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

CONTENTS

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>.

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

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

GEEA Biomass 5 MW Power Plant Project, referred to as the Project.
Version: 3.1
Date: 24/07/2007

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

Purpose and project description

The purpose of the project activity is to utilize rice husks as the biomass fuel for power generation. Geradora de Energia Elétrica Alegrete Ltda. (GEEA), which is set up by Pilecco Rice Mill Limited, will construct a 100% biomass based power plant with a maximum generation capacity of 5 MW (actual generation of 4.5 MW) in Alegrete, a town in the southern State of Rio Grande do Sul, Brazil.

The Project will displace grid electricity by generating renewable energy to be used internally at the Rice Mill and also to be sold to the grid. By using biomass as fuel, the Project will also avoid methane emissions due to the decay of unutilized rice husks.

The majority of the electricity generated (82%) will be supplied to the South-Southeast-Midwest (S-SE-MW) interconnected grid, by connecting to a 13.8 kV distribution line, and the Pilecco Rice Mill which currently sources its electricity from the same grid. The balance (18%) will be provided for the project plant's in-house consumption as well as the Sílica Brasil Sul (SBS) biomass treatment plant, which otherwise would sources its electricity from the same grid.

The main agricultural activity in the region where the project will be located is rice production and processing. The rice mills generate huge amounts of biomass residues (rice husks). Brazilian and local state legislation prohibits the unlicensed displacement and/or uncontrolled burning of those rice husks. As a result, the rice mills have a huge amount of rice husk that is left to decay.

Like all large rice mills, Pilecco Rice Mill generates a substantial amount of rice husks that are currently disposed in lands located in the rural area of the city. With this project, rice husks generated by Pilecco and other rice mills will be combusted to generate electricity. Transport of rice husks from other rice mills to the project site will be done in trucks carrying containers specifically developed for the Project. Internal transportation within the plant site will be performed solely through the use of conveyors and elevators.

The project activity will utilize approximately 67,320 tonnes annually of rice husks, which will be mostly supplied by external sources. It will generate approximately 35,640 MWh annually; from this, around 29,304 MWh per annum will be supplied to the S-SE-MW interconnected grid and the Pilecco Rice Mill. The remaining will be for consumption by GEEA-SBS biomass treatment plant and the biopower plant's internal consumption. The expected amount of greenhouse gases (GHGs) emissions reduction is on average 19,486 tonnes of CO_2 equivalent per annum.

Contribution to sustainable development

The project will help the promotion of sustainable development through:

- Increasing employment opportunities in the area where the plant is located;
- Increasing diversity and quantity of energy supply;
- Decreasing environmental impacts, such as the emissions due to irregular disposal of residues in open air as well as the desertification phenomena, which is intensified by the dispersal of rice husks in the camps due to the wind;
- Utilizing residues (rice husks) from small rice mills that otherwise would need to be disposed at landfill sites because these small producers do not have conditions to set up a biomass power plant, for instance;
- Using clean and efficient technologies, and conserving natural resources;
- Acting as a clean technology demonstration project and capacity building, encouraging development of modern and efficient use of biomass throughout the Country;
- Optimizing the use of natural resources, avoid new uncontrolled waste disposal places, using a large amount of biomass residues from the region.

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)	**Geradora de Energia Elétrica Alegrete Ltda. (GEEA)** (Private entity)	No
Japan	**Mitsubishi UFJ Securities Co. Ltd. (MUS)** (Private entity)	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.		

See contact information in the Annex 1 of this PDD.

Geradora de Energia Elétrica Alegrete Ltd. (GEEA):
GEEA is a new company formed by the directors of Pilecco Rice Mill Ltd. which is a solid and expressive company with 30 years of experience in the rice mill business. It will build, own and operate the 5 MW power plant.

Mitsubishi UFJ Securities Co., Ltd. (MUS):
MUS through its Clean Energy Finance Committee acts as the CDM advisor for the project activity.

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.:

Rio Grande do Sul State

A.4.1.3. City/Town/Community etc:

Alegrete

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

The Project will be located at Brás Faraco Avenue, n. 691, 4km Southwest off Alegrete City's downtown, adjacent to Pilecco Rice Mill. Alegrete City is located on the Southwest side of Rio Grande do Sul State, close to the boarder with Argentina and Uruguay, approximately 487 km from the state's capital, Porto Alegre. Alegrete is located at latitude South 29º46'47" and longitude North 55º47'15". Its average altitude is 116 meters over the sea level. The average temperature is 18.6ºC and the yearly rainfall is 1574 mm with a hydro excess of 316 mm, thus characterizing a sub-temperate wet climate (Maluf, 2000)[1].

As seen in Figure 1, the site is well connected by roads and railroads. The external rice husk will be brought by road transport.

[1] MALUF, Jaime Ricardo Tavares (2000). Nova classificação climática do Estado do Rio Grande do Sul. *Revista Brasileira de Agrometereologia*, v. 8, n.1, p. 141-150.

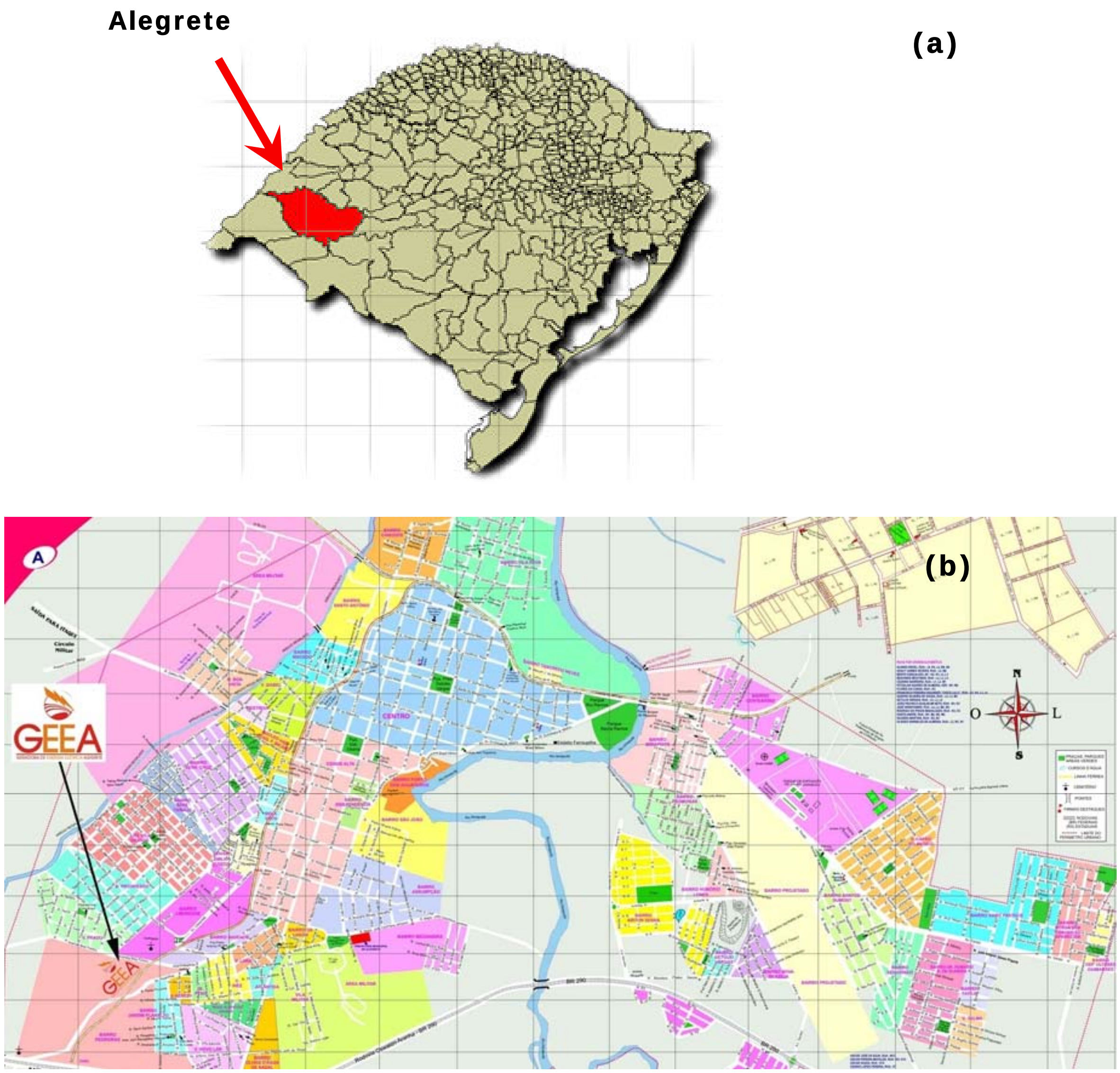

Figure 1. (a) Location of Alegrete in Rio Grande do Sul State; (b) Exact location of the GEEA project activity in Alegrete

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

As per *Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM Project Activities* (SSC M&P), the project activity falls under the following categories:

- **Type I : Renewable energy projects**
  Category D : Renewable electricity generation for a grid

The power plant with 5 MW maximum generation capacity generates electricity utilizing renewable biomass fuel – rice husks. With an actual generation of 4.5 MW, the net generated power (3.8 MW) will be supplied to the distribution grid in Rio Grande do Sul State. The thermal capacity is equivalent to 29.7 $MW_{thermal}$.[2] Therefore, the project activity conforms to applicability condition of Type I.D. since the electricity generation capacity is less than the eligibility limit of 15MW and the total sum of all sums of energy output does not exceed the limit of 45$MW_{thermal}$.

- **Type III : Other project activity**
  Category E : Avoidance of methane production from biomass decay through controlled combustion

  The proposed project activity prevents the methane generation from biomass (rice husk) left to decay anaerobically in waste disposal sites through controlled combustion of biomass. As a result, less methane is produced and emitted to the atmosphere. The annual project emissions are estimated to be equal or lower than 776 tonnes of CO_2 equivalent. The project activity does not recover or combust methane. The emission reductions are less than 60 kt CO_2 equivalent annually.

Technology employed for project activity

A scheme of the technology used in the project activity is shown in Figure 2.

The Project involves the implementation of a biomass-based power generation plant with 5MW maximum generation capacity using a biomass boiler technology. This technology will allow the plant to be operated solely on residual biomass (rice husk). The technology utilized will be a thermal power plant with a vertical water-tube boiler with a fluidized bed combustion. This boiler, model Mitre MPB 30 supplied by "Mitre Engenharia e Informatica Ltda" and "Cooperativa São José Metalurgica",can burn raw or treated rice husk (cellulignin), dry or wet at medium temperature (760 to 870^{o}C) generating only amorphous fly ash silica good for cement application avoiding generation of crystalline black silica that has no application.

