CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT
FOR SMALL-SCALE PROJECT ACTIVITIES (SSC-CDM-PDD)
Version 02

LAGES METHANE AVOIDANCE PROJECT

(Version 02)

September, 2005

History of the document

Version	Date	Nature of revision(s)
01	21 Jul 2005	Initial adoption
02	21 Sep 2005	Revision providing the clarifications and corrective actions requested by the validator

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CONTENTS

SECTION A. General description of the small-scale project activity

A.1. Title of the small-scale project activity:

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

A.2. Description of the small-scale project activity:

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 project is not requiring emission reductions from the electricity grid displacement.

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 already under operation 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. The Project sells electricity to the local distribution company and to industrial clients so-called free consumers. The steam produced in the plant is supplied to the two of the biggest regional wood industries, namely Battistella and Sofia. This energy is used mainly for wood drying, with minimum 60% returning to Lages as condensate.

These two wood industries, Battistella and Sofia, have already established 10 years contracts for supplying about 30% of the volume of wood waste necessary for the Project activity in full load, or about 70% at average load. The average wood waste consumption of the Project is 459,000 tonnes/year at full load and 183,600 tonnes/year at average load operation (load factor of 40%). The remaining fuel amount will be acquired in the spot market from others timber industries present in the region. All the timber industries are based on the *pinus* species, which currently represent the main planted forest in the State of Santa Catarina. Nowadays, this wood waste does not have a continuous and total use. Part of the residue generated in the region is used in wood dryers and small boilers, with very low efficiency since abundance of residues gives no incentive for efficiency improvements (increasing efficiency would only aggravate the problem of excess wood waste). A very small part is used by poultry farmers. The remaining part unused is deposited outdoors in piles of different volumes depending on the size of wood sawmill, constituting an environmental problem. The Battistella's wood waste pile, one of the main suppliers of wood waste to the Lages Project, was among the largest in the region before installation of the Lages Project.

Fire risks, methane and carbon monoxide gas emissions, and occupation of physical space that could be used for other purposes are among the resulting environmental problems of these wood waste piles. The Project implementation is an alternative to dumping, consuming 183,600 tonnes/year at average load operation and up to 459,000 tonnes/year at full load operation using wood waste as fuel in steam and electricity production. By reducing the unused amount of wood waste in a region with expanding wood industries, the Project contributes to the improvement of the conditions of residues disposal, as well as to an improvement on other environmental aspects. Assuming that the Lages Project would eventually run at full capacity, the amount of wood waste used could reach 459,000 tonnes per year. In this case, only the wood waste to be used in the Project would correspond to about 1 million m^3 due to the low density

[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.

of the material. Projecting the wood waste production for the lifetime of the Project (25 years) this volume would correspond to a total of 25 million m^3, representing an area of approximately 500 ha of 5 m deep piles.

The Project Activity contributes to the mitigation of the greenhouse gases emissions in reducing the methane production in wood waste piles where the residues that will be used would be deposited otherwise. It is also important to point out the fact that the biomass presents a great advantage for the country in terms of diversifying energy supply and its use has a positive impact on the local economy, including the direct and indirect generation of jobs.

A.3 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)	• Lages Bioenergética Ltda. (Private Entity) as the Special Purpose Company created by Tractebel Energia S.A. to implement the Lages Project	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

Further contact information of the project participants is provided in Annex 1. Any changes in the project participants list during the project will be immediately informed to CDM Executive Board and Brazilian Designated National Authority (DNA).

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

A.4.1.1 Host Party(ies):

Brazil.

A.4.1.2. Region/State/Province etc.:

Brazilian South region, State of Santa Catarina.

A.4.1.3. City/Town/Community etc.:

Lages municipality.

A.4.1.4. Detailed description of the physical location, including information allowing the unique identification of this small-scale project activity(ies):

The State of Santa Catarina is located in the centre of the Brazilian South region occupying an area of 95,442.9 km^2, as illustrated in the Figure 1. Lages Project is located at Vivandério Santos do Vale Street,

in Lages municipality, in State of Santa Catarina. Lages municipality is located 223 km West from Florianópolis (the capital of the State), in the region called Planalto Serrano (Elevation: 916 m, Latitude: 27º48'58" S and Longitude: 50º19'30" W). The access to the Project by road is through BR-282 or highway BR-116, as illustrated in the Figure 2.

Figure 1: Geographic localization of the State of Santa Catarina and Lages municipality. (Source: www.bussolaescolar.com.br, accessed on March, 2005)

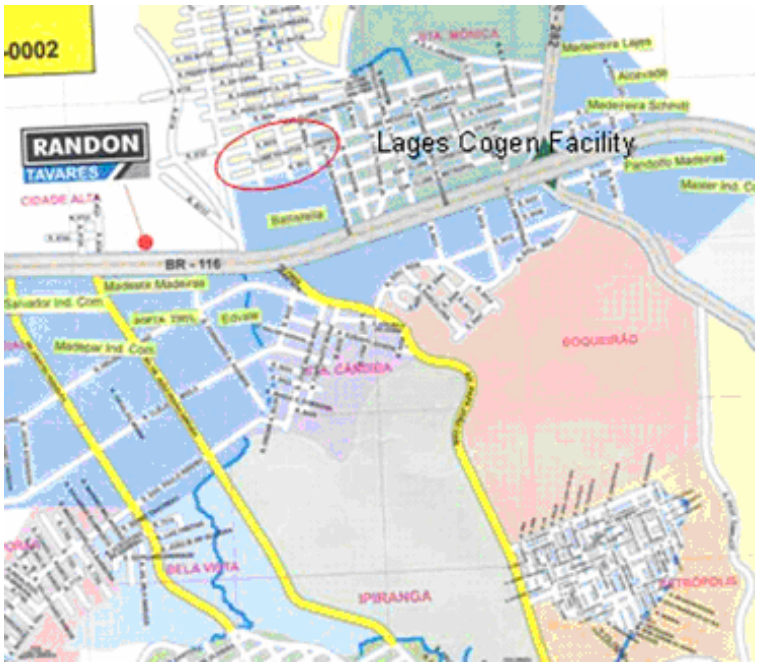

Figure 2: Map of Lages municipality and location of the Lages Project.

A.4.2. Type and category(ies) and technology of the small-scale project activity:

The Project is in accordance with the Appendix B of the simplified modalities and procedures for small-scale CDM project activities – Type III.E "Avoidance methane production from biomass decay through controlled combustion" – since it avoids the production of methane from biomass that would have

otherwise been left to decay as a result of anthropogenic activity through controlled combustion and directly emits less than 15 kilotonnes of carbon dioxide equivalent annually.

The estimation of total emissions of the project activity, including the leakages, is the order of 3.070 ktonnesCO_2e/year, which totalize over the crediting period (10 years) 30.698 ktonnesCO_2e. Please refer to the Section E.1 for detailed information. This way the Project is eligible as small-scale and will remain under the limits for small-scale project activities Type III every year over crediting period.

Lages Project consists of a boiler with a steam turbine, producing electricity and supplying steam to local wood industries, using wood waste from local industries as a fuel. Figure 3 illustrates the schematic diagram of the Project.

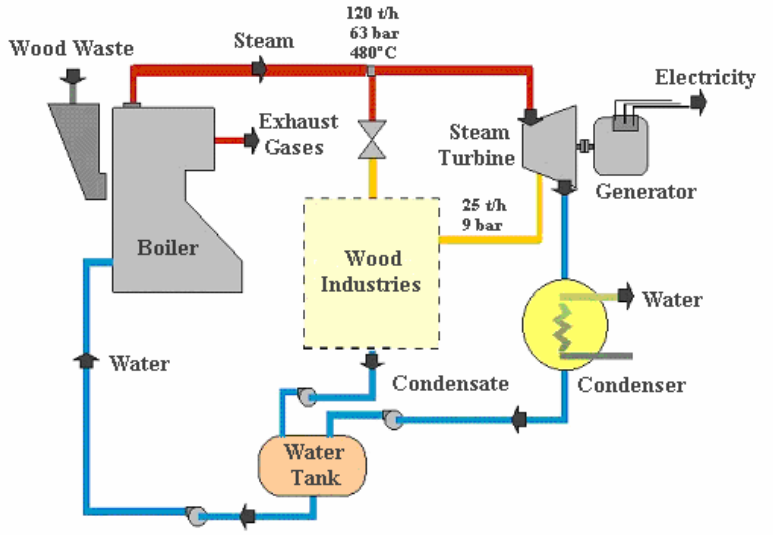

Figure 3: Lages Project's cogeneration facility schematic diagram.

This technology in association with adjusted control devices and operation and maintenance routines causes very low environmental impacts from production of electricity and steam. Because of this, the Brazilian Environmental Agency approves its use. This technology is widely used in the sugar cane industry in Brazil to produce steam and electricity to supply its industrial processes needs. However, the Lages Project is the first cogeneration plant in Brazil, in its installed capacity range, that was built to produce steam for industrial use and electricity for the national grid as main activity, using wood waste as fuel.

Besides, it is important to point out the main equipments of the Project, such as boiler, steam turbine (only some components were imported), generator and transformer were produced in Brazil promoting the transference of the technology and know-how to the host Party.

A.4.3. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed small-scale project activity, including why the emission reductions would nor occur in the absence of the proposed small-scale project activity, taking into account national and/or sectoral policies and circumstances:

The Project reduces anthropogenic of GHG emissions by avoiding methane emissions from anaerobic digestion of wood waste in piles of sawmill residues widely disposed without adequate environmental control. In the baseline scenario this wood waste would continue to be dumped in a region where open air

burning of biomass is prohibited, dumping in piles is the prevailing practice, and where the supply of such wood waste exceeds its demand.

