%					
Total	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	136,522.70	100.00%					

CONSUMED AMOUNTS IN 2007

Wood waste suppliers	Status (Active/Non-active)	Round trip distance to Lages Project (km) [AW]	Truck Capacity (tonnes) [AX]	Consumed wood waste amount (tonnes/month)												Total consumed amount (tonnes/year) [A]	Travels (un./year) [AY=A/AX]	Total travelled distance (km/year) [AZ=AW*AY]
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Lages region																		
Battistella	Active	2.0	12.0	5,690.95	5,117.23	4,152.30	2,206.38	4,889.82								22,056.68	1,838	3,676
Sofia	Active	4.0	10.0	22.10	29.01	193.53	229.14	260.55								734.34	73	294
Boa Esperança Paiquerê	Active	140.0	15.0	1,841.09	1,719.22	2,338.93	1,358.63	849.99								8,107.86	541	75,673
Edeschons	Active	5.0	0.0	0.00	0.00	0.00	0.00	0.00								0.00	0	0
Janderson	Active	16.0	0.0	0.00	0.00	0.00	0.00	0.00								0.00	0	0
Madbras	Active	40.0	0.0	0.00	0.00	0.00	0.00	0.00								0.00	0	0
Madebampi	Active	10.0	9.0	179.00	115.93	131.24	68.40	61.76								556.33	62	618
Madeireira Lajes	Active	4.0	13.0	11.47	15.28	14.78	11.38	0.00								52.92	4	16
Madepar	Active	5.0	12.0	1,910.39	2,252.94	2,980.71	2,059.53	2,056.14								11,259.71	938	4,692
MJ Madeiras	Active	5.0	11.0	761.65	680.10	870.94	703.02	931.13								3,946.84	359	1,794
Pandolfo	Active	3.0	7.0	492.27	525.85	496.75	353.18	790.92								2,658.97	380	1,140
Pinusbras	Active	5.0	0.0	0.00	0.00	0.00	0.00	0.00								0.00	0	0
Polese	Active	26.0	0.0	0.00	0.00	0.00	0.00	0.00								0.00	0	0
Righez	Active	50.0	0.0	0.00	0.00	0.00	0.00	0.00								0.00	0	0
Araupel	Active	160.0	0.0	0.00	0.00	0.00	0.00	0.00								0.00	0	0
Claudio Paes	Active	30.0	0.0	0.00	0.00	0.00	0.00	0.00								0.00	0	0
Flora Pinus	Active	6.0	0.0	0.00	0.00	0.00	0.00	0.00								0.00	0	0
Indupinho	Active	100.0	0.0	0.00	0.00	0.00	0.00	0.00								0.00	0	0
Indusflora	Active	20.0	17.0	669.97	762.14	382.88	268.40	324.25								2,407.65	142	2,833
Jose Altenir	Active	60.0	0.0	0.00	0.00	0.00	0.00	0.00								0.00	0	0
Lopes	Active	100.0	0.0	0.00	0.00	0.00	0.00	0.00								0.00	0	0
Martins	Active	16.0	0.0	0.00	0.00	0.00	0.00	0.00								0.00	0	0
Mengatto	Active	5.0	14.0	1,733.05	1,366.09	1,924.29	1,219.44	1,207.33								7,450.21	532	2,661
Multiform	Active	2.0	20.0	6,114.92	4,801.82	7,023.32	5,786.89	6,796.06								30,523.00	1,526	3,052
Pisani	Active	18.0	14.0	209.19	475.14	675.43	453.54	430.79								2,244.10	160	2,885
Sart	Active	60.0	16.0	17.83	0.00	0.00	0.00	0.00								17.83	1	67
Tributto	Active	30.0	13.0	267.30	382.50	401.53	200.17	275.77								1,527.26	117	3,524
Turbina	Active	130.0	0.0	0.00	0.00	0.00	0.00	0.00								0.00	0	0