The combustion gases of the boiler are cleaned by a medium temperature bag filter (240^{o}C) reaching a particulate emission of < 10 mg/m^3 well bellow than specifications of < 100 mg/m^3 by the environmental agency. Vapor at the pressure of 42 kgf/cm^2 generated in the boiler is used to run the process biomass treatment as well as running other processes in the Pilecco Rice Mill.

The turbine is an extraction/condensing turbine type. The electric generator has a maximum potency of 6,250 kVA (5MW), generating electricity at 13.8 kV and 60 Hz.

The boiler is specially designed to operate for 8,000 hours a year to avoid fouling, slagging, erosion, and corrosion. Solid combustion residues such as fly-ash are provided to Silica Sul Brasil (SBS), which is located beside the plant, therefore no road transport of combustion residues is necessary. The transport of residues between GEEA and SBS is done using screw conveyors.

The project will consume around 67,000 tonnes of rice husks annually. The rice husk is supplied mainly by external sources using road transport, whose transportation emissions are accounted. The amount of biomass supplied by external sources will be measured with a stationary balance at the entrance of the

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[2] The thermal capacity is estimated as following:

7.75 ton/h x 1000 kg/ton x 3,300 kcal/kg x 4.18 J/cal / 3,600 s/h = 29,695 $W_{thermal}$ = 29.7 $MW_{thermal}$

factory. The amount of biomass supplied by Pilecco Rice Mill will be measured by a flow meter located at the conveyor. Another balance at the entrance of the boiler measures the total amount of rice husks combusted by GEEA.

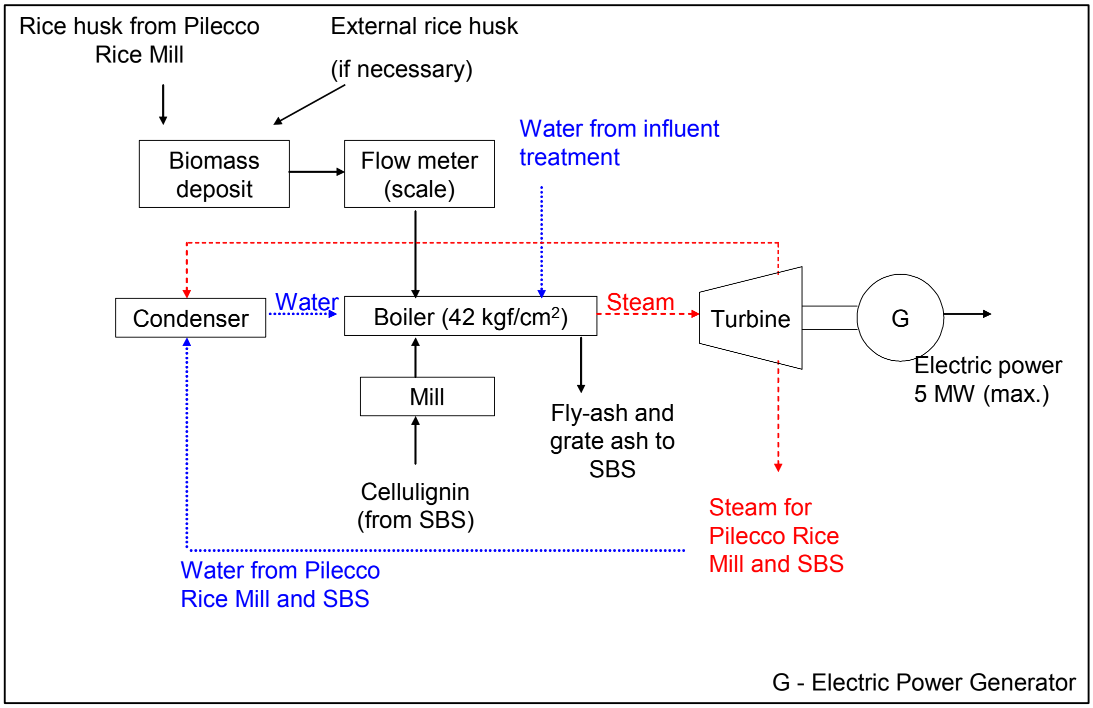

Figure 2. Scheme of the technology employed in the biomass power plant

As part of the biomass used in the project activity will be transported from other localities, PROBEM[3] developed a transport technology for the biomass, called *Disperse Biomass Transport*. Aiming to improve the transport efficiency, a biomass compactor is adapted to a truck. This compactor will compact the rice husk from 125 kg/m^3 to 315 kg/m^3, i.e. a compacting factor of 2.5 is obtained. The compactor can compact 40 tonnes of rice husk per hour. According to tests, the compactor will consume 0.3 liters of diesel oil per ton of biomass compacted. Also aiming to improve the transport efficiency and decrease the fuel consumption, the transportation trucks will carry two 40-feet containers in each trip. Each container has an internal volume of 78m^3 and can carry around 20-22.5 ton of rice husk. With this technology, it will be possible to carry at least 45 tonnes of biomass per truck per trip. It will also make feasible to transport rice husks for a long distance (around 250-300 km each way) economically.

The ultimate and immediate analysis of rice husk and the cellulignin are presented in Table 1 together with the calorific value, while the combustion parameters are shown in Table 2.

[3] Technology PROBEM® – Programa de Biomassa – Energia - Materiais (Materials – Energy – Biomass Programs) which was developed by Dr. Daltro Garcia Pinatti and collaborators and it belongs to RM Materiais Refratários Ltda, Lorena, SP, Brazil. The Group Pilecco obtained exclusive rights to use PROBEM® Technology in Rio Grande do Sul State, Uruguay, and Argentina. RM Materiais Refratários Ltda. is a company of the Peixoto de Castro Group (GPC).

Table 1. Chemical and thermal analysis of rice husk and cellulignin

Parameter	Unit	Rice husk	Cellulignin of rice husk
Carbon	%	34.71	32.31
Hydrogen	%	7.20	4.31
Nitrogen	%	0.15	Not determined
Sulfur	%	0.13	0.05
Oxygen	%	31.89	33.45
Ash	%	18.26	23.22
Moisture	%	7.66	6.66
Total	%	100.00	100.00
Higher heating value (HHV)	kJ/kg	13,871	13,832
Lower heating value (LHV)	kJ/kg	12,455	12,939

Table 2. Combustion performance parameters of rice husk and rice husk cellulignin

Parameter	Unit	Rice husk	Raw cellulignin	Powdered cellulignin
Maximum mixture	%	100	100	100
Lower heating value (LHV)	kcal/kg	3,300	3,070	3,070
Water content	%	12	10	10
Density	kg/m^3	125	175	175
CO_2 content in the gases	%	12.8	12.8	12.8
Air excess	%	60	60	60
Boiler thermal load	(Mcal/h)	25,516	25,482	25,482
Efficiency	%	85.62	85.74	85.74
Fuel consumption	kg/h	7,732	8,300	4,000
Fuel consumption	m^3/h	61.9	47.4	22.8

The project uses the above described environmentally safe and sound technology, which leads to utilization of biomass residues, especially rice husks, otherwise left for decay.

The GEEA project is attracting the interest of many rice mill owners in the region. The technology of biomass power plant will be transferred to other project developers that wish to use biomass residues.

The training program for the workers will cover the following necessary issues:

- Basic plant operations, safety and engineering
- Environmental management and awareness
- Wastewater and water treatment operations
- Process engineering and control systems
- Fire safety and evacuation

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 not occur in the absence of the proposed small-scale project activity, taking into account national and/or sectoral policies and circumstances:

The proposed project activity will effectively displace the fossil fuel-based electricity generation by supplying carbon-neutral electricity to the S-SE-MW interconnected grid. In utilizing biomass residues, the proposed project activity will reduce greenhouse gas emissions by preventing rice husks from being left to decay.

(1) Replacement of fossil fuel based power generation

By the replacement of power from the grid and by supply of electricity to the grid, carbon from the coal combustion and other fossil fuels in power plants is avoided. The carbon emission factor of 0.2611 tonnes CO_2e/MWh was estimated using data from Operador Nacional do Sistema Elétrico (ONS), Eletrobrás, and Agência Nacional de Energia Elétrica (ANEEL).

(2) Avoidance of methane emission from biomass decay

In the absence of the project activity, the rice husks generated in the Southwest part of Rio Grande do Sul State would be left to decay. The production of rice in Rio Grande do Sul State amounts 6.3 million ton in 2003/4 harvest (IRGA, 2006)[4]. Since 22% of the weight of the rice corresponds to husks, there was a generation of 1.39 million ton of rice husks in 2003/4 harvest. Considering only Alegrete City, the rice production was 332 thousand ton in 2003/4 harvest, generating an amount of 73 thousand tons of rice husks. Rice fields occupy an area of 45,000 hectares in Alegrete. More than half of the rice husk generated from rice mills in Rio Grade do Sul State are currently being left to decay in open air and the practice will continue in absence of the Project.

Table 3 shows the application of rice husk for different purposes according to a survey done in 1986 by CIENTEC, taking in account almost one hundred mills, corresponding to 57 up to 60% of the rice production, in cities that presented productions up to 100,000 rice bags per year. The latest CIENTEC's data updates still keep the same ratio between the use and sources of rice husks in the State. The rice husk surplus of 60% is considerable, thus indicating that will not occur competition use of the biomass. The Annex 6 presents the total rice husk surplus generation within a radius of 300 km far from the project site; the surplus generation is over 400,000 ton per year of rice husk. This indicates that the project activity will not cause a diversion of biomass from another activity.

Table 3. Use of the rice husks in Rio Grande do Sul State (Rucatti and Kayser, 2004)[5]

Application	Percentage (%)
1.Destined to grain drying	15.2
2.Destined to steam generation	14.0
3.Used as cement additive	7.0
4.Used for motor power generation	4.2
5.Rice husks Surplus	59.6
Total	100.0

[4] IRGA – Instituto Rio Grandense do Arroz: Rice production ranking in different regions. Available online: http://www.irga.rs.gov.br/arquivos/ranking.pdf (retrieved on February 2006)

[5] RUCATTI, Evely Gischkow, KAYSER, Victor Hugo, 2004. Produção e Disponibilidade de Arroz por Região Brasileira. Instituto Riograndense do Arroz. Rio Grande do Sul, Brasil.

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

The total estimated amount of emission reductions over the chosen crediting period of 10 years is 194,859 tonnes of CO_2 equivalent (average of 19,486 tonnes of CO_2 equivalent annually).

The total emission reduction is estimated as in Table 4.

