THE GOLD STANDARD:
Project Design Document for Gold Standard Voluntary Offset projects

(GS-VER-PDD)

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Explanatory information on how to complete the PDD and how to obtain Gold Standard registration can be found in the project developer's manual available on the Gold Standard website.

This template of the PDD is applicable for micro-, small- and large-scale projects. Note that the shaded boxes present information on the Gold Standard VER project development procedures. Project developers should delete these shaded boxes when preparing their PDD.

VOLUNTARY OFFSET PROJECTS

PROJECT DESIGN DOCUMENT FORM (GS-VER-PDD)
Version 01 - in effect as of: January 2006)

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity

Title: Biogas Tanks in Guizhou Province in China
Version: 1
Date: 20 August 2008
Version: 2
Date: 10 September 2009
Version: 3
Date: 15 November 2009
Version: 4
Date: 25 November 2009

A.2. Description of the project activity

Introduction

The project activity has been implemented by a French NGO, Initiative Développement (ID), in Guizhou province, China. Guizhou province, mainly constituted of a rural population, is one of the poorest provinces located in the southwest part in China. "Over 90% of the province's total land area is mountainous. The difficulties posed by this landscape have led to inadequate infrastructure and low levels of outside investment. The landscape has constrained overall development, particularly in rural areas. About 15% of Guizhou's villages are still inaccessible by road, 27% of the village population is not connected to an electrical grid and the average rural per-capita income is only 27% of that of the province's urban areas".[1]

This population still relies on traditional energy sources for cooking, such as firewood, charcoal and/or coal. Consequently, Guizhou province is severely affected by deforestation. Furthermore, the immeasurable use of coal contributes to the increase of global warming. The smoke coming out of the energy-inefficient stoves has a negative health impact on women and children who are the main ones to use the kitchen. According to the World Health Organization, Indoor Air Pollution is one of the major global concerns that remain unattended. More than 1,6-million people die every year from the effects of breathing in poisonous smoke from animal dung, wood and coal used for cooking[2].

Purpose of the Project Activity

The purpose of the project is to provide the villagers of Guizhou a new, free and clean source of energy through the construction of the 8 m^3 biogas tanks for individual households. The project is being implemented in two districts of Guizhou province- Weining district and Danzhai district. Since Guizhou's rural population mainly consists of farmers, a biogas tank project is particularly suitable for the local situation as the wastes from farming activity will be utilized to produce a clean and convenient energy. The implementation of the project will take place between the years 2007 and 2009, with 300 biogas tanks in 2007, 600 in 2008, and 800 in 2009. The project aims to accomplish the following points:

[1] http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2009/04/20/000334955_20090420033606/Rendered/PDF/449130PAD0P091101Official0Use0Only1.pdf

[2] http://www.who.int/mediacentre/news/statements/2004/statement5/en/

- To save time spent for firewood collection and save the annual expenses on the purchase of additional firewood, charcoal, coal required for cooking, space heating and lighting.
- Improve the living conditions of the beneficiaries by preventing lung diseases caused due to the indoor air-pollution caused due the smoke generated by cook-stoves based on firewood, charcoal and coal.
- The efficient use of waste, mainly excrement (human & animal's), in the biogas tanks which will improve the hygiene of the house and its surroundings thanks to the new toilets and pigsties. The residual waste from the biogas tank can be used as an organic fertilizer reducing the farmer's dependency on chemical fertilisers.
- And finally, the project will reduce the demand for firewood, charcoal, and coal in the project area leading to a decrease in the rate of deforestation in Guizhou province.

In the absence of the project the beneficiaries would still have been dependent on the local forest cover, which would have lead to increased deforestation, health issues due to indoor air-pollution and also due to the unhygienic conditions near the household.

Implementation of the project

The first step of the identification of the project beneficiaries consists in identifying the villages: a selected village should have good access in order to be able to bring the equipment and materials needed for the constructions of the tanks. Among the villages with access roads for transportation of materials, the priority for the implementation of biogas tanks is given to the ones with the poorest access. Also, the villages should be able to provide enough labour, since the beneficiaries will actively take part in the construction of their tanks. Once the villages are identified, the villagers will be selected, according to their incomes, their livestock, and their motivation to join the project and build a tank. Biogas tank technicians will then work in the villages and help the villagers for the construction of the tanks.

How does the project mitigate GHG emissions?

Depending on village in the project area, villagers mainly use firewood and/or coal for cooking. Basically, the project will partly or fully replace these traditional fuels with biogas. The coal consumption savings will directly be converted into CO_2 emissions reductions, while the wood consumption related savings will be converted to CO_2 emissions reductions, according to a biomass non-renewability rate. The waste generated from the pigsty would have led to methane emissions if left to decay naturally. But this waste from the pigsty would be used in the production of the biogas avoiding the methane emissions.

View of the project participants of the contribution of the project to Sustainable Development

The preliminary and potentially complementary consultations (see Section G) witnessed many interests in the biogas tank project, in terms of sustainable development. The project will contribute to the local development of the beneficiaries' villages through the following ways:

Impact on Natural Resources

- *Avoided deforestation*
  The project slows down deforestation and preserves biodiversity and local ecosystems in general, due to the option of biogas use to fuelwood

- *Water quality*
  Thanks to a better management of excrement, there are less viruses and bacteria in the local environment[3], which improves indirectly the water quality.

