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

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>.
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:

Alcoholes Del Istmo – Biomass energy plant
Version 4.0
27/12/2012

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

The proposed project activity involves the installation of a new biomass plant for steam and electricity generation in Alcoholes del Istmo (AISA) which is one of the largest distilleries in Panama.

Biomass fuel will be entirely composed of renewable biomass residues which will be mainly obtained from cane leafs and stems, bagasse or even wood residues from local cattle ranches' fences.[1]
Cane leafs and stems are obtained as a result of a change in the harvesting practice. Actually, habitually sugar cane is burnt before the harvest to make the cut easier. With the implementation of the project, sugar cane will be cut without burning which implies a major change in the cane harvesting management. Without the project activity it would be impossible to recover cane leafs and stems for any energy generation purposes.

In the current situation the steam and electricity requirements for the distillery process are met by a cogeneration system based on two bunker C-fired boilers. Electricity is mainly produced with the existing turbo-generator and partially imported from the national grid.

The project consists in the replacement of the two existing fossil fuel boilers and the 300 kW turbo-generator by a new boiler based on biomass residues and a new turbo-generator of higher capacity.

The project is developed in 2 distinct phases:
1. Replacement of two bunker C boilers by one boiler based on biomass residues with the same heat output (10 TPH, 10 bar, 210 °C).
2. Replacement of the 300 kW turbo-generator of by a new one of 500 kW.

The project activity reduces emissions by decreasing fuel oil consumption which is currently used to generate steam and electricity and by decreasing the on-site electricity imports from the national grid. Additionally, the surplus of electricity generated by the new plant will be supplied to the grid displacing conventional power based on fossil fuel consumption.

Without the CDM project activity, AISA would have continued to use the current cogeneration plant based on bunker C consumption and therefore GHG emissions would not have been avoided.

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[1] *In case of lack of leafs and stems or bagasse , wood waste residues from cattle ranches' fences that would otherwise be thrown away could be eventually required.*

Main sustainable development benefits

This project contributes to the sustainable development of Panama in different manners such as social, environmental and economical well being. It is in accordance with the national environmental strategy established by the DNA.[2]

Environmental impacts

By reducing on-site fossil fuel consumption and by displacing fossil-fuel based grid electricity generation, the project contributes to reduce greenhouse gas (GHG) emissions. This production of heat and electricity from a renewable source is expected to avoid 226,372 tCO_2e over the 10 years crediting period.

Apart from CO_2, the project implementation also reduces other local air pollutants such as CO, SO_x and NO_x associated with:

- The burning of fuel oil.
- The burning of sugar cane in near plantations.
  As it has been stated before, the project implies a major change in the management of cane harvest: until now, cane producers' were burning leafs of sugar canes during harvest; this is the common practice in the sugar sector.
  Cane burning is a source of local pollution and used to deteriorate local environment and also bothers local population. With this project, AISA proposes a change of practice and mitigates local pollution otherwise generated during harvest.

Social impacts

About 77 jobs will be directly created by AISA to operate the new equipments and coordinate the project: the project involves the training and education of the staff in charge of the new process and technologies implemented. In addition, 186 jobs will be indirectly created to collect, transport and ensure the biomass supply.

Technology transfer

New equipments and engineering are provided by a Brazilian company[3]; in this manner the project promotes a technology transfer between both countries; it becomes a relevant technical reference for other distilleries and industries interested in carrying out similar projects.

Conclusion

The proposed project activity will contribute to sustainable development by substituting a fossil fuel based system by a renewable biomass residues based system. It will generate environmental benefits not only by reducing greenhouse gas emissions but also by reducing other local air pollutants associated with the burning of cane plantations which would have otherwise deteriorated the local environment. In addition, the project will contribute to the creation of new jobs and will involve the training of the staff in the operation and maintenance of new green technologies.

[2] *See the "Estrategia Nacional del Ambiente: http: www.anam.gob.pa/pdf/GApma2008_2012.pdf*

[3] *BENECKE IRMAOS & CIA, de Brasil*

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)
Panama	Alcoholes del Istmo S.A. (prívate entity)	No
Switzerland	RWE Supply & Trading Switzerland SA (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.		

Alcoholes Del Istmo SA (AISA) is situated close to the small town of Las Cabras, in the Pesé District, Province of Herrera in Panama. Offices and the plant are located 32 kilometers away from the city of Chitré, 250 km from Panama City.

AISA was registered on the 6th November 1997 and is one of the largest distilleries in Panama. The main activity is the production of clear distilled liquor and alcohols coming from sugar cane molasses provided by sugar refineries of the region. AISA has a current production capacity of 65,000 liters per day of clear distilled liquor, crude alcohol (78 & 94 °GL) and 35,000 liters of refined high quality alcohol.

The industrial license (No. 6 2511) establishes that AISA activities are production, manufacture, blending, storage, transport, distribution and ageing of alcohols; export, import, re-export and marketing of alcohols and its derivates.

Employing 74 workers comprising administrative officers, engineers and others technicians, this distillery is one of the most important employers of the local area.

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):

Panama

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

Herrera

A.4.1.3. City/Town/Community etc:

Las Cabras

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

The CDM project activity will take place in the main processing facilities of AISA in Las Cabras, Pesé district , province of Herrera which is located approximately 250 km away from Panama City.

Figure 1: Map of Panama

Figure 2: Map of Chitré

GPS coordinates

Latitude 7°52'20.20"N
Longitude 80°32'15.74"W

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

Type and categories

The Project covers the following project types and categories:

Project Type: I, Category C: Thermal energy for the user.
The project is a small scale project activity and falls under the category I according to the Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM project activities. It is a category C "*Thermal energy for the user*" project because it involves the construction of a cogeneration system that produces heat and electricity primarily for on-site use from renewable sources, displacing steam and electricity generation from oil-fired steam boiler.

The boiler installed under the project activity has a maximum thermal output of 6.9 MW_{th}[4], below the 45 MW_{th} thresholds for small-scale projects.

The following table summarizes the baseline scenario and the project scenario in accordance to the 1st and 2nd implementation phases.

	Baseline	Project activity
Heat	**Fuel Oil Boiler 1:** StandardKessel 10 TPH, 220 °C, 10 bar **Fuel Oil Boiler 2:** Lointek 6.5 TPH, 220 °C, 10 bar (backup)	**Biomass Boiler :** Benecke 4601 10 TPH; 210 °C; 10 - 12 bar Biomass consumption : 4,187 kg/h
Electricity	300 kW Steam turbine & generator	500 kW Steam turbine & generator
Fuel	Bunker C Grade nº.6 NCV: 9,842 kcal/kg[5]	NCV (leafs, stems and bagasse): 1,750 kcal/kg[6]. Due to lack of biomass during the first years of the project activity, bunker C could be co-fired.

Table 1: Baseline and project activity scenarios.

The following points summarize the technical description of the current situation and CDM project scenarios.

Description of the current situation

Heat requirements

Annual alcohol production in AISA needs about 7 kg of superheated steam per liter of alcohol produced. This steam is used to provide the heat needed by the distillation process into the distillation columns.
Steam from boiler is produced at 10 bar pressure, which is used to feed directly the production process and to feed the steam turbine and produce electricity. Extracted steam from turbine (low pressure) is also used to feed the production process. Table 2 summarizes steam requirements in the baseline situation:

	TPH	Pressure	Temperature
Steam production			
Steam generated	10	10 bar	210 °C
Steam consumption			
Directly for production process	4.2	10 bar	210 °C
Cogeneration	5.8	10 bar	210 °C
Extracted from turbine and used for distillation process	5.8	1.6 bar	120 °C

Table 2: Steam requirements in baseline situation.

The total steam requirements of the distillery are 10 TPH and are covered fully by the fuel oil boiler 1 which has a measured efficiency of 82%. Fuel oil boiler 2 is only used as backup in case of maintenance or failure of boiler 1.

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[4] *Installed capacity of the boiler has been calculated considering an output enthalpy of 2,851 kJ/kg (210°C, 10 bar) and an input enthalpy of feed water of 334.76 kJ/kg (80°C,1.013 bar).*

[5] *http://www.mef.gob.pa/cope/pdf/PLAN%20DE%20EXPANSI%D3N%20DEL%20SIN%202007-Actualizado.PDF*

[6] *These values have been obtained from data provided by the boiler manufacturer.*

Electricity requirements

The site consumption is approximately 36.5 MWh per year plus 0.18 kWh/y per litre of alcohol produced; this energy demand is principally used in running processes such as motors, pumps, lighting and auxiliary systems such as control or monitoring tasks.

The turbine generator of 300 kW was installed by the end of 2006 and was supposed to produce most of the electricity demand of the site. Indeed, on the basis of the current alcohol production[7] of 7,000,000 litres per year the turbo-generator will be producing about 88% of the total electricity demand.

Baseline situation is summarized in the diagram below:

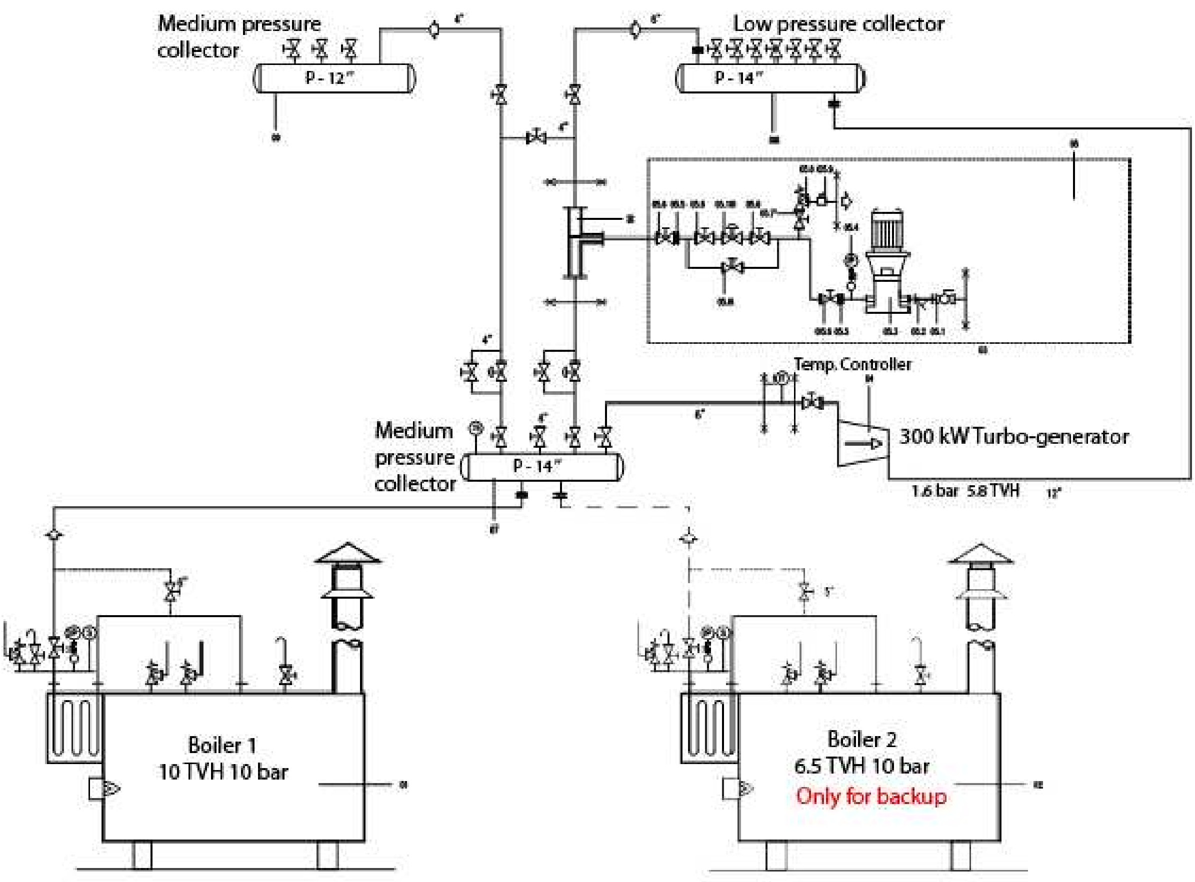

Figure 3: Baseline situation diagram.

[7] Corresponding to 2010

Forecast energy consumption

Steam and electricity will be increased in the next years as the result of the forecasted increase of alcohol production.

Based on heat and electricity specific consumptions, the table below indicates the current and forecasts for heat and electricity consumptions of AISA from 2011 to 2020.

