CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Annexes

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

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

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AMC Têxtil Biomass Project
Version 01, 21 November 2007

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

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The AMC Têxtil Biomass Project (hereafter, the AMC Project) developed by AMC Têxtil Ltda and Ciclo Ambiental Engenharia Ltda. is a biomass fuel switch project for the production of thermal energy. The project replaces residual fuel oil (RFO) BPF 1A fired boilers and thermic fluid heater with biomass residues (wood chip) from the sustainable management. The boilers and thermic fluid heater are used to provide thermal energy to the plant.

AMC Têxtil Ltda was founded in 1980 by Ademar Menegotti and Cecília Rubini Menegotti, producing cotton jersey to supply to retail regional market. Currently, AMC Têxtil produces cotton jersey and fabric to national market.

The project activity reduces greenhouse gas emissions by replacing of residual fuel oil BPF 1A by wood chip in boilers and thermic fluid heater at the project site. Furthermore, the project will help to meet the sustainable development goals of the Brazil by providing the following benefits:

Sustainable development

This local and cleaner source of thermal energy has an important contribution to environmental sustainability by reducing carbon dioxide emissions that would have occurred otherwise in the absence of the project. The project activity reduces emissions of greenhouse gas (GHG) by reducing the combustion of fossil fuel source – residual fuel oil, which would be generating in the absence of the project. The project activity will contribute to:

- Generate clean energy which will be supplied to local manufactory;
- Create new jobs direct and indirect during the crediting period.
- Train employees in order to (i) meet the new project activity requirements, (ii) introduce new operational processes and, (iii) new maintenance procedures;
- Improve local air quality;
- Generate local income;
- Reduce the amount of GHG emissions and other pollutants;
- Avoid the decay of biomass residues on fields; and
- Avoid the use of biomass for other purposes rather than for energy purposes.

A.3. Project participants:

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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 Party)	AMC Têxtil Ltda (private entity)	No
	Ciclo Ambiental Engenharia Ltda. (private entity)	
(*) 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.		

Detailed contact information on parties and private/public entities involved in the project activity are listed in Annex 1.

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

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

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A.4.1.1. Host Party(ies):

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Brazil.

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

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Santa Catarina.

A.4.1.3. City/Town/Community etc:

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Jaraguá do Sul.

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

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The project activity is located at AMC Têxtil Ltda plant at the intersection of latitude 26°28’52.60”S and longitude 49°08’35.73” W. Jaraguá do Sul is a city of around 108,489 inhabitants, according to IBGE, 2000.

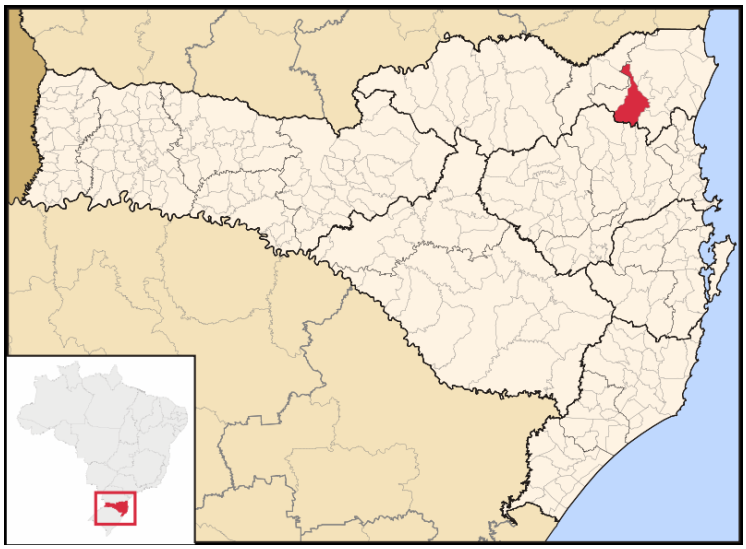

Figure 1 – Jaraguá do Sul city location

Figure 2 - Location of the AMC Têxtil Ltda project

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

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As per 'Appendix B to the simplified modalities and procedures for small – scale CDM project activities' the project activity falls under Type(I) *'renewable energy project activities'* and category *I.C 'thermal energy, to the user directly'*. The project conforms to the project category since the nominal installed capacity of the Project is below the 45 $MW_{thermal}$.

The proposed CDM project activity replaces the existing fired boiler with residual fuel oil BPF 1A by a new fired boiler with biomass (wood chip), in order to supply steam/heat to the plant. The fuel switching

process, results in replacing the steam/heat system due to the different characteristics of the biomass fuel in comparison to the residual fuel oil BPF 1A.

The consumption of residual fuel oil BPF 1A in baseline scenario is about 800 tonnes/month to generate steam/heat to AMC Project.

Technology Employed

The proposed project activity comprises of generating biomass based thermal energy of the manufacturing unit at AMC Têxtil Ltda. The technology proposed for the project activity involves direct combustion of biomass (wood chip) in the boiler and thermic fluid heater to generate thermal energy. During combustion chemical energy contained in the biomass is converted into thermal energy, which is utilized for steam/heat generation.

Boilers

In AMC Project a new biomass boiler was bought to substitute the amount of steam/heat supplied by three of the residual fuel oil BPF 1A fired boilers. During project activity the three residual fuel oil BPF 1A fired boilers will remain on-site for stand-by and maintenance purposes only.

The biomass requirement of the generating unit is about 100 tonnes/day. The new boiler has been specially designed for burning biomass. The boilers conform to the requirements of the local regulation. A brief description of the boilers is given below.

Biomass boiler

Figure 3 - Biomass boiler

- This boiler can generate 19 TPH steam at 8 kg/cm2.
- Boiler efficiency: 83%1.
- Nominal Capacity: 14.67 MWth;
- Date of manufacturing: 2006;
- Manufactured by H. Bremer;
- Nominal life time: 25 years (by regulation – ABNT NR13);
- Fuel used is wood chip (to 50% humidity);
- In operation.

[1] The efficiency was informed by H. Bremer and the evidence will be shown to DOE.

Residual fuel oil BPF 1A boilers

Figure 4a– One of three residual fuel oil BPF 1A boilers.

Boiler 1

- This boiler can generate 8 TPH steam at 8 kg/cm^2.
- Boiler efficiency: 87%[2].
- Nominal Capacity: 6.1 $MW_{th;}$
- Date of manufacturing: 2000;
- Manufactured by H. Bremer;
- Nominal life time: 25 years (by regulation – ABNT NR13);
- Fuel used is residual fuel oil BPF 1A;
- In stand-by.

Figure 5b – One of three residual fuel oil BPF 1A boilers.

Boiler 2

- This boiler can generate 8 TPH steam at 8 kg/cm^2.
- Boiler efficiency: 87%[3].
- Nominal Capacity: 6.1 $MW_{th;}$
- Date of manufacturing: 1997;
- Manufactured by H. Bremer;
- Nominal life time: 25 years (by regulation – ABNT NR13);
- Fuel used is residual fuel oil BPF 1A;
- In stand-by.

Figure 6c – One of three residual fuel oil BPF 1A boilers.

Boiler 3

- This boiler can generate 8 TPH steam at 8 kg/cm^2.
- Boiler efficiency: 87%[4].
- Nominal Capacity: 6.1 $MW_{th;}$
- Date of manufacturing: 1993;
- Manufactured by H. Bremer;
- Nominal life time: 25 years (by regulation – ABNT NR13);
- Fuel used is residual fuel oil BPF 1A;
- In stand-by.

[2] The efficiency was informed by H. Bremer and the evidence will be shown to DOE.

[3] The efficiency was informed by H. Bremer and the evidence will be shown to DOE.

[4] The efficiency was informed by H. Bremer and the evidence will be shown to DOE.

Thermic fluid heaters

The technology involves direct combustion of fuel (residual fuel oil BPF 1A or biomass) in the thermic fluid heaters to generate heat. By burning the fuel chemical energy contained in it is converted into thermal energy, which is utilized for heating the thermal fluid. The thermic fluid, which acts as a heat carrier, is heated up in the heater and circulated through the user equipment. There it transfers heat for the process through a heat exchanger and the fluid is then returned to the heater.

In AMC Project a new biomass thermic fluid heater was bought to substitute the amount of heat supplied by one of the residual fuel oil BPF 1A fired thermic fluid heater. During project activity the residual fuel oil BPF 1A fired thermic fluid heater will remain on-site just for stand-by and maintenance purposes. The biomass requirement of the generating unit is about 70 tonnes/day. The thermic fluid heater has been specially designed for burning biomass. The thermic fluid heaters conform to the local regulation requirements. A brief description of the thermic fluid heaters is given below.

Biomass thermic fluid heater

- This thermic fluid heater can produce heat energy of 4,000 Mcal/hr at 0.5 kg/cm^2;
- Boiler efficiency: 83%[5];
- Nominal Capacity: 4.65 MW_{th};
- Date of manufacturing: 2006;
- Manufactured by H. Bremer;
- Nominal life time: 25 years (by regulation – ABNT NR13);
- Fuel used is wood chip (to 50% humidity);
- In operation.

Residual fuel oil thermic fluid heater

- This thermic fluid heater can produce heat energy of 5,000 Mcal/hr at 0.5 kg/cm^2;
- Boiler efficiency: 84%[6];
- Nominal Capacity: 5.82 MW_{th};
- Date of manufacturing: 2006;
- Manufactured by Konus (WEISHAUPT);
- Nominal life time: 25 years (by regulation – ABNT NR13);
- Fuel used is residual fuel oil;
- In stand-by.

[5] The efficiency was informed by H. Bremer and the evidence will be shown to DOE.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

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The chosen crediting period is 10 years which is fixed crediting period. Estimated amount of emission reductions over these 10 years is as follows:

Years	Annual estimation of emission reductions in tonnes of CO2e
1/7/2008	15,641
2009	31,281
2010	31,281
2011	31,281
2012	31,281
2013	31,281
2014	31,281
2015	31,281
2016	31,281
2017	31,281
30/6/2018	15,641
Total estimated reductions (tCO_2e)	**312,810**
Total number of crediting years	**10**
Annual average over the crediting period of estimated reductions	**31,281**

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

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There is no Annex 1 public funding involved in the AMC Project.

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

Paragraph 2 of Appendix C of the Simplified Modalities and Procedures for Small Scale CDM project activities states that:

"2. A proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- *With the same project participants;*
- *In the same project category and technology/measure; and*
- *Registered within the previous 2 years; and*

[6] The efficiency was informed by H. Bremer and the evidence will be shown to DOE.