Socio-economic Impacts

- *Reduction of time spent for firewood collection*
  For the project's beneficiaries who used to collect firewood in the forest to satisfy their energy demand, a biogas tank will make them reduce their firewood consumption; hence they will save time spent on collecting firewood.
- *Reduction of time spent for cooking*
  Biogas is more convenient to use than firewood and coal: the stove is more efficient, so that cooking needs less time; moreover, cooking with biogas doesn't require getting the fuel and preparing the fire before using it. That's why the beneficiaries agree that biogas is more convenient and requires less time for cooking.
- *Money saved from the purchase of fuel, electricity and fertilizers*
  For the project's beneficiaries who used to buy their fuel for cooking (coal or charcoal), a reduction in use of these traditional energy sources will also mean a reduction of the money spent on cooking fuel. Also, the biogas tank comes with a biogas lamp, which will replace electric lamps, and which will reduce the money spent by the households on their electricity consumption.

Impact on health

- *Enhanced hygiene in the house*
  The biogas tank will be directly fed with animal and human excrement, through the toilets and pigsty specifically built for this project. The hygiene level and living conditions of local populations will be improved due to the installation of toilets and pigsties close to the bio-digesters.
- *Reduction of smoke emissions in the kitchen*
  Cooking with firewood and coal indoors fills the house with smoke, which contains airborne particles, carbon monoxide and other toxic elements. All of these emissions can cause lung diseases and other health problems. Biogas stoves are smoke-free.

[3] SOLAGRO, 2002. *Effets de la digestion anaérobie sur les micropolluants et germes pathogènes.*

Sustainable Development Matrix

Local/regional/global environment	
1. Water quality and quantity	+
2. Air quality (emissions other than GHGs)	+
3. Other pollutants (where relevant, toxicity, radioactivity, POPs, ozone depleting gases)	0
4. Soil condition (quality & quantity) – use of organic fertilizer of sludge for land application	+
5. Biodiversity (species and habitat conservation)	+
Social sustainability and development	
6. Employment (including job quality, fulfillment of labour standards)	+
7. Livelihood of the poor (including poverty alleviation, distributional equity, and access to essential services)	+
8. Access to energy services	+
9. Human and institutional capacity (including empowerment, education, involvement, gender)	+
Economic and technological development	
10. Employment (numbers)	+
11. Balance of payments (sustainability)	0
12. Technological self reliance (including project replicability, hard currency liability, skills development, institutional capacity, technology transfer)	+
TOTAL	+

Explanation of the Grid

1. The water quality is indirectly improved due to the new management system of the excrements. Some project areas have poor access to water, although water is necessary for the running of the biogas system. However, it doesn't seem to be a problem for the beneficiaries, as the tank is filled with waste water.
2. The air quality is improved, thanks to a reduction of the combustion of traditional fuels (coal and firewood), which emits smoke, carbon monoxide, toxic elements and airborne particles. This is one of the main purposes of the project. At the same time, bad odors coming from manure are reduced due to the organic elements decomposition occurring in the tank.
3. Besides the production of methane, the anaerobic decomposition that occurs in the tank also produces hydrogen sulfide (H_2S), the combustion of which releases sulfur dioxide ($S0_2$), and both are considered to be toxic and responsible for respiratory ailments[4]. However, a filter located in the manometer prevents the emission of this H_2S, therefore of SO_2. Anaerobic digestion enhances ammoniac (NH_3) production, which is mainly found in the residual wastes of the tank. NH_3 spreads easily in the air when the wastes are withdrawn from the tank. For high concentrations, it may be harmful. That is why beneficiaries are trained in proper management of the tank's sewage. The difference of NH_3 production between the natural outdoor and anaerobic decomposition of the excrements depends on multiple external factors such as outside temperature, means of excrements spreading, etc. No in-depth studies were conducted to assess this

[4] R.A.Hamburg, 1989. *Household Cooking Fuel Hydrogen Sulfide and Sulfur Dioxide Emissions from Stalks, Coal and Biogas.*

difference. Finally, the nitrous oxide (N_2O) emissions, a GHG with a high global warming potential (298; IPCC, AR4, 2007), seem to decrease with an anaerobic waste management compared to natural outdoor decomposition[5].

4. The residual wastes in the tank can be used as a natural fertilizer. Its impact on the local soil fertility has not been studied in detail.
5. The project avoids local deforestation and protects the forest's ecosystem.
6. No significant impact on social sustainability and development, in terms of employment.
7. Poverty alleviation is one of the expected results of the project. Villages of Guizhou province are among the poorest areas in the whole of China, so the biogas tanks provide the villagers with a free energy source. Thanks to the biogas produced, the villagers save money from fuel expenditures and electricity bills.
8. As explained in the previous section, improved access to energy is one of the main objectives of the project. Firewood users save time on firewood collection in the forest. Beneficiaries of the project expressed that biogas is more convenient to use and free, compared to traditional fuels.
9. Beneficiaries of the project fully participate in the construction of the tank, so that they develop new skills, such as in masonry, in waste management, in residual waste use, or more generally, in biogas production.
10. The project needs biogas technicians, as well as local promoters who will explain and help the beneficiaries in the construction of their tanks. These promoters are hired to check the project and to monitor it. Moreover, they help the villagers in case of malfunctions of the tank. The promoters come from Guizhou villages.
11. No significant impact was found.
12. Biogas production in tanks already exists in China, but at the time of writing, bio-digesters are installed in more economically privileged areas, since the users have to purchase their tanks. On the other hand, the project focuses on the most disfavored areas of Guizhou, mainly ethnic minorities of China. Many NGOs are now interested to implement biogas projects in those areas.