Table 4. Net emission reduction by the project emissions (tonnes CO_2 equivalent per year)

Year	Annual estimation of emission reductions in tonnes of CO_2e
2008 (July-December)	4,929
2009	10,905
2010	12,966
2011	14,966
2012	16,908
2013	18,791
2014	20,620
2015	22,394
2016	24,116
2017	25,786
2018 (January-June)	22,479
Total estimated reductions (tonnes of CO_2e)	**194,859**
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	**19,486**

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

The Project does not involve public funding from Annex 1 countries.

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

According to the *Paragraph 2 of Appendix C to SSC M&P Project Activities*, a small-scale project is considered a debundled component of a large project activity if there is a registered small-scale activity or an application to register another small-scale activity:

- With the same project participants;
- In the same project category and technology/measure;
- Registered within the previous 2 years;
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

There is no other small-scale activity that meets all the above mentioned criteria. Accordingly, the proposed project activity is not a debundled component of a larger project activity.

Although GEEA is planning another CDM project with Silica Sul Brasil Ltda., the project participants, project category, and technology/measures are different.

SECTION B. Application of a baseline methodology:

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

Main methodologies:

Type I.D. – **Renewable electricity generation for a grid** (Version 10: 23 December 2006)

Type III.E – **Avoidance of methane production from biomass decay through controlled combustion** (Version 10: 23 December 2006)

Complementary methodologies and tools:

ACM0002 – **Consolidated methodology for grid connected electricity generation from renewable sources** (Version 6: 19 May 2006)

AMS III.G – **Methane landfill recovery** (Version 4: 23 December 2006)

"Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site"(Annex 14, EB26)

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

As explained in Section A.4.2., the project activity is applicable to the project categories of Type I.D. – Renewable electricity generation for a grid as well as Type III.E – Avoidance of methane production from biomass decay through controlled combustion under *Appendix B of the SSC M&P*.

With reference to the indicative simplified baseline and monitoring methodologies for Type I.D. (version 10: 23 December 2006) and Type III.E (version 10: 23 December 2006) stated in *Appendix B of the SSC M&P*, the baseline calculation methods are chosen as follows:

(1) Electricity generation for a grid

The baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2e/kWh) calculated according the option (a) of item 9 for Type I.D. The emission coefficient is calculated as the combined margin (CM) consisting in a combination of operating margin (OM) and built margin (BM) according to the procedures prescribed in the approved methodology ACM0002 (Version 6).

(2) Avoidance of methane production

The baseline calculation chosen for methane avoidance is given in Type III.E, ,wherein the Yearly Methane Generation Potential is calculated using the First Order Decay (FOD) model based on the discrete time estimate method of the IPCC Guidelines, as described in AMS III.G and the *"Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site"*.

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 Project faces the several barriers for implementation as described below.

There are several options for the disposal of rice husk and for power supply as shown in the Table 5.

Table 5. Scenario analysis

A. Power supply scenarios	
Scenario 1A: Supply by the grid	The Southern part of Brazil has no recorded problems with power supply. Moreover, electricity is relatively cheap in Brazil. Therefore, there are no regulations or other issues that would incentive Pilecco Rice Mill or other mills to generate their own electricity. Therefore, the most probable power supply for rice mills and other industries in Brazil is power supply by the grid.
Scenario 2A: Supply by thermal power plant only (based on fossil fuels)	This scenario is unlikely in Southern part of Brazil. The interconnected grid provides electricity cheaper than a plant based solely on fossil fuels would provide. Moreover, this is not a common practice in Southern part of Brazil.
B. Biomass disposal scenarios	
Scenario 1.B: Disposal in open air	The practice of rice husk disposal in Rio Grande do Sul State, Brazil consists mostly of open-air disposal. Pilecco Rice Mill and several other mills are presently disposing their rice husks in landfill sites until they are naturally decomposed. The emissions due to the transport of the rice husk to the landfills in the baseline are neglected for conservatism. There are currently no national or local safety requirements or regulations against this method of disposal. Nor are new regulations likely during the crediting period to require Pilecco Rice Mill or other mills to change their current practice.
Scenario 2.B: Open-air burning	Disposal of rice husk by burning it in the open air is not an acceptable practice in Rio Grande do Sul State anymore. In the past, it was a common practice; however, this leads to air pollution and it is not accepted by communities. Therefore, it was completely forbidden by the State regulation and State environmental agencies. Therefore, open-air burning is not a likely scenario to be adopted by the project participants.
Scenario 3: The Project without the CDM	The south Brazilian region, i.e. the states of Rio Grande do Sul, Santa Catarina and Paraná, have no recorded problems with power

	supply, even along the electricity crisis observed in 2001. Therefore, there are no sufficient legal or institutional incentive to install of a biomass power plant. The equipment cost for grid-connected biomass power plants are significantly higher than that for GHG-intensive conventional fossil fuel power plants. Although the operating and maintenance costs for biomass power plants are comparatively lower, increasing their attractiveness in long term, this is still insufficient to increase project returns to the level attained by conventional plants. Without the benefits of CERs to be generated from a CDM project, the Project will not be implemented.
Scenario 4: Biomass power generation (the Project)	The project participants will install the biomass power plant and claim emissions reduction for displacing grid electricity and for avoidance of methane from decaying biomass through controlled combustion.

Based on the above analysis of each scenario, there are only two plausible scenarios:

- Scenario 1 (A - power supply by the grid and B- disposal in open air) which is the continuation of current practice
- Scenario 4 (the proposed Project).

The two scenarios above identified are then contrasted to the following barriers:

- Technological barrier
- Investment barrier
- Barrier due to prevailing practice

Technological barrier

Implementation of the project activity involves higher risks due to performance uncertainty. Although the project was designed to combust rice husk, it is by no means guaranteed that the technology will not encounter unforeseen problems. Rice husks have a higher amount of inorganic components and have lower calorific content than other residual biomass. For instance, while the rice husk presents a Lower Heating Value (LHV) of 12.5 MJ/kg, wood's LHV is 15 MJ/kg, and charcoal's is 30 MJ/kg. In short, there is a higher risk and lower performance for rice husk power generation compared to generating power from other residual biomass. Due to this risk, the project would not be implemented without the revenues from CERs.

Investment barrier

The construction of a renewable energy plant faces specific financial/economic barriers due to the fact that the capital costs related to biomass units are very high. Additionally, the equipment cost for grid-connected biomass power plants is also high. The Project involves construction and installation of a biomass power plant, wherein the biomass boiler alone cost US$ 4.25 million (BRL 9 million); the total Project cost is US$ 8.9 million (BRL 18.8 million). Although the operating and maintenance costs for biomass power plants are comparatively low, increasing their attractiveness in long term, this is still insufficient to increase project returns to the level attained by conventional plants. It is worth noting that there are no direct subsides or promotional support for the implementation of biomass power plants currently.

Additionally, the capital costs involved in the project pose a barrier, especially considering the high interest rates prevalent in developing countries as well as the difficulties to obtain financing for technologies developed nationally. The project faced difficulties to obtain funding: it took two years of negotiation in order to fund 80% of the capital cost from the National Bank of Social and Economic Development (BNDES). BNDES is the only bank in Brazil that usually funds such risky type of project; it required guaranty such as equipment and other properties. The required guaranty has to be at least twice the value of the financed amount. At that time, BNDES did not have a specific credit line for financing projects using technology developed within Brazil, so it was more difficult at that time to obtain such fund; recently BNDES has launched such credit line.

The analysis of the project finances shows that the project activity would not be economically feasible under such circumstances. Table 6 summarizes the key indicators for IRR-calculations over a period of 10 and 21 years. The IRR without CERs is very low, making the project not attractive for the investors (developers) even over 21 years-period. With the additional revenue from CERs selling, then the IRR reaches 8.0%. Although still low, this value is much closer to the SELIC rate, which has been falling as following: 17.47% (2004), 18.95% (2005), 14.66 % (2006), and 11.43% (2007)[6]. The SELIC rate is usually used by investors as a reference for an investment. Projects with IRR higher than the SELIC are more likely to be implemented. Although the IRR is low, the project developer wants to take this project as a way to keep a good environmental image of his business on rice processing, as a way to contribute to improvement of environmental conditions in the region and to contribute to the sustainable development in the region since it can generate jobs.

An investment sensitivity analysis is presented in Annex 7; electricity price seems to be the factor with the most influence on the IRR.

In developing countries, where short-term cost minimization is important, grid-connected biomass power projects do not represent an attractive course of action. The additional revenue from the sale of CERs as shown in Table 6 will increase the Project's return to a more acceptable level, enabling the implementation of the Project. Without this extra source of income, the low return combined with the real and perceived risks involved make the Project unattractive to investors.

Table 6. Summary of the investment analysis

Investment	18,000,000 BRL	8,909,000 USD
Equity	20%	
Debt	80%	
Biomass cost (BRL/ton)	20	
Biomass purchased (ton/y)	67,300	
Running and maintenance costs	10	% of the revenue
Gross generation (MWh/y)	35,640	
In-house consumption (MWh/y)	3,168	

[6] SELIC - Special System of Clearance and Custody. Source: Brazilian Central Bank, 2007.

Net electricity sold to the grid or to other company (MWh/y)	32,472	
Electricity price (BRL/MWh)	120	(as of March 2007)
Conversion rate (BRL/USD)	2.11	(as of March 2007)
CER price (USD)	18	
Corporate tax (%)	33	
Depreciation (%)	1	
IRR after tax (without CERs)	**-1.98 % (10 years)**	**6.02% (21 years)**
IRR after tax (with CERs)	**1.42 % (10 years)**	**8.01% (21 years)**

Barrier due to prevailing practice

The continuation of current practices on residues management (Scenario 1) presents no particular obstacles. It is unlikely that new regulations are introduced during the crediting period to require Pilecco Rice Mill to change its current practice. This practice has been used effectively in the past with good results, and the continued operation of existing facilities and actual practices presents no real barriers. Moreover, Brazil has a huge rice industry, with more than 350 rice mills. A considerable fraction, about 60%, of rice production corresponds to the south region. Environmental agencies have been approving new areas for disposing the industrial residues, such as rice husks, with clear and effective rules, in such a way that only the distance, and by consequence the transport costs, will represent obstacles for taking the residues into consideration as a pressure to perform future projects.

Using biomass waste as fuel for electricity generation is not a standard waste management practice in Brazil; especially in Rio Grande do Sul State. As the opposite, usually landfill is the main waste management practice in Brazil. Moreover, using biomass for power generation is also uncommon in Brazil, as evidenced in Table 7.

The project activity, therefore, is highly unlikely to be the natural choice. The few industries that installed a rice husk power plant in Brazil had done it as a CDM project activity. This is an indication that the biomass power generation is not attractive without the revenue from CERs.