- *Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point."*

As none of the above condition is applicable to this CDM project activity, it is not a debundled component of a large-scale project activity.

SECTION B. Application of a baseline and monitoring methodology

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

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As per simplified modalities and procedures of small scale CDM project activity, the title and reference of the methodology adopted for this project is as follows:

- Title: Type I- Renewable Energy Projects
- Category: C. Thermal Energy for the user (Version 12, of AMS-I.C)

B.2 Justification of the choice of the project category:

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- *AMS.I.C – Thermal energy for the user with or without electricity*. The project activity use wood chip, renewable biomass, to generate thermal energy for the boiler and thermic fluid heater of AMC Têxtil Ltda. In the baseline scenario the fuel employed is the residual fuel oil, a high-pollutant fossil fuel.

The proposed activity is eligible to apply the following monitoring methodology:

- AMS.I.C since the project involves the supply of the thermal energy means of a renewable source of biomass that displaces fossil fuels and the aggregate installed capacity of the units will not exceed 45 MW_{th}.

Justification

- The project activity supplies thermal energy to AMC Têxtil plant.
- As per manufacturer specification, the total thermal generation capacity is 43.44 MW_{th}, which is less than 45 MW_{th}.

B.3. Description of the project boundary:

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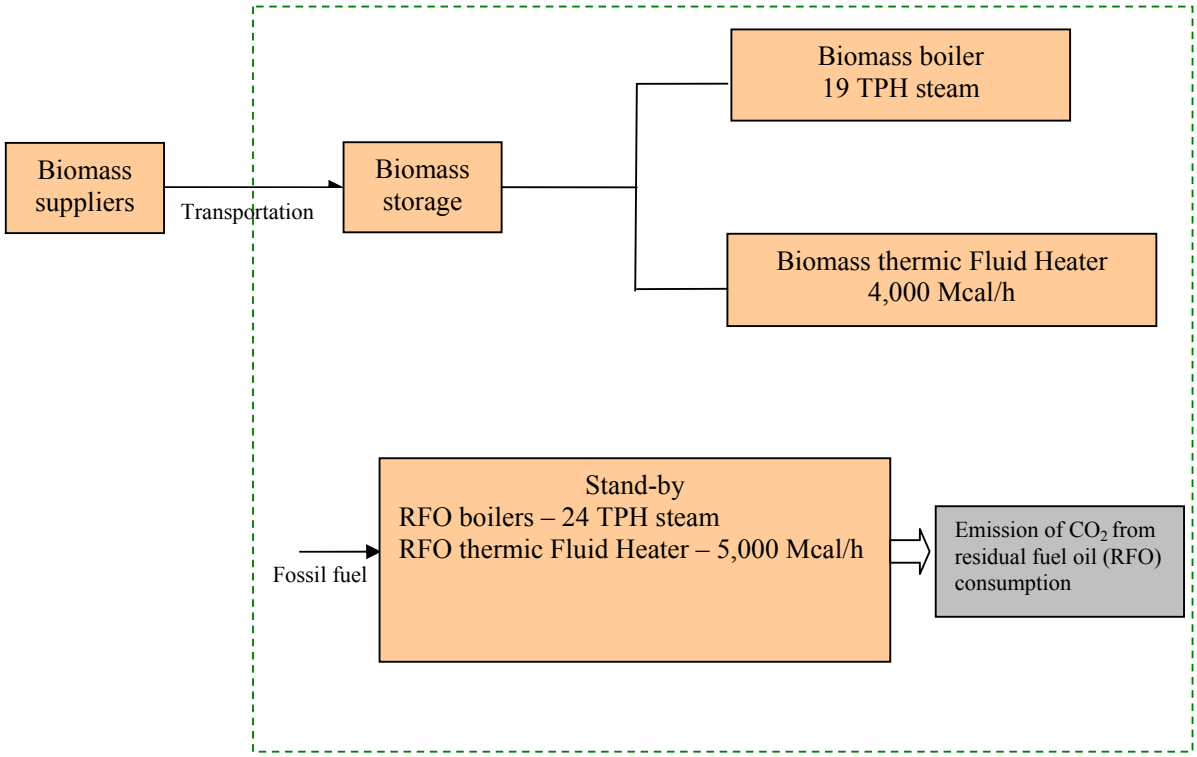
The project boundary is limited to the physical, geographical site of the renewable energy generation. Project activity displaces fossil fuel supplied by external source to renewable source of thermal energy.

According to the selected approved project category the project boundary has been described as the physical, geographical site of the renewable energy generation project. The project boundary covers entire area from the point of fuel supply from the different sources / supplier to the point of thermal energy (steam/heat) generation which is strictly used for production processes. Thus, boundary covers transport of fuel and boilers and thermic fluid heaters consuming equipments. The project participant does not need to account potential CH_4 emissions from the storage of biomass because the period of storage is 20 days. For the project activity the project boundary can be schematically presented as follows:



The greenhouses gases included in or excluded from the project boundary are shown in table below.

	Source	Gas	Included?	Justification / Explanation
Baseline	Emissions from thermal energy generation	CO_2	Yes	The source of emissions in the baseline
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
Project Activity	On-site fossil fuel consumption	CO_2	Yes	Emission of CO_2 from fossil fuel (residual fuel oil BPF 1 A) consumption in standby equipments.
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
	Off-site transportation of biomass residues	CO_2	Yes	Emission of CO_2 from transportation of biomass residues (wood chip).
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.

	Biomass storage	CO_2	No	It is assumed that CO2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	No	Excluded for simplification. Since biomass residues are stored for not longer than one year, this emission source is assumed to be small. In case of the project, the biomass residues are stored for not longer than 20 days.
		N_2O	No	Excluded for simplification. This emissions source is assumed to be very small.

B.4. Description of baseline and its development:

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Baseline as per Paragraph 6 and 10 of "*Type AMS. I. C. Thermal energy for the user with or without electricity (Version 12: Valid from 10th August, 2007 onwards)"* of Appendix B of the simplified M&P for small-scale CDM project activities states that:

> *"6. For renewable energy technologies that displace technologies using fossil fuels, the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity times an emission coefficient for the fossil fuel displaced. IPCC default values for emission coefficients may be used."*

The baseline for the renewable thermal energy generation, which displaces residual fuel oil BPF 1A is the amount of BPF 1A used (TJ) to produce 18-19 tonnes of steam per hour at 8 kgf/cm² (170°C) with three boilers and one thermic fluid heater. The annual consumption at AMC Project is about 9,600 tonnes of residual fuel oil BPF 1A with net calorific value of 9,600 kcal/kg, totalizing 385 TJ/year. It is expected a 25 tonnes of residual fuel oil BPF 1A monthly consumption just for its preventive maintenance purpose, which shall be discounted from baseline. From 2008 until the end of the crediting period, the value was maintained as a conservative number for residual fuel oil BPF 1A consumption forecast.

The calculation formulae used to estimate the anthropogenic emissions by sources of GHGs 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 is provided in section B.6.3.

B.5. 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 additionality of the project activity is assessed and demonstrated through Attachment A to Appendix B of the Simplified Modalities and Procedures for small-scale CDM project activities.

In absence of the project activity the most likely scenario would be the use of residual fuel oil BPF 1A in the operation of the boilers and thermic fluid heater.

Despite the barriers associated with the project, AMC Têxtil Ltda decided to implement it. The fact that the project would be able to benefit from carbon credits was one of the key factors in the decision making.

a) Investment barrier

AMC Têxtil Ltda has specific requirements in terms of return on investment of proposed project in order to approve a project. Any project that scapes the main purpose of the company business activity (such as the fuel switching project proposed), whose main purpose is to produce textile, must show economical feasibility by considering both IRR (Internal Rate of Return) and NPV (Net Present Value). In case of having a given project, which IRR is lower than SELIC (basic interest rate in domestic open market), NPV shall be taken into account in order to evaluate whether the project is either contributing or destroying the company equity. If a given project has an IRR above SELIC, the decision shall be favorable to the project carry on. On the other hand, if a given project has an IRR lower than SELIC, then the NPV must be positive, otherwise the board of directors shall decide to not approve it.

The proposed project activity does not meet both IRR and NPV requirements without the income from CDM component. Based on financial calculations the annual cash flow without income from the sale of carbon credits, produces a pre-tax internal rate of return lower than inflation and a negative net present value, thus it does not accomplish the AMC Project requirements for the project go ahead. In the calculations, an annual inflation of 5% and taxation of 34% was used.

As per March of 2006, considering the same taxation and inflation used previously and adding the income from CDM component (CERs at $10 Euros/unit and $1 Euro at R$ 2.67), based on financial calculation, the annual cash flow produces a pre-tax internal rate of return above SELIC and a positive net present value. This calculation estimated that the CERs sale timing would have happen as per July of 2007, which resulted for the approval of the proposed project activity by the board of AMC Têxtil Ltda. Since then, it was very clear to the board, that the economical feasibility of proposed project activity relies on the CDM component.

However, according to the new schedule and chronogram of CDM registration, the CERs sale shall take place on July 2008, which reduces the pre-tax internal rate of return, but keeps a positive net present value (NPV). This outcome still corroborates the board of director decision to go ahead with the proposed project activity, as it attends to the AMC Project requirements on economical and financial point view. Anyway, the CDM clearly incentives and motivates the board decision in favor of the proposed project activity, otherwise the board would not be favorable to go ahead.

The details of the IRR and NPV calculations are given in Annex 5.

b) Technological Barriers

Compared to the project activity, a residual fuel oil BPF 1A boiler would have led to more GHG emissions, but it is a technology with lower risks associated with performance uncertainty, considering following:

Possible problems of Biomass Generation: there are uncertainties related to achievement of higher steam temperature and pressure parameters by using biomass as a primary fuel because the wood chip tends to not be dry enough. Higher moisture content of biomass could also pose problems in fuel efficiency, thus increasing the net cost in thermal generation. In addition, multi fuel generation pose technological risks. This includes the issue of stable energy output when mixing biomass of different compositions and that the biomass is eventually not dry enough. The thermodynamic of biomass boiler can be negatively affected by these reasons, thus creating unstable thermal power and steam output.