A.3. Project participants:

Name of Party involved ((Host) indicates a host Party)	Private and/or public entities project participants (As applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China		No
France	Initiative Développement (Project Coordinator) & GoodPlanet .org	No

Since ID and Goodplanet are not local NGOs, the leaders of each village have signed an agreement for the transfer of credits arising from the total project activity for a period of 10 years. A copy of the transfer of credit certificate could be provided upon request.

[5] Fédération des producteurs de porcs du Québec, 2004. *Les sous-produits liquides de traitement des lisiers.*

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party:
People's Republic of China

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

A.4.1.3. City/Town/Community etc:

County/District	Towns	Villages	Communities
Weining	Cahoai	Damacheng, Zhengjiaying, Dongshan, Gaoshan, Lujiahe, Xiangtang	Miao, Han…
	Dajie	Gaohua	Miao, Han…
	Niupeng	Xinshan, Yingshan, Yutang, Dengjiaying, Fanjiatian	Miao, Han…

County/District	Towns	Villages	Communities
Danzhai	Longquan	Jiaogui, Delu, Wuli, Jinshan, Longdong, Shanmu, Gaopai, Jinguadong	Miao, Han.
	Xingren	Jiajiao & Zhela, Dianlie, BaiTou	Miao, Han.
	Yangwu	Yangwang & Paimo	Miao,Han, Yi…
	Paidiao	Zaisu	Miao, Han…

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

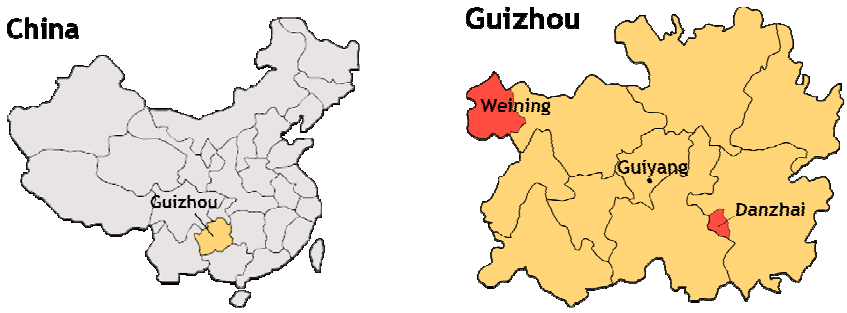


Figure 1 – Maps of People's Republic of China and of Guizhou Province

Province	County/District	Longitude[6]	Latitude[7]
Guizhou	Weining	104° 13' 59"	26° 51' 0"
	Danzhai	107° 46' 59"	26° 13' 0"

The precise project areas are given in separate annexes.

A.4.2. Size of the project:

As the assessed project emission reductions are below 5000 tCO_2e per year, the project falls under the micro-scale category.

A.4.3. Category of project activity:

Domestic Renewable Energy, Biogas, Agro processing and other residues.
(Point A.1.1.2.2 of the Appendix A of the Gold Standard VER Project Developer's Manual)

A.4.4. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectorial policies and circumstances:

The size the of the biogas plants varies as per the energy needs and the available agro-waste/human waste material in the region. The biodigester type used in the project activity is a 3-in-1 system which includes a biogas digester, a pig house, and toilets. The pigsty and household toilets are connected to the biogas plant through an underground pipe construction so that waste flows directly into the biodigester. This also makes sure a continuous supply to produce the biogas. Therefore considering the waste quantity available, the size of the biogas plant in the project activity is 8 m^3. The generated gas from the biodigester leads to the kitchen cooking stove and a lamp, through a well sealed pipe to make sure that there is no escape or loss of the biogas. The diagram below shows a typical set-up of a biogas plant in the project area.

How does the project mitigate GHG emissions?

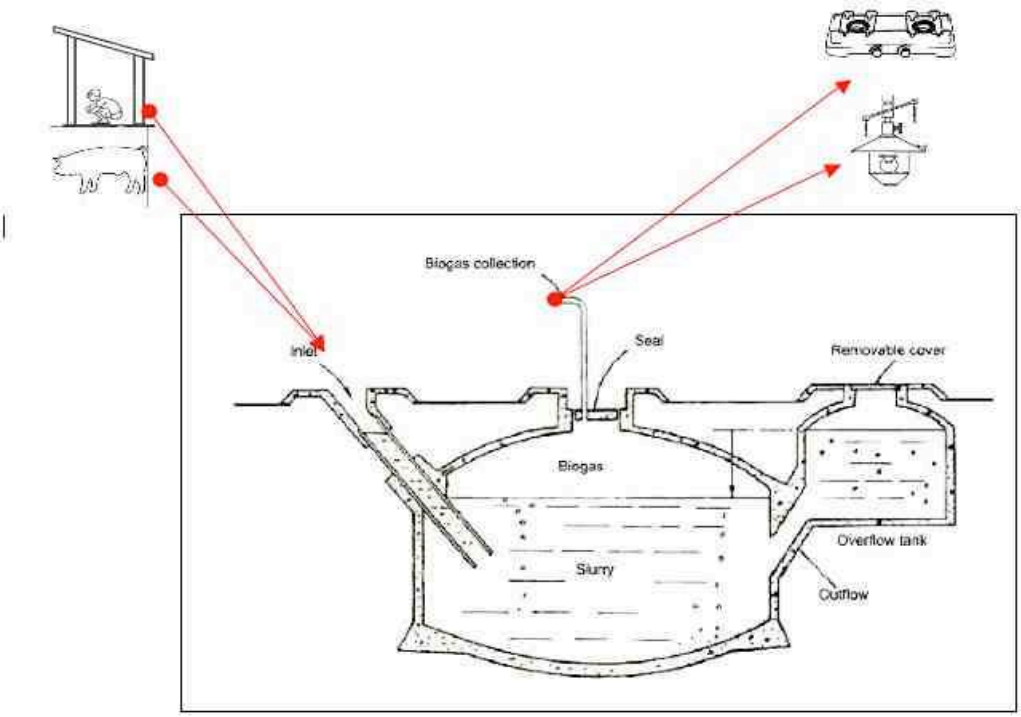
As explained before, project participants will save firewood and/or coal, which they have been using as cooking fuels, thanks to the introduction of the bio-digester technology. The non-renewable biomass ratio is assessed in order to claim the emission reductions concerning the wood savings. Furthermore, emission reductions from the coal savings have been calculated as well. A detailed technical explanation on the working and design of the 8m^3 biodigester is provided separately in the annexes.