Table 7. Power generation in Brazil (% per fuel source)

	1970	1980	1990	2000	2003	2004
Generation to the grid or to the public						
Petrol-derived fuels	5.0	1.8	1.1	2.9	2.0	2.1
Natural Gas	0.0	0.0	0.0	0.4	2.5	3.8
Coal	2.9	1.8	1.2	2.1	1.4	1.6
Uranium	0.0	0.0	1.0	1.7	3.7	3.0
Hydro	84.0	90.5	91.4	85.6	80.8	79.6
Biomass	0.0	0.0	0.0	0.0	0.0	0.0
Self-generation						
Petrol derived fuels	3.1	2.0	1.2	1.4	1.0	1.1
Natural Gas	0.0	0.0	0.1	0.7	1.1	1.2
Coal	0.1	0.1	0.0	0.1	0.1	0.1
Hydro	3.0	2.0	1.4	1.7	3.1	3.2
Biomass*	1.7	1.8	2.3	3.1	4.2	4.2
Others	0.1	0.1	0.2	0.2	0.1	0.1

* It includes several types of waste, sugar cane bagasse, wood, biomass residual, and other renewable sources.
Source: National Energy Balance 2005. Ministry of Mines and Energy

Faced with the technological and investment barriers as well as barriers due to the prevailing practice as outlined above, the Project will not be carried out in the course of regular business. Hence, it is additional.

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 indicated by a dotted line in the Figure 3. The project boundary is identified based on the definitions stated in *Appendix B of the SSC M&P* as below:

(1) Electricity generation for a grid
The project boundary encompasses the physical, geographical site of the renewable generation source, i.e., the power generation plant.

(2) Avoidance of methane production
The project boundaries are the physical, geographical sites:

a) where the solid waste would have been disposed and the avoided methane emission occurs in absence of the proposed project activity,
b) where the treatment of biomass through controlled combustion takes place,
c) and in the itineraries between them, where the transportation of wastes and combustion residues occurs.

Therefore, the project boundary includes the landfill site where the rice husk would be disposed, the rice husk power plant, and the itineraries of transportation. As the combustion residues are used as product in another process, their deposition is not considered within the boundary.

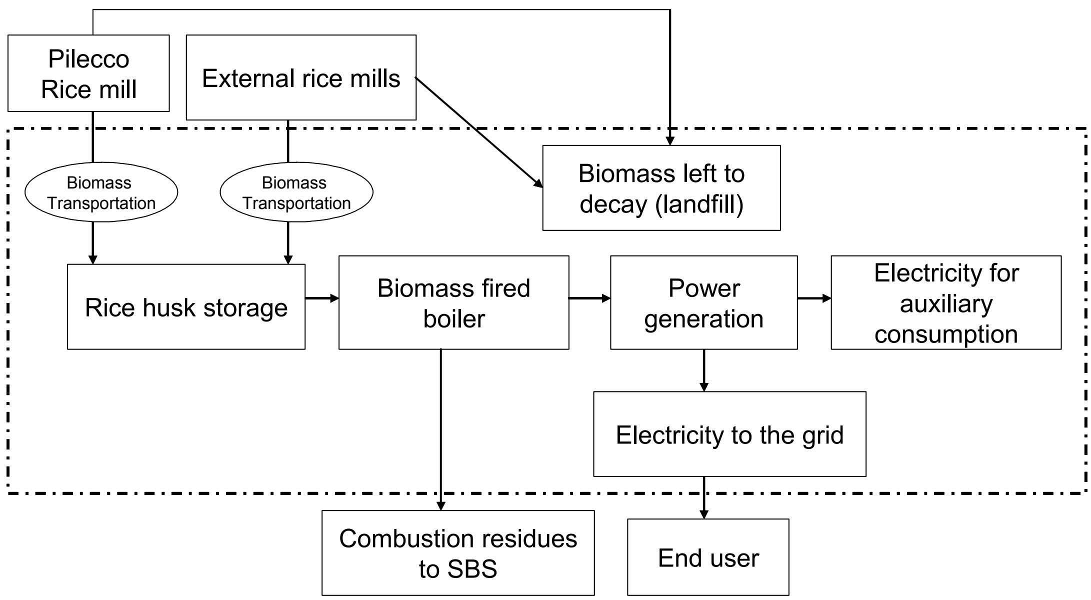

Figure 3. Project activity boundary

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

(1) Electricity generation for a grid

The baseline for grid connected renewable electricity generation is based on methodology AMS I.D. of *Appendix B of the SSC M&P* (Version 10: 23 December 2006). As mentioned above, the electricity generation from the power plant will be supplied to S-SE-MW interconnected grid, therefore the combined margin emissions (in tCO_2e/MWh) consisting in a combination of operating margin (OM) and built margin (BM) according to the procedures prescribed in the approved methodology ACM0002 (Version 06).

Baseline emission for grid electricity (tCO_2e/year)	=	Electricity generated by the Project (MWh/year)	x	Combined margin emission of current generation mix of S-SE-MW grid (tCO_2e/MWh)

(2) Avoidance of methane production

The baseline for avoidance of methane production from biomass decay through controlled combustion is based on methodology AMS III.E of *Appendix B of the SSC M&P* (Version 10: 23 December 2006). The baseline scenario is the situation where, in the absence of the project activity, biomass and other organic matter are left to decay within the project boundary and methane is emitted to the atmosphere. In this methodology, the yearly baseline emissions are the amount of methane that would have been emitted from the decay of the cumulative quantity of the waste diverted or removed from the disposal site, to date. The Yearly Methane Generation Potential is calculated using the First Order Decay model based on the discrete time estimate method of the IPCC Guidelines, as described in category AMS III.G (Version 4: 23 December 2006) and the *“Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site”*.

There is no regulation that requires the removal or combustion of methane generated by the decay of rice husk. Therefore, the amount of methane that would be destroyed is not accounted in the baseline. There is evidence that such regulation would not be enacted during the crediting period of the project activity.

The selected formula for calculation of the baseline emissions is provided in Section E.1.1.

Assumptions of the baseline

To estimate the baseline emissions related to the avoidance of methane production from biomass decay through controlled combustion, the baseline calculations as described under category III.E of *Appendix B of the of the SSC M&P* (Version 10: 23 December 2006) are used.

The baseline emissions are the amount of methane from the decay of the biomass content of the waste treated in the project activity. The Yearly Methane Generation Potential is calculated using the First Order Decay (FOD) model based on the discrete time estimate method of the IPCC Guidelines, as described in category AMS III.G (Version 4) and in the *“Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site”*(Annex 14, EB26). This tool presents the default value of the Degradable Organic Carbon (DOC) for wood and straw waste as 0.43. Therefore, in this project, it is applied the default value of DOC as 0.43.

The value of *k* applicable to any single solid waste is determined by a large number of factors associated with the composition of the waste and the conditions at the site. For wood and straw waste, the default value is 0.030 per year in temperate wet places and 0.035 in tropical wet places. Alegrete presents a clime sub-temperate humid (Maluf, 2000); therefore the value of *k* equals to 0.030 is adopted in this project.

In the absence of this project activity, the rice husks would be deposited in a landfill site located in a landfill site close to the rice husk generation site and distant 220 km from the project site. The amount of rice husks has a height between 3~5 meters, therefore the Methane Correction Factor (MCF) used in the baseline emissions estimation is 0.4, which is the IPCC default value for unmanaged shallow sites. As the site does not receive soil as cover, the Oxidation factor (OX) is zero. The model correction factor (φ) is 0.90.

The default values for DOC, MCF, OX, φ, and *k* are given in the aforementioned tool.

Date of completing the final draft of this baseline section: 23/12/2006

Name of entities determining the baseline:

GEEA - Geradora de Energia Elétrica Alegrete Ltda.
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Clean Energy Finance Committee, Mitsubishi UFJ Securities Co., Ltd.
Marunouchi Building 26F, 2-4-1 Marunouchi, Chiyoda-ku, Tokyo 100-6317, Japan
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Email: hatano-junji@sc.mufg.jp

Mitsubishi UFJ Securities is the CDM advisor to the Project and is also a project participant. The contact details of the above entity determining the baseline is listed in Annex I.

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:

05/05/2006

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

25y-0m

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

Fixed crediting period

C.2.1. Renewable crediting period:

n/a

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

n/a

C.2.1.2. Length of the first crediting period:

n/a

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

01/07/2008

C.2.2.2. Length:

10y-0m

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:

AMS Monitoring methodology for Type I.D (Version 10: 23 December 2006) and Type III.E (Version 10: 23 December 2006) as described in *Appendix B of the of the SSC M&P CDM Project Activities* are applied to this project activity.

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

The proposed project activity is eligible to apply the monitoring methodologies of Type I.D. and Type III.E since it is a biomass based power generation project, which is less than the electricity generation capacity of 15MW, but also avoids methane emission from biomass that would have otherwise been left to decay within the project emission reduction limit of 60,000 tonnes CO_2 equivalent annually.

(1) **Electricity generation for a grid** – monitoring consists metering the electricity generated by the renewable technology.

(2) **Avoidance of methane production** – The annual emissions reduction will be measured as the difference between the baseline emission and the sum of the project emission and leakage. The annual amount of biomass combusted by the project activity is to be measured and recorded. The distance for transporting the waste in the baseline and project scenario shall also be recorded.

D.3 Data to be monitored:

The amount of the electricity generated, supplied to Pilecco Rice Mill and SBS, and the amount delivered to the grid will be monitored by electricity meters, which will be calibrated in accordance with the strict standards set by the ONS. At total, there will be four electricity meters in the plant. The actual sales to power purchaser can also be easily verified through the invoice/receipts between GEEA and the power purchaser.

The amount of biomass transported from external sources and the amount of biomass combusted in the boiler will also be measured.

By using these monitored data, the project emission will be calculated *ex post* according to the methodology of Type III.E (Version 10).

Table 8 indicates the variables that will be monitored for the project activity.