The greenhouse gas emission reductions generated by the Project are about 220,439 tCO_2e/year and a total of 2,204,394 tCO_2e in a ten years fixed crediting period. This estimative are based on an availability factor of 95% and a conservative load factor of 40% of the Lages Project's cogeneration facility, i.e. 183,600 tonnes/year of wood waste consumed and conservative assumptions regarding avoided methane emissions.

A.4.3.1. Estimated amount of emission reductions over the chosen crediting period:

Years	Annual estimation of emission reductions in tonnes of CO_2e
2004	36,740
2005	220,439
2006	220,439
2007	220,439
2008	220,439
2009	220,439
2010	220,439
2011	220,439
2012	220,439
2013	220,439
2014	183,700
Total estimated reductions / project emissions (tonnes of CO_2e)	**2,204,394**
Total number of crediting years	**10**
Annual average over the crediting period of estimated reductions / project emissions (tonnes of CO_2e)	**220,439**

It is important to point out that crediting period starts in 01/11/2004 (only 2 months in 2004) and finishes in 31/10/2014 (only 10 months in 2014), totalizing 10 years or 120 months.

A.4.4. Public funding of the small-scale project activity:

There is no public funding from Annex I countries in the Project Activity. All required investments were fully funded by Tractebel Energia S.A.'s equity and financing provided by the Brazilian Development Bank (BNDES), in a pass-though operation with Regional Bank for the South Region Development (BRDE). BNDES is charged with financing, with a long term perspective, to projects that contribute to the country's development.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a larger project activity:

This Project is not part of a larger emission-reduction project since it does not attend the criteria to determine the occurrence of debundling established in the Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM project activities.

SECTION B. Application of a baseline methodology

B.1. Title and reference of the approved baseline methodology applied to the small-scale project activity:

The Project uses "Small-Scale Methodology III.E: Avoidance of methane production from biomass decay through controlled combustion".

B.2. Project category applicable to the small-scale project activity:

AMS III.E 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. Furthermore, Lages Project directly emits less than 15 kilotonnes of carbon dioxide equivalent annually (see Section E for calculation of project activity emissions).

Lages Project uses biomass (wood waste) from a sustainable source as fuel, which would otherwise continue to be dumped and kept in stockpiles for years. Furthermore, the State law (Decree nº 14,250 of June 5th, 1981) bans open air burning of wood waste, leading to piled up wood waste if it is not used for other purposes.

Simplified methodology AMS III.E for small-scale CDM project activity stipulates that the baseline emissions (i.e. the avoided methane emissions) are the amount of methane from the decay of the biomass or other organic waste treated in the project activity. The formulae used to calculate the methane emission factor and the baseline emissions are presented in the Section E.1 and the key information and data used are presented in the table below. IPCC default values are used.

Parameter	Value	Value	Unit	Data source
MCF	Methane correction factor	0.8 (Battistella) 0.4 (Sofia) 0.4 (Spot Market)	(fraction)	IPCC
DOC	Degradable organic carbon	0.3	(fraction)	IPCC
DOC_F	Fraction DOC dissimilated to landfill gas	0.77	(fraction)	IPCC
F	Fraction of CH_4 in landfill gas	0.5	(fraction)	IPCC
$CH_4\_IPCC_{decay}$	IPCC CH_4 emission factor for decaying biomass in the region of the project activity	0.1232 (Battistella) 0.0616 (Sofia) 0.0616 (Spot Market)	tCH_4/t	Calculated
$QT_{biomass}$	Quantity of biomass treated under the project activity	36,590 (Battistella) 15,600 (Sofia) 84,000 (Spot Market) 136,190 (Total)	t/year	Estimated
CH_4_GWP	GWP for CH_4	21	tCO_2e/tCH_4	UNFCCC
BE_y	Baseline methane emissions from biomass decay	94,667 (Battistella) 20,180 (Sofia) 108,662 (Spot Market) 223,509 (Total)	tCO_2e/year	Calculated

For Lages Project, MCF default value of 0.4 is considered for the methane emissions calculation for the amount of unused wood waste bought from Sofia and in the Spot Market, given the majority of the wood waste piles in the Lages region is in unmanaged shallow waste disposal sites with depths of less than 5 meters. However, for the methane emissions calculation for the amount of unused wood waste from Battistella, given the characteristics of its wood waste pile and in order to consider a more realistic scenario, is considered MCF value of 0.8 which is based on IPCC default for unmanaged deep waste disposal sites with depths greater than or equal to 5 meters.

It is also important to point out that for Battistella, due to the size of its wood waste pile, spontaneous combustion may occur sporadically in some points of the pile. However, this spontaneous combustion is not significant since Battistella takes immediate actions to extinguish the fire (for instance, spreading soil over the points in combustion) mainly because the State law bans open air burning of wood waste, the wood waste pile is located close to Battistella's industrial buildings, representing fire risks, and Battistella site is close to two local communities, which would be affected by the smoke produced and would alert the environmental authorities.

Even so, in order to be conservative in the baseline scenario for Battistella, we have considered a discount factor for the methane that would be already destroyed due to this possible spontaneous combustion. 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 amount supplied by Battistella (69,600 tonnes/year) and what was previously burned in its old boilers to produce steam (32,640 tonnes/year). This represents a wood waste amount of 370 tonnes/year which is not treated under Lages Project since is burned spontaneously in the Battistella pile.

To establish the value of the discount factor we have evaluated the spontaneous combustion sporadically occurring on the wood waste pile already existing at Battistella site, which has an estimated amount of 37,500 tonnes[2] and, hence, is approximately equal to annual amount of wood waste that would be dumped and left to decay in the baseline scenario for Battistella (36,960 tonnes/year). If we consider that 1% of this pile is destroyed by spontaneous combustion this means that around 375 tonnes/year or 1 tonne/day are burned. This is a conservative amount in relation to what is usually observed at Battistella, as could be confirmed by Designated Operational Entity (DOE) validating and/or verifying the Project. Besides, this amount, when firing, produces around 1.5 tonnes/day or 1,000 m³/day of emissions[3] and consequently smoke. It looks clear that if this volume of smoke is produced, it would affect the local communities, which would require solutions from the environmental authorities.

For Lages Project, since the biomass composition is 100% of wood waste, the DOC default value of 0.3 is considered for the methane emissions calculation. IPCC default values to DOC_F and F are used.

The total wood waste amount treated under the Lages Project is about 136,190 tonnes/year that would otherwise be dumped in the baseline scenario, which is equivalent to total wood waste amount consumed/burned by Lages Project (183,600 tonnes/year) less the amount was previously burned by Battistella and Sofia in their old boilers before the Lages Project to be installed (32,640 tonnes/year and 14,400 tonnes/year respectively) and less the amount burned spontaneously in the Battistella pile (370 tonnes/year). The baseline methane emissions from the biomass decay to the Lages Project is the sum of the baselines calculated separately to each wood waste supplier (Battistella, Sofia and Spot Market).

[2] Considered a pile with conservative dimensions (length of 150 meters, width of 50 meters and height of 10 meters) and a conservative wood waste density of 500 kg/m³ (usually equivalent to 350 kg/m³).

[3] Considered that 1 tonne of wood waste has around 0.5 tonnes of carbon (C), 50% of the combustion is completed, producing CO_2, and 50% is not completed, producing only CO.

B.3. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

The baseline scenario to Lages Project is the business-as-usual (BAU) scenario of continued dumping of wood waste in stockpiles. The project activity aims the use of the previously dumped wood waste for electricity and steam generation. Furthermore, Lages Project is qualified to use simplified methodology AMS III.E when reduces anthropogenic emissions and the project emissions, which consist of emissions from wood waste combustion, from off-site and on-site wood waste transportation and from ash transportation, represent a total of 3.070 ktonnesCO_2e/year, less than annual limit of 15 ktonnesCO_2e/year.

The additionality of the Project is established through the barrier analysis included in Attachment A to Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM project activities. As demonstrated below, it is concluded that the Project is additional since it is not business-as-usual and not part of the BAU baseline scenario when the implementation decision was taken in 2001:

(a) Technological barriers: the project represents one of the first applications of the technology in the country, leading to technological concerns even when the technology has been proven in other countries.

The Lages Project's technology is widely used in the sugar cane industry in Brazil to produce steam and electricity to supply its industrial processes needs. However, the Lages Project is the first cogeneration plant in Brazil, in its installed capacity range, that was built to produce steam for industrial use and electricity for the national grid as main activity, using wood waste as fuel.

Since the Project is the first of its kind in terms of size, technology and objective, there is no historical data available that can be used to quantitatively estimate technological/investment risks. However, the very fact that no projects with similar characteristics have been implemented in the past tends to demonstrate that real and/or perceived risks exist for such project. Such considerations are likely to include the risks related to ability to secure long term Power Purchase Agreements with attractive tariffs taking into account technology/investment and generation costs.

(b) Barriers due to prevailing practice: there is a lack of will to change the current biomass disposal practice with or without regulations.

Wood industries in the region dispose the wood waste in an uncontrolled way in big dumps without any kind of control of environmental impacts. The residues are left in the deposits for long period of time. This scenario is considered as the "business-as-usual" scenario and a practice that is likely to continue as the wood industry in the region is growing year after year causing an increase on wood waste production.

The Universidade do Planalto Catarinense (UNIPLAC) conducted an initial study[4] in 2001 to evaluate wood waste production in the Lages region (they considered a range of 120 km from Lages). The research covered 33% of the potential suppliers registered in the region (which are 283 companies) and found out that the amount of wood waste produced by them in the study area was 26,376 tonnes/month. From this amount, the companies reported that 20,789 tonnes/month were sold in the spot market, mainly for wood dryers and small boilers with very low efficiency (abundance of wood waste gives no incentive to increase efficiency). A very small part was reported as being used by poultry farmers. Finally, according to the survey of these sawmills, 5,587 tonnes/month did not have any use and were disposed inadequately.