In the project scenario, the methane emissions due to the incomplete combustion of biogas will be accounted and will be deducted from the overall emission reductions. To conclude, the project will mitigate GHG emissions that would

[6] http://www.infoplease.com/atlas/latitude-longitude.html

[7] http://www.infoplease.com/atlas/latitude-longitude.html

have otherwise been released to the atmosphere in the absence of the project activity. The total emission reductions achieved by the project are estimated at 44,411 tCO_2e during a fixed crediting period of ten years.



"Why the GHG emissions reductions wouldn't occur without the project?"

The implementation of the biogas plants in the rural areas of China has been carried out since 1973. Taking into consideration the increasing need of energy the Chinese government has been promoting biogas technology to individual families by giving them subsidies to build the biodigester. This activity by the government has been carried out under the National Biogas Programme. Since January 2006, the Chinese government has passed a new environment related law known as the 'Renewable Energy Law', under which the government plans to increase the implementation of the biogas plants in the rural areas. The beneficiaries of the project are already some of the poorest families in the Guizhou province and therefore have financial difficulties (the project doesn't provide sources of income); the biogas tank project couldn't be implemented without the VER credits. Moreover, alternative situations such as biogas tanks constructed by the government, or sold directly to the beneficiaries are not feasible since the beneficiaries targeted by the project are among the poorest populations of the whole China and can't afford a biogas tank. As per ID- China, a biogas set (tank, toilets and pigsty) costs at an estimated 315 Euros (including material, human resources, training, etc., while the beneficiaries earn less than 1000 CNY per year per person, which means less than 2000 CNY per year per household (around 200 Euros). Finally, it may be assumed that beneficiaries of the project wouldn't have switched to other energy sources placed higher in the energy ladder, such as LPG and Kerosene, because those fuels are far more expensive than free firewood, cheap charcoal and coal. Since electricity is a more convenient and available source, beneficiaries have already switched, to some extent, to electricity used for cooking (boiling water mainly). One of the reasons the project wouldn't be implemented through the governmental biogas project is the lack of infrastructure and also the economic situation of the beneficiaries do not give them the option to build the biogas tanks sold through the open market. These are a few arguments to assure that the GHG emission reductions would not occur without the initiative by ID to implement the biogas project in the region.

A.4.4.1. Estimated amount of emission reductions over the crediting period:

Period	Annual estimation of emission reductions (in tCO2e)
1st April 2008 to end of Winter 2008-2009	1073
Summer 2009/Winter 2009-2010	3460
Summer 2010/Winter 2010-2011	4950
Summer 2011/Winter 2011-2012	4950
Summer 2012/Winter 2012-2013	4950
Summer 2013/Winter 2013-2014	4950
Summer 2014/Winter 2014-2015	4950
Summer 2015/Winter 2015-2016	4950
Summer 2016/Winter 2016-2017	4950
Summer 2017/Winter 2017-2018	4950
Beginning of Summer 2018 to 1st April 2018	279
Total emissions reductions	**44411**
Total number of crediting years	10
Annual average over the crediting period of estimated reductions	4441

Table 1 – Estimated amount of emission reductions over the crediting period

SECTION B. Application of a baseline methodology

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

Indicative programme, baseline, and monitoring methodology for Small Scale Biodigester Voluntary Gold Standard.

B.1.1. Justification of the choice of the methodology and why it is applicable to the project activity:

This methodology is applicable as per definition of Section I of the Indicative programme, baseline, and monitoring methodology for Small Scale Biodigester, Voluntary Gold Standard:

This methodology is applicable to programmes of activities involving the implementation of biodigesters in households within the project's boundaries. The project activity is implemented by a project coordinator who acts as the project participant. The individual households will not act as project participants. The consumption of biogas from the biodigesters replaces the consumption of fossil fuel and/or biomass.

Furthermore, the following conditions apply to the methodology:
- The biodigester programme promotes the wide-scale use of biogas as substitute for wood, agricultural residues, animal dung and fossil fuels that are presently used for the cooking, space heating and lighting needs of most rural households.
- The methodology applies to project with biodigesters with a maximum total biodigester volume of 20 m3.
- The biodigesters in the programme are not included in another CDM or voluntary market project (i.e. no double counting takes place),
- If more than one climate zone is included in the project, the project should make a distinction per climate zone.

Under the presented scheme:

- The biogas tank project is implemented by Initiative Développement who acts as the project participant.
- The volume of implemented biodigesters is 8 m^3 and biogas is used for cooking purposes in replacement of fossil fuel and biomass (firewood and charcoal).
- All the tanks of the Initiative Développement Biogas Tank programme are included in only this voluntary carbon project. Initiative Développement gets some co-funding for this project from private sponsors, but the partnerships with these sponsors are not based on GHG emission reductions.
- Finally, since the geographical project boundaries are wide, the project may include several climate zones, so that the project will make a distinction per climate zone.