Table 8. Data to be monitored

ID number	Data type	Data variable	Source of data	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)	Comment
D.1	Activity level (Baseline and Project)	Electricity generated	Electronic supervisory system of the biomass power plant	kWh	m	Continuous and monthly	100%	Electronic	
D.2	Activity level (Baseline and Project)	Composition of biomass combusted in power plant	Sampling	Type	m	Quarterly	Representati ve	Electronic	Used for baseline emission, measured at least quarterly by sampling at Project site
D.3	Activity level (Baseline and Project)	Electricity delivered to the grid	Electronic supervisory system of the biomass power plant	kWh	m	Continuous and monthly	100%	Electronic	
D.4	Activity level (Baseline and Project)	Electricity delivered to Pilecco Rice Mill	Electronic supervisory system of the biomass power plant	kWh	m	Continuous and monthly	100%	Electronic	
D.5	Activity level (Baseline and Project)	Electricity delivered to SBS	Electronic supervisory system of the biomass power plant	kWh	m	Continuous and monthly	100%	Electronic	

ID number	Data type	Data variable	Source of data	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)	Comment
D.6	Activity level (Baseline and Project)	Amount of biomass combusted in power plant	Scale	tonnes	m	Monthly (aggregate)	100%	Electronic	
D.7	Activity level (Project)	Amount of biomass transported	Determination	tonnes	m	Monthly (aggregate)	100%	Electronic	Scale at the gate of the company
D.8	Activity level (Project)	DAFy	Documentation on transportation transactions.	Km/truck	m	Monthly (aggregate)	100%	Electronic	
D.9	Activity level (Project)	Truck capacity for biomass transportation	Documentation on transportation transactions.	tonne/truck	m	Monthly (aggregate)	100%	Electronic	
D.10	Activity level (Project)	Amount of fuel spent for compacting biomass	Documentation on fuel purchase and number of hours of work	tonne / tonne of rice husk	e	Monthly (aggregate)	100%	Electronic	The number of operating hours and the amount of fuel used according the fuel purchase notes will be used to estimate the amount of fuel used by ton of biomass compacted

ID number	Data type	Data variable	Source of data	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)	Comment
D.11	Status (Baseline)	Fraction of methane captured ate the SWDS and flared, combusted or used (f)	Project developer	-	-	Yearly	100%	Electronic	Project developer will take info from SWDS operator or site visit
D.12	Status (Baseline)	Global Warming Potential (GWP_{CH4})	Decisions under the UNFCCC and Kyoto Protocol	-	-	Yearly	-	Electronic	GWP valid for the commitment period
D.13	Status (Project)	Surplus of biomass	Project developer	%	e	Yearly	-	Eletronic	Project developer will consult Rice Processing Associations or statistics to obtain the surplus amount of biomass (rice husk) and estimate the surplus percentage

Notes:
All the data will be archived during the credit period and two years from the issuance of CERs.
As rice husks are highly inflammable, additional fuel for start-up will not be necessary. Therefore, the amount of fuel for start-up is not monitored.
Non-biomass carbon will not be used in the project activity; therefore it will not be monitored.
As combustion residues are not generated, the transportation of residues is not monitored.

As described previously, the Project will neither lead to fuel diversion to carbon-intensive fuels or displacement of existing or planned rice husk plants.

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

Quality control and assurance measures including performance review will be carried out. All monitoring equipment will be regularly calibrated.
All variables used to calculate project and baseline emissions are directly measured or are publicly available data (default values adopted by IPCC, for instance).

Table 9. Quality control and assurance of parameters

ID number	Uncertainty level of data (high / medium / low)	Explain QA /QC procedures planned for these data, or why such are not necessary.
D.1 D.3 D.4 D.5	Low	The amount of the electricity generated, supplied to Pilecco Rice Mill and SBS, and delivered to S-SE-MW grid will be monitored by electricity meters (main meter and backup meter), which will be calibrated. The consistency of the electricity delivered to the grid (D.2) will be verified through the actual sale records. The amount of electricity delivered to Pilecco Rice Mill (D.3) will be cross-checked with the average power consumption before the project implementation.
D.6	Low	The amount of biomass combusted in the boiler will be monitored by measuring equipments/balances. Maintenance and calibration of the equipments will be carried out according to the national standards.
D.7 D.9	Low	The amount of rice husk transported by truck is monitored accurately, as all truck loads are registered. The truck loads will be monitored by measuring equipments/balances. Maintenance and calibration of the equipments will be carried out according to the national standards.
D.8	Low	Average incremental distance for biomass will be consistently check by distance record by the truck and confirmed using other sources (e.g. maps)
D.10	Low	The documentation will be cross-checked. The values obtained will be compared to the results of tests.

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

Figure 4 outlines the operational and management structure that GEEA will implement to monitor emission reductions generated by the project activity. GEEA will form an operational and management team, which will be responsible for monitoring of all the parameters aforementioned. This team composes of a general manager and a group of operators. The general manager will be responsible for ensuring that all data is recorded accurately, and that measuring equipment is calibrated. Further, it will be an integral part of his duties to ensure that the plant is run as efficiently as possible, maximizing the energy generated. A group of operators, who are under the supervision of the general manager, will be trained and assigned for monitoring of different parameters on a timely basis as well as recording and archiving data in an orderly manner. Training will be done with classes and an instruction manual for operators will be organized. Monitoring reports will be forwarded to and reviewed by the general manager on a monthly basis in order to ensure the Project follows the requirements of the monitoring plan.

Data archived will also be verified regularly by the DOE. The performance of the Project will be reviewed and analyzed by the consultant on a regular basis.

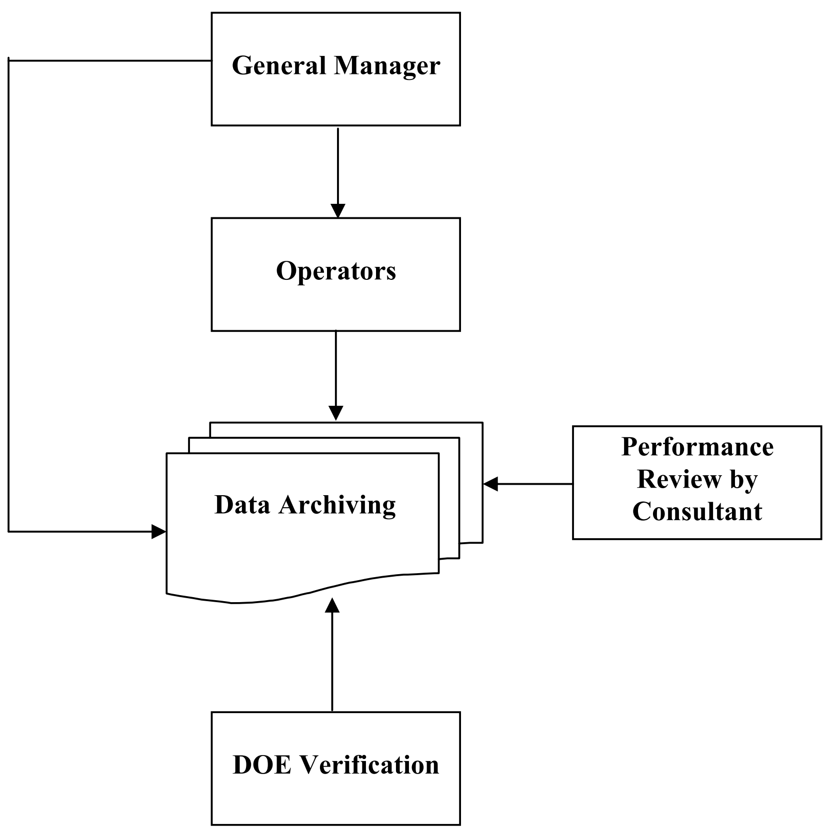

Figure 4. Operational and management structure for monitoring the project activity.

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

- Mitsubishi UFJ Securities Co.,Ltd.
- Geradora de Energia Elétrica Alegrete (GEEA) Ltda.

Mitsubishi UFJ Securities is the CDM advisor to the Project. The contact details of the above entities determining the baseline and monitoring plan are listed in Annex I.

SECTION E.: Estimation of GHG emissions by sources:

E.1. Formulae used:

E.1.1 Selected formulae as provided in appendix B:

Baseline emissions:

(1) Electricity generation for a grid

As prescribed in Section B.5.1., the method of option (a) of item 10 for Type I.D. (Version 10) is selected for calculating grid electricity baseline emission for the Project. It is expressed as follows:

Baseline emission for grid electricity (tCO_2e/year)	=	Electricity generated by the Project (MWh/year)	x	Combined margin emission of current generation to the grid (tCO_2e/MWh)

As mentioned above, the electricity generation from the power plant will be supplied to S-SE-MW interconnected grid, therefore the combined margin emissions (in kg CO_2e/kWh) of the Operating Margin and the Build Margin of the S-SE-MW grid is used for baseline estimation, where:

(a) The Operating Margin (OM) is expressed in tCO_2e/MWh and is estimated according one of the four procedures prescribed in the approved methodology ACM0002. Any of the four procedures can be chosen, but restrictions to use Simple OM and the Average OM calculations must be considered. In this project, the Simple Adjusted OM procedure is chosen.
(b) The Build Margin (BM) is the weighted average emissions (in tCO2e/MWh) of recent capacity additions to the system, which capacity additions are defined as the greater (in MWh) of most recent 20% of existing plants or the 5 most recent plants".

(2) Biomass decay

In order to calculate the emission reductions arising from the project we have followed the formula of the amount of methane that would be generated in the absence of the project activity at the solid waste disposal site ($BE_{CH4,SWDS,y}$) described in the "*Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site"* (Annex 14, EB26) according the AMS III.G (Version 4: 23 December 2006). The quantity of methane projected to be formed during a given year is estimated using a multi-phase model, based on a first order decay (FOD) model. The default values are given by the IPCC 2006 Guidelines.

The amount of methane produced in year y ($BE_{CH4,SWDS,y}$) is calculated as follows:

$$BE_{CH4,SWDS,y} = \varphi * (1 - f) * GWP_{CH4} * (1 - OX) * 16/12 * F * DOC_f * MCF * \sum_i \sum_j W_{jx} * DOC_j * e^{-k_j * (y-x)} * (1 - e^{-k_j})$$

where,

$BE_{CH4,SWDS,y}$	Methane emissions avoided during the year *y* from preventing waste disposal at the solid waste disposal site (SWDS) during the period from the start of the project activity to the end of the year *y* (tonnes of CO_2 equivalent)
φ	Model correction factor to account for model uncertainties (default is 0.9)
f	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
GWP_{CH4}	Global Warming Potential (GWP) of methane, valid for the relevant commitment period (tonnes of CO_2 equivalent/tonne of CH_4)
16 / 12	Conversion from C to CH_4
F	Fraction of CH_4 in SWDS gas (default is 0.5)
DOC_f	Fraction of degradable organic carbon (DOC) that can decompose (default is 0.5)
DOC*j*	Fraction of degradable organic carbon (by weight) in the waste type *j*
MCF	Methane correction factor (fraction) (default is 0.4 for shallow unmanaged sites)
W_{jx}	Amount of organic waste type *j* prevented from disposal in the SWDS in the year x (tonnes/year) ($W_{jx} = Q_y$)
k_j	Decay rate for the waste stream type *j*
j	Waste type distinguished into the waste categories
x	Year during the crediting period: x runs from the first year of crediting period (x=1) to the year which avoided emissions are calculated (x=y)
y	Year for which methane emissions are calculated

$$BE_y = BE_{CH4,SWDS,y} – MD_{reg,y}$$

where,

BE_y	Baseline methane emissions from biomass decay at year "y" (tonnes of CO_2 equivalent)
$MD_{reg,y}$	methane that would be captured and destroyed to comply with national or local safety requirement or legal regulations in the year "y" (tonnes of CO_2 equivalent)

The project combust freshly generated wastes.