[4] BRAND, Martha A.; SIMIONI, Flávio J.; ROTTA, Débora N. H.; ARRUDA, Luiz Gonzaga Padilha. "*Caracterização da produção e uso dos resíduos madeiráveis gerados na indústria de base florestal da região serrana catarinense*". Final project report (version in Portuguese). UNIPLAC, Lages, December, 2001.

To establish Lages Project scenario, for the amount of wood waste available, the UNIPLAC study was used as a starting point, i.e., 26,376 tonnes/month produced by 283 companies. Additional consultations were also undertaken with the UNIPLAC experts and considering that the totals in the initial study were estimated to represent only 33% of the number of the wood industries in 2001 and the consistency of the sample used in the survey, it is possible to conclude that the whole wood industries population located in Lages region could produce 79,927 tonnes/month. From this total, it is also possible to estimate the unused part disposed in an inadequate way 16,930 tonnes/month.

However, four considerations should be taken into account regarding the disclosed amount:

(i) According to the complementary study[5] conducted by UNIPLAC the three biggest wood industries (Battistella, Sofia and Madepar) did not disclose the full wood waste amount effectively available during the initial study. Thus, complementary study concludes that the actual wood waste production was 30,213 tonnes/month. Considering that these totals were estimated to represent only 33% of the number of the wood industries in 2001 it is possible to extrapolate that the whole wood industries population located in Lages region could produce 91,555 tonnes/month and that the unused part disposed in an inadequate way was 19,394 tonnes/month;

(ii) Considering that the UNIPLAC's study is public, there was no interest by the wood industry to reveal the real amount of wood waste production and in particular the amount of wood waste simply dumped since disclosing this information could create an environmental liability to the industry;

(iii) Timber industry activity has increased considerably from 2001 to 2004, mainly due to increase in exports, consequently increasing the wood waste generation. According to wood industry sector official data[6], the amount of exported manufactured wood has increased 39.56% from 2001 to 2003, the sawed wood exported has increased 45.29% from 2002 to 2004, the plywood exported has increased 103.68% from 2002 to 2004 and furniture and its parts exported has increased 76.57% from 2002 to 2004. The wood industry production has increased 7.68% in the last year. State of Santa Catarina has increased 24.57% the amount of exported manufactured wood from 2001 to 2003 and has been the second largest wood exporter among Brazilian states in 2002 and 2003 with about 20% of total amount. A recent study[7] by Associação Brasileira da Indústria de Madeira Processada Mecanicamente (ABIMCI) and Fórum Nacional das Atividades de Base Florestal (FNABF) found that there are 3,194 companies in the wood sector in Santa Catarina state, i.e. about eleven times more than the number of potential wood waste suppliers identified in the UNIPLAC study in 2001 (which was focused on the Lages region and only in the primary transformation industry – saw and rolling mills; secondary transformation industry – wood panels, matches, elements of civil construction, etc; and tertiary transformation industry – furniture, devices wooden, etc; excluding the pulp and paper industry). As the plantation forests used by the wood industry are planted and maintained in a sustainable way it is possible to foresee a continued increase in this industrial activity in the next years and consequently an increase on wood waste production;

(iv) The basis for calculating fuel consumption by a boiler is the energy content of the fuel (the so-called low heating value or LHV), amounts and specifications of the steam generated, and

[5] Complementary study "Quantificação da disponibilidade de biomassa na região de Lages – SC" (version in Portuguese).

[6] Data available at www.remade.com.br, accessed in March, 2005.

[7] Setor de Processamento Mecânico da Madeira no Estado de Santa Catarina, ABIMCI/FNABF, February 18, 2004.

the boiler efficiency. For wood waste fuel the base LHV usually considered is 1,850 kcal/kg, which corresponds to biomass residues with moisture content around 50%. However, the UNIPLAC study reports also other kinds of residues in the wood industry chain with varying degree of moisture content. For example, some types or residue have moisture content of around 20% (and consequently about twice as high LHV). Therefore, the 30,213 tonnes/month of wood waste based on the UNIPLAC complementary study corresponds to around 35,830 tonnes/month when normalized to the wet base of 1,850 kcal/kg LHV. Accordingly, the total of wood waste estimated to be produced in Lages region, corrected to the 1,850 kcal/kg LHV base, is about 108,576 tonnes/month and the unused wood waste available is 23,000 tonnes/month.

Furthermore, the State law (Decree nº 14,250 of June 5th, 1981) bans open air burning of wood waste, leading to an increase in piled up wood waste when it is not used for other purposes. At average load conditions the Project will consume 15,300 tonnes/month, out of which about 3,951 tonnes/month was previously burned by Battistella (for own consumption in its old boilers and in a lower amount due to conservative assumption of spontaneous combustion in its pile, as already commented above) and Sofia (for own consumption in its old boilers). Therefore, the effective amount of unused wood waste that Lages Project requires is about 11,349 tonnes/month.

Is important to point out that the Project will use only wood waste of low quality, with moisture content around 50%, which is normally dumped and left to decay. The wood waste of high quality (chips or dry residues) is not an attractive option to be used as fuel when it is used for other more important purposes (cellulose, agglomerate, chicken bed). As demonstrated in the UNIPLAC study, in 2001 the average price to the wood waste of low quality was around 5 BRL[8]/tonne (around 2 USD/tonne[9]) and of the high quality was around 17 BRL/tonne (around 7 USD/tonne). Currently, after the Project implementation, more value has been given to wood waste produced in the region and these prices could reach values around 4 USD/tonne and 20 USD/tonne respectively. Therefore, price is a good indicator of the quality of the wood waste used as fuel by the Project.

(c) Other barriers: experience and/or procedures for collecting the biomass from dispersed sources may be lacking.

The Project developer had to implement a new logistics program to implement the new Project scenario, given that the facility itself has no sources of wood waste (in contrast to e.g. most sugar cane based projects). Hence, using wood waste as fuel also entails more commercial and management risks for a facility like the Lages Project.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the small-scale project activity:

The project boundary is defined – in accordance with the AMS III.E methodology in Appendix B – as the physical, geographical site where the treatment of biomass takes place. Based on the (i) contracts already signed with the sawmills for wood waste supply and (ii) list of other suppliers identified by Lages Project sponsors and supplying wood waste seasonally or as needed, the project boundary is extended to include these sites. If other sawmills are included in the wood waste suppliers, their sites will be included in the project boundary and their inclusion reported to the Designated Operational Entity verifying the Emission Reductions.

[8] Brazilian Real.

[9] Considering 2.32 BRL/USD, which was the BRL/USD exchange rate in the end of 2001.

B.5. Details of the baseline and its development:

The Project uses baseline established in the simplified methodology AMS III.E for small-scale CDM project activity, which stipulates that the baseline emissions (i.e. the avoided methane emissions) are the amount of methane emissions from the decay of the biomass or other organic waste treated in the project activity.

The completion date of the baseline study is 18/03/2005.

Contact information of the entities determining the baseline is presented as follows:

Organization:	Tractebel Energia S.A.
Street/P.O.Box:	Rua Antônio Dib Mussi, 366
Building:	Tractebel Energia
City:	Florianópolis
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Postfix/ZIP:	88015-110
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Title:	Director
Salutation:	Mr.
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*TC/BR Tecnologia e Consultoria Brasileira S.A. – Grupo Altran is the CDM adviser to the Project. The company is not a Project Participant.

SECTION C. Duration of the project activity / Crediting period

C.1. Duration of the small-scale project activity:

C.1.1. Starting date of the small-scale project activity:

23/12/2003.

C.1.2. Expected operational lifetime of the small-scale project activity:

25 y – 0 m.

C.2. Choice of the crediting period and related information:

C.2.1. Renewable crediting period:

Not applicable.

C.2.1.1. Starting date of the first crediting period:

Not applicable.

C.2.1.2. Length of the first crediting period:

Not applicable.

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

01/11/2004.

C.2.2.2. Length:

10 y – 0 m.

SECTION D. Application of a monitoring methodology and plan

D.1. Name and reference of approved monitoring methodology applied to the small-scale project activity:

The Project uses "Small-Scale Methodology III.E: Avoidance of methane production from biomass decay through controlled combustion".

D.2. Justification of the choice of the methodology and why it is applicable to the small-scale project activity:

The AMS III.E monitoring methodology 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.

D.3. Data to be monitored:

ID nº	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	For how long is archived data to be kept?	Comment
1	Fuel	Amount of wood waste combusted	tonnes	m	Monthly	100%	Electronic and paper	2 years after crediting period or last CERs issuance, whichever occurs later	Data to be collected in order to monitor the emissions from project activity and baseline scenario.
2	Fuel	Amount of wood waste obtained from Battistella	tonnes	m	Monthly	100%	Electronic and paper	2 years after crediting period or last CERs issuance, whichever occurs later	Data to be collected in order to monitor the emissions from baseline scenario.
3	Fuel	Amount of wood waste obtained from Sofia	tonnes	m	Monthly	100%	Electronic and paper	2 years after crediting period or last CERs issuance, whichever occurs later	Data to be collected in order to monitor the emissions from baseline scenario.
4	Fuel	Amount of wood waste obtained from spot market	tonnes	m	Monthly	100%	Electronic and paper	2 years after crediting period or last CERs issuance, whichever occurs later	Data to be collected in order to monitor the emissions from baseline scenario.
5	Default values	IPCC and other default values	Variable	Verified	Annually	100%	Electronic and paper	2 years after crediting period or last CERs issuance, whichever occurs later	Data to be collected in order to monitor the emissions from project activity and baseline scenario and the leakage. All IPCC and other default values used will be annually verified to identify any changes.