B.2. Description of how the methodology is applied in the context of the project activity:

As determined in the section II of the methodology, two main points are studied to determine the baseline scenario: The most plausible scenario and the assessment of suppressed and satisfied demand.

1) The most plausible scenario

The methodology offers two possibilities:

- The baseline scenario is the pre-project scenario i.e. the situation before the implementation of the project.
- The baseline scenario is the situation where fossil fuels are used to meet energy service needs (even if they are not currently being used).

LPG tanks of 11.5 Kg cost around 90 CNY in Guizhou province. Since the baseline energy demand is high, in order to switch from traditional cooking fuels (firewood and coal) to LPG, a household would need around 40 LPG tanks per year to meet their energy demand[8], which represent annual expenses of 3600 CNY. This is greater than the annual income of the households.

A switch to LPG is then too expensive for the populations targeted by the project. Besides, a switch to Kerosene is not likely to occur since cooking with kerosene is not a common practice in Guizhou's countryside. In any case, it would be too expensive as well.

Therefore, as a switch to fossil fuel is not likely to occur in the next few years, the most plausible baseline scenario is the pre-project situation, in which firewood and coal remain the main fuels used for cooking.

2) Suppressed and Satisfied demand

The two main energy profiles for cooking are: first, households who use mainly firewood for cooking; second, households who mainly use coal as their main fuel, including for cooking.

- Firewood is always collected in the forest and never bought in the market, so it requires more time for collection. Even though the forest suffers from severe deforestation, the wood remains available; therefore, to meet the energy demand the villagers have to travel long distances to collect wood, without the biogas project. This is the case for Danzhai district.
- For the second profile, coal is bought a few times a year in large quantities because it's a fuel used for both space heating and cooking. During the winter, beneficiaries heat their houses almost the whole day, so that space heating requires far more energy than cooking. During summer, beneficiaries don't heat their households. In any case, beneficiaries resort to coal instead of firewood when coal is easily available at low prices satisfying the energy demand for cooking. This is the case for Weining district.

Therefore, the villages targeted by the biogas project are considered to be present in a suppressed demand as they due to poverty they have to depend on firewood and coal.

In the project situation there is suppressed demand and the calculations of the baseline are carried out with the pre-project situation option for simplification and which is conservative.

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[8] Estimation based on the comparison between LPG and Firewood NCVs, and LPG stoves and Firewood stoves efficiencies.

NCVfirewood = 15.6 Tj/Gg, NCVlpg = 47.3 Tj/Gg, EfficiencyFirewood = 10%, EfficiencyLPG = 60%.

Consumption = 23 kg of firewood / day ≈ 23 * (NCVfirewood / NCVlpg) * (EfficiencyFirewood / EfficiencyLPG) kg of LPG / day

Consumption ≈ 1.26 kg of LPG / day = 40.1 LPG Tank / year

3) Parameters to determine in order to quantify the baseline

The key parameters needed to determine the baseline scenario are displayed in the next table. Baseline emissions are calculated for a period *p* and for a climatic area (see Annex 3.).

Name	Description	Values		Unit	Source
		Weining	Danzhai		
$N_{sample,p}$	Number of households in the baseline sample.	85	88	-	ID
$N_{hh,p}$	Number of households participating in the project in the climatic area.	550	750	-	ID
$F_{i,p,h}$	Daily amount of fuel *i* consumed by household *h* of the baseline sample during the period *p*	One value per household per fuel		Kg	Survey conducted by ID
MS_p	Average fraction of livestock's manure put into the tank.	100%	58.49%	%	Survey conducted by ID
MCF	Methane conversion factor of the manure management system.	2%		%	Survey conducted by ID
$LC_{T,p,h}$	Number of livestock of category *T* in household *h* of the climatic area	One value per household per livestock category		-	Survey conducted by ID
D_p	Average length of the considered period p	Winter: 5 months Summer: 7 months	Winter: 4.5 months Summer: 7.5 months	Months	Monitoring of ID
$\eta_{NRB,h}$	Non-renewability rate of biomass for the project	63.19%	61.09%	%	Study undertaken by ID
$EF_{CO2,i}$	CO_2 Emission Factor per unit of energy of fuel *i*	One value per fuel		MJ/kg	IPCC Guidelines
NCV_i	Net Calorific Value per mass unit of fuel *i*	One value per fuel		$kgCO_2eq/MJ$	IPCC Guidelines
GWP_{CH4}	Global Warming Potential of methane.	21		CO2e	IPCC Guidelines
VS_T	Daily volatile solid excreted for livestock category *T*.	One value per livestock category		Kg dry matter/animal/day	IPCC Guidelines
Bo_T	Maximum methane producing capacity for manure produced by livestock category *T*.	One value per livestock category		m^3 CH_4/kg of VS_T	IPCC Guidelines

Table 2 – Key Parameters to determine the Baseline Situation

4) Updating of the baseline

For the years 2007 and 2008, the project was implemented in several villages of Danzhai and Weining districts. These two districts constitute two different climatic areas and different baselines are required for each. The main energy sources used for cooking are firewood in Danzhai and coal in Weining.

In case a new climatic area is added to the project, a new baseline will be needed. Moreover, the contexts may be different in different villages of the same climatic area, according for example to the availability of firewood. In a climatic area, an update baseline study could then be needed, as well as a new non-renewable-biomass study. Two baseline studies were carried out: one for Danzhai district and one for the project area of Weining district. Two separate baseline studies were carried out since the fuel consumption in both the districts is different. Also to understand the effects of the NRB rates in both the regions, separate NRB studies have been carried out and therefore respective baselines have been provided further in the PDD.