Information about choice of parameters for baseline calculation is presented in B.5. As discussed in B.5, φ is 0.9, f is null, the MCF is 0.4, *k* is 0.030, OX is zero, and the DOC_j is 0.43.

Project emissions:

According to the AMS. III.E, the project activity emissions consist of:

a) CO_2 emissions related to the combustion of the non-biomass carbon content of the waste (plastics, rubber and fossil derived carbon) and auxiliary fuels used in the combustion facility,

b) Incremental CO_2 emissions due to incremental distances between the collection points to the controlled combustion site and to the baseline disposal site as well as transportation of combustion residues and final waste from controlled burning site to disposal site,

c) CO_2 emissions related to the power used by the project activity facilities, including the equipments for air pollution control required by regulations. In case the project activity consumes grid-based electricity, the grid emission factor ($kgCO_2e/kWh$) is used, or it is assumed that diesel generators would have provided a similar amount of electric power, calculated as described in category I.D.

PE_y = PEy,comb + PEy,transp + PEy,power

where,

PE_y	project activity direct emissions in the year "y" (tonnes of CO_2 equivalent)
PEy,comb	emissions through combustion of non-biomass carbon in the year "y"
PEy,transp	emissions through incremental transportation in the year "y"
PEy,power	emissions through electricity or diesel consumption in the year "y"

Combustion-related CO_2 emissions

IPCC guidelines[7] stipulate that biomass combustion is assumed to equal its regrowth. Based on this assumption, the amount of CO_2 produced by combusting rice husk in the project activity is considered equal to the amount of CO_2 absorbed by the rice plant and trees as they grow. Since only biomass will be combusted, CO_2 emission from combustion is zero.

$$PE_{y,comb} = Q_{y,,non\text{-}biomass} * 44/12 + Q_{y,fuel} * E_{y,fuel}$$

where,

$Q_{y,,non\text{-}biomass}$	Non-biomass carbon of the waste combusted in the year "y" (tonnes of Carbon)
$Q_{y,fuel}$	Quantity of auxiliary fuel used in the year "y" (tonnes)
$E_{y,fuel}$	CO_2 emission factor for the combustion of the auxiliary fuel (tonnes CO_2 per tonne fuel, according to IPCC Guidelines)

No fuel is used for start up ($Q_{y,fuel}$), because the rice husks are highly inflamable. The non-biomass waste amount ($Q_{y,,non\text{-}biomass}$) is null, since this treatment is meant just for biomass.

Transport-related emissions

Part of the biomass used in the project activity will be transported from other localities. Aiming to improve the transport efficiency of the biomass, PROBEM involves a technology to compact the biomass. Therefore, the transport-related emissions correspond to the transport itself and the compacting process as following:

[8] Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual (Volume 3)

$PEy,_{transp\ total} = PEy,_{transp} + PEy,_{Comp}$

In this project, project emissions due to road transportation will be estimating applying the equation below:

$$PEy,_{transp} = (Qy,_{transp}/CT) * DAF_w * EF_{CO2} + (Qy,_{ash}/CTy,_{ash}) * DAF_{ash} * EF_{CO2}$$

where,

$Qy,_{transp}$	quantity of biomass transported (tonnes)
CT	average truck capacity for biomass transportation (tonnes/truck)
DAF	average incremental distance for biomass transportation (km/truck)
EF_{CO2}	CO_2 emission factor from fuel use due to transportation (kg CO_2/km, IPCC default value is 0.001097)
$Qy,_{ash}$	quantity of combustion residues produced in the year "y" (tonnes)
$CTy,_{ash}$	average truck capacity for combustion residues transportation (tonnes/truck)
DAF_{ash}	average distance for combustion residues transportation (km/truck)

The products obtained from the combustion are destined to SBS, therefore there are no combustion residues ($Qy,_{ash}$).

The truck average capacity is higher than in common trucks because a compactor is used to accommodate the rice husks in the containers; additionally, the trucks will carry two containers at once.

The incremental average distance (DAF) corresponds to the difference between the average distance that the rice husk is transported from the source to the project landfill site and the average distance between the source and the project site. The rice husk is transported in average 220 km one way, which corresponds to a DAF of 440 km/truck.

In future, the biomass transport might be changed to railroad. As a conservative measure, in this document, only emissions from road transport were considered.

Emissions related to the compacting process are described in Section E.1.2.

Power consumption-related emissions

All power needs will be met by the in-house power generation. Therefore, the CO_2 emissions related to power consumption will be null.

Regarding heat requirements, the plant will produce its own heat and vapor to run the processes.

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:

Formulae not provided in appendix B, related to the methodology described in category I.D.

Baseline Emissions:

Electricity displacement related emissions

The baseline emissions resulting from the electricity supplied and/or not consumed from the grid is calculated as follows.

$BEy,power = EGny * CEF_{CO2,elect}$

where,

BEy,power	Baselinet Emissions of electricity consumption (tonnes CO_2e)
EGny	Net electricity generation by project activity in year y (MWh)
$CEF_{CO2,elect}$	Grid Carbon Emission Factor (measured in tonnes CO_2e / MWh)

$CEF_{CO2,elect}$ is calculated as a combined margin (CM) of the Build Margin *(EF_BMy)* and the Operating Margin. According the recommendations given in ACM0002, for Brazilian projects, the Operating Margin is calculated as the Simple Adjusted Operating Margin $(EF\_OMy_{adjusted})$. The $CEF_{CO2,elect}$ is estimated as following:

$$CEF_{CO2,elect} = (\omega OM * EF\_OMy_{adjusted}) + (\omega BM * EF\_BMy)$$

where,

$EF\_OMy_{adjusted}$	Simple Adjusted Operating Margin emission factor[8]
EF_BMy	Build Margin emission factor[9]
ωOM = ωBM	weights by default = 0.5

The Simple Adjusted Operating Margin $(EF\_OMy_{adjusted})$ is calculated as below:

$$EF\_OMy_{adjusted} = (1 - \lambda_y) * \frac{\sum F_{i,j,y} * COEF_{i,j}}{GEN_{j,y}} + \lambda_y * \frac{\sum F_{i,k,y} * COEF_{i,k}}{GEN_{k,y}}$$

where,

$F_{i,,y}$	the amount of fuel *i* (in GJ) consumed by power source *j* or *k* in year *y*;
k	set of low-cost or must-run plants delivering electricity to the grid;
j	other plants;
$COEF_{i,y}$	carbon coefficient of fuel *i* (tCO_2e/GJ);
GEN_y	electricity (MWh) delivered to the grid by source *j* or *k*

$$\lambda_y = \frac{\text{number of hours per year for which low-cost/must-run sources are on margin}}{\text{8760 hours per year}}$$

[8] Simple Adjusted Operating Margin factor $(EF\_OMy_{adjusted}.)$ is the weighted average emissions (in kg CO_2e/kWh) of all generating sources serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation, where the power sources (including imports) are separated in low-cost/must-run power sources and other power sources.

[9] Build Margin factor (*EF_BMy*) is the weighted average emissions (in kg CO_2e/kWh) of recent capacity additions to the system, which capacity additions are defined as the greater (in MWh) of most recent 20% of existing plants or the 5 most recent plants.

The CO_2 emission coefficient $COEF_i$ is obtained as following:

$$COEF_i = NCV_i * EFCO_{2,i} * OXID_i$$

where,

NCVi	net calorific value (energy content) per mass or volume unit of a fuel *I*;
$OXID_i$	oxidation factor of the fuel (see page 1.29 in the 1996 Revised IPCC Guidelines for default values);
$EFCO_{2,i}$	CO_2 emission factor per unit of energy of the fuel *i*.

Where available, local values of *NCVi* and $EFCO_{2,i}$ should be used. If no such values are available, country-specific values (see e.g. IPCC Good Practice Guidance) are preferable to IPCC world-wide default values.

The Build Margin emission factor *(EF_BMy)* is the weighted average emission factor of a sample of power plants *m*. This sample includes either the last five plants built or the most recent plants that combined account for 20% of the total generation, whichever is greater (in MWh). The equation for the build margin emission factor is:

$$EF\_BM_y\,(tCO_2e/MWh) = \frac{\Sigma_{i,m} F_{i,j,y} * COEF_{i,m}}{\Sigma_m GEN_{m,y}}$$

where,
$F_{i,j,y}$, $COEF_{i,m}$ and $GEN_{m,y}$ are analogous to the *OM* calculation above.

Please refer to the methodology text or the explanations on the variables mentioned above.

The plant will be connected to the Southeast-South-Midwest interconnected system. Load and values for Lambda (λ), Simple Adjusted Operating Margin and Build Margin emission factors are presented at Table 10.

Table 10. SSC Emission factors for the Brazilian South-Southeast-Midwest interconnected grid

Year	**OM (tCO_2e / MWh)**	**Load (MWh)**	**Lambda (λ)**
2003	**0.9823**	288,933,290	0.5312
2004	**0.9163**	302,906,198	0.5055
2005	**0.8086**	314,533,592	0.5130
Total generation	**-**	**906,533,592**	

Simple Adjusted OM (tCO_2e/MWh)	**0.4349**	
BM 2004 (tCO_2e/MWh)	**0.0872**	
CEF $_{CO2,elect}$ (OM*0.5+BM*0.5)	**0.2611**	

Note: Imports are included.
Source: Operador Nacional do Sistema Elétrico (ONS), Centro Nacional de Operação do Sistema, Acompanhamento Diário da Operação do SIN, (daily reports from Jan. 1, 2003 to Dec. 31, 2005).

Project emissions:

Emissions due to fossil fuel use for compacting biomass

Additionally, fossil fuel will be spent to compact the rice husk prior to transportation. The emissions are estimated as the equation below. As tests carried out by PROBEM, 0.3 liters of diesel oil (corresponding to 0.252 kg[10]) will be spent to compact each ton of rice husk. The amount of fuel used to compact the biomass will be monitored.

$PEy,_{Comp} = Q_{y,transp} * f_{comp} * EF_{CO2,comp}$

where,

$Q_{y,transp}$	quantity of biomass transported (tonnes)
f_{comp}	average consumption of diesel oil per ton of biomass (kg/ton)
$EF_{CO2,comp}$	CO_2 emission factor from fuel use due to combustion in motor (kg CO_2/kg, IPCC default value is 0.00317)

Power consumption-related emissions

Project emissions related to the electricity consumption when it occurs will be calculated as following:

$PEy,power = ECy * CEF_{CO2,elect}$

where,

PEy,power	Project emissions of electricity consumption (tonnes CO_2e)
ECy	Electricity consumption by project activity in year y (MWh)
$CEF_{CO2,elect}$	Grid Carbon Emission Factor (measured in tonnes CO_2e / MWh).