ID nº	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	For how long is archived data to be kept?	Comment
6	On-site transportation	Diesel oil purchase	liters	m	Monthly	100%	Electronic and paper	2 years after crediting period or last CERs issuance, whichever occurs later	Data to be collected in order to monitor the emissions from project activity.
7	Off-site transportation	Location of wood waste suppliers compared to Lages site	km	m	Monthly	100%	Electronic and paper	2 years after crediting period or last CERs issuance, whichever occurs later	Data to be collected in order to monitor the leakage. This data will be measured once time when supplier is contracted and only monitored monthly to verify any change in the location of the wood waste supply site. If change is verified new measurement is carried out.
8	Off-site transportation	Truck capacity	tonnes	m	Monthly	100%	Electronic and paper	2 years after crediting period or last CERs issuance, whichever occurs later	Data to be collected in order to monitor the leakage. This data will be measured always that wood waste is supplied.
9	Ash transportation	Location of ash disposal site	km	m	Monthly	100%	Electronic and paper	2 years after crediting period or last CERs issuance, whichever occurs later	Data to be collected in order to monitor the leakage. This data will be measured once at the time when ash is disposed and only monitored monthly to verify any change in the location of the disposal site. If change is verified new measurement is carried out.

ID nº	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	For how long is archived data to be kept?	Comment
10	Ash transportation	Truck capacity	tonnes	m	Monthly	100%	Electronic and paper	2 years after crediting period or last CERs issuance, whichever occurs later	Data to be collected in order to monitor the leakage. This data will be measured always that ash is transported.
11	Ash Production	Amount of ash produced	tonnes	m	Monthly	100%	Electronic and paper	2 years after crediting period or last CERs issuance, whichever occurs later	Data to be collected in order to monitor the leakage.

More details about the data to be monitored are showed in the Monitoring Plan presented in the Annex 4.

D.4. Qualitative explanation of how quality control (QC) and quality assurance (QA) procedures undertaken:

The operator must designate a competent manager who will be in charge of and accountable for the generation of ERs, including monitoring, record keeping, computation of ERs, audits and verification. The manager will officially sign off on all GHG emissions worksheets.

Well-defined protocols and routine procedures, with good, professional data entry, extraction and reporting procedures will reduce costs and time needed, while making it considerably easier for the auditor and verifier to do their work. The better organized and transparent the organization, the easier it is to monitor, audit and verify.

Proper management processes and systems records must be kept by the operator as the auditors will request copies of such records to judge compliance with the required management system. Auditors will accept only one set of official information, and any discrepancies between the official, signed records and on-site records will be questioned.

D.5. Please describe briefly the operational and management structure that the project participant will implement in order to monitor emission reductions and any leakage effects generated by the project activity:

The project operator will have certain operational and data collection obligations to fulfill in order to maximize the CO_2 emission reductions and to ensure that sufficient information is available to calculate CO_2 in a transparent manner and to allow for a successful verification of these ERs.

In order to ensure the successful operation of the Lages Project and the credibility and verifiability of the ERs achieved, the project must have a well-defined management and operational system. It is the obligation of the operator to put such system in place. It must include the operation and management of the monitoring and record keeping described in the Monitoring Plan. The proper functioning of the Lages Project management and operational system must be monitored by the operator and will be subject to independent verification. The Monitoring Plan will offer a general guidance in this regard.

D.6. Name of person/ entity determining the monitoring methodology:

Contact information of the entities determining the monitoring methodology is the same presented in the Section B.5 for the baseline.

SECTION E. Estimation of CHG emissions by sources

E.1. Formulae used:

E.1.1. Selected formulae as provided in appendix B:

The Project used the formulae presented in the simplified methodology AMS III.E. 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 (tCH_4/t);
- MCF: Methane correction factor (fraction) (default is 0.4)[10];
- DOC: Degradable organic carbon (fraction, see equation below or default is 0.3);
- DOC_F: Fraction DOC dissimilated to landfill gas (default is 0.77);
- F: Fraction of CH_4 in landfill gas (default is 0.5).

MCF default value according to AMS III.E methodology is 0.4, which is based on IPCC default value for unmanaged shallow waste disposal sites with depths of less than 5 meters.

For Lages Project, MCF default value of 0.4 is considered for the methane emissions calculation for the amount of wood waste supplied by Sofia and Spot Market and treated under the Lages Project (15,600 tonnes/year[11] and 84,000 tonnes/year[12] respectively), given the majority of the wood waste piles in the Lages region is in unmanaged shallow waste disposal sites with depths of less than 5 meters. However, for the methane emissions calculation for the amount of wood waste supplied by Battistella and treated under the Lages Project (36,590 tonnes/year[13]), given the characteristics of its wood waste pile and in order to consider a more realistic scenario, MCF value of 0.8 is considered which is based on IPCC default for unmanaged deep waste disposal sites with depths greater than or equal to 5 meters.

The Photos 1, 2 and 3 illustrate examples of how the wood waste is kept (dumped) in the absence of the Project.

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[10] IPCC default for unmanaged shallow waste disposal sites under 5 meters.

[11] For Sofia supply, the wood waste amount to be treated under the Lages Project is equivalent to amount of 30,000 tonnes/year to be supplied by it less 14,400 tonnes/year was previously burned in its old boilers to produce steam, which is currently supplied by Lages Project.

[12] For Spot Market supply, the wood waste amount to be treated under Lages Project is equal to amount to be supplied by it (84,000 tonnes/year). Lages Project only supplies steam to Battistella and Sofia, any amount of steam is supplied to Spot Market.

[13] For Battistella supply, the wood waste amount to be treated under the Lages Project is equivalent to amount of 69,600 tonnes/year to be supplied by it less 32,640 tonnes/year was previously burned in its old boilers to produce steam, which is currently supplied by Lages Project, and less 370 tonnes/year burned due to conservative assumption of spontaneous combustion in its wood waste pile, as already commented in the Section B.2.

Photo 1: Lages Project entrance and in the right side the Battistella's plant limits.

Photo 2: Lages Project aerial view.

Photo 3: Wood waste disposal sites in the Lages region (spot market).

For DOC, the following equation may be used instead of the default:

$$DOC = 0.4*A+0.17*B+0.15*C+0.30*D$$

where,

- A: Per cent waste that is paper and textiles;
- B: Per cent waste that is garden waste, park waste or other non-food organic putrescibles;
- C: Per cent waste that is food waste;
- D: Per cent waste that is wood or straw.

For Lages Project, since the biomass composition is 100% of wood waste, the DOC default value of 0.3 is considered for the methane emissions calculation.

Since other values are not available, DOC_F and F default values presented in AMS III.E are considered for the IPCC CH_4 emission factor calculation.

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 (tCO_2e/year);
- $QT_{biomass}$: Quantity of biomass treated under the project activity (t/year);
- CH_4_GWP: GWP for CH_4 (tCO_2e/tCH_4).

The baseline methane emissions from the biomass decay to the Lages Project is the sum of the baselines calculated separately to each wood waste supplier (Battistella, Sofia and Spot Market), as presented further in the tables of the Section E.2. The total amount treated under the Lages Project is about 11,349 tonnes/month (136,190 tonnes/year) that would otherwise be dumped in the baseline scenario.

Baseline emissions shall exclude methane emissions that would have to be removed to comply with national or local safety requirement or legal regulations. There are no such regulations in Brazil or State of Santa Catarina.

The formulae presented in the AMS III.E 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:

$$PE_y = QC_{biomass}*E_{biomass}(CH_4bio\_comb*CH_4\_GWP+N_2Obio\_comb*N_2O\_GWP)/10\text{^}6$$

where,

- PE_y: Project activity emissions ($ktCO_2e$/year);
- $QC_{biomass}$: Quantity of biomass consumed by the project activity (t/year);
- $E_{biomass}$: Energy content of biomass (TJ/t);

- CH_4bio_comb: CH_4 emission factor for biomass and waste (which includes dung and agricultural, municipal and industrial wastes) combustion ($kgCH_4/TJ$). Default value is 300 $kgCH_4/TJ$ according to AMS III.E, which is based on general IPCC default value. However, 30 $kgCH_4/TJ$ is assumed to Lages Project since this is the specific IPCC default value to energy industry;
- CH_4_GWP: GWP for CH_4 (tCO_2e/tCH_4);
- N_2Obio_comb: N_2O emission factor for biomass and waste (which includes dung and agricultural, municipal and industrial wastes) combustion (kgN_2O/TJ, default value is 4);
- N_2O_GWP: GWP for N_2O (tCO_2e/tN_2O).

The amount of wood waste to be consumed/burned by Lages Project, which is estimated to be the average monthly consumption at average load conditions, is 15,300 tonnes/month (183,600 tonnes/year).

However, to calculate the total project activity emission is necessary to consider the emissions from on-site wood waste transportation and the leakages from off-site wood waste transportation and ash transportation, which are calculated through the formulae presented in the Sections E.1.2.1 and E.1.2.2.

E.1.2. Description of formulae when not provided in appendix B:

E.1.2.1. Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary:

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 as described in the AMS III.E and presented in the Section E.1.1);
- CO_2, CH_4 and N_2O emissions due to on-site wood waste transportation.

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

$$OT\_GHG_y = Q_{diesel} * D_{diesel} * (VEF\_CO_2 + VEF\_CH_4 * CH_4\_GWP + VEF\_N_2O * N_2O\_GWP)/10\text{^}6$$

where,

- OT_GHG_y: Emissions from on-site transportation ($ktCO_2e$/year);
- Q_{diesel}: Diesel oil consumption (l/year);
- D_{diesel}: Diesel oil density (t/l);
- VEF_CO_2: CO_2 emission factor for trucks ($kgCO_2/t$);
- VEF_CH_4: CH_4 emission factor for trucks ($kgCH_4/t$);
- CH_4_GWP: GWP for CH_4 (tCO_2e/tCH_4);
- VEF_N_2O: N_2O emission factor for trucks (kgN_2O/t);
- N_2O_GWP: GWP for N_2O (tCO_2e/tN_2O).