Year	Alcohol production (density: 0.81 kg/l)		Steam extracted (7 kg of steam/l)	Electricity requirements
	Litres	Tons	Tons	MWh
2010	7,000,000	5,670	49,000	1,298
2011	8,000,000	6,480	56,000	1,477
2012	9,000,000	7,290	63,000	1,657
2013	10,000,000	8,100	70,000	1,837
2014	11,000,000	8,910	77,000	2,017
2015	12,000,000	9,720	84,000	2,197
2016	12,000,000	9,720	84,000	2,197
2017	12,000,000	9,720	84,000	2,197
2018	12,000,000	9,720	84,000	2,197
2019	12,000,000	9,720	84,000	2,197
2020	12,000,000	9,720	84,000	2,197

Table 3: Forecast energy consumption

Description of the proposed project activity

Heat and electricity (cogeneration)

In its first and second phases, the project will replace the use of two units of bunker C fired boilers by one boiler based on biomass fuel. Apart from boilers, the project also replaces the old turbo generator by a new one of higher capacity.

Contrary to the current situation, in the project activity, the entire steam production will be sent to the turbine generation system before going into the process. This means that in the project activity, steam and electricity will be entirely produced by a cogeneration phase.

Because the amount of electricity produced will be higher than the site requirements, additional production will be injected into the national grid.
Characteristics of the proposed project activity are summarized in tables 4 and 5.

	STEAM	PRESSURE	TEMPERATURE
Heat production			
Biomass boiler	10 TPH	10-12 bar	210°C
Heat Consumption			
Cogeneration	10 TPH	10 bar	210°C
Extracted from turbine and used for distillation process	10 TPH	1.6 bar	120°C

Table 4: Steam production and characteristics during the project activity.

	INSTALLED CAPACITY	EXPECTED ON-SITE CONSUMPTION	EXPECTED SURPLUS OF ELECTRICITY EXPORTED TO THE GRID
Electricity generation	0.5 MW[8]	Please refer to table 3	Please refer to table 15

Table 5: Electricity generation during the project activity.

Figure 4 summarize new cogeneration process implemented by the project activity:

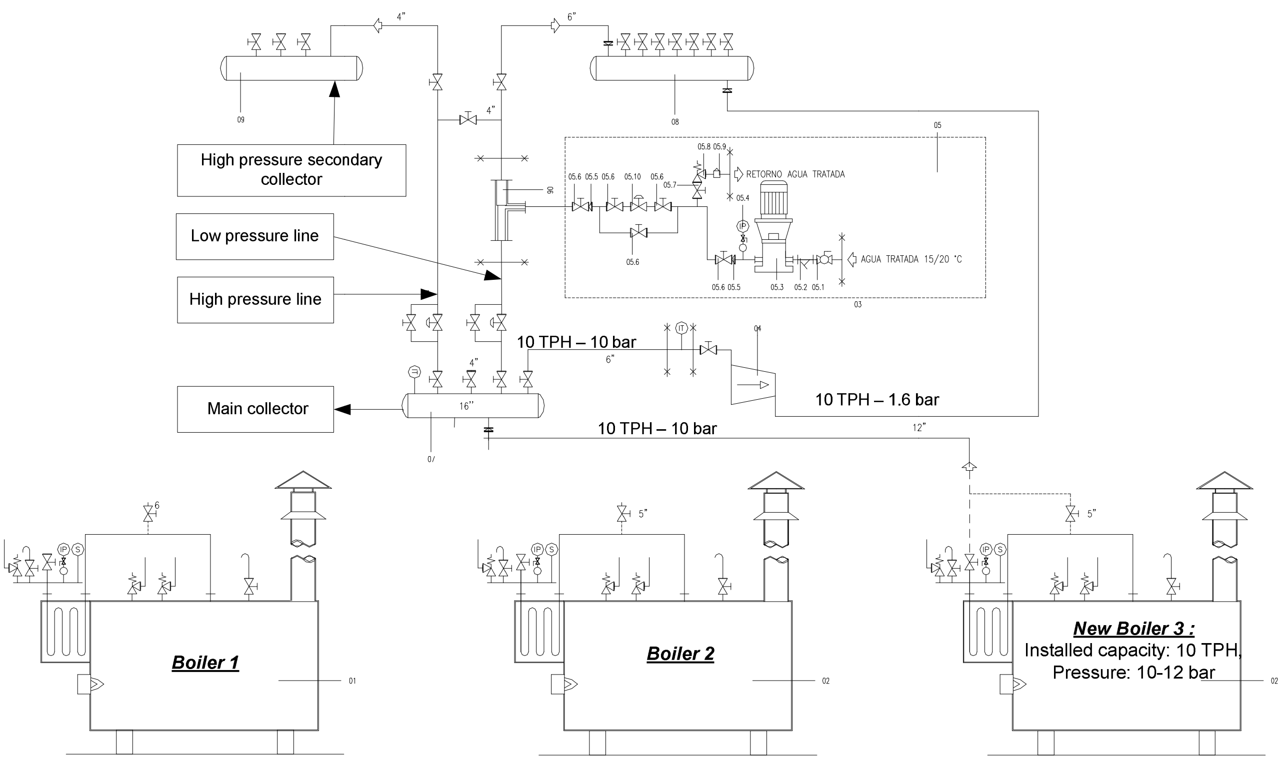

Figure 4: Project Activity situation diagram.

[8] *Subject to CDM, this capacity will become available at the earliest in January 2011, otherwise the current capacity of 0.3MW will remain.*

Use of the existing equipments

As a result of the project activity, existing boilers will be taken out of operation and only used in case of emergency.

Lifetime of equipments

	Type of equipment	Commissioning date	Expected lifetime	Justification
Existing equipment	**Fuel Oil Boiler 1:** StandardKessel 10 TPH; 220 °C; 10 bar	2005 (retrofitted)	More than 10 years	Letter sent by independent third party.
	Fuel Oil Boiler 2: Lointek 6.5 TPH; 220 °C; 10 bar	2005 (retrofitted)		
	300 kW Steam turbine & generator	2005 (retrofitted)	More than 20 years (=> 2025)	
New equipment	**Biomass Boiler :** Benecke 4601 10 TPH; 210 °C; 10 - 12 bar	2011	More than 25 years (=> 2036)	Default value provided by the **"Tool to determine the remaining lifetime of equipment."**
	500 kW Steam turbine & generator	2011	More than 25 years (=>2036)	

Table 6: Justification of the existing equipments lifetime and technical specifications.

Environmental aspects

This is a new and environmentally safe technology that will lead to a significant increase in energy efficiency and reduction of *greenhouse gases* emission and pollutants associated with fossil fuel combustion. Indeed, the design of the new boiler limits particle emissions. Filter tests have been undertaken by the provider.

Biomass residues supplying

Biomass residues supplying is made in accordance to phases below:

1. *Cutting*

Cane leafs are collected during the cane harvesting season. As it has been previously explained, a new kind of practice consisting in cutting the cane without burning it will be implemented with the project activity.
Once cane has been cut and transported to sugar mills, cane leafs are left on the fields. A machine is then used to cut the stems of the cane, also used by the project activity.

2. *Collecting*

Collecting is made in two steps, first a packing machine collects and packs the cane leafs and stems that have been cut and left on the fields. This machine makes packages of 0.14 m^3 and 20 kg of biomass. Once they have been bundled, workers tie the packages and load them into trucks for transportation.

3. Transport and storage

Biomass packages are transported from different areas near the distillery facilities. Once received, packages are stored and covered by AISA's personnel in order to avoid excess of humidity.

4. Boiler feeding

Biomass packages are put in a conveyor belt to feed the boiler. Boiler control adjusts and regulates belt speed in order to maintain a constant steam production.

Biomass residues availability and fossil fuel consumption

Even if biomass residues resources in near plantations are sufficient to ensure the fuel supplying of the new boiler, the change of practice in cane harvesting methods will be progressive. Owing to this situation, a certain amount of auxiliary fossil fuel will be used during the project activity. Table below shows the yearly estimation of biomass residues and bunker C requirements:

Year	Alcohol production (litres/year)	Biomass residues (tonnes/year) [9]	Bunker C (gal/year) [10]	Bunker C Proportion
2011	8,000,000	16,225	394,238	33.8 %
2012	9,000,000	25,349	86,444	6.6 %
2013	10,000,000	34,474	0	-
2014	11,000,000	43,598	0	-
2015	12,000,000	52,723	0	-
2016	12,000,000	52,723	0	-
2017	12,000,000	52,723	0	-
2018	12,000,000	52,723	0	-
2019	12,000,000	52,723	0	-
2020	12,000,000	52,723	0	-

Table 7: Biomass and bunker C consumption according to alcohol production.

[9] *Biomass residues are mainly based on cane leafs and stems; however, bagasse or even wood waste from sawmills could be also used as fuel.*

[10] *Based on biomass residues supply forecasts estimated by AISA.*

Pictures below illustrate different biomass supplying phases.

Figure 5: Leafs leaved after cane harvest.

Figure 6: Machine used to cut stems.

Figure 7: Collecting biomass.

Figure 8: Packing biomass.

Figure 9: Biomass package.

Figure 10: Tied packages.

Figure 11: Transport.

Figure 12: Packages on conveyor belt.

Figure 13: Biomass boiler overview.

Figure 14: Boiler feeding.

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

Years	**Annual estimation of emission reductions in tonnes of CO_2e**
2012	16,912
2013	19,949
2014	21,943
2015	23,938
2016	23,938
2017	23,938
2018	23,938
2019	23,938
2020	23,938
2021	23,938
Total estimated reduction (tonnes CO_2e)	**226,372**
Total number of crediting years	**10**
Annual average over the crediting period of estimated reductions (tonnes CO_2e)	**22,637**

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

The Project involves no public funding or ODA.

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

The project activity is not a debundled component of a larger project activity and there is no registered small-scale CDM project activity:

- With the same project participants; and
- In the same project category and technology/measure; and
- Registered within the previous 2 years; and
- That has a project boundary within 1 km of the project boundary of the proposed small-scale activity at the closest point of a larger 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:

The following methodology is applied:

- AMS-I.C Version 19: "*Thermal energy production with or without electricity*".

This methodology refers to the following tools:

- "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (Version 02)
- "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 1)
- "Tool to determine the baseline efficiency of thermal or electric energy generation systems" (Version 1)

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

The project type is a Type I category C that covers "*Thermal energy production with or without electricity*".

The choice of the methodology is accurate for the project and it is justifiable since the project respects all the conditions required:

Ref.1*	**AMS-I.C**	*"This methodology comprises renewable energy technologies that supply users with thermal energy that displaces fossil fuel use. These units include technologies such as solar thermal water heaters and dryers, solar cookers, energy derived from renewable biomass and other technologies that provide thermal energy that displaces fossil fuel"*.
	Project Activity	The project consists in the implementation of a new biomass plant for thermal and electricity generation. This new plant will replace the existing power system based on oil fuel consumption. The project will only use renewable biomass residues.
Ref.2*	**AMS-I.C**	*Biomass-based cogeneration systems) are included in this category. For the purpose of this methodology "cogeneration" shall mean the simultaneous generation of thermal energy and electrical energy in one process. Project activities that produce heat and power in separate element processes (for example, heat from a boiler and electricity from a biogas engine) do not fit under the definition of cogeneration project*.
	Project Activity	The project involves the simultaneous generation of thermal and electrical energy trough a steam boiler and turbine. Heat and power are not generated in separate element process.
Ref.3*	**AMS-I.C**	*Emission reductions from a biomass cogeneration system can accrue from one of the following activities:* *a) Electricity supply to a grid;* *b) Electricity and/or thermal energy (steam or heat) production for on-site consumption or for consumption by other facilities;* *c) Combination of (a) and (b).*
	Project Activity	The cogeneration plant supplies electricity to the national grid and produce heat and electricity for onsite consumption (*Combination of (a) and (b)).*