Alceir de Jesus	Active	60.0	22.0	62.22	22.85	185.84	145.39	0.00								416.29	19	1,135
Jaquirana	Active	360.0	16.0	0.00	0.00	17.66	527.99	1,057.03								1,602.68	100	36,060
Madebins	Active	180.0	0.0	0.00	0.00	0.00	0.00	0.00								0.00	0	0
Boa Esperança Matriz	Active	50.0	15.0	732.00	784.91	965.68	617.29	817.07								3,916.95	261	13,056
Madeiraira Santa Paulina	Active	14.0	11.0	254.00	298.43	369.46	239.24	244.47								1,405.59	128	1,789
Vilso Isidoro	Active	30.0	0.0	0.00	0.00	0.00	0.00	0.00								0.00	0	0
Antonio Amarante	Active	70.0	0.0	0.00	0.00	0.00	0.00	0.00								0.00	0	0
Sérgio Bochet	Active	50.0	16.0	17.14	17.58	19.50	13.74	16.53								84.48	5	264
Extrapac	Active	10.0	0.0	0.00	0.00	0.00	0.00	0.00								0.00	0	0
Laminadora Catarinense	Active	3.0	12.0	40.21	0.00	0.00	0.00	22.77								62.98	5	16
Pinus Forte	Active	3.0	14.0	419.84	415.66	414.83	169.99	275.02								1,695.33	121	363
Alcides Inaldo	Active	10.0	10.0	50.06	0.00	0.00	0.00	8.42								58.48	6	58
José de Souza	Active	60.0	8.0	27.26	0.00	0.00	14.91	0.00								42.18	5	316
Malke	Active	20.0	6.0	14.09	0.00	0.00	0.00	11.82								25.91	4	86
Arno Tillmann	Active	70.0	16.0	0.00	104.72	142.93	92.14	164.53								504.32	32	2,206
Floko	Active	75.0	32.0	0.00	78.34	0.00	0.00	0.00								78.34	2	184
Madeiraira Santa Rita	Active	14.0	11.0	0.00	40.26	0.00	0.00	0.00								40.26	4	51
Aristides Araujo	Active	10.0	15.0	0.00	0.00	188.50	26.20	26.27								240.98	16	161
Germino Vargas	Active	10.0	6.0	0.00	0.00	14.22	0.00	0.00								14.22	2	24
Sérgio Luiz Bogorni	Active	70.0	16.0	0.00	0.00	77.75	0.00	0.00								77.75	5	340
Brazilian Pine	Active	3.0	15.0	0.00	0.00	0.00	116.85	17.44								134.28	9	27
Celso Pedro Paese	Active	30.0	15.0	0.00	0.00	0.00	38.00	96.64								134.64	9	269
Clesio Kauling	Active	70.0	13.0	0.00	0.00	0.00	115.19	0.00								115.19	9	620
Comboni	Active	90.0	15.0	0.00	0.00	0.00	58.11	158.61								216.72	14	1,300
Eder Roberto Monn	Active	70.0	16.0	0.00	0.00	0.00	14.20	0.00								14.20	1	62
Nilton Sabatini	Active	20.0	17.0	0.00	0.00	0.00	286.78	147.58								434.36	26	511
Olimpyo	Active	16.0	14.0	0.00	0.00	0.00	632.34	333.39								965.74	69	1,104
Gilberto Muniz Lima	Active	60.0	17.0	0.00	0.00	0.00	0.00	56.88								56.88	3	201
J.A. Maines	Active	180.0	15.0	0.00	0.00	0.00	0.00	79.74								79.74	5	957
IJ Tomazi	Active	16.0	27.0	0.00	0.00	0.00	0.00	29.45								29.45	1	17
Ravazin	Active	20.0	24.5	0.00	0.00	0.00	0.00	26.62								26.62	1	22
Madeiraira Norte Pontcalense	Active	160.0	17.0	0.00	0.00	0.00	14.77	0.00								14.77	1	139
-																0.00	0	0
-																0.00	0	0
Total				21,538.00	20,006.00	23,983.00	18,064.00	22,442.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	106,033.00	7,538	164,265