Due to these barriers, it is highly unlikely that the project activity would be implemented without the help of CDM. Therefore, the project activity is additional to any GHG emission reduction that would have occurred without CDM component.

c) Barrier due to prevailing practice:

Fuel switching project from residual fuel oil to biomass in boilers is not common practice in the textile sector and in the region. In addition, it is not common practice in the region and in the textile sector, to replace residual fuel oil boiler during its life cycle (as residual fuel oil boilers are available for 10 year of operation ahead), by a new biomass boiler, in order to accomplish an energy hedge derived from a renewable resource. The proposed project activity increases the utilization of biomass residues as an energy source beyond that which is not common practice in the region, as biomass were used as a raw material by the furniture industry for exportation, thus reducing the fossil fuel utilization for energy purposes. Since the domestic currency is appreciated in comparison to USD and Euro, the demand of biomass by furniture industry for exportation purpose has been reduced, making biomass residues available for other purposes, such as for energy purpose.

National policies and circumstances relevant to the baseline

There is no Brazilian existing regulatory or policy requirements that stimulate less GHGs emission technologies and there are no barriers to the continuation of fuel oil use. Also, there is no near future expectancy of any regulation to the textile industry to limit the fuel oil use.

Impact of CDM registration

The project activity has been under development since the first quarter of 2006. The growing confidence in the appraisal of the project activity resulted in a decision to proceed with investment in the proposed project activity in the light of CDM component. CDM registration therefore does affect the proposed project implementation and its success as otherwise it would not be possible to accomplish AMC Project economical requirements. Besides, CDM registration also contributes for reducing GHG emission, as the project proponent is going to be committed for this purpose by replacing residual fuel oil for biomass in its boilers and thermic fluid heater, otherwise it would be free to decide using either fuel oil or biomass accordingly to their availability and convenience. By this means that the CDM registration would contribute to GHG emission reduction better than it would in the absence of the CDM registration. Therefore, CDM registration has strong impact in the project implementation, as well as to accomplish the environmental and economical AMC targets.

Summary of the outcome of the application of analyses

The scenario using residual fuel oil BPF 1A for steam/heat generation is shown to be the baseline scenario. This scenario is the least-cost and most economically attractive course of action. The proposed project activity is wood chip from the nearby plantations fired in boilers and thermic fluid heater for steam/heat generation. The project activity is shown to be additional based on the investment and barriers analyses.

Consideration of CDM

This boilers and thermic fluid heater fuel switching project was seriously considered as CDM project activity in the AMC Têxtil Board of Directors meeting held on 16/01/2006 and the project was planned as a CDM project. This document was registered in notary public[7].

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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The emission reductions can be calculated using the following formula:

$$ER_y = BE_y - PE_y - L_y$$

Where:

ER_y	Emissions Reductions (tCO_2e) in year y
BE_y	Emissions in the baseline scenario (tCO_2e) in year y
PE_y	Project emissions (tCO_2e) in year y
L_y	Leakage (tCO2e) in year y

1. Baseline emissions

As described in section *B.4*, the proposed baseline is the GHG emissions that would have occurred due to use of residual fuel oil BPF 1A in the boilers or thermal fluid heater in absence of this project activity.

Baseline emissions due to burning of residual fuel oil BPF 1A in boilers and thermal fluid heater are calculated based on the steam/heat generated from burning of residual fuel oil BPF 1A. Total heat content of the steam generated in boilers and total heat supplied by the thermal fluid heater to the thermic fluid is taken into account for baseline calculations.

The baseline methodology is applied in the context of the project activity as follows:

For steam/heat produced using fossil fuels the baseline emissions are calculated as follows:

$$BEy = \frac{HG_y \times EF_{CO2}}{\eta_{th}}$$

Where:

BE_y	the baseline emissions from steam/heat displaced by the project activity during the year y in tCO_2e.
HG_y	the net quantity of steam/heat supplied by the project activity during the year y in TJ

[7] The evidence will be shown to DOE

EF_{CO2}	the CO_2 emission factor per unit of energy of the fuel that would have been used in the baseline plant in (tCO_2/TJ), obtained from reliable local or national data if available, otherwise, IPCC default emission factors are used.
η_{th}	the efficiency of the plant using fossil fuel that would have been used in the absence of the project activity

The net quantity of steam/heat supplied by the project activity during the year y in TJ is:

$$HG_y = HG_{by} + HG_{hy}$$

Where:

HG_y	the net quantity of steam/heat supplied by the project activity during the year y in TJ
HG_{by}	net quantity of steam supplied by the boilers during the year y in TJ.
HG_{hy}	net quantity of steam supplied by the thermic fluid heater during the year y in TJ.

2. Project emissions

The project emissions of the project activity consist of the emissions due to transportation of biomass (wood chip) and residual fuel oil BPF 1A consumption in boilers and/or thermic fluid heater. Detailed calculations are as follows.

The GHG emission due to burning of wood chip (renewable energy source) in the boiler and thermic fluid heat is not considered as these emitted GHG is come from Natural Carbon Cycle.
The project emissions are calculated as follows:

$$PEy = PE_{tb} + PE_{RFO}$$

Where:

PE_y	Project emissions (tCO_2e) in year y
PE_{tb}	Project emissions due to transportation of biomass (t CO_2e) in year y.
PE_{RFO}	Project emissions due residual fuel oil BPF 1A consumption in boilers and/or thermic fluid heat (t CO_2e) in year y.

2.a. Emission due transportation of biomass (PE_{tb})

The project emissions due to transportation of biomass are calculated as follows:

$$PEtb = \frac{Q_{bio} \times D_{bio} \times D_t \times D_c \times D_d \times NCV_d \times EF_d}{C_t}$$

Where:

PE_{tb}	Project emissions due to transportation of biomass (t CO_2e) in year y.
Q_{bio}	Total quantity of biomass transported in the year y, in m³.
D_{bio}	Density of biomass, in tonnes/m³.

D_t	Distance between suppliers and project activity, in km/truck.
D_c	Diesel consumption per km, in l/km.
D_d	Density of diesel, in kg/l.
NCV_d	Net calorific value of diesel, in MJ/kg.
EF_d	Diesel emission factor, in tCO_2/MJ.
C_t	Average capacity of truck, in tonnes/truck.

2.a. Emission due residual fuel oil BPF 1A consumption in boilers and/or thermic fluid heat (PE_{RFO})

It is expected a 300 tonnes of residual fuel oil BPF 1A yearly consumption for emergency cases, which shall be discounted from baseline. From 2008 until the end of the crediting period, the value was maintained as a conservative number for oil consumption prediction.

$$PE_{RFO} = C_{RFO} \times NCV_{RFO} \times FE_{RFO}$$

Where:

PE_{RFO}	Project emissions due residual fuel oil BPF 1A consumption in boilers and/or thermic fluid heat (t CO_2e) in year y.
C_{RFO}	Total consumption of residual fuel oil BPF 1A in year y, in tonnes.
NCV_{RFO}	Net calorific value of residual fuel oil BPF 1A, in TJ/tonnes.
FE_{RFO}	CO_2 emission factor for residual fuel oil BPF 1A, in tCO_2/TJ.

3. Leakage

Paragraph 16 of "AMS I.C. Thermal energy for the user with or without electricity (Version 12: Valid from 10th August, 2007 onwards)" states that:

> *"10. If the generating equipment is transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered."*

In the AMC Project, there is no transfer of energy generating equipment from another activity and no transfer of the existing equipment to another activity hence no leakage is considered.

According to Attachment C to Appendix B, version 02 *("Indicative simplified baseline and monitoring methodologies for selected small-scale project activities categories"*). The use of biomass from existing forests has the leakage evaluated through competing uses for the biomass. In AMC Project case, leakage is not relevant as there is available surplus of woodchip in the region for other activities which use this biomass as fuel.

B.6.2. Data and parameters that are available at validation:

(Copy this table for each data and parameter)

Data / Parameter:	**CO2 emission factor for residual fuel oil (RFO)**
Data unit:	tCO_2/TJ
Description:	Quantity of CO_2 emitted in tonnes per TJ of energy generated by burning of RFO.
Source of data used:	Volume 2 of 2006 IPCC guidelines for National Greenhouse Gas Inventories.
Value applied:	77.4
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC was chosen as the source for reliable data for emissions factors.
Any comment:	Referring table 2.3 of chapter 2 of volume 2 of 2006 IPCC guidelines, value for CO_2 emission factor for RFO is 77,400 $kgCO_2/TJ$, which is equal to 77.4 tCO_2/TJ.

Data / Parameter:	η_{th}
Data unit:	%
Description:	Efficiency of the plant using fossil fuel that would have been used in the absence of the project activity
Source of data used:	
Value applied:	87
Justification of the choice of data or description of measurement methods and procedures actually applied :	Paragraph# 13 option b of AMS-1.C – version 12. b) Highest of the efficiency values provided by two or more manufacturers for units with similar capacity.
Any comment:	The evidence will be shown to DOE.

Data / Parameter:	**Net calorific value of residual fuel oil (RFO).**
Data unit:	kcal/kg
Description:	Net calorific value of residual fuel oil
Source of data used:	2006 National Energy Net (BEN) – Executive Summary page 60 table 36 Fuels Density and Net Calorific Power.
Value applied:	9,590
Justification of the choice of data or description of measurement methods and procedures actually applied :	The National Energy Net (Balanço Energético Nacional) is the official energy data reference in Brazil through Mines and Energy Ministry (MME).
Any comment:	-

Data / Parameter:	Net calorific value (NCV) of diesel
Data unit:	MJ/kg
Description:	Capacity of producing energy in MJ per kg of diesel burnt.
Source of data used:	Table 1.2 of Chapter 2 of Volume 2 of 2006 IPCC guidelines for National Greenhouse Gas Inventories
Value applied:	43.0
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data source selected is an official & authentic source.
Any comment:	NCV to diesel is used to calculate energy generated by burning of diesel (Fuel used in trucks during transportation of biomass)

Data / Parameter:	Density of diesel
Data unit:	Kg/l
Description:	Quantity of diesel in Kg per unit volume in liter.
Source of data used:	Records maintained at the diesel supplier
Value applied:	0.85
Justification of the choice of data or description of measurement methods and procedures actually applied :	To calculate the diesel consumption in kg.
Any comment:	-

Data / Parameter:	CO2 emission factor for diesel
Data unit:	tCO_2/TJ
Description:	Quantity of CO_2 emitted in tonnes per TJ of energy generated by burning of diesel.
Source of data used:	Table 3.2.1 of Chapter 3 of Volume 2 of 2006 IPCC guidelines for National Greenhouse Gas Inventories
Value applied:	74.1
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC was chosen as the source for reliable data for emissions factors.
Any comment:	As per table 3.2.1 of chapter 3 of volume 2 of 2006 IPCC guidelines, value for CO2 emission factor for diesel is 74,100 kgCO2/TJ, which is equal to 74.1 tCO_2/TJ.