For more details on the updating of the baseline, see Annex 3.

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

1) Description of the Baseline scenario

As determined in the section B.2, the baseline scenario is the pre-project situation without suppressed demand. Therefore Baseline Option I (b) (survey on a sample) of the methodology has been applied. Two different areas in the project boundaries are already identified and two baseline surveys have been carried out, one for villages of Danzhai, and one for the villages in Weining district. The results of the baseline surveys give information on the pre-project scenario.

The results and reports of the baseline surveys have been attached as separate annexes on the GS registry account.

A) Danzhai district

A survey was conducted in February and March 2008 in Jiaogui village. Jiaogui is a common Miao village of Danzhai district (Guizhou Province), one of the poorest areas in China. The survey was carried out among a random selection of project beneficiaries, at least less than three months after the biogas tank construction. 88 villagers were interviewed (another 30 respondents were interviewed in other villages, in order to compare the end users' behavior in different Miao villages).

The survey revealed that people in Danzhai mainly use firewood for cooking and they collect it by cutting small trees or branches in the forest nearby their houses. Some agricultural waste (mainly corn) and dead wood are also used for cooking by the villagers. They also use other cooking fuels such as coal and charcoal, but their main use remains space heating, while firewood is more often used to cook food (for people or animals). Another observation through the field survey is that due to poverty within the community and due to lack of finance to buy coal, they sometimes switch to firewood for space heating.

Two different periods with different energy consumptions were identified within the year: summer and winter. The firewood consumption remains higher in the winter, since the meals and the cooking related practices vary from season to season. In the baseline situation, the beneficiaries of the biogas tank project used to consume an annual average of 22.97 kg of equivalent dry firewood collected on trees for cooking per day per household (the actual consumption is higher because the wood is partly wet, and because villagers also consume dead wood simply collected in the forest).

The main energy source in Danzhai remains firewood. Nonetheless, they still rely on other energy sources such as coal, charcoal and even electricity. For lighting in the baseline situation, depending on the way of calculation, their electricity consumption was at least 57.4 kWh per year per household (the baseline figure of 57.4 kWh is then conservative because it may underestimate the actual baseline consumption).

Finally, with regards to farming activities, it was observed that villagers owned an average of 2.42 pigs, 0.76 piglets, 1.14 buffalos and 0.26 horses. All the respondents use manure as fertilizer in the fields, but also use chemical fertilizers and pesticides.

Some other villages of Danzhai were visited during the survey. The interviews revealed that the average baseline consumption of dry firewood for cooking was similar to Jiaogui village, which means that the cooking behavior of Miao people in Danzhai could be considered homogenous. The average baseline consumption for other villages in the sample was found to be about 23.16 kg of dry firewood for cooking per day per household, so that the difference with Jiaogui village is only 0.8%. The conclusion is then an average firewood baseline consumption of 23 kg per day per household in Danzhai district.
According to the further NRB study done in Danzhai county, the comparison between the consumption of wood and the sustainable yield of the local forest provides a non-renewability rate of the biomass of 61.09% for Danzhai.

B) Weining district

A second survey was conducted in March 2008 in the municipality of Weining targeted by the project: Dongshan. It revealed that Dongshan villagers mainly use coal for their thermal energy needs. The sample size was 58 respondents.

Two different periods were identified: winter where people use fuel for space heating (from October-November to February-March) and summer (from March-April to September-October). Villagers buy trucks of coal a few times a year and use it for cooking, space heating, water boiling and cooking animals' food. The survey revealed that they consume a daily average of 18.86 kg of coal for both cooking and space heating, and consume 6.37 kg of coal for cooking only, which can be conservatively considered as the summer consumption when villagers don't heat their houses.

For lighting, the annual electricity consumption was found to be approximately 49 kWh per household per year.
Finally, about the farming activity, it was evaluated that Dongshan villagers owned an average of 3.51 pigs, 4.07 piglets, 0.38 buffalos and 0.09 horses.

Forests are generally not very accessible from villages in Weining County, where deforestation seems to have been severe. Only one township in the project area consumes firewood: Dajie. A NRB study was done in one village, Ajigen which shows a Non-Renewable biomass rate of 63.19%.

The monitoring team will continuously keep updated about the possibilities of a large-scale reforestation or deforestation that might occur either through a government initiative or private.

The ID team keeps itself updated of the local situation by visiting and exchanging information with the local forest government officials; therefore it can carry out the reassessment for any future large-scale reforestation or deforestation activity in the project area. Also, from the local beneficiaries the change could be re-assessed during the monitoring of the project for a period of 10 years.

Incase the increase in fuel wood consumption is identified we will consider reassessment of the baseline from approach 1 to the appropriate approach options given in the methodology for baseline calculations.

2) Description of the Project scenario

The Project scenario is the situation where beneficiaries are using the biogas produced from their waste management in the tank.

Baseline surveys were carried out with beneficiaries of the biogas tank project a few months after the construction of the tanks. They were able to answer questions about their baseline consumption as well as their project consumption, in order to quantify the project scenario. As expected, the fuel consumption was noticeably reduced and was converted into CO_2 emission reductions (please refer to Section E).

In Jiaogui village (Danzhai), the average consumption of dry firewood, obtained from cutting trees in the forest, was 13.03 kg per day per household (average between summer and winter consumptions). In Dongshan (Weining), the coal consumption was 13.72 kg per day per household (including space heating), and 0.76 kg per day per household (just for cooking, which may account for the summer consumption).