<table>
<tr><td rowspan="2">Ref.4*</td><td>AMS-I.C</td><td>The total installed/rated thermal energy generation capacity of the project equipment is equal to or less than 45 MW thermal. [11]</td></tr>
<tr><td>Project Activity</td><td>The total thermal capacity of the boiler is 6.9 MW_{th} and has been determined by taking the difference between enthalpy of total output leaving the project equipment and the total enthalpy of input of feed water entering the boiler.</td></tr>
<tr><td rowspan="2">Ref.5*</td><td>AMS-I.C</td><td>For co-fired systems, the total installed thermal energy generation capacity of the project equipment, when using both fossil and renewable fuel shall not exceed 45 MW thermal</td></tr>
<tr><td>Project Activity</td><td>During the first 2 years, the amount of biomass available will not be sufficient to ensure the on-site fuel requirements; therefore bunker C will be co-fired in the biomass boiler. The proportion of fossil fuel to be used is mentioned in Table 7.
Since the thermal capacity of the boiler is 6.9 MW_{th} this condition is fulfilled.</td></tr>
<tr><td rowspan="2">Ref.6*</td><td>AMS-I.C</td><td>The following capacity limits apply for biomass cogeneration units:
(a) If the project activity includes emission reductions from both the thermal and electrical energy components, the total installed energy generation capacity (thermal and electrical) of the project equipment shall not exceed 45 MW thermal. For the purpose of calculating this capacity limit the conversion factor of 1:3 shall be used for converting electrical energy to thermal energy (i.e., for energy renewable project activities, the maximal limit of 15 MW(e) is equivalent to 45 MW thermal output of the equipment or the plant);
(b) If the emission reductions of the cogeneration project activity are solely on account of thermal energy production (i.e., no emission reductions accrue from electricity component), the total installed thermal energy production capacity of the project equipment of the cogeneration unit shall not exceed 45 MW thermal;
(c) If the emission reductions of the cogeneration project activity are solely on account of electrical energy production (i.e., no emission reductions accrue from thermal energy component), the total installed electrical energy generation capacity of the project equipment of the cogeneration unit shall not exceed 15 MW.</td></tr>
<tr><td>Project Activity</td><td>The project falls under option (a) having a total thermal capacity of 6.9 MW_{th} and a total electricity capacity of 0.5 MW.</td></tr>
<tr><td rowspan="2">Ref.7*</td><td>AMS-I.C</td><td>The capacity limits specified in the above paragraphs apply to both new facilities and retrofit projects. In the case of project activities that involve the addition of renewable energy units at an existing renewable energy facility, the total capacity of the units added by the project should comply with capacity limits in paragraphs 4 to 6, and should be physically distinct from the existing units.</td></tr>
<tr><td>Project activity</td><td>This condition does not apply to the project activity as it does not involve the addition of renewable energy units at an existing renewable energy facility.</td></tr>
<tr><td>Ref.8*</td><td>AMS-I.C</td><td>Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category.</td></tr>
</table>

[11] *Thermal energy generation capacity shall be manufacturer's rated thermal energy output, or if that rating is not available the capacity shall be determined by taking the difference between enthalpy of total output (for example steam or hot air in kcal/kg or kcal/m3) leaving the project equipment and the total enthalpy of input (for example feed water or air in kcal/kg or kcal/m3) entering the project equipment. For boilers, condensate return (if any) must be incorporated into enthalpy of the feed.*

	Project Activity	This condition applies to the project activity as it involves the retrofit or modification of the current cogeneration plant for renewable energy generation.
Ref.9*	**AMS-I.C**	*New Facilities (Greenfield projects) and project activities involving capacity additions compared to the baseline scenario are only eligible if the comply with the related and relevant requirements in the "General Guidelines to SSC CDM methodologies".*
	Project activity	The project activity complies with the related and relevant requirements in the "*General Guidelines to SSC CDM methodologies*".
Ref.10*	**AMS-I.C**	*If solid biomass fuel (e.g. briquette) is used, it shall be demonstrated that it has been produced using solely renewable biomass and all project or leakage emissions associated with its production shall be taken into account in the emissions reduction calculation.*
	Project activity	This condition does not apply to the project activity since it does not involve the use of solid biomass fuel (e.g. briquette). The project activity will only consume biomass residues (namely: leafs and stems, wood and bagasse).
Ref.11*	**AMS-I.C**	*Where the project participant is not the producer of the processed solid biomass fuel, the project participant and the producer are bound by a contract that shall enable the project participant to monitor the source of the renewable biomass to account for any emissions associated with solid biomass fuel production. Such a contract shall also ensure that there is no double-counting of emissions reductions.*
	Project activity	This condition does not apply to project activity since, as stated before, it does not involve the use of processed solid biomass fuel.
Ref.12*	**AMS-I.C**	*If electricity and/or steam/heat produced by the project activity is delivered to a third party i.e. another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the energy will have to be entered into that ensures there is no double-counting of emissions reductions.*
	Project activity	This condition doesn't apply since the electricity and steam produced by the new cogeneration plant will be used for onsite requirements, excess of electricity will be exported to the national grid, not to another facility or facilities within the project boundary.
Ref.13*	**AMS-I.C**	*If the project activity recovers and utilizes biogas for power/heat production and applies this methodology on a stand-alone basis i.e. without using a Type III component of a SSC methodology, any incremental emissions occurring due to the implementation of the project activity (e.g. physical leakage of the anaerobic digester, emissions due to inefficiency of the flaring), shall be taken into account either as project or leakage emissions.*
	Project activity	This condition does not apply to the project activity as it does not involve the use of biogas for power/heat generation.
Ref.14*	**AMS-I.C**	*Charcoal based biomass energy generation project activities are eligible to apply the methodology only if the charcoal is produced from renewable biomass sources provided:* *(a) Charcoal is produced in kilns equipped with methane recovery and destruction facility; or* *(b) If charcoal is produced in kilns not equipped with a methane recovery and destruction facility, methane emissions from the production of charcoal sham be considered. These emissions shall be calculated as per the procedures defined in the approved methodology AMS-III.K. Alternatively, conservative emission factor values from peer reviewed literature or from a registered CDM project activity*

		can be used, provided that it can be demonstrated that the parameters from these are comparable e.g. source of biomass, characteristics of biomass such as moisture, carbon content, type of kiln, operating conditions such as ambient temperature.
	Project activity	This condition does not apply to the project activity since it does not involve the use of charcoal based biomass energy generation.

**Reference paragraph number in "technology measure" section (AMS-I.C methodology)*

The electricity and heat generated by the Project will be consumed by the facilities at AISA's site and surplus electricity will be exported to the grid.

B.3. Description of the project boundary:

As referred to in AMS-I.C, the spatial extent of the project boundary encompasses:

(a) All plants generating power and/or heat located at the project site, whether fired with biomass, fossil fuels or a combination of both;
(b) All power plants connected physically to the electricity system (grid) that the project plant is connected to;
(c) Industrial, commercial or residential facility, or facilities, consuming energy generated by the system and the processes or equipments affected by the project activity;
(d) The processing plant of biomass residues, for project activities using solid biomass fuel (e.g. briquette), unless all associated emissions are accounted for as leakage emissions;
(e) The transportation itineraries, if the biomass is transported over distances greater than 200 kilometres, unless all associated emissions are accounted for as leakage emissions;
(f) The site of the anaerobic digester in the case of the project activity that recovers and utilizes biogas for power/heat production and applies this methodology on a stand-alone basis i.e. without using a Type III component of a SSC methodology.

Next diagram illustrates the project boundary:

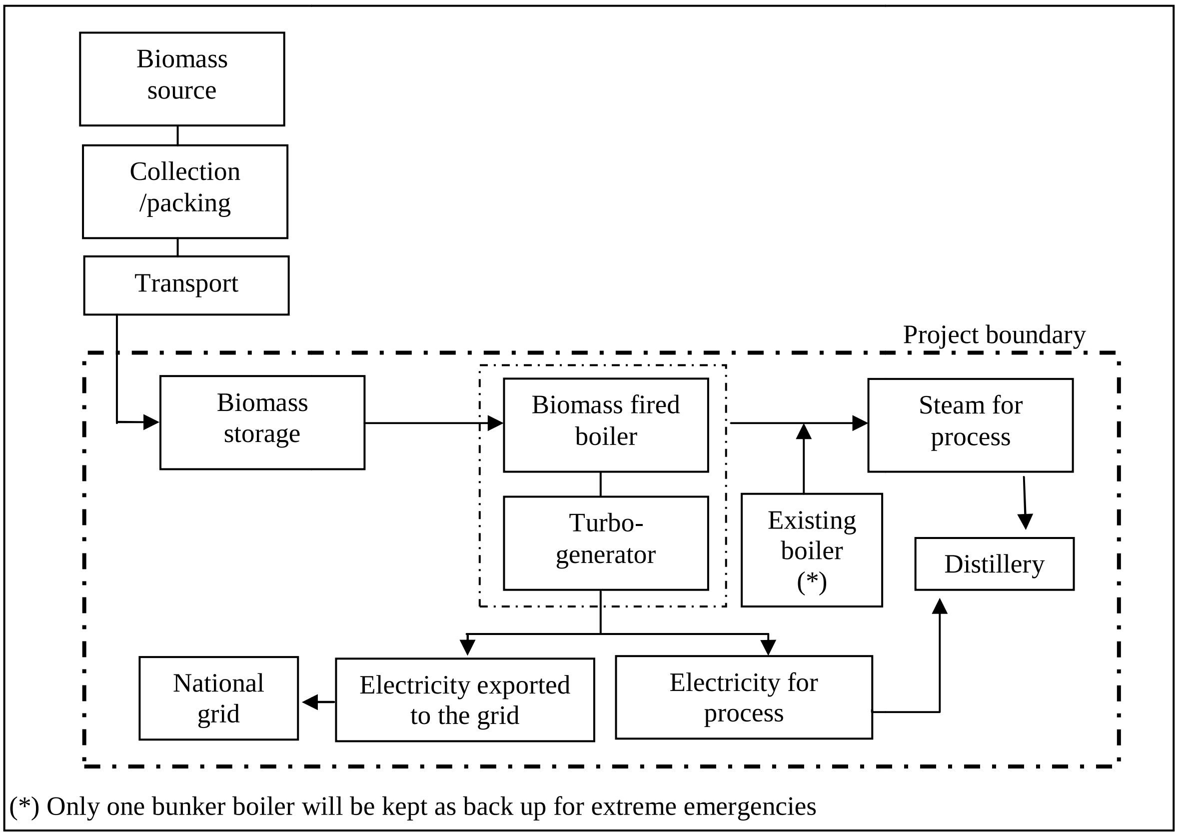

Figure 15: Project boundary.

Because the project uses biomass residues (and not biomass from forests or biomass from croplands or grasslands) that are transported over distances smaller than 200 km, the project boundary does not include the area where the biomass is produced.

Emissions by sources

Carbon dioxide is the only GHG included in the Project boundary.

	Source	Gas	Included?	Justification/Explanation
Baseline emissions	Power generation by oil fired boiler	CO_2	Yes	Electricity is generated from a cogeneration plant based on bunker C.
		CH_4	No	Conservative
		N_2O	No	Conservative
	Thermal energy generation by oil fired boiler	CO_2	Yes	Thermal energy is generated from a power plant based on bunker C.
		CH_4	No	Conservative
		N_2O	No	Conservative
	Emissions from grid electricity consumption	CO_2	Yes	Part of electricity is consumed from the grid in the baseline scenario.
		CH_4	No	Negligible
		N_2O	No	Negligible
	Decomposition of biomass	CO_2	No	Biomass is also burnt under the baseline scenario.

	combusted by the Project	CH_4	No	Biomass is burnt; therefore it does not decompose under anaerobic conditions under the baseline scenario.
		N_2O	No	Conservative
	Emissions from transportation of fossil fuels used for power and heat generation	CO_2	No	Excluded, this is conservative
		CH_4	No	Conservative
		N_2O	No	Conservative
Project emissions	Emissions from auxiliary fuel combustion	CO_2	Yes	Major source of emission
		CH_4	No	Negligible
		N_2O	No	Negligible
	Emissions from transportation of biomass	CO_2	No	Negligible
		CH_4	No	Negligible
		N_2O	No	Negligible

B.4. Description of baseline and its development:

Baseline emissions calculation has been determined as per paragraphs 16, 17 and 18 of the AMS-I.C (Version 19) which states the following:

Ref.16*	**AMS-I.C**	*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 factor for the fossil fuel displaced.*
	Project Activity	Please refer to sections B.6.1 and B.6.2 to find assumptions and baseline calculation.
Ref.17*	**AMS-I.C**	*Existing facilities are those that have been in operation for at least three years immediately prior to the start date of the project activity. For project activities implemented in existing facilities, baseline calculations shall be based on historical data on energy use(e.g. electricity, fossil fuel) and plant output (e.g. steam/electricity) in the baseline plant from at least three years prior to project implementation. For existing facilities having no historical data/information on baseline parameters such as efficiency, energy consumption and output (e.g. the available data is not reliable due to various factors such as the use of imprecise or non-calibrated measuring equipment), the baseline parameters can be determined using a performance test/measurement campaign to be carried out prior to the implementation of the project activity. The project proponent may follow the relevant provisions from the "Tool to determine baseline efficiency of thermal and electricity systems". In case of project activity exporting to other facilities included within the project boundary, historical data from the recipient plants are required.*
	Project Activity	The project is developed in existing facilities that have been in operation more than three years, therefore historical information in the use of energy sources and plant output has been used to calculate baseline emissions.
Ref. 18	**AMS-I.C**	*For project activities implemented in existing facilities where the additionality is demonstrated based on a baseline scenario that is not the continuation of the current practice (e.g. continued use of the fossil fuel that was used prior to the implementation of the project activity), the baseline emission factor is chosen as lower of the two: (a) the emission factor of the fossil fuel that would have been used in the identified baseline*

		scenario; and (b) the emission factor of the fossil fuel that was used prior to the implementation of the project activity.
	Project Activity	Addtionality is demonstrated based on a baseline scenario that is the continuation of the current practice. The selection of the baseline scenario is explained below.