B.6.3 Ex-ante calculation of emission reductions:

>>

1. Baseline emissions

$$BEy = \frac{HG_y \times EF_{CO2}}{\eta_{th}}$$

Where:

BE_y	the baseline emissions from steam/heat displaced by the project activity during the year y in tCO2e.
HG_y	the net quantity of steam/heat supplied by the project activity during the year y in TJ
EF_{CO2}	the CO2 emission factor per unit of energy of the fuel that would have been used in the baseline plant in (tCO2 / TJ), obtained from reliable local or national data if available, otherwise, IPCC default emission factors are used.
η_{th}	the efficiency of the plant using fossil fuel that would have been used in the absence of the project activity

The net quantity of steam/heat supplied by the project activity during the year y in TJ is:

$$HG_y = HG_{by} + HG_{hy}$$

Where:

HG_y	the net quantity of steam/heat supplied by the project activity during the year y in TJ
HG_{by}	net quantity of steam supplied by the boilers during the year y in TJ.
HG_{hy}	net quantity of steam supplied by the thermic fluid heater during the year y in TJ.

HG_{by} = net quantity of steam supplied by the boilers during the year y in TJ.

HG_{by} = tons of steam generated per year x heat content in the steam in TJ/tonnes.
HG_{by} = 477,991 x 0.0003837
HG_{by} = 183.4 TJ

HG_{hy} = net quantity of steam supplied by the thermic fluid heater during the year y in TJ.

HG_{hy} = thermic fluid heater capacity (in Mcal/h)x Hour per year (h/year)
HG_{hy} = 5,000 x 8,640 = 43,200,000 Mcal or
HG_{hy} = 180.87 TJ

Therefore, HGy = 364.27 TJ

BE = the baseline emissions from steam/heat displaced by the project activity during the year y in tCO2e.
BE = (HG_y x EF_{CO2}) / η_{th}
BE = (364.27 x 77.4) / 0.87
BE = 32,407 tCO_2/year

2. Project emissions

$$PEy = PE_{tb} + PE_{RFO}$$

Where:

PE_y	Emissions in the project scenario (t CO_2e) in year y
PE_{tb}	Project emissions due to transportation of biomass (t CO_2e) in year y.
PE_{RFO}	Project emissions due residual fuel oil BPF 1A consumption in boilers and/or thermic fluid heat (t CO_2e) in year y.

2.a. Emission due transportation of biomass (PE_{tb})

The project emissions due to transportation of biomass are calculated as follows:

$$PE_{tb} = \frac{Q_{bio} \times D_{bio} \times D_t \times D_c \times D_d \times NCV_d \times EF_d}{C_t}$$

Where:

Q_{bio}	Total quantity of biomass transported in the year y, in m³.	168,000
D_{bio}	Density of biomass, in tonnes/m³.	0.38
D_t	Distance between suppliers and project activity, in km/truck.	60
D_c	Diesel consumption per km, in l/km.	0.20
D_d	Density of diesel, in kg/l.	0.85
NCV_d	Net calorific value of diesel, in MJ/kg.	40.4
EF_d	Diesel emission factor, in tCO_2/MJ.	0.0000741
C_t	Average capacity of truck, in tonnes/truck.	10

PE_{tb} = 194 tCO_2/year

2.b. Emission due residual fuel oil BPF 1A consumption in boilers and/or thermic fluid heat (PE_{RFO})

It is expected a 300 tonnes of residual fuel oil BPF 1A yearly consumption for emergency cases, which shall be discounted from baseline. From 2008 until the end of the crediting period, the value was maintained as a conservative number for oil consumption prediction.

$$PE_{RFO} = C_{RFO} \times NCV_{RFO} \times FE_{RFO}$$

Where:

C_{RFO}	Total consumption of residual fuel oil in year y, in tonnes.	300
NCV_{RFO}	Net calorific value of residual fuel oil, in TJ/tonnes.	9,590
FE_{RFO}	CO_2 emission factor for residual fuel oil, in tCO_2/TJ.	77.4

PE_{RFO} = 932 tCO_2/year

Therefore, PE_y = 1,126 tCO_2/year

3. Leakage

Ly = 0

4. Emission reduction

$$ER_y = BE_y - PE_y - L_y$$

ER_y = 32,407

B.6.4 Summary of the ex-ante estimation of emission reductions:

>>

Year	Estimation of project activity emission (tonnes of CO_2e)	Estimation of baseline emission (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
1/7/2008	563	16,204	0	15,641
2009	1,126	32,407	0	31,281
2010	1,126	32,407	0	31,281
2011	1,126	32,407	0	31,281
2012	1,126	32,407	0	31,281
2013	1,126	32,407	0	31,281
2014	1,126	32,407	0	31,281
2015	1,126	32,407	0	31,281
2016	1,126	32,407	0	31,281
2017	1,126	32,407	0	31,281
30/6/2018	563	16,204	0	15,641
Total (tCO_2e)	11,260	324,070	0	312,810

B.7 Application of a monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	**Biomass Consumption**
Data unit:	Tonnes.
Description:	The quantity of biomass burnt in biomass boiler and thermic fluid heater at project site.
Source of data to be used:	On-site measurements.
Value of data	To be registered.
Description of measurement methods	The amount of biomass burnt by will be monitored by the followings procedures: Every truck that arrives at project site is weighed on the entrance and the biomass

and procedures to be applied:	is unloaded at the storage area. Daily the cubic volume of the biomass at storage site is calculated in cubic meters (m^3). With biomass densities it ´s calculated the physical biomass stock in tonnes. This value is registered on a daily biomass stock control sheet. Then the daily biomass consumption is calculated based on the previous stocked quantity (initial stock) plus all biomass entrances during the current day minus the final stock (measured at the end of the day). Monthly the Engineering Manager will consolidate this biomass consumption values.
QA/QC procedures to be applied:	Cross-check purchase receipts with the quantity of biomass consumed at AMC Têxtil Ltda.
Any comment:	

Data / Parameter:	**-**
Data unit:	-
Description:	Availability of biomass surplus in project´s region.
Source of data to be used:	Letters and or statements of biomass suppliers stating its biomass production capacity in the region.
Value of data	Annually, biomass suppliers will provide letters evidencing their biomass production capacity.
Description of measurement methods and procedures to be applied:	Annually.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	**HGy**
Data unit:	TJ.
Description:	the net quantity of steam/heat supplied by the project activity during the year y.
Source of data to be used:	On-site measurements.
Value of data	To be registered.
Description of measurement methods and procedures to be applied:	The amount of steam is monitored by steam outflow and its energy content calculated by the enthalpy of the steam. This enthalpy is determined based on the mass flow and temperature and pressure. Steam tables are used to calculate the enthalpy as a function of temperature and pressure. The steam mass flow produced is daily registered and monthly consolidated in a HGy control sheet.
QA/QC procedures to be applied:	Cross-check biomass consumed with steam production.
Any comment:	

Data / Parameter:	**Boiler Temperature**
Data unit:	Celsius.
Description:	the average of daily boiler temperature.
Source of data to be used:	On-site measurements.
Value of data	To be registered.

Description of measurement methods and procedures to be applied:	The daily average of boiler temperature is registered in the HGy control sheet. Monthly and then annually the mean of daily records is calculated and registered in the same sheet.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	**Boiler Pressure**
Data unit:	Bar or kgf/cm2.
Description:	the average of daily boiler temperature.
Source of data to be used:	On-site measurements.
Value of data	To be registered.
Description of measurement methods and procedures to be applied:	The daily average of boiler temperature is registered in the HGy control sheet. Monthly and then annually the mean of daily records is calculated and registered in the same sheet.
QA/QC procedures to be applied:	
Any comment:	

B.7.2 Description of the monitoring plan:

>>

The data to be monitored during project's crediting period is quantity of biomass burned in the biomass boiler and biomass thermic fluid heater, the steam/heat produced and the temperature and pressure of biomass boiler and biomass thermic fluid heater. All monitoring data will be electronically kept in AMC Textil system for two years after the end of crediting period.

Biomass Steam production control: The amount of steam is monitored by steam outflow and its energy content calculated by the enthalpy of the steam. This enthalpy is determined based on the mass flow and temperature and pressure. Steam tables are used to calculate the enthalpy as a function of temperature and pressure. The steam mass flow produced is daily registered and monthly consolidated in an HGy control sheet.

Biomass receipt and consumption control: Every truck that arrives at project site is weighed on the entrance and the biomass is unloaded at the storage area. Daily the cubic volume of the biomass at storage site is calculated in cubic meters (m^3). With biomass densities it ´s calculated the physical biomass stock in tonnes. This value is registered on a daily biomass stock control sheet. Then the daily biomass consumption is calculated based on the previous stocked quantity (initial stock) plus all biomass entrances during the current day minus the final stock (measured at the end of the day). Monthly the operator will consolidate this biomass consumption values.

Biomass Boiler Temperature: The daily average of biomass boiler temperature is registered in the HGy control sheet. Monthly and then annually the mean of daily records is calculated and registered in the same sheet.

Biomass Boiler Pressure: The daily average of biomass boiler pressure is registered in the HGy control sheet. Monthly and then annually the mean of daily records is calculated and registered in the same sheet.

Monitoring plan management responsibilities are described as follows:
Engineering Manager (EM) – Responsible to organize monitoring data and undertake periodic internal audits in project´s operations to check if operator of boilers and thermic fluid heaters are following the monitoring plan and if any corrective actions are required. Technician service team will control biomass, steam production, daily average temperature and pressure. This manager is also responsible for boilers' emissions monitoring, operation, maintenance, calibration, training crew and for the final disposal of residues generated by the boilers.

The calibration instruments make part of a computer management system, which all measuring and safety equipments are predicted at Calibration Instruments Plan, according manufacturer.

Availability of biomass surplus in project´s region: Annually, biomass suppliers will provide letters evidencing their biomass production capacity, which is more than enough to attend project´s demand.

B.8 Date of completion of the application of the baseline and monitoring methodology and the name of the responsible person(s)/entity(ies)

>>
Date of completing the final draft of the baseline section & monitoring methodology:
21/11/2007

Name of person / entity determining the baseline:
Engineer Master Science (MSc.) Marcos Eduardo Gomes Cunha / Ciclo Ambiental Engenharia Ltda.
Rua Siqueira Campos, 185 – Distrito de Sousas - Campinas – SP – CEP 13.106-006.
Email: marcos@cicloambiental.com.br

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>
The starting date of the project is 04/04/2006.