E.1.2.2. Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities:

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:

$$BT\_GHG_y = QC_{biomass}/TC_{biomass}*AVD_{biomass}*(VEF\_CO_2+VEF\_CH_4*CH_4\_GWP+VEF\_N_2O*N_2O\_GWP)/10\text{^}6$$

where,

- BT_GHG_y: Emission from off-site transportation ($ktCO_2e$/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: GWP for CH_4 (tCO_2e/tCH_4);
- VEF_N_2O: N_2O emission factor for trucks (kgN_2O/km);
- N_2O_GWP: GWP for N_2O (tCO_2e/tN_2O).

Emissions from ash transportation are calculated using the following equation:

$$AT\_GHG_y = Q_{ash}/TC_{ash}*AVD_{ash}*(VEF\_CO_2+VEF\_CH_4*CH_4\_GWP+VEF\_N_2O*N_2O\_GWP)/10\text{^}6$$

where,

- AT_GHG_y: Emission from ash transportation ($ktCO_2e$/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: GWP for CH_4 (tCO_2e/tCH_4);
- VEF_N_2O: N_2O emission factor for trucks (kgN_2O/km);
- N_2O_GWP: GWP for N_2O (tCO_2e/tN_2O).

The ash produced by the project activity will be transported from Lages site to Jorge Lacerda Thermoelectric Power Plant, to be disposed in an appropriate manner. However, research is being carried out for the use of the ash as an organic fertilizer instead. If the conclusion of the research is positive, the ash will be returned to the planted forests of the region as its final destination.

Jorge Lacerda is located 340 km from Lages Project site (680 km to a round trip) in Capivari de Baixo municipality, in State of Santa Catarina.

According to UNIPLAC study[14], the percentage of ash produced is on dry basis on average 0.44% of the total amount of wood waste burned. On wet basis this percentage is on average 1.7%. Conservatively, to estimate the leakage of the Project the value of 2% of the wood waste consumed will be assumed as the quantity of ash produced and transported (Q_{ash}).

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):

$$LE_y = BT\_GHG_y + AT\_GHG_y$$

E.1.2.3. The sum of E.1.2.1 and E.1.2.2 represents the small-scale project activity emissions:

The total project activity emissions (PE_{y_total}) are obtained by sum of PE_y from Section E.1.1, with OT_GHG_y from Section E.1.2.1 and with LE_y from Section E.1.2.2:

$$PE_{y\_total} = PE_y + OT\_GHG_y + LE_y$$

E.1.2.4. Describe the formulae used to estimate the anthropogenic emissions by sources of GHG's in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities:

The formulae used to estimate the baseline methane emissions from the biomass decay (BE_y) was already presented and described in the Section E.1.1.

E.1.2.5. Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period:

The emission reduction due to the project activity (ER_y) is 220,439 tCO_2e/year and is obtained by the difference between BE_y and PE_{y_total} in tCO_2e/year:

$$ER_y = BE_y - PE_{y\_total}$$

[14] BRAND, Martha A.; SIMIONI, Flávio J.; ROTTA, Débora N. H.; ARRUDA, Luiz Gonzaga Padilha. "*Caracterização da produção e uso dos resíduos madeiráveis gerados na indústria de base florestal da região serrana catarinense*". Final project report (version in Portuguese). UNIPLAC, Lages, December, 2001. Complemented by study "Quantificação da disponibilidade de biomassa na região de Lages – SC".

E.2. Table providing values obtained when applying formulae above:

All values and data sources of the parameters used in the equations of the Section E.1 to determine the emission reduction due to the project activity are presented in the Annex 3. The values obtained when applying these equations and parameters are presented in the tables as follows:

IPCC CH_4 emission factor for decaying biomass (CH_4_IPCCdecay)						
Wood waste suppliers	**IPCC CH_4 emission factor for decaying biomass (CH_4_IPCC$_{decay}$)**	**Methane correction factor (MCF)**	**Degradable organic carbon (DOC)**	**Fraction DOC dissimilated to landfill gas (DCO_F)**	**Fraction of CH_4 in landfill gas (F)**	**16/12**
	(tCH_4/t)	**(fraction)**	**(fraction)**	**(fraction)**	**(fraction)**	**(fraction)**
Battistella	0.1232	0.8	0.3	0.77	0.5	1.33
Sofia	0.0616	0.4	0.3	0.77	0.5	1.33
Spot Market	0.0616	0.4	0.3	0.77	0.5	1.33

BATTISTELLA SUPPLY				
Baseline methane emissions from biomass decay (BE_y)				
Year	**Baseline methane emissions from biomass decay (BE_y)**	**Quantity of biomass treated under the project activity* ($QT_{biomass}$)**	**IPCC CH_4 emission factor for decaying biomass (CH_4_IPCC$_{decay}$)**	**GWP for CH_4 (CH_4_GWP)**
	(tCO_2e/year)	**(t/year)**	**(tCH_4/t)**	**(tCO_2e/tCH_4)**
2004	15,778	6,098	0.1232	21
2005	94,667	36,590	0.1232	21
2006	94,667	36,590	0.1232	21
2007	94,667	36,590	0.1232	21
2008	94,667	36,590	0.1232	21
2009	94,667	36,590	0.1232	21
2010	94,667	36,590	0.1232	21
2011	94,667	36,590	0.1232	21
2012	94,667	36,590	0.1232	21
2013	94,667	36,590	0.1232	21
2014	78,889	30,492	0.1232	21
Total	**946,667**	365,904	-	-

*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)**	**Quantity of biomass treated under the project activity* ($QT_{biomass}$)**	**IPCC CH_4 emission factor for decaying biomass (CH_4_IPCC$_{decay}$)**	**GWP for CH_4 (CH_4_GWP)**
	(tCO_2e/year)	**(t/year)**	**(tCH_4/t)**	**(tCO_2e/tCH_4)**
2004	3,363	2,600	0.0616	21
2005	20,180	15,600	0.0616	21
2006	20,180	15,600	0.0616	21
2007	20,180	15,600	0.0616	21
2008	20,180	15,600	0.0616	21
2009	20,180	15,600	0.0616	21
2010	20,180	15,600	0.0616	21
2011	20,180	15,600	0.0616	21
2012	20,180	15,600	0.0616	21
2013	20,180	15,600	0.0616	21
2014	16,817	13,000	0.0616	21
Total	**201,802**	156,000	-	-

SPOT MARKET SUPPLY				
Baseline methane emissions from biomass decay (BE_y)				
Year	Baseline methane emissions from biomass decay (BE_y)	Quantity of biomass treated under the project activity* ($QT_{biomass}$)	IPCC CH_4 emission factor for decaying biomass ($CH_4\_IPCC_{decay}$)	GWP for CH_4 (CH_4_GWP)
	(tCO_2e/year)	(t/year)	(tCH_4/t)	(tCO_2e/tCH_4)
2004	18,110	14,000	0.0616	21
2005	108,662	84,000	0.0616	21
2006	108,662	84,000	0.0616	21
2007	108,662	84,000	0.0616	21
2008	108,662	84,000	0.0616	21
2009	108,662	84,000	0.0616	21
2010	108,662	84,000	0.0616	21
2011	108,662	84,000	0.0616	21
2012	108,662	84,000	0.0616	21
2013	108,662	84,000	0.0616	21
2014	90,552	70,000	0.0616	21
Total	**1,086,624**	840,000	-	-

Baseline methane emissions from biomass decay (BE_y)				
Year	Baseline methane emissions from biomass decay (BE_y)	Battistella Supply	Sofia Supply	Spot Market Supply
	(tCO_2e/year)	(tCO_2e/year)	(tCO_2e/year)	(tCO_2e/year)
2004	37,252	15,778	3,363	18,110
2005	223,509	94,667	20,180	108,662
2006	223,509	94,667	20,180	108,662
2007	223,509	94,667	20,180	108,662
2008	223,509	94,667	20,180	108,662
2009	223,509	94,667	20,180	108,662
2010	223,509	94,667	20,180	108,662
2011	223,509	94,667	20,180	108,662
2012	223,509	94,667	20,180	108,662
2013	223,509	94,667	20,180	108,662
2014	186,258	78,889	16,817	90,552
Total	**2,235,092**	946,667	201,802	1,086,624

Project activity emissions (PE_y)							
Year	Project activity emissions (PE_y)	Quantity of biomass consumed by project activity ($QC_{biomass}$)	Energy content of biomass ($E_{biomass}$)	CH_4 emission factor for biomass and waste combustion (CH_4bio_comb)	GWP for CH_4 (CH_4_GWP)	N_2O emission factor for biomass and waste combustion (N_2Obio_comb)	GWP for N_2O (N_2O_GWP)
	($ktCO_2e$/year)	(t/year)	(TJ/t)	($kgCH_4$/TJ)	($tCO_2e/t\ CH_4$)	(kgN_2O/TJ)	(tCO_2e/tN_2O)
2004	0.443	30,600	7.7460E-03	30	21	4	310
2005	2.659	183,600	7.7460E-03	30	21	4	310
2006	2.659	183,600	7.7460E-03	30	21	4	310
2007	2.659	183,600	7.7460E-03	30	21	4	310
2008	2.659	183,600	7.7460E-03	30	21	4	310
2009	2.659	183,600	7.7460E-03	30	21	4	310
2010	2.659	183,600	7.7460E-03	30	21	4	310
2011	2.659	183,600	7.7460E-03	30	21	4	310
2012	2.659	183,600	7.7460E-03	30	21	4	310
2013	2.659	183,600	7.7460E-03	30	21	4	310
2014	2.216	153,000	7.7460E-03	30	21	4	310
Total	**26.594**	1,836,000	-	-	-	-	-