**Reference paragraph number in "technology measure" section (AMS-I.C methodology)*

Following paragraphs demonstrate selection of baseline scenario out of the various alternatives available to the project proponent.

Identification of alternative baseline scenarios for steam/heat and electricity consumption.

Alternative A: Electricity is imported from a grid and thermal energy (steam/heat) is produced using fossil fuel;

Alternative B: Electricity is produced in an onsite captive power plant (with a possibility of export to the grid) and thermal energy (steam/heat) is produced using fossil fuel;

Alternative C: A combination of (a) and (b);

Alternative D: Electricity and thermal energy (steam/heat) are produced in a cogeneration unit using fossil fuel (with a possibility of export of electricity to a grid/other facilities and/or thermal energy to other facilities);

Alternative E: Electricity is imported from a grid and/or produced in an on-site captive power plant using fossil fuels (with a possibility of export to the grid); steam/heat is produced from renewable biomass;

Alternative F: Electricity is produced in an on-site captive power plant using biomass (with a possibility of export to a grid) and/or imported from a grid; steam/heat is produced using fossil fuel;

Alternative G: Electricity and thermal energy (steam/heat) are produced in a biomass fired cogeneration unit (without a possibility of export of electricity either to a grid or to other facilities and without a possibility of export of thermal energy to other facilities). This scenario applies to a project activity that installs a new grid connected biomass cogeneration system that produces surplus electricity and this surplus electricity is exported to a grid. The baseline scenario is that the electricity would otherwise have been generated by the operation of grid-connected power plants and by the addition of new generation sources to the grid;

Alternative H: Electricity and/or thermal energy produced in a co-fired system.

Alternative I: Electricity is imported from a grid and/or produced in a biomass fired cogeneration unit (without a possibility of export either to the grid or to other facilities); steam/heat is produced in a biomass fired cogeneration unit and/or a biomass fired boiler (without a possibility of export thermal energy to other facilities). This scenario applies to a project activity that installs a new biomass cogeneration system that displaces electricity which otherwise would have been imported from a grid.

<u>Alternative A: Electricity is imported froma grid and thermal energy (steam/heat) is produced using fossil fuel.</u>

In the absence of the project activity, energy is produced in a cogeneration unit using fossil fuel (bunker C). Electricity is partially imported from the grid but not totally. Indeed, less than 20% of the total demand is being imported from the grid.

⇨ *Alternative A is ruled out as an alternative scenario.*

Alternative B: Electricity is produced in an onsite captive power plant (with a possibility of export to the grid) and thermal energy (steam/heat) is produced using fossil fuel.

This could be an alternative baseline scenario; however, it is an inefficient option since thermal energy and electricity can be produced together in a cogeneration unit. In fact, in the current situation, AISA satisfies its energy demand with a cogeneration unit. Therefore, this option is not being considered as the baseline scenario.

⇨ *Alternative B is not a plausible and realistic scenario.*

Alternative C: A combination of (A) and (B).

Alternative C is not a plausible and realistic alternative as explained above in Alternative A and B.

⇨ *Alternative C is not a plausible and realistic scenario.*

Alternative D: Electricity and thermal energy (steam/heat) are produced in a cogeneration unit using fossil fuel.

In the absence of the project activity, thermal energy (steam/heat) and electricity would have been produced in the current cogeneration plant composed of the two boilers based on fossil fuel consumption and a steam turbine & generator. This choice is the most plausible scenario since the distillery must produce steam for the process and consequently, the best economical choice for electricity generation is the cogeneration (in this case, also based on fossil fuel consumption).

⇨ *Alternative D is a plausible and realistic scenario.*

Alternative E: Electricity is imported from a grid and/or produced in an on-site captive power plant using fossil fuels (with a possibility of export to the grid); steam/heat is produced from renewable biomass;

Even if electricity could be imported from the grid, alternative E is not a plausible and realistic scenario since renewable biomass based boilers face investment barriers (please refer to section B.5).

⇨ *Alternative E is not a plausible and realistic scenario.*

Alternative F: Electricity is produced in an on-site captive power plant using biomass (with a possibility of export to a grid) and/or imported from a grid; steam/heat is produced using fossil fuel;

Producing electricity from biomass is not a plausible and realistic scenario since renewable biomass based boilers face investment barriers, in addition in this hypothetical case, electricity would have been produced in a cogeneration unit and therefore, heat could not have been produced from fossil fuel.

⇨ *Alternative F is not a plausible and realistic scenario.*

Alternative G: Electricity and thermal energy (steam/heat) are produced in a biomass fired cogeneration unit (without a possibility of export of electricity either to the grid or to other facilities and without a possibility of export of thermal energy to other facilities);

Alternative G is not a plausible and realistic scenario since renewable biomass boilers face investment barriers (please refer to section B.5).

⇨ Alternative G is not a plausible and realistic scenario

Alternative H: Electricity and/or thermal energy produced in a co-fired system.

Biomass boilers can be also used as co-fired systems, however, as it has been stated in Alternatives E, F and G biomass boilers face investment barriers therefore they cannot be implemented without the CDM.

⇨ Alternative H is not a plausible and realistic scenario

Alternative I: Electricity is imported from a grid and/or produced in a biomass fired cogeneration unit (without a possibility of export of electricity to the grid or to other facilicities); steam/heat is produced in a biomass fired cogeneration unit and/or a biomass fired boiler (without a possibilitu of export of thermal energy to other facilities).

Not applicable as explained in Alternative G.

⇨ Alternative I is not a plausible and realistic scenario

Conclusion

The most plausible scenario for heat and electricity generation is the use of a fossil fuel cogeneration plant. Indeed, in the absence of the project activity, alternative D occurs: prior to the project activity, AISA has been using only bunker C as fuel to meet its fuel requirements; hence the same fuel would have continued to be used in boilers for steam and electricity generation in absence of the project activity. . In this manner, baseline emissions for heat and electricity consumption will be calculated as the total energy produced in the cogeneration unit multiplied by the emission factor of bunker C and divided by the efficiency of the cogeneration unit.

As demonstrated in *Section B.5* the most plausible and realistic scenario is the continuation of the current practice.

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:

In accordance with paragraph 28 of the simplified modalities and procedures for small-scale CDM project activities, a simplified baseline and monitoring methodology may be used for a small-scale CDM project activity and project participants shall demonstrate to a Designated Operational Entity that the project activity would otherwise not be implemented due to the existence of one or more barrier(s) listed in Attachment A to Appendix B.

	Continuation of the current practice	The proposed project activity without the CDM incentive	Impact of CDM registration
Access-to-finance barrier: *the project activity could not access appropriate capital without consideration of the CDM revenues*	The continuation of the current practice does not require any new investment therefore there is no need to access the finance.	Since 2005 AISA has focused its priorities on improving the quality of its production as well as increasing it. This objective has represented a significant financial effort for the company. As a result, the budget available to develop other projects such as biogas or biomass generation programs has been almost inexistent. Under this context, AISA did not have the financial capacity to invest in the	The Global Bank accepted to finance the boiler based on biomass residues but considering carbon credits as a decisive component in the approval[11]. This loan permitted to AISA to buy, install and operate the biomass boiler which is in operation since

	Continuation of the current practice	The proposed project activity without the CDM incentive	Impact of CDM registration
		new biomass plant and asked a bank a loan for the total amount of the required investment. In January 2007 a bank refused to finance the project; then in February 2007 a second bank – Global Bank - expressed its interest to finance the first phase of the project but taking under consideration the obtaining of carbon credits[12]	April 2008. Regarding the financing of the 2nd phase of the project related to install a turbo-generator, in September 2009 the bank agreed to consider its approval but subjected to the obtaining of carbon credits.
Conclusion	**There is no barrier that prevent the continuation of the current practice**	**There is a financial barrier that prevents the implementation of the proposed project activity without the CDM incentive.**	**The designation of the project as a CDM activity, and the attendant benefits and incentives derived from the project activity, will help alleviate the identified barrier and thus enable the project to be undertaken.**

The registration of AISA's project and its implementation as a CDM project activity will also enhance the CDM awareness in the country. It will be a model for all distilleries in the country and thus AISA's project will trigger the implementation of a longer series of biomass cogeneration plants in the region.

CDM Consideration

Being aware of the absolute necessity of carbon credits, the board of AISA considered the CDM in the earliest stages of the project development. A detailed description of CDM steps undertaken by AISA are summarized in table 8 below:

Phase	Events and action	Date	Evidence provided to the DOE
1	*First CDM consideration by AISA's board*	Sep 2006	E-mails between member of AISA's board
	Prior CDM notification with the DNA	Nov 2006	Letter from the DNA First CDM assessment carried out by the DNA
	Bank loan pre- approval for the boiler considering the CDM	Feb 2007	Letter from bank stating that the loan approval is subject to Biomass Supply Agreement, Equipment Purchase Order, CDM assessment & CDM Consultancy Agreement.

[12] *Letters from bank confirming the necessity of carbon credits as a necessary condition to support the proposed project are available for DOE consultation.*

	Boiler purchase order	31 Mar 2007	Purchase order
	Contact with a PDD consultant	Sep 2007	Emails, CDM Consultancy offer
	CDM Consultancy Agreement	Dec 2007	Agreement between AISA & ecosur
	Loan Bank approval phase 1 on condition of CDM (biomass boiler)	Oct 2007	Letter from bank
	Boiler purchase	Oct 2007	Boiler invoice
	Boiler starting operation	May 2008	Report from the supplier (Benecke)
1&2	*Initial discussion with potential buyers*	Jan /Feb 2009	LoI, mails.
	DOE's agreement for CDM validation	Feb 2009	Agreement between AISA & RINA
2	*Loan Bank pre- approval for turbo on condition of CDM*	Sep 2009	Letter from bank stating the necessity of carbon credits to grant the loan.
	ERPA signature	Sept 2010	ERPA between AISA & RWE Supply & Trading Switzerland SA
	Turbo-generator purchase	(*Dec 2012*)	*(Expected- subject to the CDM project registration)*
	Turbo-generator installation	(*Feb 2013)*	*(Expected)*
	Turbo-generator starting operation	(*Apr 2013)*	*(Expected)*

Table 8: Timeline of events and actions which have been taken to achieve CDM registration.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

The baseline emissions as discussed in Section B.4 include emissions that would have occurred in the absence of the project activity. According to the approved AMS I.C methodology, paragraphs 21 and 28 are used to calculate the baseline emissions; corresponding equations are given in the table below.

As per paragraph 45 of this methodology, CO_2 emissions from on-site consumption of fossil fuels due to the project activity are calculated using the version 2 of the *"Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"*.

As it is demonstrated in table below, the project activity is not expected to cause any emissions leakage.

Procedure followed to calculate	Equation used	Methodological choices

Baseline emissions (BE_y)	**Electricity and steam produced in a cogeneration unit, using fossil fuel.**	**AMS-I.C, paragraph 27 & 28**
	$$BE_{cogen,CO2,y} = [\frac{EG_{PJ,thermal,y} + EG_{PJ,electrical,y} \times 3.6}{\eta_{BL,cogen}}] \times EF_{FF,CO2}$$ Where: $BE_{cogen,CO2,y}$ Baseline emissions from electricity and thermal energy displaced by the project activity during the year *y*(tCO_2e) $EG_{PJ,electrical,y}$ The amount of electricity supplied by the project activity during the year *y* (GWh) 3.6 Conversion factor, expressed as TJ/GWh $EG_{PJ,thermal,y}$ The net quantity of thermal energy supplied by the project activity during the year y; TJ $EF_{FF,CO2}$ The CO_2 emission factor of the fossil fuel that would have been used in the baseline cogeneration plant obtained from reliable local or national data if available, alternatively, IPCC default emission factors can be used (tCO_2/TJ) $\eta_{BL,cogen}$ The total annual average efficiency of the cogeneration plant using fossil fuel determined in accordance with paragraph 28 of the AMS-I.C V19, which says: "*In the case of an existing baseline cogeneration plant, the efficiency shall be calculated as the total annual energy produced over the last three years using the historical data as prescribed in paragraph 17 (total electricity generated and total steam/heat extracted divided by the thermal energy value of the fuel use)*"	Since in the baseline situation steam and electricity would have been generated in a cogeneration unit, equation (3) of the methodology AMS-I.C is applied in the baseline emission calculations. As per paragraph 28, total annual average efficiency has been determined from historical data. -