C.1.2. Expected operational lifetime of the project activity:

>>
25y-0m

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

C.2.1. Renewable crediting period

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:

>>
01/07/2008 *(DD/MM/YYYY)*

C.2.2.2. Length:

>>
10 years

SECTION D. Environmental impacts

>>

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

>>
AMC Project complies with the environmental regulations of the country. The plant has the required environmental license issued by the State environmental agency, FATMA (Fundação do Meio Ambiente), LO n° 861/2007, issued in October 22nd, 2007, valid until October, 22nd, 2009, according figure below.

ESTADO DE SANTA CATARINA
SECRETARIA DE ESTADO DO DESENVOLVIMENTO SUSTENTÁVEL
FUNDAÇÃO DO MEIO AMBIENTE

FATMA

LICENÇA AMBIENTAL DE OPERAÇÃO

011394
Selo de Autenticidade

COORDENADORIA DE DESESENVOLVIMENTO AMBIENTAL DE JOINVILLE
e-mail:joinville@fatma.sc.gov.br www.fatma.sc.gov.br

LICENÇA AMBIENTAL DE OPERAÇÃO - LAO Nº 861/2007

A **Fundação do Meio Ambiente - FATMA**, no uso de suas atribuições que lhe são conferidas pelo parágrafo 2º do artigo 3º da Lei Estadual Nº 5.793 de 15 de outubro de 1980, regulamentada pelo Decreto 14.250, de 05 de junho de 1981, com base no Parecer Técnico nº 313/07, datado de 16/10/07, concede a presente **Licença Ambiental de Operação** a

Nome: **A.M.C.TÊXTIL LTDA.**
Endereço: **RUA JOAQUIM FRANCISCO DE PAULA, 4.850 - CHICO DE PAULA**
Município: **JARAGUÁ DO SUL/SC.**
CNPJ: **75.364.570/0002-40**

Para Atividade de

Fabricação de Artefatos Têxteis com Tinturaria.
(Item 24.70.00)

Localizada em

Rua Joaquim Francisco de Paula, 4.850 - Bairro Chico de Paula
Município de Jaraguá do Sul - 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 **48 (quarenta e oito) meses** a contar da presente data, conforme Processo de Licenciamento **FATMA Nº IND/137/CRN**, observadas as condições deste documento, (verso e anverso), bem como de seus anexos que, embora não transcritos, são parte integrante do mesmo.

Joinville, 22 de outubro de 2007.

JULIO ABELAIDO SERPA
Gerente de Desenvolvimento Ambiental
de Joinville - FATMA .

Figure 7 - Operation license at AMC Têxtil Project

This project activity presents no major environmental impacts and does not request an Environmental Impact Assessment.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

The atmospheric emissions of the equipments were monitored and compared to the applicable law. The results evidenced a significant improvement, when compared to the utilization of fuel oil in the equipments. The results were compared to confirm the improvement in air condition of the project.

SECTION E. Stakeholders' comments

>>

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

>>

The Brazilian Designated National Authority for the CDM, Comissão Interministerial de Mudanças Globais do Clima, requires the compulsory invitation of selected stakeholders to comment the PDD sent to validation in order to provide the letter of approval.

The organizations and entities invited for comments on the project were:

- Jaraguá do Sul City Hall;
- Jaraguá do Sul City Council;
- Jaraguá do Sul Environmental Department;
- FATMA – State Environmental Agency;
- Santa Catarina State Public Attorney;
- FBOMS – National NGOs representative;
- Local NGO.

E.2. Summary of the comments received:

>>

No comment has been received so far.

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

>>

No comment has been received so far.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

1. Project Participant

Organization:	AMC Têxtil Ltda.
Street/P.O.Box:	Rua Joaquim Francisco de Paulo, 4850 - B. Chico de Paula
Building:	Administrativo
City:	Jaraguá do Sul
State/Region:	Santa Catarina – SC
Postfix/ZIP:	89254-710
Country:	Brazil
Telephone:	+ 55 47 3372-8500
FAX:	
E-Mail:	
URL:	www.menegotti.com.br
Represented by:	
Title:	
Salutation:	Mr.
Last Name:	Steffens
Middle Name:	-
First Name:	Reinaldo
Department:	Diretoria
Mobile:	
Direct FAX:	
Direct tel:	+ 55 47 3372-8554
Personal E-Mail:	reinaldo@menegotti.com.br

2. Project Participant

Organization:	Ciclo Ambiental Engenharia Ltda.
Street/P.O.Box:	Rua Siqueira Campos, 185 – Distrito de Sousas.
Building:	
City:	Campinas.
State/Region:	São Paulo – SP.
Postfix/ZIP:	13.106-006.
Country:	Brazil.
Telephone:	+ 55 19 3258 6335.
FAX:	+ 55 19 3258 6335.
E-Mail:	
URL:	http://www.cicloambiental.com.br/
Represented by:	
Title:	
Salutation:	Mr.
Last Name:	Cunha
Middle Name:	-
First Name:	Marcos
Department:	Diretoria
Mobile:	
Direct FAX:	
Direct tel:	+ 55 19 3258 6335.
Personal E-Mail:	marcos@cicloambiental.com.br

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no funding from Annex-I parties

Annex 3

BASELINE INFORMATION

As described in the item B.4, the proposed baseline is the GHG emissions that would have occurred due to use of residual fuel oil in the boilers and thermic fluid heater in absence of this project activity.

Baseline emissions due to burning of residual fuel oil BPF 1A in boilers and thermal fluid heater are calculated based on the steam/heat generated from burning of residual fuel oil BPF 1A. Total heat content of the steam generated in boilers and total heat supplied by the thermal fluid heater to the thermic fluid is taken into account for baseline calculations.

The baseline methodology is applied in the context of the project activity as follows:

For steam/heat produced using fossil fuels the baseline emissions are calculated as follows:

$$BEy = \frac{HG_y \times EF_{CO2}}{\eta_{th}}$$

Where:

BE_y	the baseline emissions from steam/heat displaced by the project activity during the year y in tCO2e.
HG_y	the net quantity of steam/heat supplied by the project activity during the year y in TJ
EF_{CO2}	the CO2 emission factor per unit of energy of the fuel that would have been used in the baseline plant in (tCO2 / TJ), obtained from reliable local or national data if available, otherwise, IPCC default emission factors are used.
η_{th}	the efficiency of the plant using fossil fuel that would have been used in the absence of the project activity

The net quantity of steam/heat supplied by the project activity during the year y in TJ is:

$$HG_y = HG_{by} + HG_{hy}$$

Where:

HG_y	the net quantity of steam/heat supplied by the project activity during the year y in TJ
HG_{by}	net quantity of steam supplied by the boilers during the year y in TJ.
HG_{hy}	net quantity of steam supplied by the thermic fluid heater during the year y in TJ.

Annex 4

MONITORING INFORMATION

The data to be monitored during project's crediting period is quantity of biomass burned in the biomass boiler and biomass thermic fluid heater, the steam/heat produced and the temperature and pressure of biomass boiler and biomass thermic fluid heater. All monitoring data will be electronically kept in ACM Têxtil system for two years after the end of crediting period.

Steam production control: The amount of steam is monitored by steam outflow and its energy content calculated by the enthalpy of the steam. This enthalpy is determined based on the mass flow and temperature and pressure. Steam tables are used to calculate the enthalpy as a function of temperature and pressure. The steam mass flow produced is daily registered and monthly consolidated in an HGy control sheet.

Biomass receipt and consumption control: Every truck that arrives at project site is weighed on the entrance and the biomass is unloaded at the storage area. Daily the cubic volume of the biomass at storage site is calculated in cubic meters (m^3). With biomass densities it ´s calculated the physical biomass stock in tonnes. This value is registered on a daily biomass stock control sheet. Then the daily biomass consumption is calculated based on the previous stocked quantity (initial stock) plus all biomass entrances during the current day minus the final stock (measured at the end of the day). Monthly the operator will consolidate this biomass consumption values.

Boiler Temperature: The daily average of boiler temperature is registered in the HGy control sheet. Monthly and then annually the mean of daily records is calculated and registered in the same sheet.

Boiler Pressure: The daily average of boiler pressure is registered in the HGy control sheet. Monthly and then annually the mean of daily records is calculated and registered in the same sheet.

Monitoring plan management responsibilities are described as follows:
Engineering Manager (EM) – Responsible to organize monitoring data and undertake periodic internal audits in project´s operations to check if operator of boilers and thermic fluid heaters are following the monitoring plan and if any corrective actions are required. Technician service team will control biomass, steam production, daily average temperature and pressure. This manager is also responsible for boilers' emissions monitoring, operation, maintenance, calibration, training crew and for the final disposal of residues generated by the boilers and thermic fluid heater.

The calibration instruments make part of a computer management system, which all measuring and safety equipments are predicted at Calibration Instruments Plan, according manufacturer.

Availability of biomass surplus in project´s region: Annually, biomass suppliers will provide letters evidencing their biomass production capacity, which is more than enough to attend project´s demand.

Annex 5

IRR AND NPV CALCULATION

Economical Feasibility Calculation based on datas available on March 2.006.

I. Given:

Annual Inflation (**)	5%
Tax	34%
Discount rate	6%
€ /tCO2e	€ 10.00
CER's (tCO2e) 10 years	300.000 tCO2e
1 EURO (€)	R$ 2,67
CER's Revenue	**R$ 8.010.000,00**

II. Investment Analysis Result:

IRR	**4,70%**
NPV	**(R$ 637.470,82)**
IRR with CER'S	**18,96%**
NPV with CER'S	**R$ 4.388.102,27**

III. The monthly income displayed at the cash flow column is calculated as following:

(A-B)-(((A-B)-depreciation*) x 0,34)

(*) depreciation = R$ 26.380,52 = (R$ 3.165.662,37 x 0,10)/12
(**) The annual inflation shall be applied annually over the maintenance and operation (M&O) cost.