3) What are the ERs?

In Danzhai district, villagers mainly use firewood. Basically, the project will replace this firewood with biogas, partly or fully. The firewood consumption of Danzhai was estimated to be 61.09 % non-renewable. 61.09 % of the firewood savings accomplished by the project are then converted into CO_2 emission reductions. In Weining, the cooking fuel is mainly coal. Coal savings due to the project's implementation were translated into CO_2 emission reductions. Wood is consumed in one of the townships: Dajie, which includes the village named Ajigen, where a NRB was conducted. The firewood consumption there is estimated to be 63.19% non-renewable. Therefore, 63.19% of the firewood savings of the 50 beneficiaries in Dajie are converted into CO_2 emission reductions.

The physical leakage and incomplete combustion of biogas is a major source of CH_4 emissions in the project scenario. These emissions were accounted for and deducted from the total estimation of ERs.

4) Additionality of the ERs

As required in the methodology, the additionality is demonstrated using the latest version (version 05.2) of the "*Tool for the demonstration and assessment of additionality*" which is available on the UNFCCC website.

Step 1. Identification of alternatives to the project activity

Sub-step 1a. Define alternatives to the project activity

The following options are identified as alternatives to the VER project activity for the 1300 households targeted. For each alternative the total energy requirement remains the same. Alternative EBL2 and EBL3 are the same project activity but without VER money.

- EBL1: Continuation of the current situation: *the households keep their habits and continue to burn coal or firewood to meet their energy requirement.*

- EBL2: Project activity without VER money, Biogas Tanks sold through the market: *the households buy a biogas tank through the private market (without any subsidies).*

- EBL3: Project activity without VER money, Biogas Tank project implemented by the government: *the targeted households benefit from the governmental biogas tank dissemination program and get a subsidy.*

- EBL4: Switch to LPG: *the households don't build a biogas tank but switch to LPG for their cooking needs and keep traditional fuel for their heating requirements.*

Sub-step 1b. Consistency with mandatory laws and regulations
All the alternatives are complying with the existing regulations and laws.

Step 2. Investment analysis

Sub-step 2a. Determine appropriate analysis method
There are three main investors in the project: ID (and its funders), local governmental agencies, and the 1300 beneficiary households. Since the project is a voluntary effort to improve the energy needs of the local people, it does not generate income for any of the promoters, and the tanks belong to the beneficiaries after the complete construction. Biogas tanks allow them to save money as their coal consumption is reduced. Therefore simple cost analysis (option I) shall be applied.

Sub-step 2b. – Option I. Apply simple cost analysis
Through a historical review of the project and a detailed financial plan, we will first show that ID, as a non-profit NGO actor has no financial benefit in the project activity. Additionally governmental agencies, which belong in the public sector will also receive no financial benefit from the project.
As a result the financial attractiveness of the different alternatives will be analyzed for the rural households who benefit from the project. The average life span of a well constructed and maintained biogas tank is 15 years.
So the question is: over a 15 year period is the project activity without VER money more attractive than the listed alternatives from the rural household point of view?

- **Historical review of the project: a scaling up due to the Voluntary Emission Reduction market.**

ID is a non-profit organization which started working in China on water related projects in 2003. In 2005 and 2006 ID began experimenting with biogas on a very small scale: only 200 biogas tanks were built in two years. This pilot project was funded by "Ensemble Foundation". During the second semester of 2006, ID and Action Carbone negotiations made possible to continue the implementation of the biogas tanks in the project areas, thanks to access to carbon financing through the Voluntary Offsets market. Action Carbone agreed to finance the project and in return would own the Carbon Credit (VER's) generated by the project. Therefore, in 2007, ID started a larger project of biogas tank construction thanks to the funds advanced by Action Carbone.

The table below shows the evolution of the construction allowed by the project:

County	District	2005	2006	2007	2008	2009	TOTAL
	DANZHAI			100	450	200	**750**
DAJIE	WEINING			50			**50**
MAZHA	WEINING	50					**50**
CAOHAI	WEINING	50	100	150			**300**
NIUPENG	WEINING				150	200	**350**
		100	**100**	**300**	**600**	**400**	**1500**

This second table shows the total cost of the project from 2007 to 2018 and how those costs are shared. The project was announced in 2007 to the main co-financer, Ensemble Foundation (see the letters sent by Action Carbone to Ensemble Foundation). The project has been announced on a yearly basis to the other stakeholders: local governments and technical bureaus (Agriculture Bureau). Raising Carbon Finance has always been a condition for the project and is also essential to assure the long term maintenance of the biogas tanks built under the project activity.

	Costs		Investors			
	Number of tanks built	Total Cost of the project[9]	Action Carbone	Ensemble Foundation	Chinese Government[10]	Targeted Households[11]
2007	300	208 200 €	78 600 €	10 508 €	39 000 €	80 092 €
2008	600	416 400 €	157 200 €	9 080 €	78 000 €	172 120 €
2009	400	277 600 €	135 150 €	7 000 €	26 000 €	109 450 €
2010	0	22 100 €	22 100 €	0 €	0 €	0 €
2011	0	22 100 €	22 100 €	0 €	0 €	0 €
2012	0	22 100 €	22 100 €	0 €	0 €	0 €
2013	0	22 100 €	22 100 €	0 €	0 €	0 €
2014	0	22 100 €	22 100 €	0 €	0 €	0 €
2015	0	22 100 €	22 100 €	0 €	0 €	0 €
2016	0	22 100 €	22 100 €	0 €	0 €	0 €
2017	0	22 100 €	22 100 €	0 €	0 €	0 €
2018	0	22 100 €	22 100 €	0 €	0 €	0 €

- **Cost analysis from the beneficiaries point of view**

From the beneficiary's point of view looking at a 15 year time period, which alternative is the most attractive alternative?
Out of the 1300 households who benefit from the project 750 are mainly using firewood and 550 are mainly using coal. The table below shows the costs in these two cases (the firewood is a free fuel collected in the forest whereas the coal has to be bought) for the identified alternatives. All costs below are in Chinese RMB/year. The detailed spreadsheets used for this calculation are available as a separate annex.