Emissions from on-site transportation (OT_GHG_y)								
Year	Emissions from on-site transportation (OT_GHG_y)	Diesel oil consumption (Q_{diesel})	Diesel oil density (D_{diesel})	CO_2 emission factor for trucks (VEF_CO_2)	CH_4 emission factor for trucks (VEF_CH_4)	GWP for CH_4 (CH_4_GWP)	N_2O emission factor for trucks (VEF_N_2O)	GWP for N_2O (N_2O_GWP)
	($ktCO_2e$/year)	(l/year)	(t/l)	($kgCO_2$/t)	($kgCH_4$/t)	(tCO_2e/tCH_4)	(kgN_2O/t)	(tCO_2e/tN_2O)
2004	0.034	12,167	8.800E-04	3,172.31	0.18	21	0.09	310
2005	0.206	73,000	8.800E-04	3,172.31	0.18	21	0.09	310
2006	0.206	73,000	8.800E-04	3,172.31	0.18	21	0.09	310
2007	0.206	73,000	8.800E-04	3,172.31	0.18	21	0.09	310
2008	0.206	73,000	8.800E-04	3,172.31	0.18	21	0.09	310
2009	0.206	73,000	8.800E-04	3,172.31	0.18	21	0.09	310
2010	0.206	73,000	8.800E-04	3,172.31	0.18	21	0.09	310
2011	0.206	73,000	8.800E-04	3,172.31	0.18	21	0.09	310
2012	0.206	73,000	8.800E-04	3,172.31	0.18	21	0.09	310
2013	0.206	73,000	8.800E-04	3,172.31	0.18	21	0.09	310
2014	0.172	60,833	8.800E-04	3,172.31	0.18	21	0.09	310
Total	**2.058**	730,000	-	-	-	-	-	-

Emissions from off-site transportation (BT_GHG_y)									
Year	Emissions from off-site transportation (BT_GHG_y)	Quantity of biomass consumed by project activity ($QC_{biomass}$)	Truck average capacity for biomass transportation ($TC_{biomass}$)	Average round trip distance to biomass supply sites ($AVD_{biomass}$)	CO_2 emission factor for trucks (VEF_CO_2)	CH_4 emission factor for trucks (VEF_CH_4)	GWP for CH_4 (CH_4_GWP)	N_2O emission factor for trucks (VEF_N_2O)	GWP for N_2O (N_2O_GWP)
	($ktCO_2e$/year)	(t/year)	(t)	(km)	($kgCO_2$/km)	($kgCH_4$/km)	(tCO_2e/tCH_4)	(kgN_2O/km)	(tCO_2e/tN_2O)
2004	0.018	30,600	10	5.2	1.097	6.0E-05	21	3.1E-05	310
2005	0.106	183,600	10	5.2	1.097	6.0E-05	21	3.1E-05	310
2006	0.106	183,600	10	5.2	1.097	6.0E-05	21	3.1E-05	310
2007	0.106	183,600	10	5.2	1.097	6.0E-05	21	3.1E-05	310
2008	0.106	183,600	10	5.2	1.097	6.0E-05	21	3.1E-05	310
2009	0.106	183,600	10	5.2	1.097	6.0E-05	21	3.1E-05	310
2010	0.106	183,600	10	5.2	1.097	6.0E-05	21	3.1E-05	310
2011	0.106	183,600	10	5.2	1.097	6.0E-05	21	3.1E-05	310
2012	0.106	183,600	10	5.2	1.097	6.0E-05	21	3.1E-05	310
2013	0.106	183,600	10	5.2	1.097	6.0E-05	21	3.1E-05	310
2014	0.088	153,000	10	5.2	1.097	6.0E-05	21	3.1E-05	310
Total	**1.058**	1,836,000	-	-	-	-	-	-	-

Emissions from ash transportation (AT_GHG_y)									
Year	Emissions from ash transportation (AT_GHG_y)	Quantity of ash produced by the project activity* (Q_{ash})	Truck average capacity for ash transportation (TC_{ash})	Round trip distance to disposal site (AVD_{ash})	CO_2 emission factor for trucks (VEF_CO_2)	CH_4 emission factor for trucks (VEF_CH_4)	GWP for CH_4 (CH_4_GWP)	N_2O emission factor for trucks (VEF_N_2O)	GWP for N_2O (N_2O_GWP)
	($ktCO_2e$/year)	(t/year)	(t)	(km)	($kgCO_2$/km)	($kgCH_4$/km)	(tCO_2e/tCH_4)	(kgN_2O/km)	(tCO_2e/tN_2O)
2004	0.016	612	28	680	1.097	6.0E-05	21	3.1E-05	310
2005	0.099	3,672	28	680	1.097	6.0E-05	21	3.1E-05	310
2006	0.099	3,672	28	680	1.097	6.0E-05	21	3.1E-05	310
2007	0.099	3,672	28	680	1.097	6.0E-05	21	3.1E-05	310
2008	0.099	3,672	28	680	1.097	6.0E-05	21	3.1E-05	310
2009	0.099	3,672	28	680	1.097	6.0E-05	21	3.1E-05	310
2010	0.099	3,672	28	680	1.097	6.0E-05	21	3.1E-05	310
2011	0.099	3,672	28	680	1.097	6.0E-05	21	3.1E-05	310
2012	0.099	3,672	28	680	1.097	6.0E-05	21	3.1E-05	310
2013	0.099	3,672	28	680	1.097	6.0E-05	21	3.1E-05	310
2014	0.082	3,060	28	680	1.097	6.0E-05	21	3.1E-05	310
Total	**0.988**	36,720	-	-	-	-	-	-	-

*To estimate the leakage of the Project was assumed that 2% of the wood waste consumed is transformed in ash.

Leakage emissions (LE_y)			
Year	Leakage emissions (LE_y)	Emissions from off-site transportation (BT_GHG_y)	Emissions from ash transportation (AT_GHG_y)
	($ktCO_2e$/year)	($ktCO_2e$/year)	($ktCO_2e$/year)
2004	0.034	0.018	0.016
2005	0.205	0.106	0.099
2006	0.205	0.106	0.099
2007	0.205	0.106	0.099
2008	0.205	0.106	0.099
2009	0.205	0.106	0.099
2010	0.205	0.106	0.099
2011	0.205	0.106	0.099
2012	0.205	0.106	0.099
2013	0.205	0.106	0.099
2014	0.170	0.088	0.082
Total	**2.046**	1.058	0.988

Total project activity emissions (PE_{y_total}) *[sum of E.1.2.1 and E.1.2.2]*				
Year	**Total project activity emissions (PE_{y_total})**	**Project activity emissions (PE_y)**	**Emissions from on-site transportation (OT_GHG_y)**	**Leakage emissions (LE_y)**
	($ktCO_2e$/year)	**($ktCO_2e$/year)**	**($ktCO_2e$/year)**	**($ktCO_2e$/year)**
2004	0.512	0.443	0.034	0.034
2005	3.070	2.659	0.206	0.205
2006	3.070	2.659	0.206	0.205
2007	3.070	2.659	0.206	0.205
2008	3.070	2.659	0.206	0.205
2009	3.070	2.659	0.206	0.205
2010	3.070	2.659	0.206	0.205
2011	3.070	2.659	0.206	0.205
2012	3.070	2.659	0.206	0.205
2013	3.070	2.659	0.206	0.205
2014	2.558	2.216	0.172	0.170
Total	**30.698**	26.594	2.058	2.046

Emission reductions due to the project activity (ER_y) *[difference between E.1.2.4 and E.1.2.3]*			
Year	**Emission reduction due to the project activity (ER_y)**	**Baseline methane emissions from biomass decay (BE_y)**	**Total project activity emissions (PE_{y_total})**
	(tCO_2e/year)	**(tCO_2e/year)**	**(tCO_2e/year)**
2004	36,740	37,252	512
2005	220,439	223,509	3,070
2006	220,439	223,509	3,070
2007	220,439	223,509	3,070
2008	220,439	223,509	3,070
2009	220,439	223,509	3,070
2010	220,439	223,509	3,070
2011	220,439	223,509	3,070
2012	220,439	223,509	3,070
2013	220,439	223,509	3,070
2014	183,700	186,258	2,558
Total	**2,204,394**	2,235,092	30,698

SECTION F. Environmental impacts

F.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

The Brazilian environmental licensing occurs in accordance with federal, state and municipal legislation, the determination of the Environmental Ministry and the resolutions of the Brazilian Environment Advice (CONAMA).

Lages has received all the necessary environmental licenses for the implementation of the Project. Resolution CONAMA nº 279/2001 determines that the state environmental agencies can simplify environmental assessment and licensing requirements for cogeneration projects with low environmental impact. Accordingly, the Environmental Agency of the State of Santa Catarina (FATMA) requested the elaboration of the Simplified Environmental Report – *Relatório Ambiental Simplificado* (RAS) – for the Lages Project, simplifying the whole environmental licensing process which is carried out in three stages:

1. Preliminary Environmental License – *Licença Ambiental Prévia* (LAP) – a license that demonstrates the environmental feasibility of the Project and the anticipated environmental impacts caused by its implementation. The Preliminary Environmental License (LAP nº 007/02) was issued by FATMA on May 2nd, 2002.
2. Installation Environmental License – *Licença Ambiental de Instalação* (LAI) – the second environmental license allowing the construction of the plant. This license is issued in accordance with the conditions described in the RAS, prepared by the Project sponsor and approved by the State Environmental Agency. The Installation Environmental License (LAI nº 054/02) was issued by FATMA on October 21st, 2002
3. Operating Environmental License – *Licença Ambiental de Operação* (LAO) – the last license issued by the environmental agency allowing the operation of the plant. The plant has to be in accordance with the specifications of the environmental agency and the license is issued just before the Commercial Operation Date. The Operating Environmental License (LAO nº CPS/321/2.003) was issued by FATMA on December 5th, 2003 and a renewal (LAO nº CPS/002/2.005) on January 6th, 2005, which is presented in the Annex 5.