IV. Cash flow Analysis:

	FUEL BPF OIL					WOOD CHIP					Cash flow
month	M&O	Kg	R$/Kg	FUEL	A	M&O	M3	R$/M3	FUEL	B	with CER'S
dez/06	R$ 23.000,00	793.000	R$ 0,75	R$ 594.750,00	R$ 617.750,00	R$ 34.000,00	16.800	R$ 22,04	R$ 370.272,00	R$ 404.272,00	(R$ 3.165.662,37)
jan/07	R$ 23.000,00	793.000	R$ 0,75	R$ 594.750,00	R$ 617.750,00	R$ 34.000,00	16.800	R$ 22,04	R$ 370.272,00	R$ 404.272,00	R$ 149.864,86
fev/07	R$ 23.000,00	793.000	R$ 0,75	R$ 594.750,00	R$ 617.750,00	R$ 34.000,00	16.800	R$ 22,04	R$ 370.272,00	R$ 404.272,00	R$ 149.864,86
mar/07	R$ 23.000,00	793.000	R$ 0,75	R$ 594.750,00	R$ 617.750,00	R$ 34.000,00	16.800	R$ 22,04	R$ 370.272,00	R$ 404.272,00	R$ 149.864,86
abr/07	R$ 23.000,00	793.000	R$ 0,75	R$ 594.750,00	R$ 617.750,00	R$ 34.000,00	16.800	R$ 22,04	R$ 370.272,00	R$ 404.272,00	R$ 149.864,86
mai/07	R$ 23.000,00	793.000	R$ 0,75	R$ 594.750,00	R$ 617.750,00	R$ 34.000,00	16.800	R$ 22,04	R$ 370.272,00	R$ 404.272,00	R$ 149.864,86
jun/07	R$ 23.000,00	793.000	R$ 0,75	R$ 594.750,00	R$ 617.750,00	R$ 34.000,00	16.800	R$ 22,04	R$ 370.272,00	R$ 404.272,00	R$ 149.864,86
jul/07	R$ 23.000,00	793.000	R$ 0,75	R$ 594.750,00	R$ 617.750,00	R$ 34.000,00	16.800	R$ 22,04	R$ 370.272,00	R$ 404.272,00	R$ 8.159.864,86
ago/07	R$ 23.000,00	793.000	R$ 0,75	R$ 594.750,00	R$ 617.750,00	R$ 34.000,00	16.800	R$ 22,04	R$ 370.272,00	R$ 404.272,00	R$ 149.864,86
set/07	R$ 23.000,00	793.000	R$ 0,75	R$ 594.750,00	R$ 617.750,00	R$ 34.000,00	16.800	R$ 22,04	R$ 370.272,00	R$ 404.272,00	R$ 149.864,86
out/07	R$ 23.000,00	793.000	R$ 0,75	R$ 594.750,00	R$ 617.750,00	R$ 34.000,00	16.800	R$ 22,04	R$ 370.272,00	R$ 404.272,00	R$ 149.864,86
nov/07	R$ 23.000,00	793.000	R$ 0,75	R$ 594.750,00	R$ 617.750,00	R$ 34.000,00	16.800	R$ 22,04	R$ 370.272,00	R$ 404.272,00	R$ 149.864,86
dez/07	R$ 23.000,00	793.000	R$ 0,75	R$ 594.750,00	R$ 617.750,00	R$ 34.000,00	16.800	R$ 22,04	R$ 370.272,00	R$ 404.272,00	R$ 149.864,86
jan/08	R$ 24.150,00	793.000	R$ 0,75	R$ 594.750,00	R$ 618.900,00	R$ 35.700,00	16.800	R$ 22,04	R$ 370.272,00	R$ 405.972,00	R$ 149.501,86
fev/08	R$ 24.150,00	793.000	R$ 0,75	R$ 594.750,00	R$ 618.900,00	R$ 35.700,00	16.800	R$ 22,04	R$ 370.272,00	R$ 405.972,00	R$ 149.501,86
mar/08	R$ 24.150,00	793.000	R$ 0,75	R$ 594.750,00	R$ 618.900,00	R$ 35.700,00	16.800	R$ 22,04	R$ 370.272,00	R$ 405.972,00	R$ 149.501,86
abr/08	R$ 24.150,00	793.000	R$ 0,75	R$ 594.750,00	R$ 618.900,00	R$ 35.700,00	16.800	R$ 22,04	R$ 370.272,00	R$ 405.972,00	R$ 149.501,86
mai/08	R$ 24.150,00	793.000	R$ 0,75	R$ 594.750,00	R$ 618.900,00	R$ 35.700,00	16.800	R$ 22,04	R$ 370.272,00	R$ 405.972,00	R$ 149.501,86
jun/08	R$ 24.150,00	793.000	R$ 0,75	R$ 594.750,00	R$ 618.900,00	R$ 35.700,00	16.800	R$ 22,04	R$ 370.272,00	R$ 405.972,00	R$ 149.501,86
jul/08	R$ 24.150,00	793.000	R$ 0,75	R$ 594.750,00	R$ 618.900,00	R$ 35.700,00	16.800	R$ 22,04	R$ 370.272,00	R$ 405.972,00	R$ 149.501,86
ago/08	R$ 24.150,00	793.000	R$ 0,75	R$ 594.750,00	R$ 618.900,00	R$ 35.700,00	16.800	R$ 22,04	R$ 370.272,00	R$ 405.972,00	R$ 149.501,86
set/08	R$ 24.150,00	793.000	R$ 0,75	R$ 594.750,00	R$ 618.900,00	R$ 35.700,00	16.800	R$ 22,04	R$ 370.272,00	R$ 405.972,00	R$ 149.501,86
out/08	R$ 24.150,00	793.000	R$ 0,75	R$ 594.750,00	R$ 618.900,00	R$ 35.700,00	16.800	R$ 22,04	R$ 370.272,00	R$ 405.972,00	R$ 149.501,86
nov/08	R$ 24.150,00	793.000	R$ 0,75	R$ 594.750,00	R$ 618.900,00	R$ 35.700,00	16.800	R$ 22,04	R$ 370.272,00	R$ 405.972,00	R$ 149.501,86
dez/08	R$ 24.150,00	793.000	R$ 0,75	R$ 594.750,00	R$ 618.900,00	R$ 35.700,00	16.800	R$ 22,04	R$ 370.272,00	R$ 405.972,00	R$ 149.501,86
jan/09	R$ 25.357,50	793.000	R$ 0,75	R$ 594.750,00	R$ 620.107,50	R$ 37.485,00	16.800	R$ 22,04	R$ 370.272,00	R$ 407.757,00	R$ 149.120,71
fev/09	R$ 25.357,50	793.000	R$ 0,75	R$ 594.750,00	R$ 620.107,50	R$ 37.485,00	16.800	R$ 22,04	R$ 370.272,00	R$ 407.757,00	R$ 149.120,71
mar/09	R$ 25.357,50	793.000	R$ 0,75	R$ 594.750,00	R$ 620.107,50	R$ 37.485,00	16.800	R$ 22,04	R$ 370.272,00	R$ 407.757,00	R$ 149.120,71
abr/09	R$ 25.357,50	793.000	R$ 0,75	R$ 594.750,00	R$ 620.107,50	R$ 37.485,00	16.800	R$ 22,04	R$ 370.272,00	R$ 407.757,00	R$ 149.120,71
mai/09	R$ 25.357,50	793.000	R$ 0,75	R$ 594.750,00	R$ 620.107,50	R$ 37.485,00	16.800	R$ 22,04	R$ 370.272,00	R$ 407.757,00	R$ 149.120,71