$CEF_{CO2,elect}$ is calculated as a combined margin (CM) of the Build Margin *(EF_BMy)* and the Operating Margin. According the recommendations given in ACM0002, for Brazilian projects, the Operating Margin is calculated as the Simple Adjusted Operating Margin *(EF_OMy $_{adjusted}$)*.

Since the power to run the equipments such as electrical screws, conveyors, elevator and so on will be supplied by in-house power generation, it is assumed that these emissions are null, i.e. PEy, power equals zero.

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 controlled combustion technology equipment is not transferred from another activity nor the existing equipment is transferred to another activity, therefore, leakage effects at the site of the other activity do not need to be considered. Therefore, no leakage calculation is required. Therefore, the project activity has no emissions due to the energy generation; i.e., PEel is null.

[10] Diesel oil density equals 840 kg/m^3 (BEN – Balanço Energético Nacional 2006, Ministério de Minas e Energia)

As discussed in A.4.3, the production of rice and consequently the supply of rice husks in Rio Grande do Sul State are large. During the harvest of 2003/2004, Rio Grande do Sul produced around 6.3 millions tonnes of rice (IRGA, 2006)[11]. Every tonne of rice produced leads to the supply of 0.22 tonnes of rice husks (CIENTEC, 1986)[12]. This indicates that the project activity will not cause a diversion of biomass from another activity.

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 small scale project activity emissions are estimated as following:

$PE_{Total} = PE_{y,comb} + PE_{transp} + PE_{y,Power}$

where,

$PE_{y,comb}$	Emissions due to the combustion of auxiliary fossil fuels and non-biomass components and it is calculated as described in E.1.1.
$PEy_{,transp}$	Emissions due to the transport and compacting process of residual biomass obtained from external sources as well as transport of residues and it is calculated as described in E.1.1
$PEy_{,power}$	Emissions due to the electricity use and it is calculated as described in E.1.1

The project activity total emissions are estimated to be equal or lower than 776 t CO_2e/year.

E.1.2.4 Describe the 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:

The formulae used to estimate baseline emissions are described in Section E.1.1, while the assumptions are presented in Section B.5. The grid connected electricity baseline corresponds to 84,784 t CO_2e for the crediting period and the methane avoidance baseline corresponds to 117,834 t CO_2e for the crediting period. Total baseline emissions amount for the crediting period is 202,618 t CO_2e.

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:

Emission reductions consist on the difference between the baseline emissions and the project emissions. Total emission reduction is the sum of the emission reductions obtained from the electricity displacement component and the methane avoidance component. It is given as following:

$ER = ER_{ID} + ER_{IIIE}$

where,

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[11] IRGA – Instituto Rio Grandense do Arroz: Rice production ranking in different regions. Available online: http://www.irga.rs.gov.br/arquivos/ranking.pdf (retrieved on February 2006)

[12] CIENTEC, 1986. Programa Energia: Aproveitamento Energético da Casca de Arroz. Relatório do Projeto de Pesquisa. Porto Alegre, Fundação de Ciência e Tecnologia.

ER_{ID} Emission reduction by the displacement of electricity from the grid (tonnes of CO_2 equivalent)
ER_{IIIE} Emission reduction by the avoidance of methane production from biomass decay through controlled combustion (tonnes of CO_2 equivalent)

(1) Electricity generation for a grid

ER_{ID} = BEel,y – PEel

where,

ER_{ID} Emission reduction by the displacement of electricity from the grid (tonnes of CO_2 equivalent)
BEel,y Baseline emissions from power displacement (tonnes of CO_2 equivalent)
PEel,y Project emissions related to electricity generation (tonnes of CO_2 equivalent)

PEel,y is equivalent to leakage. As discussed in E1.2.2, it is null.

(2) Methane avoidance from biomass decay

$ER_{IIIE} = BE_y - PE_{Total}$

where,

ER_{IIIE} Emission reduction by the avoidance of methane production from biomass decay through controlled combustion (tonnes of CO_2 equivalent)
PE_{Total} Project activity total emissions (tonnes of CO_2 equivalent)
BE_y Baseline methane emissions from biomass decay (tonnes of CO_2 equivalent)

Remark: formulae can be used for any given time period. It should be stated clearly what time period is meant.

Emissions reductions due to the project activity are on average 19,486 tonnes of CO_2e/year, 194,859 tonnes of CO_2 equivalents for the 10-year-crediting period.

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

Table 12. Table providing the values used and obtained when applying formulae related to AMS I.D - Emission reduction by grid connected electricity generation

Indicator	Abbreviation	Value	Unit
Simple adjusted operating margin emission factor	$EF\_OMy_{adjusted}$	0.4349	tonnes CO_2e / MWh
Build margin emission factor	EF_BMy	0.0872	tonnes CO_2e / MWh
Baseline emission factor	EFy	0.2611	tonnes CO_2e / MWh
Annual electricity generated by the Project	EGy	35,640	MWh / year
Net annual electricity supplied or substituting the grid	EGny	32,472	MWh / year
Electricity in-house consumption	ECy	3,168	MWh / year

Indicator	Abbreviation	Value	Unit
Baseline emission	BEel	8,478	tonnes CO_2e / year
Project emissions	PEel	0	tonnes CO_2e / year
Emission reduction from electricity generation	ER_{ID}	8,478	tonnes CO_2e / year

Note: See Annex 3

Table 11. Table providing the values used and obtained when applying formulae related to AMS III.E - Emission reduction by avoidance of methane production from biomass decay through controlled combustion

Indicator	Abbreviation	Value	Unit
Methane correction factor	MCF	0.4	dimensionless fraction
Degradable organic carbon	DOC	0.43	dimensionless fraction
Fraction DOC dissimilated to landfill gas	DOC_f	0.5	dimensionless fraction
Fraction of CH_4 in landfill gas	F	0.5	dimensionless fraction
Decay rate	k	0.030	$year^{-1}$
Model correction factor to account model uncertainties	φ	0.9	dimensionless fraction
Oxidation factor	OX	0	dimensionless fraction
Quantity biomass treated by the project activity	Q_y	67,320	tonnes / year
Methane that would be destroyed or removed in the year “y” for safety or legal regulation	$MD_{reg,y}$	0	tonnes of CH_4 / year
Global Warming Potential (GWP) for CH_4	GWP_{CH4}	21	tonne of CO_2e / tonne of CH_4
Non-biomass carbon of the waste combusted	$Q_{y,,non\text{-}biomass}$	0	tonnes C / year
Quantity of auxiliary fuel	$Q_{y,fuel}$	0	tonnes of fuel / year
CO_2 emission factor for the combustion of the auxiliary fuel and non-biomass material	$E_{y,fuel}$	3.2	tonnes CO_2 / tonnes fuel
Project activity emissions from combustion of auxiliary fuel and non-biomass material	$PE_{y,comb}$	0.2	tonnes of CO_2e / year
Quantity of biomass transported	$Qy,_{transp}$	67,320	tonnes / year
Quantity of ash transported	$Qy,_{ash}$	0	tonnes / year
Average truck capacity	CT	45	tonnes / truck
Average incremental distance for biomass transportation	DAF	440	km / truck
Average distance for combustion residues transportation*	DAF_{ash}	0	km / truck
Average truck capacity for transporting combustion residues	CT_{ash}	n/a	ton / truck
CO_2 emission factor from fuel use due to transportation	EF_{CO2}	0.001097	kg CO_2 / km
Project activity emissions from fossil fuel used in the transport	PE_{Transp}	817	tonnes of CO_2e / year
Average consumption of diesel oil per ton of biomass compacted	f_{comp}	0.252	kg of diesel oil / ton biomass
CO_2 emission factor from fuel use due to combustion in motor	$EF_{CO2,comp}$	0.00317	kg CO_2 / kg diesel
Project activity emissions from fossil fuel used for compacting the biomass	$PEy,_{Comp}$	54	tonnes of CO_2e / year

Indicator	Abbreviation	Value	Unit
Total project activity emissions due transport	$PEy_{,transp\ total}$	776	tonnes of CO_2e / year
Project activity emissions due to power consumption	PE_{power}	0	tonnes of CO_2e / year
Total project activity emissions	PE_{Total}	776	tonnes of CO_2e / year

* Combustion residues will be transported by screw conveyors to SBS where they will be converted to silica and commercialized.

Table 13. Net emission reduction by of project (tonnes CO_2 equivalent per calendar year)

	Type I.D grid connected electricity generation			**Type III.E Avoidance of methane production**				**Total net emission reduction**
Year	Baseline emissions (A)	Project emissions (B)	Net emission reduction (A-B)	Baseline emissions (C)	Fuel consumption project emissions (D)	Transport related project emissions (E)	Net emission reduction (C-D-E)	(A-B) + (C-D-E)
2008 (Jul-Dec.)	4,239	0	4,239	1,078	0	388	690	4,929
2009	8,478	0	8,478	3,202	0	776	2,426	10,905
2010	8,478	0	8,478	5,263	0	776	4,487	12,966
2011	8,478	0	8,478	7,264	0	776	6,488	14,966
2012	8,478	0	8,478	9,205	0	776	8,429	16,908
2013	8,478	0	8,478	11,089	0	776	10,313	18,791
2014	8,478	0	8,478	12,917	0	776	12,141	20,620
2015	8,478	0	8,478	14,691	0	776	13,915	22,394
2016	8,478	0	8,478	16,413	0	776	15,637	24,116
2017	8,478	0	8,478	18,084	0	776	17,308	25,786
2018 (Jan.-June)	4,239		4,239	18,627	0	388	18,239	22,479
Total estimated reductions	84,784	0	84,784	117,834	0	7,759	110,075	194,859
Total number of crediting years	10	10	10	10	10	10	10	10
Annual average	8,478	0	8,478	11,783	0	776	11,007	19,486

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 project obtained the Operating License of number 86/2006-DL, in February 9th, 2006. In order to obtain the license, the project developers showed evidence that no negative environmental impact is incurred by this activity.

In relation to the baseline scenario no negative environmental impacts will arise as a result of the project activity.

The project meets all national and local legislation. Some points noted for the plant are as following:

- The combustion of rice husk may present some concerns because of the low density of the husk and the high particulate in the flue gas. However, automation of the combustion control as well as a gas treatment system will reduce the particular emissions at the stack.

- SO_2 emissions from combusting rice husk will be minimal and be reduced compared to using fossil fuel. NO_x emissions will also be low and maintained within the prevailing emission standards.

The positive environmental impacts arising from the project activity are:

- The project will contribute to displace more carbon-intensive electricity generation sources from the S-SE-MW grid, promoting the use of renewable fuels (biomass) for electricity generation.