The measures of environmental compensation are based on the raised and negative impacts of the Project presented in the RAS. Tractebel Energia (and/or its special purpose company, Lages Bioenergética Ltda.) has complied with the current law, Resolution CONAMA nº 002/1996, that determines the destination of 0.5% of the value of the workmanship as resources for compensatory actions whose application shall be in parks/reserves of the State and was defined by common agreement with the FATMA, during the phase of implantation of the Project.

The concern with the environment is rooted in the operating principles of the Tractebel Energia (and/or Lages Bioenergética Ltda.) and its Code of Ethics, that also lead to the creation of its own Code of Environment. The Code of Environment adopts as policy the application of all norms of the current law and studies necessary to this end, applying economically acceptable methods and techniques to reduce the actual damage to the environment, to protect nature in a better way and to promote sustainable development.

The policy and actions in the environmental area of Tractebel Energia are recognized by FATMA through the Fritz Müller prize awarded in 2002 and in 2004 for the Lages Project. The Prize Fritz Müller, created on April 15th, 1982, is granted by the FATMA to the companies located in the State of Santa

Catarina that have stood out in the control of the pollution generated in the processes of industrial production.

Among the environmental mitigation measures proposed during the environmental licensing the following were included:

- The sanitary sewer treatment, industrial liquid sewers (boiler and cooling tower purge, regeneration waters of resins of the demineralization station, water/oil separator and floor and equipments washing) and cooling tower that would allow the recirculation of sewage water and prevent launching into the receiving river. The silt generated would be directed to the stream bed and later destined to the clay product industry or the same destination as the ash generated by the wood waste combustion;
- The ash generated could be destined to a landfill, used in the cement plant or returned to the forests, the last option being the preferred one. However, it is necessary to characterize the ash, the land where it will be deposited and to get from the FATMA and the Ministry of Agriculture a specific authorization, in the same way as with the disposal of silt proceeding from the sewer treatment;
- The other generated solid wastes would be segregated for recycling (metals), office waste directed to the municipal landfill. The oils used in the Project would be segregated and recycled;
- The Lages Project implementation, by itself, would bring environmental benefits eliminating the wood waste storage and reducing methane emission besides improving the air quality in the region through the dismantling of old more polluting boilers of two adjacent wood industries that would get their steam needs supplied by the Lages Project;
- Because a gas washing system the Project would have low emissions of particulate materials, ensuring compliance with all standards of air quality established in the Resolution CONAMA 003/1990).

SECTION G. Stakeholders' comments

G.1. Brief description of how comments by local stakeholders have been invited and compiled:

According to established on the Modalities and Procedures for a Clean Development Mechanism, paragraph 37, item (b) and on the Resolution nº 1 of September 11th, 2003 from the Brazilian Inter-Ministerial Commission of Climate Change, which is the Brazilian Designated National Authority (DNA), the project developer of a CDM project must send to the local stakeholders a letter with a description of the project and an invitation for comments. The stakeholders were invited on July 20th, 2005 and again on August 15th, 2005 to contribute with comments to Lages Project in the CDM and its PDD, as listed below:

- City Hall and City Council of Lages municipality;
- State Environmental Agency (Fundação do Meio Ambiente – FATMA) and Municipal Environmental Secretariat;
- Brazilian Forum of NGOs (Fórum Brasileiro de ONGs e Movimentos Sociais para o Meio Ambiente e o Desenvolvimento – FBOMS);
- Associations of the local communities (Caroba and Santa Mônica communities);
- District Attorney.

Stakeholders	
Representative	**Entity**
João Raimundo Colombo (Lages Mayor)	City Hall of Lages
Willy João Brun Filho (President)	City Council of Lages
Luiz Antonio Garcia Correa (Director)	State Environmental Agency (Fundação do Meio Ambiente – FATMA)
Cosme Polese (Regional Coordinator)	State Environmental Agency (Fundação do Meio Ambiente – FATMA)
João Alberto Duarte (Municipal Secretary)	Municipal Environmental Secretariat
Esther Neuhaus (Executive Manager)	Brazilian Forum of NGOs (Fórum Brasileiro de ONGs e Movimentos Sociais para o Meio Ambiente e o Desenvolvimento – FBOMS)
Ivonildo Pereira (President)	Association of the Caroba community
Enio Quintino Ribeiro (President)	Association of the Santa Mônica community
George Andre Franzoni Gil (Attorney)	District Attorney (Promotoria de Justiça)
Jakson Corrêa (Attorney)	District Attorney (Coordenadoria Geral do Centro de Apoio Operacional do Meio Ambiente)

Additionally, it is important to point out that local stakeholders had already been invited to contribute with comments and suggestions during other stages of the project as follows:

- To contribute with comments related to the Lages Project implementation and the impacts caused by construction;
- To contribute with comments related to the Lages Project and its participation in the Clean Development Mechanism through the Environmental Assessment disclosed during a period of 60 days from January 19th, 2005 in the Municipal Environmental Secretariat, UNIPLAC[15], FATMA, Tractebel Energia website (http://www.tractebelenergia.com.br) and Lages Project site.

In order to bring transparency to its operational activities and understanding that a Project requires a long term partnership between the sponsor and the community, Tractebel Energia (and/or its special purpose company, Lages Bioenergética Ltda.) has held several meetings and made public Project presentations to the Lages community during the project development and implementation as follows:

Date	Local	Public
August 24th, 2001	UNIPLAC	University students and other guests[16]
May 7th, 2002	UNIPLAC	University students and other guests
April 22nd, 2003	Lages City Council[17]	Lages' councillors
May 24th, 2004	Facility neighbourhood church	Facility neighbourhood
Jan 28th, 2005	Facility neighbourhood	All community
Several events	Lages Project visiting	All community

Besides these presentations and meetings, in order to comply with the Brazilian environmental requirements[18], Tractebel Energia (and/or its special purpose company, Lages Bioenergética Ltda.) announced in the three main newspapers when requiring to and when issued by FATMA[19] the Environmental Licenses for the Project:

[15] Local university.

[16] Besides the UNIPLAC students, representatives of the Lages Commercial and Industrial Association were invited to the presentation.

[17] This presentation was broadcasted to the municipality.

[18] Resolution CONAMA nº 001/1986.

[19] State Environmental Agency.

Newspaper	Average circulation (per day)
Diário Oficial[20]	5,000
Correio Lageano[21]	7,500
Diário Catarinense[22]	45,000

G.2. Summary of the comments received:

Any comment of the stakeholders about Lages Project in the CDM was received until September 21st, 2005. During the period for public comments (from July 26th, 2005 to August 24th, 2005) in the validation stage only two positive comments were received by Det Norske Veritas – DNV (the Designated Operational Entity – DOE – contracted as Project validator), which are presented in the Validation Report.

G.3. Report on how due account was taken of any comments received:

Not applicable, when any comment of the stakeholders about Lages Project in the CDM was received until September 21st, 2005.

[20] Diário Oficial is the state-owned official newspaper.

[21] Correio Lageano is a newspaper with regional circulation.

[22] Diário Catarinense is a newspaper with state circulation.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Operating Company – fully owned by Tractebel Energia S.A.

Organization:	Lages Bioenergética Ltda.
Street/P.O.Box:	Rua Vivandério Santos do Vale, s/n
Building:	Unidade de Co-geração Lages
City:	Lages
State/Region:	Santa Catarina
Postfix/ZIP:	88516-600
Country:	Brazil
Telephone:	+55 49 3221-4500
FAX:	+55 49 3221-4535
E-Mail:	-
URL:	-
Represented by:	
Title:	Director
Salutation:	Mr.
Last Name:	Minuzzo
Middle Name:	Carlos Cauduro
First Name:	José
Department:	Operation
Mobile:	-
Direct FAX:	+55 48 3221-7070
Direct tel:	+55 48 3221-7040
Personal E-Mail:	minuzzo@tractebelenergia.com.br

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding from Annex I countries in the Project Activity.

Annex 3

CALCULATION PARAMETERS

The key parameters to calculate the emission reduction due to the project activity are presented as follows:

Parameter	Value	Unit	Data source	Comment
MCF	0.8 (Battistella) 0.4 (Sofia) 0.4 (Spot Market)	(fraction)	IPCC	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	0.3	(fraction)	IPCC	Waste is 100% compounded by wood. Default value is applied.
DOC_F	0.77	(fraction)	IPCC	Default value is applied.
F	0.5	(fraction)	IPCC	Default value is applied.
$QC_{biomass}$	69,600 (Battistella) 30,000 (Sofia) 84,000 (Spot Market) 183,600 (Total)	t/year	Measured	Values estimated based on Lages Project wood waste consumption to a load factor of 40%.
$QT_{biomass}$	36,590 (Battistella) 15,600 (Sofia) 84,000 (Spot Market) 136,190 (Total)	t/year	Measured	Amount of wood waste consumed by Lages Project less the amount was already burned by Battistella and Sofia in their old boilers and less the spontaneous combustion considered in the Battistella pile.
Q_{ash}	3,672	t/year	Measured	Estimated on 2% of the amount of wood waste consumed by Lages Project ($QC_{biomass}$). Conservative estimation.
$E_{biomass}$	7.746E-3	TJ/t	UNIPLAC	Considered 1,850 kcal/kg (7,746 kJ/kg) for estimative purposes, which is default value to wood waste in the Lages region, according to values reported in the UNIPLAC study.
CH_4bio_comb	30	$kgCH_4/TJ$	IPCC	Default value according to AMS III.E is 300 $kgCH_4/TJ$, which is based on general IPCC default value. However, 30 $kgCH_4/TJ$ is used since this is the specific IPCC default value to energy industry.
N_2Obio_comb	4	kgN_2O/TJ	IPCC	Default value according to AMS III.E is 4 kgN_2O/TJ, which is based on IPCC default value.
CH_4_GWP	21	tCO_2e/tCH_4	UNFCCC	Official value.
N_2O_GWP	310	tCO_2e/tN_2O	UNFCCC	Official value.