Project emissions (PE_y)	**Emissions due to fossil fuel consumption:** $$PE_{FC,j,y} = \sum_i FC_{i,j;y} \times COEF_{i,y}$$ Where: $PE_{FC,j,y}$ Are the CO_2 emissions from fossil fuel combustion in process *j* during the year y (tCO_2/yr); $FC_{i,j,y}$ Is the quantity of fuel type *i* combusted in process *j* during the year *y* (mass or volume unit/yr); $COEF_{i,y}$ Is the CO_2 emission coefficient of fuel type *i* in year *y* (tCO_2/mass or volume unit) *i* Are the fuel types combusted in process *j* during the year *y* $COEF_{i,y}$ is calculated as per option B of the "*Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion*": $$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y}$$ Where: $NCV_{i,y}$ Is the weighted average net calorific value of the fuel type *i* in year *y* (GJ/mass or volume unit) $EF_{CO2,i,y}$ Is the weighted average CO_2 emission factor of fuel type *i* in year *y* (tCO_2/GJ)	As per paragraph 45 of the AMS-I.C, these emissions are those generated in the consumption of fossil fuels due to the project activity. As it is explained in the section A.4.2, a certain quantity of bunker C will be used to meet the distillery's energy requirements during the first 2 years.
Leakage emissions (LE_y)	⇨ The energy equipment is neither transferred from another activity nor transferred to another activity. Therefore, leakage emissions are not considered. ⇨ The collecting and transporting of the biomass residues are made over a distance of less than 200 kilometers. Therefore, leakage emissions are not considered. ⇨ Concerning the transporting of fossil fuel used during the first 2 years, similar emission levels would have also occurred in the baseline due to the transport of the same bunker C. Transport emissions are considered as negligible. $$\mathbf{LE_y = 0}$$	As per paragraphs 45 and 46 of the AMS-I.C
Emissions reductions (ER_y)	$$\mathbf{ER_y = BE_y – PE_y - LE_y}$$	

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

Boiler 1 (10 TPH)

Data / Parameter:	$Q_{steam,\ boiler\ 1}$
Data unit:	TPH
Description:	Quantity of steam generated by bunker C based boiler 1
Source of data used:	Supplier
Value applied:	10

Justification of the choice of data or description of measurement methods and procedures actually applied :	-
Any comment:	This value has been used to calculate the baseline cogeneration unit efficiency.

Data / Parameter:	**$P_{steam, boiler 1}$**
Data unit:	bar
Description:	Pressure generated by boiler 1
Source of data used:	Supplier
Value applied:	10
Justification of the choice of data or description of measurement methods and procedures actually applied :	-
Any comment:	This value has been used to calculate the baseline cogeneration unit efficiency.

Data / Parameter:	**$T_{boiler 1}$**
Data unit:	°C
Description:	Steam temperature generated by boiler 1
Source of data used:	Supplier
Value applied:	210
Justification of the choice of data or description of measurement methods and procedures actually applied :	-
Any comment:	This value has been used to calculate the baseline cogeneration unit efficiency.

Data / Parameter:	**$\eta_{baseline\ coge}$**
Data unit:	Unitless
Description:	Efficiency of the stand alone boiler using fossil fuel that would have been used in the absence of the project activity
Source of data used:	Calculated
Value applied:	75,6%
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per paragraph 24 of the AMS-I.C., the efficiency shall be calculated as the total annual energy produced over the last three years using the historical data as prescribed in paragraph 14.
Any comment:	This value has been used to calculate the baseline cogeneration unit efficiency.

Other parameters

Data / Parameter:	**NCV_{bunker}**
Data unit:	TJ/ tonne
Description:	Net calorific value of bunker C
Source of data to be used:	Autoridad Nacional de los Servicios Públicos (ASEP)

	http://www.asep.gob.pa/electric/Anexos/ANEXO_1256.pdf Page 98/461
Value of data	36,514 k Cal/gal
Justification of the choice of data or description of measurement methods and procedures actually applied :	36,514 k Cal/gal = 0.000152870 TJ/gal
Any comment:	This value has been used to calculate the project emissions as well as the baseline cogeneration unit efficiency.

Data / Parameter:	**$NCV_{residual\ oil}$**
Data unit:	TJ/ tonne
Description:	Net calorific value of residual oil
Source of data to be used:	Report of analysis Intertek
Value of data	136,338 BTU/gal
Justification of the choice of data or description of measurement methods and procedures actually applied :	136,338 BTU/gal = 0.000143748 TJ/gal
Any comment:	This value has been used to calculate the baseline cogeneration unit efficiency.

Data / Parameter:	**EF_{CO2}**
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor per unit of energy of the bunker that would have been used in the baseline plant and in the project emissions calculation
Source of data used:	IPCC (Volume 2, Chapter 1, Table 1.4)
Value applied:	78.8
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value at the upper limit of the uncertainty at a 95% confidence interval, as per "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" .
Any comment:	Bunker C enters in the category “residual fuel oil”

B.6.3 Ex-ante calculation of emission reductions:

Baseline emissions

As per paragraph 44 of the methodology, the quantities and types of biomass and the biomass to fossil fuel ratio (in the case of co-fired systems) to be used during the crediting period should be explained and documented transparently in the CDM-PDD. For the selection of the baseline scenario, an *ex ante* estimation of these quantities have been estimated based on AISA’s production information and have been presented in the ERs excel spreadsheet.

According to section B.6.1, baseline emission related to cogeneration can be estimated as follows:

$$BE_{y,cogen} = (HG_{y,cogen} + EG_{y,cogen} \times 3.6) \times EF_{CO2} / \eta_{cogen}$$

Net quantity of thermal energy supplied by the project activity ($EG_{PJ,thermal}$)

For ex-ante estimations, calculations are based on specific steam consumption per liter of alcohol produced, and then once the project activity will be implemented, this parameter will be monitored directly.

Alcohol production and steam requirements forecasts for the next 10 years are presented in the table below.

	Steam consumption	Steam enthalpy[13]	$EG_{PJ,thermal}$
	Tons	MJ/t	TJ
2012	63,000	2,558	161.2
2013	70,000	2,558	179.1
2014	77,000	2,558	197.0
2015	84,000	2,558	214.9
2016	84,000	2,558	214.9
2017	84,000	2,558	214.9
2018	84,000	2,558	214.9
2019	84,000	2,558	214.9
2020	84,000	2,558	214.9
2021	84,000	2,558	214.9
		TOTAL	2,041.3

Table 9: Net quantity of thermal energy supplied by the project activity

Electricity supplied by the cogeneration unit ($EG_{y,cogen}$).

	On-site electricity generation	Energy produced onsite: $EG_{y,\ cogen}$
	MWh	TJ
2012	3,086	11.11
2013	3,429	12.34
2014	3,771	13.58
2015	4,114	14.81
2016	4,114	14.81
2017	4,114	14.81
2018	4,114	14.81
2019	4,114	14.81
2020	4,114	14.81
2021	4,114	14.81
	TOTAL	140.71

Table 10: Amount of electricity supplied by the project activity during the year y and used for on-site requirements.

[13] *Steam enthalpy at 10 bar and 210 °C.*

Baseline cogeneration plant efficiency

As per paragraph 28 of the AMS-I.C the total annual average efficiency of the cogeneration plant using fossil fuel shall be calculated as the total annual energy produced over the last three years using the historical data as prescribed in paragraph 17.

Historical steam and fossil fuel consumption as well as electricity generation by the turbine are shown in tables below:

	Fossil fuel	
	Consumption	**Energy**
	gal/y	**TJ**
2005	842,076	128.5
2006	827,143	125.5
2007	847,176	128.7

Table 11: Total fossil fuel energy used for cogeneration in the baseline

	Steam		Electricity	
	Production	**Energy**[14]	**Production**	**Energy**
	Tonnes/y	**TJ**	**kWh**	**TJ**
2005	37,358	94.0	0	0.0
2006	38,182	96.1	0	0.0
2007	39,222	98.7	139,672	0.5

Table 12: Total energy produced in the baseline cogeneration plant

Then, the total electricity generated and total steam/heat extracted is divided by the thermal energy value of the used fossil fuel. The baseline cogeneration plant calculation is calculated as per table below:

	Baseline efficiency
	%
Year 2006	73.2%
Year 2007	76.5%
Year 2008	77.1%
Average	**75.6%**

Table 13: Baseline efficiency cogeneration plant

[14] *Thermal energy has been calculated by taking the difference between enthalpy of total steam leaving the boiler and the total enthalpy of the feed water.*

Baseline emissions related to cogeneration system

As per formula in paragraph 27 of the AMS-I.C. baseline emissions are calculated by multiplying the emission factor of the fossil used in the baseline by the total thermal and electrical energy produced in the project activity and divided by the baseline cogeneration plant efficiency.

The bunker C EF is 78.8 tCO_2/TJ[15]

Baseline cogeneration emissions are shown in table 14:

Year	$EG_{PJ,thermal}$	$EG_{PJ,electrical}$	$BE_{cogen, CO2}$
	TJ	TJ	tCO_2
2012	161.2	11.11	**17,954**
2013	179.1	12.34	**19,949**
2014	197.0	13.58	**21,943**
2015	214.9	14.81	**23,938**
2016	214.9	14.81	**23,938**
2017	214.9	14.81	**23,938**
2018	214.9	14.81	**23,938**
2019	214.9	14.81	**23,938**
2020	214.9	14.81	**23,938**
2021	214.9	14.81	**23,938**

Table 14: Baseline emissions related to cogeneration plant ($BE_{cogen,CO2}$)

Project emissions

According to section B.6.1, project emissions owing to fossil fuel consumed during the project activity are calculated as follows:

$$PE_{FC,j,y} = \sum_{i} FC_{i,j,y} \times COEF_{i,y}$$

Where:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y}$$

Year	Quantity of Bunker C used (FF)	NCV	EF	PROJECT EMISSIONS (PE_y)
	Gallons	TJ/gal	tCO_2/TJ	tCO_2
2012	86,444	0.000152870	78.8	**1,041**
2013	0	0.000152870	78.8	**0**
2014	0	0.000152870	78.8	**0**
2015	0	0.000152870	78.8	**0**
2016	0	0.000152870	78.8	**0**
2017	0	0.000152870	78.8	**0**

[15] IPCC default value at the upper limit of the uncertainty at a 95% confidence interval (Volume 2, Chapter 1, Table 1.3)

2018	0	0.000152870	78.8	**0**
2019	0	0.000152870	78.8	**0**
2020	0	0.000152870	78.8	**0**
2021	0	0	78.8	**0**
TOTAL	**86.444**	-	-	**1,041**

Table 15: Project emissions.

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

Years	Estimation of baseline emissions (tCO_2e)	Estimation of project activity emissions (tCO_2e)	Estimation of leakage emissions (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
2012	17,954	1,041	0	16,912
2013	19,949	0	0	19,949
2014	21,943	0	0	21,943
2015	23,938	0	0	23,938
2016	23,938	0	0	23,938
2017	23,938	0	0	23,938
2018	23,938	0	0	23,938
2019	23,938	0	0	23,938
2020	23,938	0	0	23,938
2021	23,938			23,938
TOTAL	**227,414**	**1,041**	**0**	**226,372**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**$Q_{, steam,p,y}$**
Data unit:	Nm^3/year
Description:	Quantity of steam supplied by the project activity during the year y
Source of data to be used:	On-site measurement
Description of measurement methods and procedures to be applied:	*Data type:* measured *Monitoring frequency:* Continuous monitoring, integrated hourly and at least monthly recording. *Data archiving policy:* paper + electronically for crediting period + 2 years *Monitoring procedure:* flow meter *Calibration frequency:* according to manufacturer specification.
QA/QC procedures to be applied:	As per the existing AISA data management system.
Any comment:	This parameter is measured at the outlet of the boiler.

Data / Parameter:	**$P_{steam, cogen}$**
Data unit:	bar
Description:	Pressure of steam extracted from turbine
Source of data to be used:	On-site measurement
Description of measurement methods and procedures to be applied:	*Data type:* measured *Monitoring frequency:* continuously, integrated hourly and recorded at least on a monthly basis. *Data archiving policy:* paper + electronically for crediting period + 2 years

	Monitoring procedure: pressure gauge *Calibration frequency:* according to manufacturer's specifications
QA/QC procedures to be applied:	As per the existing AISA data management system.
Any comment:	This parameter is measured after the turbine. This parameter is required to determine enthalpy of the steam.

Data / Parameter:	**$T_{steam, cogen,}$**
Data unit:	°C
Description:	Temperature of steam extracted from turbine
Source of data to be used:	On-site measurement
Description of measurement methods and procedures to be applied:	*Data type:* measured *Monitoring frequency:* continuously, integrated hourly and recorded at least on a monthly basis *Data archiving policy:* paper + electronically for crediting period + 2 years *Monitoring procedure:* temperature transmitter. *Calibration frequency:* according to manufacturer's specifications
QA/QC procedures to be applied:	As per the existing AISA data management system.
Any comment:	This parameter is measured after the turbine. This parameter is required to determine enthalpy of the steam.