- A reduction in dumping of rice husk that may potentially arise in the absence of the project activity.

- A reduction of methane that would be emitted in the absence of the project activity.

SECTION G. Stakeholders' comments:

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

According to the Resolution #1 dated on December 2nd, 2003, from the Brazilian Inter-Ministerial Commission of Climate Change (Comissão Interministerial de Mudança Global do Clima - CIMGC), any CDM projects must send a letter with description of the project and an invitation for comments by local stakeholders.

Letters were sent to several stakeholders, including:

- City Hall of Alegrete;
- Chamber of Alegrete;
- Environment agencies;
- Brazilian Forum of NGOs;
- District Attorney (known in Portuguese as Ministério Público, i.e. the permanent institution essential for legal functions responsible for defending the legal order, democracy and social/individual interests);
- Local associations and unions; and
- Others.

Local stakeholders, listed in Annex 5, were invited to raise their concerns and provide comments on the project activity for a period of 30 days after receiving the letter of invitation. The invitation letters were sent in March 2006 and the copies of the letters and respective receipt notifications are available upon request. A total of 28 letters were sent.

G.2. Summary of the comments received:

Up to date, twelve letters of response were received. From those, ten were in total concordance with the project, and provided commendation and appraisal.

The Alegrete's District Attorney and the Brazilian Forum of NGOs made comments as Table 14.

Table 14. Comments from stakeholders

Entity	Comments
Alegrete's District Attorney	There will be necessary to obtain the license to make groundwater removal. The effluents and air emissions should be according the criteria obtained in the operating license.
Brazilian Forum of NGOs	Stated that the material sent as well as the resources available to the Brazilian Forum of NGOs were not enough for a comprehensive evaluation. Suggested using other criteria of sustainability, such as using the *"Gold Standard PDD"*

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

As stated above, most of the comments received were of appraisal and commendation.

Answers were sent to all stakeholders that sent letters addressing their comments.

Regarding water use, the project plans to use demineralized water and circulate it internally. If groundwater removal became necessary, all licenses will be obtained and removal will be done according to them (addressing the comment by the Alegrete's District Attorney).

The project has appropriate technology to generate effluent and air emissions lower than the maximum allowed in the operating license (addressing the comment by the Alegrete's District Attorney).

Regarding the comments by the Brazilian Forum of NGOs, a letter was sent explaining that the project contributes to the sustainable development due to:

- Job generation;
- Small rice mills, which are not able to set an advanced treatment to their residues, will not need to send their residues to landfill sites;
- Power generation from a renewable source;
- Implementation of a new technology in the region;
- Value aggregation to a residue, i.e., the combustion residues will be applied in another industry;
- Avoidance of methane generation from rice husk landfilling;
- Low gaseous and water emissions;
- The project does not affect the fauna and flora.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Project participants:

Organization:	GEEA – Geradora de Energia Elétrica Alegrete Ltda.
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FAX:	55 55 3421 9000
E-Mail:	
URL:	
Represented by:	
Title:	President
Salutation:	Mr.
Last Name:	Pilecco
Middle Name:	
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Project advisor:

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Street/P.O.Box:	2-5-2 Marunouchi
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URL:	http://www.mufg.jp
Represented by:	
Title:	Chairman
Salutation:	Mr
Last Name:	Hatano

Middle Name:	
First Name:	Junji
Department:	Clean Energy Finance Committee
Mobile:	
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Direct tel:	813 6213 6175
Personal E-Mail:	hatano-junji@sc.mufg.jp

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The financial plans for the Project do not involve public funding from Annex I countries.

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Annex 3

Electricity Use Plan

Substituting the grid (MWh / y)				In-house (internal) consumption (MWh / y)	Total generation (MWh / y)
Sold to the grid	Consumed by Pilecco Rice Mill	Consumption by GEEA-SBS biomass treatment plant	Total		
24,552 (3.1 MW)	5,544 (0.7 MW)	2,376 (0.3 MW)	32,472 (4.1 MW)	3,168 (0.4 MW)	35,640 (4.5MW)

Annex 4

Biomass Transport Plan

The table below presents the biomass transportation plan. The project will use mostly biomass supplied by external sources.

Year	Amount of rice husk provided by Pilecco rice mill (tonnes / year)	Amount of rice husk transported (tonnes / year)	Average incremental distance (DAF) (km / truck)	$PEy,_{transp\ total}$ (tCO_2e / y)
2008 (July-Dec)	0	33,660	440	361
2009	0	67,320	440	776
2010	0	67,320	440	776
2011	0	67,320	440	776
2012	0	67,320	440	776
1013	0	67,320	440	776
2014	0	67,320	440	776
2015	0	67,320	440	776
2016	0	67,320	440	776
2017	0	67,320	440	776
2018 (Jan-June)	0	33,660	440	361

The crediting period will start in 1st of July of 2008. From July to December, the amount of biomass necessary to run the project will be 33,660 ton. From 2009, the amount of externally supplied biomass will be 67,320 ton per year.

The rice husk will be supplied mostly by producers from the region of Bagé and Dom Pedrito (South-west region of Rio Grande do Sul State). Currently they deposit their rice husks at the Dom Pedrito landfill site, which is located 220 km far from the project site. Therefore, the average incremental distance (DAF) is 440 km/truck.

Annex 5

List of Recipients Consulted

Institution's name in English	Institution's name in Portuguese	Person or Department in Charge
City Hall of Alegrete	Prefeitura Municipal de Alegrete	Mr. José Rubens Pillar
Chamber of Alegrete	Câmara de Vereadores	Mr. José Eduardo Aguiar
Environmental Secretary of Alegrete	Secretaria Meio Ambiente de Alegrete	Mr. Milton Araujo
Environmental Secretary of Rio Grande do Sul State	SEMA - Secretaria Meio Ambiente-RS	Mr. Mauro Sparta
State Foundation of Environmental Protection	FEPAM – Fundação Estatual de Proteção Ambiental	Ms. Cláudio Dilda
Alegrete's District Attorney	Ministério Publico Alegrete	Ms. Alessandra Moura
Rio Grande do Sul's State Attorney	Ministério Publico Estadual	Environmental Prosecuter's Office (Promotoria do Meio Ambiente)
Federal Attorney	Ministério Publico Federal	Environmental Prosecuter's Office (Promotoria do Meio Ambiente)
Federation of Rice Producers Association	Federação das Associações de Arrozeiros (Federarroz)	Mr. Valter José Pötter
Brazilian Institute of Environment and Natural Renewable Resources	Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA)	Chemical Control and Evaluation Dept. (Coordenação de Avaliação e Controle de Subst. Químicas)
Rice Producers Union	Sindicato dos Produtores de Arroz (Sindarroz)	Mr. Élio Jorge Coradini
Uruguaiana Rice Industries Union	Associação das Indústrias de Arroz de Uruguaiana (Indarroz)	Mr. Cláudio Sizuo Sano
Brazilian Association of Parboiled Rice Industries	Associação Brasileira das Indústrias de Arroz Parboilizado (ABIAP)	Mr. Alfredo Albino Treichel
Pelotas Rice Industries Union	Sindicato das Indústrias de Arroz de Pelotas	Mr. Jairton Russo
Alegrete Rural Union	Sindicato Rural de Alegrete	Mr. Oscar Souza Parreira
Rice Producers Association	Associação dos Arrozeiros	Mr. Cleomar José Guerra Ereno
Rio Grande State Rice Institute	Instituto Rio Grandense de Arroz (IRGA)	Mr. Pery Francisco Sperotto Coelho
Rotary International - Alegrete	Rotary Alegrete	Ms. Laura Faraco
Rotary International - Sul	Rotary Sul	Mr. Nilton Carloto Martins
Rotary International - Norte	Rotary Norte	Mr. Ibraim da Silveira da Silva
Alegrete Empresarial Center	Centro Empresarial de Alegrete	Mr. Arnaldo da Costa Paz Filho
Lions Club Alegrete Ibirapuitã	Lions Clube Alegrete Ibirapuitã – Companheiro Leão	Mr. Aislan Barbosa Medeiros
DCS Comunicação Cia. Ltd.	DCS Comunicação Ltda.	Mr. Antonio D'Alessandro
Brazilian Forum of NGOs for the. Environment and the Development	Fórum Brasileiro de ONGs e Movimentos Sociais para o Desenvolvimento Sustentável (FBOMS)	Ms. Esther Neuhaus
Brazilian Association of NGOs	ABONG - Associação Brasileira de Organizações não governamentais	Mr. Francisco de Assis da Silva
Industry Federation of Rio Grande do Sul State	FIERGS – Federação das Indústrias do Rio Grande do Sul	Mr. Paulo Gilberto Fernandes Tigre

Institution's name in English	Institution's name in Portuguese	Person or Department in Charge
Municipal Council of Development	Conselho Municipal de Desenvolvimento	Mr. Milton Araújo
Retailer Companies Syndicate	Sindicato das Empresas do Comércio Varejista	Ms. Márcia Michels

Annex 6

Surplus generation of rice husk
in Southwest and Mid-west regions of Rio Grande do Sul State

Municipality	Rice processing (ton/y)	Rice husk generation (ton/y)
Alegrete	291,577	64,146
Uruguaiana	466,231	102,570
Quarai	66,039	14,528
Santa Maria	45,940	10,106
São Pedro do Sul	19,984	4,396
São Gabriel	138,242	30,413
São Sepé	107,856	23,728
Livramento	60,404	13,288
Rosario do Sul	110,072	24,215
São Francisco de Assis	18,591	4,090
São Vicente do Sul	52,750	11,605
Manoel Viana	17,263	3,797
São Borja	227,423	50,033
Itaqui	311,610	68,554
TOTAL	**1,933,982**	**425,469**

Notes: For Alegrete, only the amount generated by Pilecco Rice Mill is accounted above. As a conservative measure, the generation by other rice mills in Alegrete is not shown in this table.

For GEEA Power Plant project and the GEEA-SBS Biomass Treatment project, the total amount of rice husk used will be 122,670 ton per year for both projects. The total amount of rice husk available in a radius of 300 km far from the project site corresponds to 425,469 ton/y, which is an amount almost three times higher than the necessary to carry out both projects. Therefore, this project will not lead to biomass leakage or scarcity in the region.

Annex 7

Investment sensitivity analysis

IRR for different scenarios (21years)

Scenario		IRR after tax (without CERs)	IRR after tax (with CERs)
0	Project	6.02%	8.01%
1	Maintenance cost 10% larger	5.83%	7.84%
2	CER price 10% larger	6.02%	8.21%
3	CER price 20% lower	6.02%	7.62%
4	Electricity price 10% larger	7.79%	9.69%
5	Biomass cost 10% lower	6.63%	8.59%
6	Biomass cost 10% higher	5.38%	7.42%