Parameter	Value	Unit	Data source	Comment
Q_{diesel}	73,000	l/year	Measured	A conservative consumption of 200 l/day was used for estimation purposes.
D_{diesel}	8.8E-4	t/l	ANP	According to Portaria nº 310 of Dec 27th, 2001 of the Brazilian Petroleum Agency (ANP) the value is around 880 kg/m^3.
VEF_CO_2	1.097 3,172.31	$kgCO_2/km$ $kgCO_2/t$	IPCC	Default values for US heavy duty diesel vehicles, uncontrolled. These are conservative values.
VEF_CH_4	6.0E-5 0.18	$kgCH_4/km$ $kgCH_4/t$	IPCC	Default values for US heavy duty diesel vehicles, uncontrolled. These are conservative values.
VEF_N_2O	3.1E-5 0.09	kgN_2O/km kgN_2O/t	IPCC	Default values for US heavy duty diesel vehicles, uncontrolled. These are conservative values.
$TC_{biomass}$	10	t	Measured	Conservative estimation based on trucks transporting wood waste to Lages Project.
TC_{ash}	28	t	Measured	Conservative estimation based on trucks transporting the ash produced by Lages Project.
$AVD_{biomass}$	5.2	km	Measured	Conservative estimation based on average distance of the wood waste suppliers to Lages Project.
AVD_{ash}	680	km	Measured	Distance from Lages Project to Jorge Lacerda Thermoelectric Power Plant.

Annex 4

MONITORING PLAN

The variables necessary to be monitored in order to establish the emission reductions are described in the table presented in the Section D.3.

To accurately estimate the ERs from avoided methane emissions during the operation of the Project, the actual volumes and sources of wood waste utilized will be monitored on an annual basis. Each source of wood waste (Battistella, Sofia and Spot Market) will be treated separately and the methane emissions avoided from each source are calculated using the AMS III.E, according to formula presented in Section E.1, at the end of each calendar year based on the characteristics of the wood waste supplier and the wood waste piles avoided through the use by Lages Project. Details of this procedure are laid out in the separate Monitoring Plan document.

In the supervisory room, using computers, it is possible to control and to monitor all the operations of the Lages Project's cogeneration facility in real time. From the information collected in this room a report with all the Lages control and monitoring information is elaborated monthly.

These values will be added and fed in the monitoring spreadsheet annually.

On-site use of transport fuel will be monitored monthly through the survey of the amount of diesel oil purchased. These values will be added annually and fed in the monitoring spreadsheet.

Off-site transport distance and ashes transport distance, respectively, will be measured for each new wood waste supplier or new ash disposal site. These values will be fed in the monitoring spreadsheet.

Truck capacity for off-site transportation and ash transportation will be measured monitored using weight measurements equipment.

Amount of ashes produced and transported to the ash disposal site will be monitored using weight measurements equipment when the ash is leaving the Lages Project site.

Supplementary information used to ensure the effective emissions monitoring is the annual amount of wood waste contracted for each supplier. From this value, the average distance covered in the wood waste supply to Lages Project will be established.

All IPCC default values or other default values used to calculate the GHG emissions will be annually verified and the emissions determined using always the most recent default values available.

The monitoring spread sheet in Excel will automatically calculate the baseline emissions, emissions from Project activity, leakage emissions and the total of emissions reduced by the Project.

These monitoring principles and provisions will be included in a separate Monitoring Plan document that will be prepared for the Project.

Annex 5

OPERATING ENVIRONMENTAL LICENSE

ESTADO DE SANTA CATARINA
FUNDAÇÃO DO MEIO AMBIENTE – FATMA
COORD. REGIONAL DO PLANALTO SERANO - CERPS
Rua Caetano Vieira da Costa, 575, Centro, Lages – SC.
Fone: (49) 222-3740 Fax: (49) 224-3598

SANTA CATARINA

LICENÇA AMBIENTAL DE OPERAÇÃO LAO N.º CPS/002/2.005

A Fundação do Meio Ambiente - FATMA, no uso de suas atribuições que lhe são conferidas pelo parágrafo 2º do artigo 3º da Lei Estadual N.º 5.793 de 15 de outubro de 1980, regulamentada pelo Decreto 14.250, de 05 de junho de 1981, concede a presente Licença Ambiental de Operação à:

Nome: LAGES BIOENERGÉTICA LTDA

Endereço: Rua Antônio Dib Mussi, 366, Centro,

Município: Florianópolis-SC.

CGC/CPF: 05.210.535/0001-90

Para Atividade de

Termoeléctrica / cogeração de energia elétrica e vapor / beneficiamento de madeiras. (Enquadramento *34.11.00*)

Localizada em

Avenida Vivanderio Santos do Vale, s/n.º, Bairro Caroba, município de Lages – SC.

Com as Seguintes Restrições

"*As contidas no processo de Licenciamento Ambiental e na Legislação Ambiental em vigor*".

"Esta licença não autoriza o corte ou supressão de árvores, florestas ou qualquer forma de vegetação da Mata Atlântica".

Esta LAO é válida pelo período de 12(doze) meses a contar da presente data, conforme Processo de *Licenciamento FATMA N.º DIV 083/CPS* observadas as condições deste documento, (verso e anverso), bem como de seus anexos que, embora não transcritos, são parte integrante do mesmo.

LAGES, 06 DE JANEIRO DE 2.005

ELENIR RIBEIRO DE ARRUDA
COORD. REGIONAL EM EXERCÍCIO
MATRÍCULA 235.637-6

AUTENTICAÇÃO
AUTENTICO POR SER UMA REPRODUÇÃO DO DOCUMENTO QUE FOI APRESENTADO
10 JAN. 2005
4º TABELIONATO DE NOTAS TEL: (48) 224-3599 / 222-2099
Vanda de Souza Salles TABELIÃ
CORREGEDORIA-GERAL DA JUSTIÇA DO ESTADO DE SANTA CATARINA
SELO DE FISCALIZAÇÃO ISENTO
AME 09388

Documentos Anexos

NADA CONSTA

Condições de Validade desta Licença Ambiental de Operação - LAO

1. Funcionamento de unidade para cogeração de energia elétrica e vapor, utilizando como combustível 450 t/dia de resíduos de madeira/ biomassa. O empreendimento tem capacidade para fornecer 28 MW de energia e 25 t/h de vapor, sendo utilizado no processo produtivo uma caldeira com capacidade de 120 t/h de geração de *vapor, turbina com 6.800 rpm, redutor de velocidade, gerador síncrono de energia elétrica e torre de* resfriamento com recirculação dos efluentes. Fazendo parte do complexo uma subestação de 138 kV com um *transformador de 35 MVA e duas subestações de serviços auxiliares, sendo uma com três transformadores de* 2,5 MVA e outra com dois transformadores de 1 MVA. Uma Linha de Transmissão interligando a Unidade *Cogeração de Lages-UCLA à Subestação da CELESC, com tensão de 138 kV, trifásica* e o Vaporduto com diâmetro de 8" para distribuição de vapor para a empresa BATTISTELLA e seis secadores de madeira com capacidade para 150 m^3/secador.

1.1 – Quaisquer alterações nas especificações dos elementos apresentados, deverá ser precedido de anuência da FATMA.

1.2 – A FATMA mediante decisão motivada poderá modificar as condicionantes, medidas de controle e adequação, suspender ou cancelar a presente licença, caso ocorra:

. Violação ou inadequação de quaisquer condicionantes, exigências ou normas legais;

. Omissão ou falsa descrição de informações que subsidiaram a expedição da presente licença;

. Superveniência de graves riscos ambientais e/ou de saúde pública.

2. Manter em funcionamento os seguintes Controles Ambientais e Emergenciais:

2.1- Sistema de fossa (V=5,18 m^3) e sumidouro (V=2,65 m^3), para tratamento do esgoto sanitário dos *funcionários;*

2.2- A estação de tratamento de efluentes industriais é composta de: sistema de recalque dos efluentes do sistema de regeneração; tanque de homogeneização; tanque adensador de lodo e leitos de secagem (*A=1032* m^2), esta ETE recebe os efluentes do setor de regeneração de resinas, descartes da estação de tratamento de água, da torre de resfriamento e fundo da caldeira;

2.3 - Caixas separadoras de óleo, para tratamento de efluentes das áreas dos transformadores;

2.4- Sistema de filtro lavador, para redução da emissão de materiais particulados e dispersão dos gases em chaminé de 30 metros de altura;

2.5 –Diques de contenção ao redor dos tanques de produtos químicos na área de regeneração do DESMI, como sistema de segurança contra vazamentos acidentais;

2.6- Disposição final dos lodos da ETE, em local adequado.

3. Condições específicas:

3.1- *Apresentar anualmente, relatório do monitoramento da emissão de sons e ruídos na vizinhança ao* empreendimento;

3.2- *Implementação de medidas para contenção de cinzas, que venham ser arrastadas pelas águas pluviais, nas* vias internas do empreendimento.

Marcio Laranjeira Luna
TCA
358.342-2

FATMA

Elenir Ribeiro de Arruda
Matr. 235637-6
FATMA - LAGES

Condições Gerais

I. A presente Licença não dispensa e nem substitui alvarás ou certidões de qualquer natureza, exigidas pela Legislação Federal, Estadual ou Municipal.

II. As alterações nas atuais atividades deverão ser precedidas de Licenças, observando o artigo 75 do decreto 14.250 de 05/06/81.

III. Os equipamentos de controle ambientais existentes deverão ser mantidos e operados adequadamente, de modo a conservar a eficiência, sendo tal responsabilidade única e exclusiva dessa Empresa.

TABELIONATO SALLES
4º OFÍCIO DE NOTAS 4º OFÍCIO PROTESTO