Data / Parameter:	**$T_{feedwater}$**
Data unit:	°C
Description:	Temperature of the feedwater
Source of data to be used:	On-site measurement
Description of measurement methods and procedures to be applied:	*Data type:* measured *Monitoring frequency:* continuously, integrated hourly and recorded at least on a monthly basis *Data archiving policy:* paper + electronically for crediting period + 2 years *Monitoring procedure:* temperature transmitter. *Calibration frequency:* according to manufacturer's specifications
QA/QC procedures to be applied:	As per the existing AISA data management system.
Any comment:	This parameter is required to determine the feedwater enthalpy.

Data / Parameter:	**$EG_{thermal,y}$**
Data unit:	TJ
Description:	Net quantity of thermal energy supplied by the project activity during the year *y*;
Source of data to be used:	On-site measurement
Description of measurement methods and procedures to be applied:	*Data type:* calculated *Monitoring frequency:* Continuous monitoring, aggregated annually. *Data archiving policy:* paper + electronically for crediting period + 2 years *Monitoring procedure:* - The feedwater temperature will be used to determine the feedwater enthalpy using standard steam table. - The steam pressure and the steam temperature will be used to determine the steam enthalpy using standard steam table. - The amount of feedwater will be multiplied by the feedwater enthalpy to calculate the amount of energy containing in the feedwater. - The amount of steam produced will be multiplied by the steam enthalpy to calculate the amount of steam energy produced.

	Net quantity of steam supplied by the project activity = the amount of steam energy produced minus the amount of energy containing in the feedwater. *Calibration frequency:* N/A
QA/QC procedures to be applied:	As per the existing AISA data management system.
Any comment:	

Data / Parameter:	**$EG_{pPJ,electrical,y}$**
Data unit:	MWh
Description:	Electricity supplied by the project activity in year *y*
Source of data to be used:	On-site measurement
Description of measurement methods and procedures to be applied:	*Data type:* calculated *Monitoring frequency:* Continuous monitoring, integrated hourly and at least monthly recording *Data archiving policy:* paper + electronically for crediting period + 2 years *Monitoring procedure:* measured using calibrated meters.. *Calibration frequency:* according to manufacturer's specifications.
QA/QC procedures to be applied:	As per the existing AISA data management system.
Any comment:	-

Data / Parameter:	**$B_{leafs\ and\ stems}$**
Data unit:	Tonnes/year
Description:	Annual leafs and stems consumption
Source of data to be used:	On-site measurement
Description of measurement methods and procedures to be applied:	*Data type:* measureded *Monitoring frequency:* in batches, consolidated annually *Data archiving policy:* paper + electronically for crediting period + 2 years *Monitoring procedure:* weight bridge *Calibration frequency:* according to manufacturer specifications
QA/QC procedures to be applied:	As per the existing AISA data management system.
Any comment:	Adjust for the moisture content in order to determine the quantity of dry biomass. Cross-check with purchased biomass quantity invoices and stock. Additionally, the consistency of measurements will be checked based on the energy balance that takes into account the energy generation, fossil fuels and biomass used and the efficiency of energy generation..

Data / Parameter:	**$B_{bagasse}$**
Data unit:	Tonnes/year
Description:	Annual bagasse consumption
Source of data to be used:	On-site measurement
Description of measurement methods and procedures to be applied:	*Data type:* measured *Monitoring frequency:* in batches, consolidated annually *Data archiving policy:* paper + electronically for crediting period + 2 years *Monitoring procedure:* weight bridge *Calibration frequency:* according to manufacturer specifications
QA/QC procedures to be applied:	As per the existing AISA data management system.
Any comment:	Adjust for the moisture content in order to determine the quantity of dry biomass. Cross-check with purchased biomass quantity invoices and stock. Additionally, the consistency of measurements will be checked based on the energy balance that takes into account the energy generation, fossil fuels and biomass used and the efficiency of energy generation.

Data / Parameter:	**B** **wood waste**
Data unit:	Tonnes/year
Description:	Annual wood waste consumption
Source of data to be used:	On-site measurement
Description of measurement methods and procedures to be applied:	*Data type:* measured *Monitoring frequency:* in batches, consolidated annually *Data archiving policy:* paper + electronically for crediting period + 2 years *Monitoring procedure:* weight bridge *Calibration frequency:* according to manufacturer specifications
QA/QC procedures to be applied:	As per the existing AISA data management system.
Any comment:	Adjust for the moisture content in order to determine the quantity of dry biomass. Cross-check with purchased biomass quantity invoices and stock. Additionally, the consistency of measurements will be checked based on the energy balance that takes into account the energy generation, fossil fuels and biomass used and the efficiency of energy generation.

Data / Parameter:	**M** **leafs and stems**
Data unit:	%
Description:	Moisture content of leafs and stems.
Source of data to be used:	Laboratory
Value of data	Please refer to section B.6.3
Description of measurement methods and procedures to be applied:	*Data type:* Calculated and measured *Monitoring frequency:* monitored at least on a monthly basis. *Data archiving policy:* paper + electronically for crediting period + 2 years *Monitoring procedure:* At least 3 samples taken for measurement and tested at the laboratory. *Calibration frequency:* according to manufacturer specification.
QA/QC procedures to be applied:	As per the existing AISA data management system.
Any comment:	

Data / Parameter:	**M** **bagasse**
Data unit:	**%**
Description:	Moisture content of bagasse.
Source of data to be used:	Laboratory
Value of data	Please refer to section B.6.3
Description of measurement methods and procedures to be applied:	*Data type:* Calculated and measured *Monitoring frequency:* monitored at least on a monthly basis. *Data archiving policy:* paper + electronically for crediting period + 2 years *Monitoring procedure:* At least 3 samples taken for measurement and tested at the laboratory. *Calibration frequency:* according to manufacturer specification.
QA/QC procedures to be applied:	As per the existing AISA data management system.
Any comment:	

Data / Parameter:	**M** **wood waste**
Data unit:	**%**
Description:	Moisture content of wood waste.
Source of data to be used:	Laboratory
Value of data	Please refer to section B.6.3
Description of measurement methods	*Data type:* Calculated and measured *Monitoring frequency:* monitored at least on a monthly basis.

and procedures to be applied:	*Data archiving policy:* paper + electronically for crediting period + 2 years *Monitoring procedure:* At least 3 samples taken for measurement and tested at the laboratory. *Calibration frequency:* according to manufacturer specification.
QA/QC procedures to be applied:	As per the existing AISA data management system.
Any comment:	

Data / Parameter:	**$FF_{i,y}$**
Data unit:	gal/year
Description:	Fossil fuel oil flow rate *i* combusted in the boiler during the year *y*
Source of data to be used:	On-site measurement
Description of measurement methods and procedures to be applied:	*Data type:* measured *Monitoring frequency:* continuously, recorded on an daily basis *Data archiving policy:* paper + electronically for crediting period + 2 years *Monitoring procedure:* value will be measured using a ruler gauge which will be part of the daily tank. *Calibration frequency for the ruler gauge:* annually
QA/QC procedures to be applied:	As per the existing AISA data management system. The consistency of metered fuel consumption will be cross-checked by an annual energy balance that is based on purchased quantities and stock changes. Additionally, the metered fuel consumption quantities will also be cross-checked with purchases invoices from the financial records.
Any comment:	Measured volume of fossil fuel shall be cross-checked with available purchase invoices.

Data / Parameter:	**$NCV_{biomass}$**
Data unit:	TJ/ tonne
Description:	Net calorific value per type of biomass.
Source of data to be used:	Laboratory
Value of data	Please refer to section B.6.3
Description of measurement methods and procedures to be applied:	*Data type:* measured based on dry biomass. *Monitoring frequency:* once for the crediting period. *Data archiving policy:* paper + electronically for crediting period + 2 years *Monitoring procedure:* At least 3 samples taken for measurement and tested at the laboratory. *Calibration frequency:* N/A, performed in an independent laboratory.
QA/QC procedures to be applied:	The consistency of measurements will be compared with relevant data sources and default values by the IPCC. If measurements differ significantly from previous measurements or other relevant data sources, additional measurements will be conducted.
Any comment:	Measure quarterly taking at least three samples for each measurement. The average value will be used for the rest of the crediting period.

B.7.2 Description of the monitoring plan:

The project is operated and managed by AISA which ensures the overall site operation safety in accordance with Panamanian Laws and technology providers' guidelines.

A specific monitoring plan has been established for AISA Biomass energy plant.

The following list presents different tasks envisaged by various units/departments of AISA:

1. **Technical/Engineering/Maintenance Department**; based on its relevant experience in control and maintenance of the distillery process, AISA's technical team will be able to undertake the specific actions related to the monitoring plan.
2. **Accounting/Sales/Purchasing Departments**; A lot of CDM data needs to be crosschecked, reconciled or consolidated with multiple sources whenever possible. For example, the project exports electricity to the grid, data obtained from the electricity meters can be crosschecked against the sales receipts issued by the national company that will purchase the electricity produced. This kind of reconciliation activity will be recorded properly as DOE may request for such information during the verification.
3. **Finance Department (Executive Director);** The finance department may find it necessary to monitor the amount of emission reduction to estimate the financial risks/potential revenues. In such a case, the finance department may feel the need to monitor CER production closely.

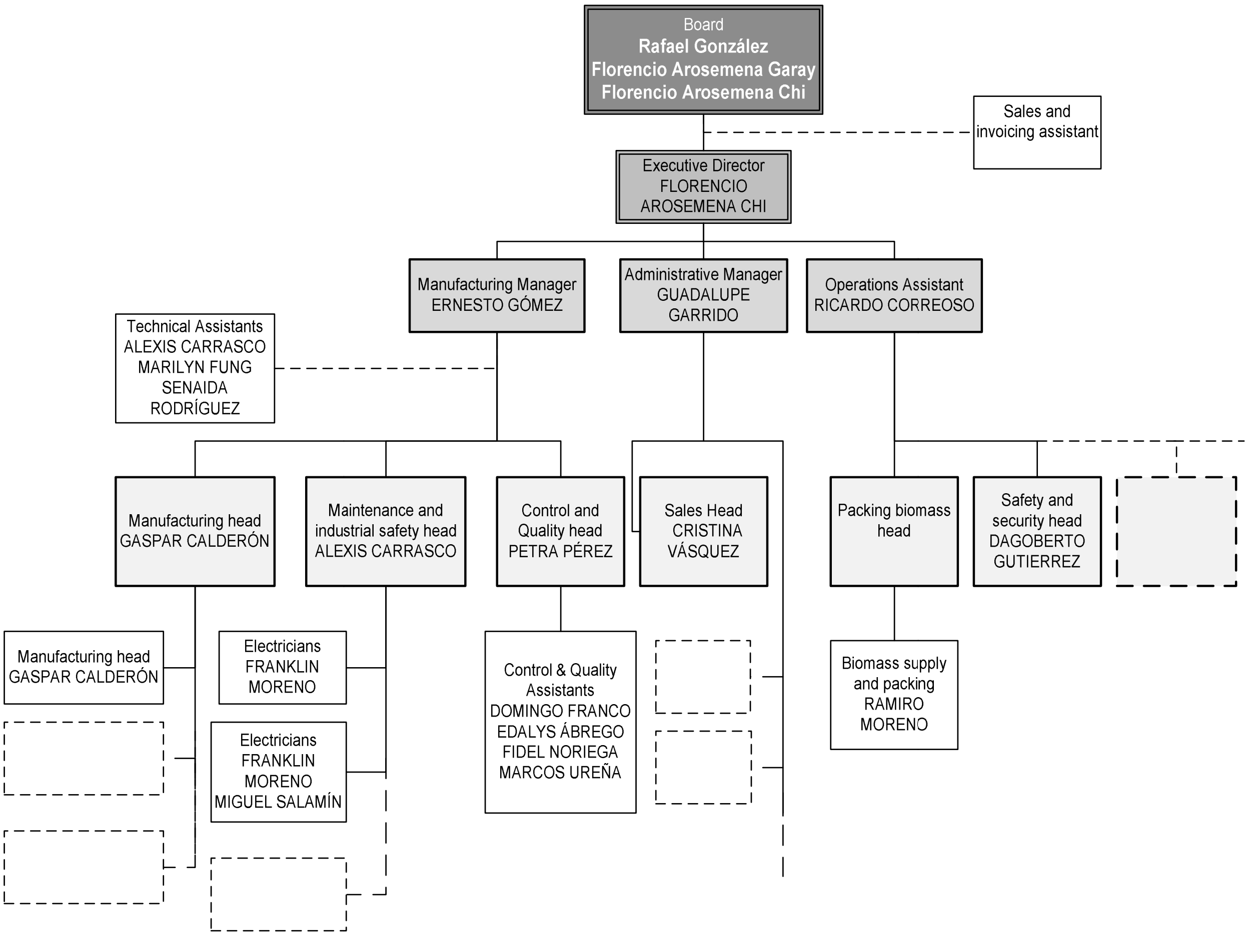

Figure 16: AISA organisation chart.