jun/09	R$ 25.357,50	793.000	R$ 0,75	R$ 594.750,00	R$ 620.107,50	R$ 37.485,00	16.800	R$ 22,04	R$ 370.272,00	R$ 407.757,00	**R$ 149.120,71**
jul/09	R$ 25.357,50	793.000	R$ 0,75	R$ 594.750,00	R$ 620.107,50	R$ 37.485,00	16.800	R$ 22,04	R$ 370.272,00	R$ 407.757,00	**R$ 149.120,71**
ago/09	R$ 25.357,50	793.000	R$ 0,75	R$ 594.750,00	R$ 620.107,50	R$ 37.485,00	16.800	R$ 22,04	R$ 370.272,00	R$ 407.757,00	**R$ 149.120,71**
set/09	R$ 25.357,50	793.000	R$ 0,75	R$ 594.750,00	R$ 620.107,50	R$ 37.485,00	16.800	R$ 22,04	R$ 370.272,00	R$ 407.757,00	**R$ 149.120,71**
out/09	R$ 25.357,50	793.000	R$ 0,75	R$ 594.750,00	R$ 620.107,50	R$ 37.485,00	16.800	R$ 22,04	R$ 370.272,00	R$ 407.757,00	**R$ 149.120,71**
nov/09	R$ 25.357,50	793.000	R$ 0,75	R$ 594.750,00	R$ 620.107,50	R$ 37.485,00	16.800	R$ 22,04	R$ 370.272,00	R$ 407.757,00	**R$ 149.120,71**
dez/09	R$ 25.357,50	793.000	R$ 0,75	R$ 594.750,00	R$ 620.107,50	R$ 37.485,00	16.800	R$ 22,04	R$ 370.272,00	R$ 407.757,00	**R$ 149.120,71**
jan/10	R$ 26.625,38	793.000	R$ 0,75	R$ 594.750,00	R$ 621.375,38	R$ 39.359,25	16.800	R$ 22,04	R$ 370.272,00	R$ 409.631,25	**R$ 148.720,50**
fev/10	R$ 26.625,38	793.000	R$ 0,75	R$ 594.750,00	R$ 621.375,38	R$ 39.359,25	16.800	R$ 22,04	R$ 370.272,00	R$ 409.631,25	**R$ 148.720,50**
mar/10	R$ 26.625,38	793.000	R$ 0,75	R$ 594.750,00	R$ 621.375,38	R$ 39.359,25	16.800	R$ 22,04	R$ 370.272,00	R$ 409.631,25	**R$ 148.720,50**
abr/10	R$ 26.625,38	793.000	R$ 0,75	R$ 594.750,00	R$ 621.375,38	R$ 39.359,25	16.800	R$ 22,04	R$ 370.272,00	R$ 409.631,25	**R$ 148.720,50**
mai/10	R$ 26.625,38	793.000	R$ 0,75	R$ 594.750,00	R$ 621.375,38	R$ 39.359,25	16.800	R$ 22,04	R$ 370.272,00	R$ 409.631,25	**R$ 148.720,50**
jun/10	R$ 26.625,38	793.000	R$ 0,75	R$ 594.750,00	R$ 621.375,38	R$ 39.359,25	16.800	R$ 22,04	R$ 370.272,00	R$ 409.631,25	**R$ 148.720,50**
jul/10	R$ 26.625,38	793.000	R$ 0,75	R$ 594.750,00	R$ 621.375,38	R$ 39.359,25	16.800	R$ 22,04	R$ 370.272,00	R$ 409.631,25	**R$ 148.720,50**
ago/10	R$ 26.625,38	793.000	R$ 0,75	R$ 594.750,00	R$ 621.375,38	R$ 39.359,25	16.800	R$ 22,04	R$ 370.272,00	R$ 409.631,25	**R$ 148.720,50**
set/10	R$ 26.625,38	793.000	R$ 0,75	R$ 594.750,00	R$ 621.375,38	R$ 39.359,25	16.800	R$ 22,04	R$ 370.272,00	R$ 409.631,25	**R$ 148.720,50**
out/10	R$ 26.625,38	793.000	R$ 0,75	R$ 594.750,00	R$ 621.375,38	R$ 39.359,25	16.800	R$ 22,04	R$ 370.272,00	R$ 409.631,25	**R$ 148.720,50**
nov/10	R$ 26.625,38	793.000	R$ 0,75	R$ 594.750,00	R$ 621.375,38	R$ 39.359,25	16.800	R$ 22,04	R$ 370.272,00	R$ 409.631,25	**R$ 148.720,50**
dez/10	R$ 26.625,38	793.000	R$ 0,75	R$ 594.750,00	R$ 621.375,38	R$ 39.359,25	16.800	R$ 22,04	R$ 370.272,00	R$ 409.631,25	**R$ 148.720,50**
jan/11	R$ 27.956,64	793.000	R$ 0,75	R$ 594.750,00	R$ 622.706,64	R$ 41.327,21	16.800	R$ 22,04	R$ 370.272,00	R$ 411.599,21	**R$ 148.300,28**
fev/11	R$ 27.956,64	793.000	R$ 0,75	R$ 594.750,00	R$ 622.706,64	R$ 41.327,21	16.800	R$ 22,04	R$ 370.272,00	R$ 411.599,21	**R$ 148.300,28**
mar/11	R$ 27.956,64	793.000	R$ 0,75	R$ 594.750,00	R$ 622.706,64	R$ 41.327,21	16.800	R$ 22,04	R$ 370.272,00	R$ 411.599,21	**R$ 148.300,28**
abr/11	R$ 27.956,64	793.000	R$ 0,75	R$ 594.750,00	R$ 622.706,64	R$ 41.327,21	16.800	R$ 22,04	R$ 370.272,00	R$ 411.599,21	**R$ 148.300,28**
mai/11	R$ 27.956,64	793.000	R$ 0,75	R$ 594.750,00	R$ 622.706,64	R$ 41.327,21	16.800	R$ 22,04	R$ 370.272,00	R$ 411.599,21	**R$ 148.300,28**
jun/11	R$ 27.956,64	793.000	R$ 0,75	R$ 594.750,00	R$ 622.706,64	R$ 41.327,21	16.800	R$ 22,04	R$ 370.272,00	R$ 411.599,21	**R$ 148.300,28**
jul/11	R$ 27.956,64	793.000	R$ 0,75	R$ 594.750,00	R$ 622.706,64	R$ 41.327,21	16.800	R$ 22,04	R$ 370.272,00	R$ 411.599,21	**R$ 148.300,28**
ago/11	R$ 27.956,64	793.000	R$ 0,75	R$ 594.750,00	R$ 622.706,64	R$ 41.327,21	16.800	R$ 22,04	R$ 370.272,00	R$ 411.599,21	**R$ 148.300,28**
set/11	R$ 27.956,64	793.000	R$ 0,75	R$ 594.750,00	R$ 622.706,64	R$ 41.327,21	16.800	R$ 22,04	R$ 370.272,00	R$ 411.599,21	**R$ 148.300,28**
out/11	R$ 27.956,64	793.000	R$ 0,75	R$ 594.750,00	R$ 622.706,64	R$ 41.327,21	16.800	R$ 22,04	R$ 370.272,00	R$ 411.599,21	**R$ 148.300,28**
nov/11	R$ 27.956,64	793.000	R$ 0,75	R$ 594.750,00	R$ 622.706,64	R$ 41.327,21	16.800	R$ 22,04	R$ 370.272,00	R$ 411.599,21	**R$ 148.300,28**
dez/11	R$ 27.956,64	793.000	R$ 0,75	R$ 594.750,00	R$ 622.706,64	R$ 41.327,21	16.800	R$ 22,04	R$ 370.272,00	R$ 411.599,21	**R$ 148.300,28**
jan/12	R$ 29.354,48	793.000	R$ 0,75	R$ 594.750,00	R$ 624.104,48	R$ 43.393,57	16.800	R$ 22,04	R$ 370.272,00	R$ 413.665,57	**R$ 147.859,05**
fev/12	R$ 29.354,48	793.000	R$ 0,75	R$ 594.750,00	R$ 624.104,48	R$ 43.393,57	16.800	R$ 22,04	R$ 370.272,00	R$ 413.665,57	**R$ 147.859,05**
mar/12	R$ 29.354,48	793.000	R$ 0,75	R$ 594.750,00	R$ 624.104,48	R$ 43.393,57	16.800	R$ 22,04	R$ 370.272,00	R$ 413.665,57	**R$ 147.859,05**

abr/12	R$ 29.354,48	793.000	R$ 0,75	R$ 594.750,00	R$ 624.104,48	R$ 43.393,57	16.800	R$ 22,04	R$ 370.272,00	R$ 413.665,57	**R$ 147.859,05**
mai/12	R$ 29.354,48	793.000	R$ 0,75	R$ 594.750,00	R$ 624.104,48	R$ 43.393,57	16.800	R$ 22,04	R$ 370.272,00	R$ 413.665,57	**R$ 147.859,05**
jun/12	R$ 29.354,48	793.000	R$ 0,75	R$ 594.750,00	R$ 624.104,48	R$ 43.393,57	16.800	R$ 22,04	R$ 370.272,00	R$ 413.665,57	**R$ 147.859,05**
jul/12	R$ 29.354,48	793.000	R$ 0,75	R$ 594.750,00	R$ 624.104,48	R$ 43.393,57	16.800	R$ 22,04	R$ 370.272,00	R$ 413.665,57	**R$ 147.859,05**
ago/12	R$ 29.354,48	793.000	R$ 0,75	R$ 594.750,00	R$ 624.104,48	R$ 43.393,57	16.800	R$ 22,04	R$ 370.272,00	R$ 413.665,57	**R$ 147.859,05**
set/12	R$ 29.354,48	793.000	R$ 0,75	R$ 594.750,00	R$ 624.104,48	R$ 43.393,57	16.800	R$ 22,04	R$ 370.272,00	R$ 413.665,57	**R$ 147.859,05**
out/12	R$ 29.354,48	793.000	R$ 0,75	R$ 594.750,00	R$ 624.104,48	R$ 43.393,57	16.800	R$ 22,04	R$ 370.272,00	R$ 413.665,57	**R$ 147.859,05**
nov/12	R$ 29.354,48	793.000	R$ 0,75	R$ 594.750,00	R$ 624.104,48	R$ 43.393,57	16.800	R$ 22,04	R$ 370.272,00	R$ 413.665,57	**R$ 147.859,05**
dez/12	R$ 29.354,48	793.000	R$ 0,75	R$ 594.750,00	R$ 624.104,48	R$ 43.393,57	16.800	R$ 22,04	R$ 370.272,00	R$ 413.665,57	**R$ 147.859,05**
jan/13	R$ 30.822,20	793.000	R$ 0,75	R$ 594.750,00	R$ 625.572,20	R$ 45.563,25	16.800	R$ 22,04	R$ 370.272,00	R$ 415.835,25	**R$ 147.395,76**
fev/13	R$ 30.822,20	793.000	R$ 0,75	R$ 594.750,00	R$ 625.572,20	R$ 45.563,25	16.800	R$ 22,04	R$ 370.272,00	R$ 415.835,25	**R$ 147.395,76**
mar/13	R$ 30.822,20	793.000	R$ 0,75	R$ 594.750,00	R$ 625.572,20	R$ 45.563,25	16.800	R$ 22,04	R$ 370.272,00	R$ 415.835,25	**R$ 147.395,76**
abr/13	R$ 30.822,20	793.000	R$ 0,75	R$ 594.750,00	R$ 625.572,20	R$ 45.563,25	16.800	R$ 22,04	R$ 370.272,00	R$ 415.835,25	**R$ 147.395,76**
mai/13	R$ 30.822,20	793.000	R$ 0,75	R$ 594.750,00	R$ 625.572,20	R$ 45.563,25	16.800	R$ 22,04	R$ 370.272,00	R$ 415.835,25	**R$ 147.395,76**
jun/13	R$ 30.822,20	793.000	R$ 0,75	R$ 594.750,00	R$ 625.572,20	R$ 45.563,25	16.800	R$ 22,04	R$ 370.272,00	R$ 415.835,25	**R$ 147.395,76**
jul/13	R$ 30.822,20	793.000	R$ 0,75	R$ 594.750,00	R$ 625.572,20	R$ 45.563,25	16.800	R$ 22,04	R$ 370.272,00	R$ 415.835,25	**R$ 147.395,76**
ago/13	R$ 30.822,20	793.000	R$ 0,75	R$ 594.750,00	R$ 625.572,20	R$ 45.563,25	16.800	R$ 22,04	R$ 370.272,00	R$ 415.835,25	**R$ 147.395,76**
set/13	R$ 30.822,20	793.000	R$ 0,75	R$ 594.750,00	R$ 625.572,20	R$ 45.563,25	16.800	R$ 22,04	R$ 370.272,00	R$ 415.835,25	**R$ 147.395,76**
out/13	R$ 30.822,20	793.000	R$ 0,75	R$ 594.750,00	R$ 625.572,20	R$ 45.563,25	16.800	R$ 22,04	R$ 370.272,00	R$ 415.835,25	**R$ 147.395,76**
nov/13	R$ 30.822,20	793.000	R$ 0,75	R$ 594.750,00	R$ 625.572,20	R$ 45.563,25	16.800	R$ 22,04	R$ 370.272,00	R$ 415.835,25	**R$ 147.395,76**
dez/13	R$ 30.822,20	793.000	R$ 0,75	R$ 594.750,00	R$ 625.572,20	R$ 45.563,25	16.800	R$ 22,04	R$ 370.272,00	R$ 415.835,25	**R$ 147.395,76**
jan/14	R$ 32.363,31	793.000	R$ 0,75	R$ 594.750,00	R$ 627.113,31	R$ 47.841,41	16.800	R$ 22,04	R$ 370.272,00	R$ 418.113,41	**R$ 146.909,31**
fev/14	R$ 32.363,31	793.000	R$ 0,75	R$ 594.750,00	R$ 627.113,31	R$ 47.841,41	16.800	R$ 22,04	R$ 370.272,00	R$ 418.113,41	**R$ 146.909,31**
mar/14	R$ 32.363,31	793.000	R$ 0,75	R$ 594.750,00	R$ 627.113,31	R$ 47.841,41	16.800	R$ 22,04	R$ 370.272,00	R$ 418.113,41	**R$ 146.909,31**
abr/14	R$ 32.363,31	793.000	R$ 0,75	R$ 594.750,00	R$ 627.113,31	R$ 47.841,41	16.800	R$ 22,04	R$ 370.272,00	R$ 418.113,41	**R$ 146.909,31**
mai/14	R$ 32.363,31	793.000	R$ 0,75	R$ 594.750,00	R$ 627.113,31	R$ 47.841,41	16.800	R$ 22,04	R$ 370.272,00	R$ 418.113,41	**R$ 146.909,31**
jun/14	R$ 32.363,31	793.000	R$ 0,75	R$ 594.750,00	R$ 627.113,31	R$ 47.841,41	16.800	R$ 22,04	R$ 370.272,00	R$ 418.113,41	**R$ 146.909,31**
jul/14	R$ 32.363,31	793.000	R$ 0,75	R$ 594.750,00	R$ 627.113,31	R$ 47.841,41	16.800	R$ 22,04	R$ 370.272,00	R$ 418.113,41	**R$ 146.909,31**
ago/14	R$ 32.363,31	793.000	R$ 0,75	R$ 594.750,00	R$ 627.113,31	R$ 47.841,41	16.800	R$ 22,04	R$ 370.272,00	R$ 418.113,41	**R$ 146.909,31**
set/14	R$ 32.363,31	793.000	R$ 0,75	R$ 594.750,00	R$ 627.113,31	R$ 47.841,41	16.800	R$ 22,04	R$ 370.272,00	R$ 418.113,41	**R$ 146.909,31**
out/14	R$ 32.363,31	793.000	R$ 0,75	R$ 594.750,00	R$ 627.113,31	R$ 47.841,41	16.800	R$ 22,04	R$ 370.272,00	R$ 418.113,41	**R$ 146.909,31**
nov/14	R$ 32.363,31	793.000	R$ 0,75	R$ 594.750,00	R$ 627.113,31	R$ 47.841,41	16.800	R$ 22,04	R$ 370.272,00	R$ 418.113,41	**R$ 146.909,31**
dez/14	R$ 32.363,31	793.000	R$ 0,75	R$ 594.750,00	R$ 627.113,31	R$ 47.841,41	16.800	R$ 22,04	R$ 370.272,00	R$ 418.113,41	**R$ 146.909,31**
jan/15	R$ 33.981,48	793.000	R$ 0,75	R$ 594.750,00	R$ 628.731,48	R$ 50.233,49	16.800	R$ 22,04	R$ 370.272,00	R$ 420.505,49	**R$ 146.398,53**