Weighted average round trip distance to Lages Project [AC=AZ/AY]
Weighted average truck capacity [AD=A/AY]

= 21.8 km
= 14.1 tonnes

PURCHASED AMOUNTS IN 2007

Wood waste suppliers	Purchased wood waste amount (tonnes/month)												Total purchased amount (tonnes/year)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lages region													
Battistella	5,412.32	26.42%	4,279.61	25.58%	3,367.42	17.31%	2,535.55	12.21%	4,514.87	21.79%			20,109.77
Sofia	21.02	0.10%	24.26	0.14%	156.93	0.81%	263.33	1.27%	240.37	1.16%			706.13
Boa Esperança Paiqueré	1,750.93	8.55%	1,437.81	8.59%	1,896.82	9.75%	1,561.32	7.52%	784.81	3.79%			7,431.71
Edeschons	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%			0.00
Janderson	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%			0.00
Madbras	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%			0.00
Madebampi	170.24	0.83%	96.95	0.58%	106.43	0.55%	78.61	0.38%	57.02	0.28%			509.25
Madeiraira Lajes	10.91	0.05%	12.78	0.08%	11.99	0.06%	13.08	0.06%	0.00	0.00%			48.76
Madepar	1,816.86	8.87%	1,884.16	11.26%	2,417.29	12.43%	2,366.79	11.40%	1,898.48	9.16%			10,383.58
MJ Madeiras	724.34	3.54%	568.78	3.40%	706.31	3.63%	807.90	3.89%	859.73	4.15%			3,667.08
Pandolfo	468.17	2.29%	439.78	2.63%	402.86	2.07%	405.87	1.96%	730.27	3.52%			2,446.94
Pinusbras	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%			0.00
Polese	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%			0.00
Righez	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%			0.00
Arapuel	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%			0.00
Claudio Paes	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%			0.00
Flora Pius	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%			0.00
Indupinho	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%			0.00
Industlora	637.17	3.11%	637.39	3.81%	310.51	1.60%	308.44	1.49%	299.39	1.44%			2,192.90
Jose Altair	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%			0.00
Lopes	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%			0.00
Martins	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%			0.00
Mengatto	1,648.20	8.05%	1,142.48	6.83%	1,560.55	8.02%	1,401.37	6.75%	1,114.75	5.38%			6,867.36
Multiform	5,815.53	28.39%	4,015.83	24.00%	5,695.75	29.28%	6,650.23	32.04%	6,274.94	30.28%			28,452.28
Pisani	198.95	0.97%	397.37	2.38%	547.76	2.82%	521.20	2.51%	397.76	1.92%			2,063.04
Sart	16.96	0.08%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%			16.96
Tributo	254.21	1.24%	319.89	1.91%	325.63	1.67%	230.03	1.11%	254.62	1.23%			1,384.38
Turbina	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%			0.00
Alceir de Jesus	59.17	0.29%	19.11	0.11%	150.71	0.77%	167.08	0.80%	0.00	0.00%			396.07
Jaquirana	0.00	0.00%	0.00	0.00%	14.32	0.07%	606.76	2.92%	975.98	4.71%			1,597.06
Madebins	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%			0.00
Boa Esperança Matriz	696.16	3.40%	656.43	3.92%	783.14	4.03%	709.38	3.42%	754.42	3.64%			3,599.54
Madeiraira Santa Paulina	241.56	1.18%	249.58	1.49%	299.62	1.54%	274.93	1.32%	225.72	1.09%			1,291.41
Vilso Isidoro	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%			0.00
Antonio Amarante	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%			0.00
Sérgio Bochart	16.36	0.08%	14.70	0.09%	15.91	0.08%	15.79	0.08%	15.26	0.07%			77.86
Extrapac	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%			0.00
Laminadora Catarinense	38.24	0.19%	0.00	0.00%	0.00	0.00%	26.17	0.13%	0.00	0.00%			64.41
Pinus Forte	399.28	1.95%	347.62	2.08%	336.42	1.73%	193.35	0.94%	253.93	1.23%			1,532.60
Alcides Inaldo	47.61	0.23%	0.00	0.00%	0.00	0.00%	0.00	0.00%	7.77	0.04%			55.38
José de Souza	25.93	0.13%	0.00	0.00%	0.00	0.00%	17.14	0.08%	0.00	0.00%			43.07
Malke	13.40	0.07%	0.00	0.00%	0.00	0.00%	0.00	0.00%	10.91	0.05%			24.31
Arno Tillmann	0.00	0.00%	87.58	0.52%	115.91	0.60%	105.89	0.51%	151.91	0.73%			461.29
Fleko	0.00	0.00%	65.52	0.39%	0.00	0.00%	0.00	0.00%	0.00	0.00%			65.52
Madeiraira Santa Rita	0.00	0.00%	33.67	0.20%	0.00	0.00%	0.00	0.00%	0.00	0.00%			33.67
Aristides Araujo	0.00	0.00%	0.00	0.00%	152.87	0.79%	30.11	0.15%	24.26	0.12%			207.24
Germino Vargas	0.00	0.00%	0.00	0.00%	11.53	0.06%	0.00	0.00%	0.00	0.00%			11.53
Sérgio Luiz Bogomi	0.00	0.00%	0.00	0.00%	63.05	0.32%	0.00	0.00%	0.00	0.00%			63.05
Brazilian Pine	0.00	0.00%	0.00	0.00%	0.00	0.00%	134.28	0.65%	16.10	0.08%			150.38
Celso Pedro Paese	0.00	0.00%	0.00	0.00%	0.00	0.00%	43.67	0.21%	89.23	0.43%			132.90
Clesio Kauling	0.00	0.00%	0.00	0.00%	0.00	0.00%	132.37	0.64%	0.00	0.00%			132.37
Comboni	0.00	0.00%	0.00	0.00%	0.00	0.00%	66.78	0.32%	146.45	0.71%			213.23
Eder Roberto Momm	0.00	0.00%	0.00	0.00%	0.00	0.00%	16.32	0.08%	0.00	0.00%			16.32
Nilton Sabatini	0.00	0.00%	0.00	0.00%	0.00	0.00%	329.56	1.59%	136.27	0.66%			465.83
Olimpyo	0.00	0.00%	0.00	0.00%	0.00	0.00%	726.68	3.50%	307.83	1.49%			1,034.51
Gilberto Muniz Lima	0.00	0.00%	0.00	0.00%	0.00	0.00%	52.52	0.25%	0.00	0.00%			52.52
J.A. Maines	0.00	0.00%	0.00	0.00%	0.00	0.00%	73.63	0.36%	0.00	0.00%			73.63
JJ Tomazi	0.00	0.00%	0.00	0.00%	0.00	0.00%	27.19	0.13%	0.00	0.00%			27.19
Ravazin	0.00	0.00%	0.00	0.00%	0.00	0.00%	24.58	0.12%	0.00	0.00%			24.58
Madeiraira Norte Pontalense	0.00	0.00%	0.00	0.00%	0.00	0.00%	16.97	0.08%	0.00	0.00%			16.97
-	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%			0.00
Total	20,483.50	100.00%	16,731.31	100.00%	19,449.65	100.00%	20,758.96	100.00%	20,721.17	100.00%	0.00	0.00%	98,144.58