Mr. Rafael González, Chief Executive Officer of AISA (refer to figure 16), will establish a CDM team dedicated to the project activity monitoring. The Board of AISA will appoint a CDM coordinator.

The responsibility of the CDM coordinator covers supervision for:

1. Monitoring equipment compliance check, ensuring that instrumentations and devices are available and properly suited to perform its function for emission reduction monitoring;
2. Development, execution, analysis and improvement of the Standard (CDM) Monitoring/Reporting Procedures;
3. Deployment of the procedures through trainings, ensuring that these procedures are fully complied with;

4. Communication and coordination between and among multiple departments in a company to disseminate CDM related information;
5. Calculation and reporting of the emission reductions and;
6. Liaison with a DOE during the verification.

The CDM coordinator will be Mr. Ernesto Gomez, a senior and experienced engineer.

In addition to the check of data sources and resources, a monitoring plan strategy will be implemented by AISA. This strategy will cover the following items:

A. **Distribution of Data Collection Tasks**. AISA will assign a member of its staff for every data that has to be recorded. Step-by-step instructions on how the data will be measured, logged, consolidated and archived will be provided to this monitoring team.

B. **Distribution of Equipment Calibration Tasks**. For every instrument or device that is used for CDM monitoring, its associated calibration means, standards, and requirements will be identified and a procedure will be established to ensure its compliance with the monitoring plan.

C. **Mechanism for Data Reconciliation**. AISA will identify which data is required to be reconciled from other sources and will integrate this step as part of the standard procedure for monitoring.

D. **Archiving Data and Reports**. Data will be maintained for a minimum of 2 years after the crediting period. In order to meet this obligation, AISA will establish the means of data keeping and maintenance that ensure the survival of data for the required period.

E. **Emission Reduction Calculation & Reporting**. A calculation and reporting format report has been established. This template will be used throughout the crediting period. This document will significantly reduce the volume of data consolidation and facilitate reporting prior to the verification process.

F. **Personnel Training and Procedure Compliance.** AISA will delegate tasks and will ensure that human resources are properly trained to perform the tasks in an appropriate manner. AISA will identify trainings that might be required to ensure that the tasks can be carried out smoothly.

AISA shall draft an equipment naming and labeling system. This plan will allow equipment and instruments to be easily referred to onsite and accurately labeled for documentation purposes. The naming and labeling of the equipment and instruments will be unique and clear, preferably using materials that will not be damaged by heat or moisture.
The naming and labeling system will be accompanied with a map that indicates:

a) Major equipment with a unique name;
b) Major pipe network to which the instrumentations are attached indicating the material flow;
c) Location of instrumentations relative to the major equipment with a unique name;

For more detailed information of the procedures for registration, monitoring, measurement, the monitoring frequency of all monitored parameters, please refer to ***Annex 4***.

All monitored and required data for verification and issuance will be kept for two years after the end of the crediting or the last issuance of CERs, whichever occurs later.

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 completion: May 1th 2010.
Name of entity determining the baseline:
ecosur
Cabrera 6009
(1414) Buenos Aires, Argentina
Tel. +54 11 47 76 44 06 / Fax +54 11 63 79 19 92

Name of the contact person in charge of baseline calculation and the monitoring plan elaboration:
Jorge JESÚS-ALAMILLA/ María Belén MIGONE
j.jesus@ecosur.fr / b.migone@ecosur-america.com
Tel. +33 1 47 55 06 78/ +54 911 58 25 40 52

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:

31/03/2007 (boiler purchase order)

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

The expected operational lifetime of the project activity is more than 25 years.

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

Fixed crediting period.

C.2.1. Renewable crediting period

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:

The crediting period starts on the date of registration of the CDM project which is expected to be in 01/09/2012.

C.2.2.2. Length:

10 years (120 months)

SECTION D. Environmental impacts

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

The project activity does not require environment 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:

N/A

SECTION E. Stakeholders' comments

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

Stakeholders have been invited to know about the project and submit their comments.

The stakeholder's consultation took place in two sessions: 21th May and 3th June 2008.
In both sessions the project was introduced and explained by the AISA staff to local authorities and TV and journal reporters.

Participants included:

- José Arturo Correa (Pesé Mayor)
- María Elsa Birgham (Pesé Mayor's secretary)
- Milagros Mendieta (Las Cabras de Pesé Magistrate)
- Alina de Corro (Ministry of Economy and Finances of Chitré)
- José María Gaitán (Education Ministry – teacher)
- Abilio Menéndez (Eco-tourist project developer)
- Delsa Caballero (Farmer)
- Alexis Guerrero (Farming producer – Emprag, S.A.)

- Juan Rodríguez (Chitré Global Bank Director)
- Roger Castillero (Global Bank Regional Manager)

- Abdiel Pérez (Journalist Canal II y SERTV – State-owned service of RAISAo & Television)
- Oswaldo Rodríguez (Reporter – Telemetro)
- Gabriel Murgasi (Journalist and reporter – Telemetro – Diario La Estrella de Panamá)
- Alfonso Castillero (Businessman of RAISAo & Television)
- Directors and technical staff of AISA

The project documentation has been submitted to the local authorities during the meeting and was available for all members. Then a project presentation started with the participants. Both sessions took place at the distillery; hence participants were invited to see the concerned facilities. At the end of each presentation stakeholders were invited to answer a brief questionnaire (Please refer to Annex 5).

Figure 17: Project presentation to local population, local authorities and journalists.

The comments received from stakeholders are summarized in section E.2.

E.2. Summary of the comments received:

1. Local authorities comments:

Local authorities expressed a strong support to the project. The city mayor of Chitré agreed to support officially the development of the project. Local authorities underlined the fact that this project is a model for other companies in the country. They hope that the project will foster local employment and will provide other indirect benefits.

Taking into account that AISA will assign 30% of the carbon credit sales to encourage the development of local projects, the concerned authorities emphasized that the CDM project activity represents an important example of sustainable development for the region.

At present, local participants have not decided the nature of the project that will be supported by AISA. However, participants mentioned some possibilities as the improvement of the local hospital or local schools.

2. Public consultation:

The comments show a strong support to the project as the population hopes that the project will boost local employment and will foster development of new activities in the industrial area (to date neither companies nor industries are installed in this area).

Other positive aspects underlined by stakeholders were:

- ✓ Local air quality improvement (harvest without burning).
- ✓ Development of sustainable jobs (harvesting, transporting, technical staff…).
- ✓ Purchase of biomass to third-parties (farmers).
- ✓ Improvement of the local economy.
- ✓ Use of biomass instead of fossil fuel.
- ✓ Non dependence on external energy sources (grid consumption).

All the comments received (questionnaires) and videos recorded are available for DOE consultation.

Please refer to Annex 5.

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

Comments were received in two manners.

A. Stakeholders were invited to answer a brief questionnaire. These questions were submitted as part of the document given to participants during the meeting. The completed questionnaires are available for DOE consultation.
B. Stakeholders were invited to express their opinion in an open manner through different TV interviews done during both sessions. Video recording of theses interviews are available upon DOE request.

Please refer to Annex 5.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Alcoholes del Istmo, S.A.
Street/P.O.Box:	Las Cabras de Pesé / P.O.Box 398 Chitré
Building:	
City:	Las Cabras de Pesé
State/Region:	Provincia de Herrera
Postfix/ZIP:	P.O.Box 398 Chitré
Country:	Rep. de Panamá
Telephone:	+507 974 9590
FAX:	+507 974 9592
E-Mail:	rgonzalez@manchanet.es
URL:	
Represented by:	Mr. Rafael González
Title:	Director/CEO of AISA
Salutation:	Mr.
Last Name:	González Fernández-Pacheco
Middle Name:	
First Name:	Rafael
Department:	Dirección
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Direct FAX:	
Direct tel:	
Personal E-Mail:	rgonzalez@manchanet.es

Organization:	RWE Supply & Trading Switzerland SA
Street/P.O.Box:	Rue des Glacis-des-Rive 12-14
Building:	
City:	1207 Geneva
State/Region:	
Postfix/ZIP:	CH-1207
Country:	Switzerland
Telephone:	
FAX:	
E-Mail:	carbon@rwe.com
URL:	
Represented by:	Mr Arran Kitson
Title:	Senior Emissions Portfolio Manager
Salutation:	
Last Name:	Kitson
Middle Name:	
First Name:	Arran
Department:	Emissions
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Direct FAX:	+41 229 183 399
Direct tel:	+41 229 183 022
Personal E-Mail:	arran.kitson@rwe.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding or direct funding from annex-1 countries availed for this project activity.

Annex 3

BASELINE INFORMATION

No additional information to be added.

Annex 4

MONITORING INFORMATION

According to the methodology AMS-I.C version 19, the following parameters shall be monitored:

Nº	Parameter	Symbol	Unit	Recording Frequency	Calibration frequency	Data; measured, calculated, estimated	Location	Method	Person Recording/ Calculating / Compiling Data	Person Verifiying Data
1	**Steam flow**	$EG_{thermal,y}$	Tonne of steam/year	Weekly	According to manufacturer specification	Measured directly with steam flow meter	At new biomass boiler / after the turbine	Steam flow meter reading will be recorded weekly on a record sheet.	Biomass Energy plant operator	Biomass Energy plant shift supervisor
2	**Steam pressure**	P_{steam}	bar	Weekly	According to manufacturer specification	Measured directly with pressure transmitter	At new biomass boiler after the turbine	Steam pressure will be continuously measured, integrated hourly and recorded weekly on a record sheet.	Biomass Energy plant operator	Biomass Energy plant shift supervisor
3	**Steam temperature**	T_{steam}	°C	Weekly	According to manufacturer specification	Measured directly with temperature transmitter	After the turbine	Steam temperature will be continuously monitored integrated hourly and recorded weekly on a record sheet.	Biomass Energy plant operator	Biomass Energy plant shift supervisor
4	**Feedwater temperature**	$T_{feedwater}$	°C	Weekly	According to manufacturer specification	Measured directly with temperature transmitter	At new biomass boiler inlet	Feedwater temperature will be continuously monitored integrated hourly and recorded weekly on a record sheet.	Biomass Energy plant operator	Biomass Energy plant shift supervisor

Nº	Parameter	Symbol	Unit	Recording Frequency	Calibration frequency	Data; measured, calculated, estimated	Location	Method	Person Recording/ Calculating / Compiling Data	Person Verifiying Data
5	**The net quantity of thermal energy supplied by the project activity**	$EG_{thermal,y}$	TJ	Continuous monitoring, aggregated annually	/	Calculated	The feedwater temperature will be used to determine the feedwater enthalpy using standard steam table. The steam pressure and the steam temperature will be used to determine the steam enthalpy using standard steam table. The amount of feedwater used in the boiler will be multiplied by the feedwater enthalpy to calculate the amount of energy containing in the feedwater. The amount of steam produced will be multiplied by the steam enthalpy to calculate the amount of steam energy produced. The amount of steam energy produced minus the amount of energy containing in the feedwater = The net quantity of thermal energy supplied by the project activity		Biomass Energy plant shift supervisor	Biomass Energy plant shift supervisor
6	**Electricity generation**	$EG_{PJ,electrical,y}$	MWh	Continuous monitoring, integrated hourly and at least monthly recording	According to manufacturer specifications	Measured directly with power meter	Power meter at turbo generator output.	Power meter reading will be recorded weekly o	Biomass Energy plant operator	Biomass Energy plant shift supervisor
7*	**Quantity of Leafs and stems**	$B_{\text{Leafs and stems}}$	tonnes	In batches Aggregated annually	According to manufacturer specifications	Measured	Quantity of biomass will be measured and adjusted for moisture content to determine the		Weigh Bridge Operator	Biomass Energy plant shift

Nº	Parameter	Symbol	Unit	Recording Frequency	Calibration frequency	Data; measured, calculated, estimated	Location	Method	Person Recording/ Calculating / Compiling Data	Person Verifiying Data
								quantity of dry biomass. The measurements will be then cross-checked with purchased biomass quantities invoices and stock.. Additionally, the consistency of measurements will be checked based on the energy balance that takes into account the energy generation, fossil fuels and biomass used and the efficiency of energy generation.		supervisor
8*	**Quantity of bagasse**	$B_{bagasse}$	tonnes	In batches Aggregated annually	According to manufacturer specifications	Measured		Quantity of biomass will be measured and adjusted for moisture content to determine the quantity of dry biomass. The measurements will be then cross-checked with purchased biomass quantities invoices and stock. Additionally, the consistency of measurements will be checked based on the energy balance that takes into account the energy generation, fossil fuels and biomass used and the efficiency of energy generation.	Weigh Bridge Operator	Biomass Energy plant shift supervisor
9*	**Quantity of wood waste**	$B_{wood\ waste}$	tonnes	In batches Aggregated annually	According to manufacturer specifications	Measured		Quantity of biomass will be measured and adjusted for moisture content to determine the quantity of dry biomass. Estimations will be then cross-checked with purchased biomass quantities invoices and stock. Additionally, the consistency of	Weigh Bridge Operator	Biomass Energy plant shift supervisor

Nº	Parameter	Symbol	Unit	Recording Frequency	Calibration frequency	Data; measured, calculated, estimated	Location	Method	Person Recording/ Calculating / Compiling Data	Person Verifiying Data
							measurements will be checked based on the energy balance that takes into account the energy generation, fossil fuels and biomass used and the efficiency of energy generation.			
10	**Quantity of bunker C**	$FF_{i,y}$	m^3	Daily	At least once a year	Measured directly	Ruler gauge located in the daily tank.	Readings will be recorded daily on a record sheet.	Biomass Energy plant operator	Biomass Energy plant shift supervisor
11	**Net calorific value per type of biomass**	$NCV_{biomass}$	TJ/ tonne	Once in the first year of the crediting period		Measured	Laboratory	Measured based on dry biomass in laboratories according to relevant national/international standards. Measure quarterly, taking at least three samples of each measurement. The average value will be used for the crediting period. The consistency of measurements will be compared with relevant data sources and default values by the IPCC. If measurements differ significantly from previous	Laboratory technician	Laboratory manager

Nº	Parameter	Symbol	Unit	Recording Frequency	Calibration frequency	Data; measured, calculated, estimated	Location	Method	Person Recording/ Calculating / Compiling Data	Person Verifiying Data
								measurements or other relevant sources, additional measurements will be conducted.		