fev/15	R$ 33.981,48	793.000	R$ 0,75	R$ 594.750,00	R$ 628.731,48	R$ 50.233,49	16.800	R$ 22,04	R$ 370.272,00	R$ 420.505,49	**R$ 146.398,53**
mar/15	R$ 33.981,48	793.000	R$ 0,75	R$ 594.750,00	R$ 628.731,48	R$ 50.233,49	16.800	R$ 22,04	R$ 370.272,00	R$ 420.505,49	**R$ 146.398,53**
abr/15	R$ 33.981,48	793.000	R$ 0,75	R$ 594.750,00	R$ 628.731,48	R$ 50.233,49	16.800	R$ 22,04	R$ 370.272,00	R$ 420.505,49	**R$ 146.398,53**
mai/15	R$ 33.981,48	793.000	R$ 0,75	R$ 594.750,00	R$ 628.731,48	R$ 50.233,49	16.800	R$ 22,04	R$ 370.272,00	R$ 420.505,49	**R$ 146.398,53**
jun/15	R$ 33.981,48	793.000	R$ 0,75	R$ 594.750,00	R$ 628.731,48	R$ 50.233,49	16.800	R$ 22,04	R$ 370.272,00	R$ 420.505,49	**R$ 146.398,53**
jul/15	R$ 33.981,48	793.000	R$ 0,75	R$ 594.750,00	R$ 628.731,48	R$ 50.233,49	16.800	R$ 22,04	R$ 370.272,00	R$ 420.505,49	**R$ 146.398,53**
ago/15	R$ 33.981,48	793.000	R$ 0,75	R$ 594.750,00	R$ 628.731,48	R$ 50.233,49	16.800	R$ 22,04	R$ 370.272,00	R$ 420.505,49	**R$ 146.398,53**
set/15	R$ 33.981,48	793.000	R$ 0,75	R$ 594.750,00	R$ 628.731,48	R$ 50.233,49	16.800	R$ 22,04	R$ 370.272,00	R$ 420.505,49	**R$ 146.398,53**
out/15	R$ 33.981,48	793.000	R$ 0,75	R$ 594.750,00	R$ 628.731,48	R$ 50.233,49	16.800	R$ 22,04	R$ 370.272,00	R$ 420.505,49	**R$ 146.398,53**
nov/15	R$ 33.981,48	793.000	R$ 0,75	R$ 594.750,00	R$ 628.731,48	R$ 50.233,49	16.800	R$ 22,04	R$ 370.272,00	R$ 420.505,49	**R$ 146.398,53**
dez/15	R$ 33.981,48	793.000	R$ 0,75	R$ 594.750,00	R$ 628.731,48	R$ 50.233,49	16.800	R$ 22,04	R$ 370.272,00	R$ 420.505,49	**R$ 146.398,53**
jan/16	R$ 35.680,55	793.000	R$ 0,75	R$ 594.750,00	R$ 630.430,55	R$ 52.745,16	16.800	R$ 22,04	R$ 370.272,00	R$ 423.017,16	**R$ 145.862,21**
fev/16	R$ 35.680,55	793.000	R$ 0,75	R$ 594.750,00	R$ 630.430,55	R$ 52.745,16	16.800	R$ 22,04	R$ 370.272,00	R$ 423.017,16	**R$ 145.862,21**
mar/16	R$ 35.680,55	793.000	R$ 0,75	R$ 594.750,00	R$ 630.430,55	R$ 52.745,16	16.800	R$ 22,04	R$ 370.272,00	R$ 423.017,16	**R$ 145.862,21**
abr/16	R$ 35.680,55	793.000	R$ 0,75	R$ 594.750,00	R$ 630.430,55	R$ 52.745,16	16.800	R$ 22,04	R$ 370.272,00	R$ 423.017,16	**R$ 145.862,21**
mai/16	R$ 35.680,55	793.000	R$ 0,75	R$ 594.750,00	R$ 630.430,55	R$ 52.745,16	16.800	R$ 22,04	R$ 370.272,00	R$ 423.017,16	**R$ 145.862,21**
jun/16	R$ 35.680,55	793.000	R$ 0,75	R$ 594.750,00	R$ 630.430,55	R$ 52.745,16	16.800	R$ 22,04	R$ 370.272,00	R$ 423.017,16	**R$ 145.862,21**
jul/16	R$ 35.680,55	793.000	R$ 0,75	R$ 594.750,00	R$ 630.430,55	R$ 52.745,16	16.800	R$ 22,04	R$ 370.272,00	R$ 423.017,16	**R$ 145.862,21**
ago/16	R$ 35.680,55	793.000	R$ 0,75	R$ 594.750,00	R$ 630.430,55	R$ 52.745,16	16.800	R$ 22,04	R$ 370.272,00	R$ 423.017,16	**R$ 145.862,21**
set/16	R$ 35.680,55	793.000	R$ 0,75	R$ 594.750,00	R$ 630.430,55	R$ 52.745,16	16.800	R$ 22,04	R$ 370.272,00	R$ 423.017,16	**R$ 145.862,21**
out/16	R$ 35.680,55	793.000	R$ 0,75	R$ 594.750,00	R$ 630.430,55	R$ 52.745,16	16.800	R$ 22,04	R$ 370.272,00	R$ 423.017,16	**R$ 145.862,21**
nov/16	R$ 35.680,55	793.000	R$ 0,75	R$ 594.750,00	R$ 630.430,55	R$ 52.745,16	16.800	R$ 22,04	R$ 370.272,00	R$ 423.017,16	**R$ 145.862,21**
dez/16	R$ 35.680,55	793.000	R$ 0,75	R$ 594.750,00	R$ 630.430,55	R$ 52.745,16	16.800	R$ 22,04	R$ 370.272,00	R$ 423.017,16	**R$ 145.862,21**
jan/17	R$ 37.464,58	793.000	R$ 0,75	R$ 594.750,00	R$ 632.214,58	R$ 55.382,42	16.800	R$ 22,04	R$ 370.272,00	R$ 425.654,42	**R$ 136.329,71**
fev/17	R$ 37.464,58	793.000	R$ 0,75	R$ 594.750,00	R$ 632.214,58	R$ 55.382,42	16.800	R$ 22,04	R$ 370.272,00	R$ 425.654,42	**R$ 136.329,71**
mar/17	R$ 37.464,58	793.000	R$ 0,75	R$ 594.750,00	R$ 632.214,58	R$ 55.382,42	16.800	R$ 22,04	R$ 370.272,00	R$ 425.654,42	**R$ 136.329,71**
abr/17	R$ 37.464,58	793.000	R$ 0,75	R$ 594.750,00	R$ 632.214,58	R$ 55.382,42	16.800	R$ 22,04	R$ 370.272,00	R$ 425.654,42	**R$ 136.329,71**
mai/17	R$ 37.464,58	793.000	R$ 0,75	R$ 594.750,00	R$ 632.214,58	R$ 55.382,42	16.800	R$ 22,04	R$ 370.272,00	R$ 425.654,42	**R$ 136.329,71**
jun/17	R$ 37.464,58	793.000	R$ 0,75	R$ 594.750,00	R$ 632.214,58	R$ 55.382,42	16.800	R$ 22,04	R$ 370.272,00	R$ 425.654,42	**R$ 136.329,71**
jul/17	R$ 37.464,58	793.000	R$ 0,75	R$ 594.750,00	R$ 632.214,58	R$ 55.382,42	16.800	R$ 22,04	R$ 370.272,00	R$ 425.654,42	**R$ 136.329,71**