(*) Each quantity of biomass will be monitored separately.

Annex 5

INFORMATION REGARDING STAKEHOLDERS CONSULTATION

The document below has been used to introduce the project to the stakeholders. Through this document, the company introduced the main aspects concerning the use of biomass as well as the project benefits.

Alcoholes del Istmo, S.A.

CONSULTA PÚBLICA – PROYECTO MDL

(Mecanismo de Desarrollo Limpio)

Producción de energía renovable a partir de biomasa

El proyecto que presentamos a consulta se resume en los siguientes puntos fundamentales:

1. Empleo de biomasa procedente de residuos agrícolas como combustible para sustituir el bunker (fuel oil) y de esta forma generar vapor para la operación de la destilería.
2. Generación eléctrica autónoma a partir del vapor generado en la caldera de biomasa.

La empresa:

Alcoholes del Istmo, S.A. Fue constituida el 6 de Noviembre de 1997, pero esta destilería ha estado en operación, bajo otras razones sociales desde 1977.

Su actividad principal consiste en la producción de aguardientes y alcoholes a partir de melazas y mieles de la caña de azúcar, que son compradas a los ingenios del área. Tiene una capacidad de producción de 65.000 litros día de aguardientes, alcohol crudo de 78 y 94º GL., y de alcohol rectificado de alta calidad.

Se localiza en el corregimiento de Las Cabras, distrito de Pesé, en la provincia de Herrera Las oficinas y la industria quedan a una distancia aproximada de 32 kilómetros de la ciudad de Chitré.

Otra de las empresas del Grupo, ***Campos de Pesé, S.A.*** se dedica a desarrollar el cultivo de caña de azúcar en el área. Este año se prevé alcanzar las 850 Has de caña de azúcar y se sigue creciendo.

Alcoholes del Istmo, S.A. tiene actualmente en plantilla más de 95 trabajadores, y es una fuente permanente de empleo y desarrollo económico muy importante en el área.

Operación de uso de biomasa como combustible:

Durante la zafra de la caña de azúcar, una vez recogida la caña, queda esparcido por el suelo una gran cantidad de materia orgánica, principalmente hojas y cogollos.

Habitualmente, la caña se venido cosechando quemada para facilitar su corte. Las hojas que quedaban una vez recogida la caña solía quemarse en el campo para que no entorpecer las posteriores labores de cultivo. Utilizando este método de recuperación de biomasa, el corte de caña se realizaría en verde, es decir, sin quemar previamente la caña que se va a cosechar.

Las Cabras de Pesé, Herrera, Rep. De Panamá - P.O.Box 396, Chitré - Tel: +507 9749590 / 9749591 –
Fax: +507 9749592 - E-mail : directores@grupoalcoholes.com 1

Alcoholes del Istmo, S.A.

Adicionalmente se tiene previsto emplear otros residuos agrícolas, así como residuos de madera picados que se tiene planeado comprar a los agricultores y otros residentes del área, fomentando una nueva posibilidad de negocio para esta zona.

Beneficios generados por el proyecto

Beneficios sociales y económicos:

- ✓ Mejoramiento en el nivel de vida de la población cercana al proyecto
- ✓ Mejor calidad de aire ya que no se dan quemas de caña y biomasa de la cosecha que molestan a los residentes del área.
- ✓ Crece el nivel económico del área, ya que se crea mucho empleo estable, tanto directo como indirecto.
- ✓ Se crean negocios alternativos ya que la empresa comprará biomasa a pequeños agricultores y cualquier persona interesada, de esta forma, en vez de comprar combustibles fósiles que no aportan nada positivo a las economías rurales del área de influencia, se estará inyectando una gran cantidad de dinero a toda esta gente, favoreciendo su nivel de ingresos y dándoles otras posibilidades de desarrollo sostenible.
- ✓ Creación de empleos
    - ❖ Técnicos agrícolas, supervisores y mecánicos
    - ❖ Operarios de maquinaria agrícola y transportistas para la recolección de biomasa
    - ❖ Operarios para la caldera
    - ❖ Operarios para el turbogenerador
    - ❖ Técnicos de laboratorio para análisis de biomasa y fertilizantes orgánicos
    - ❖ Personal que se encargará de compra de biomasa a terceros (limpieza de potreros, poda de cercas vivas, etc)
    - ❖ Personal para carga y descarga de la biomasa
    - ❖ Personal para la preparación y distribución de abonos orgánicos

Beneficios Ambientales:

- ✓ Mejoramiento en la calidad del aire : reducción de emisiones de Gases de Efecto Invernadero
- ✓ Prácticas de cosecha y cultivo mucho más amigables con el medio ambiente:
    - ❖ Se evitan las quemas de la caña de azúcar para su cosecha, que son un grave problema ambiental
    - ❖ Se evitan las requemas de biomasa en los suelos después de la cosecha para facilitar las labores de preparación de suelos (se evita la mineralización de suelos y se protege su estructura)
    - ❖ Se produce gran cantidad de fertilizantes orgánicos a partir de las cenizas generadas en la caldera y de las vinazas procedentes de la destilería
- ✓ Uso de la biomasa como fuente energía renovable en sustitución del bunker
- ✓ Generación de electricidad autónoma en vez de comprarla a la red pública

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Alcoholes del Istmo, S.A.

CONSULTA PÚBLICA – PROYECTO MDL

(Mecanismo de Desarrollo Limpio)

Producción de energía renovable a partir de biomasa

CUESTIONARIO DE EVALUACIÓN DEL PROYECTO:

Nombre: Jose Correa

Empresa / Organismo:

Cargo que desempeña: Alcalde de Pesé

Le agradecemos valore los puntos más destacados de este proyecto (del 1 al 5)

Sustitución bunker por biomasa recogida en el área	1	2	3	4	(5)
Producción de electricidad autónoma	1	2	3	(4)	5
Creación de empleo estable	1	2	3	4	(5)
Compra de biomasa a terceros (agricultores y otros)	1	2	3	4	(5)
Desarrollo de negocios alternativos (recogida y venta de biomasa)	1	2	3	4	(5)
Crece nivel económico del área (reparto de dinero de bunker)	1	2	3	(4)	5
Mejora calidad del aire para residentes (no se quema caña)	1	2	3	4	(5)
Desarrollo de cultivos y labores agrícolas más rentables	1	2	3	4	(5)
Producción de fertilizantes orgánicos	1	2	3	4	(5)
Evita evasión de divisas del país (reduce importaciones de bunker)	1	2	3	4	(5)

Si considera que este proyecto puede generar algún punto negativo, por favor, indíquelo a continuación:

Claro que no primero la limpieza de los áreas que se encuentra y segundo mejoraría el estado de vida ya que el Petroleo se ha disparado en el Mundo.

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Figure 18: Questionnaire fulfilled by the City Mayor of Chitré.

Alcoholes del Istmo, S.A.

CONSULTA PÚBLICA – PROYECTO MDL

(Mecanismo de Desarrollo Limpio)

Producción de energía renovable a partir de biomasa

CUESTIONARIO DE EVALUACIÓN DEL PROYECTO:

Nombre: x Abel Murga

Empresa / Organismo: x Diario La Estrella de Panamá

Cargo que desempeña: x Periodista

Le agradecemos valore los puntos más destacados de este proyecto (del 1 al 5)

Sustitución bunker por biomasa recogida en el área	1	2	3	4	(5)
Producción de electricidad autónoma	1	2	3	4	(5)
Creación de empleo estable	1	2	3	(4)	5
Compra de biomasa a terceros (agricultores y otros)	1	2	3	(4)	5
Desarrollo de negocios alternativos (recogida y venta de biomasa)	1	2	3	(4)	5
Crece nivel económico del área (reparto de dinero de bunker)	1	2	3	(4)	5
Mejora calidad del aire para residentes (no se quema caña)	1	2	3	4	(5)
Desarrollo de cultivos y labores agrícolas más rentables	1	2	3	4	(5)
Producción de fertilizantes orgánicos	1	2	3	4	(5)
Evita evasión de divisas del país (reduce importaciones de bunker)	1	2	3	4	(5)

Si considera que este proyecto puede generar algún punto negativo, por favor, indíquelo a continuación:

Lo que pudiera generar contradicción, es si la producción de energía renovable a partir de la biomasa es contraria a la seguridad alimentaria y al esfuerzo de quienes realizan la labor.

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Figure 19: Questionnaire fulfilled by a local journalist.

Alcoholes del Istmo, S.A.

CONSULTA PÚBLICA – PROYECTO MDL

(Mecanismo de Desarrollo Limpio)

Producción de energía renovable a partir de biomasa

CUESTIONARIO DE EVALUACIÓN DEL PROYECTO:

Nombre: Delsa L. Caballero
Empresa / Organismo: Campo de Pesé
Cargo que desempeña: asistente de Campo

Le agradecemos valore los puntos más destacados de este proyecto (del 1 al 5)

Sustitución bunker por biomasa recogida en el área	1	2	3	4	(5)
Producción de electricidad autónoma	1	2	3	4	(5)
Creación de empleo estable	1	2	3	4	(5)
Compra de biomasa a terceros (agricultores y otros)	1	2	3	4	(5)
Desarrollo de negocios alternativos (recogida y venta de biomasa)	1	2	3	4	(5)
Crece nivel económico del área (reparto de dinero de bunker)	1	2	3	4	(5)
Mejora calidad del aire para residentes (no se quema caña)	1	2	3	4	(5)
Desarrollo de cultivos y labores agrícolas más rentables	1	2	3	4	(5)
Producción de fertilizantes orgánicos	1	2	3	4	(5)
Evita evasión de divisas del país (reduce importaciones de bunker)	1	2	3	4	(5)

Si considera que este proyecto puede generar algún punto negativo, por favor, indíquelo a continuación:

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Figure 20: Questionnaire fulfilled by a farmer of Chitré.

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Alcoholes del Istmo Internacional S.A.

TÍTULO:

LISTA DE ASISTENCIA

CONSULTA PUBLICA-PROYECTO MDL
(MECANISMO DE DESARROLLO LIMPIO)

FECHA: 3-6-08

Nombre	Área	Actividad	Firma
Osvaldo Ojo Rodríguez	Canal 11 Sertvé	Periodista	[illegible]
José María Saitz	Ministerio Sda	Maestro	[illegible]
Milagros Mendieta	Los Castros Pesé	Concejala	[illegible] 6-16-486
María Elva Bingham	Municipio Pesé	Secretaria	María Elena Bingham
José Arturo Correa	Municipio Pesé	Alcalde	José Arturo Correa
Abdiel Pérez	Canal 11 Sertvé	Periodista	[illegible]
Abel Murgas	Canal 11 Sertvé	Periodista	[illegible]
Rafael González	Panamá	Productor	[illegible]
Alexis Quintero	Chitré	industrial	[illegible]
Florencio H. Arosemena	PMA	Traslado	[illegible]
ERNESTO GOMEZ	PRODUCCIÓN	GERENTE PRODUCCIÓN	[illegible]

Figure 21: List of participants to the stakeholders' consultation.