[9] The total cost of the project is estimated. It depends on the prices of raw materials, which vary a lot. The accessibility of each village also has a great influence on the transport prices. The price of a pig pen varies a lot according to the size and materials used for construction. The price for years 2010 to 2018 is the cost of monitoring and maintenance of the 1300 biogas tanks built.

[10] This is also an estimation. Our partners from the government don't give money directly to the beneficiaries, but rather supply raw materials like cement and sand.

[11] The beneficiaries pay what remains to complete the construction of the biogas tank, toilet and animal pen. This is an average amount, it varies according to the transportation cost of raw materials to the village, and size of the animal pen which is left to the discretion of each beneficiary.

	Biogas Government		Biogas Business		Current situation		Switch to LPG	
	Coal	Firewood	Coal	Firewood	Coal	Firewood	Coal	Firewood
Year 1	5546	4088	6656	5198	2383	0	5493	3607
Year 2	1458	0	1458	0	2383	0	5493	3607
Year 3	1458	0	1458	0	2383	0	5493	3607
Year 4	1458	0	1458	0	2383	0	5493	3607
Year 5	1458	0	1458	0	2383	0	5493	3607
Year 6	1458	0	1458	0	2383	0	5493	3607
Year 7	1458	0	1458	0	2383	0	5493	3607
Year 8	1458	0	1458	0	2383	0	5493	3607
Year 9	1458	0	1458	0	2383	0	5493	3607
Year 10	1458	0	1458	0	2383	0	5493	3607
Year 11	1458	0	1458	0	2383	0	5493	3607
Year 12	1458	0	1458	0	2383	0	5493	3607
Year 13	1458	0	1458	0	2383	0	5493	3607
Year 14	1458	0	1458	0	2383	0	5493	3607
Year 15	1458	0	1458	0	2383	0	5493	3607
Average	**1730**	**273**	**1804**	**347**	**2383**	**0**	**5493**	**3607**

Conclusion of step 2

For the households who use coal, to build a biogas tank with the government or through the private sector is less costly than the current situation. For the households who use firewood the current situation is the least costly.
For the firewood users a Barrier analysis would not be necessary, but for the coal users it is necessary as project activities without VER money (EBL2 and EBL3) are more attractive than the current situation (EBL1).

Step 3. Barrier Analysis

- **Initial Investment Barrier**

Even if the project is less costly on a long term basis, there is a rather high initial investment to make. This investment is around 5200 RMB for a biogas tank sold without subsidies, around 4100 RMB with government subsidies and only 2400 RMB for biogas tanks under the VER project activity. Thus, revenues from VER market helps to overcome this barrier as shown below.
The VER project activity is done in collaboration with local governmental technical agencies in charge of biogas tank development. Therefore it benefits from governmental support which provides raw construction materials and fittings like pipes, lamps and stoves. But these agencies gave us the assurance that the help they provide to the project comes in addition to the subsidies they provide for the biogas tank they built for the governmental usual program[12].

Detailed Cost of a biogas tank for various alternatives

This table shows how the costs are shared for one biogas tank in the project activities, between stakeholders for the identified alternatives. The cost of raw materials is one observed in Weining and Danzhai districts, Guizhou province during the year 2008.

[12] Written statements from the local agriculture bureau are available as an independent annex of the PDD.

	TOTAL COST	Project Activity with VER			Project without VER Government Program		Project without VER Private Market
		Agriculture Bureau	ID	Benef.	Agriculture Bureau	Benef.	Benef.
MATERIALS	**4898**	**1110**	**1400**	**2388**	**1110**	**3788**	**4898**
BIOGAS TANK (8m3)	1715	880			880		1715
KITCHEN TABLE (1.4x0.7x0.8m)	148						148
ANIMAL HOUSE (2x2,5x2m)	1950						1950
TOILETS (1x1x2m)	855						855
SIDE EQUIPMENTS	230	230			230		230
STAFF	**800**		**800**			**300**	**300**
TECHNICIAN	300		300			300	300
SITE SELECTION	140		140				
SUPERVISION	280		280				
AGRICULTURAL ACTIVITIES	80		80				
RUNNING COST IN CHINA	**160**		**160**				
TOTAL OF FIELD COST	**5858**	**1110**	**2360**	**2388**	**1110**	**4088**	**5198**
ADMINISTRATIVE COST (15%)	**390**		**390**				
TOTAL IN RMB	**6248**	**1110**	**2750**	**2388**	**1110**	**4088**	**5198**
TOTAL IN EUROS (1€=9 RMB)	**694**	**123**	**306**	**265**	**123**	**454**	**578**

This analysis is consistent with a document produced by the Energy and Environment Office of Guizhou province in 2005[13]. This document explains that the subsidy from the government is 1000 RMB and that the cost of the project is around: 1600 RMB for the tank, 150 for the kitchen table, 800 for the toilet and 1600 for the pigsty. So the total cost in 2004 is around 4150 RMB. The document further states that because of inflation each year the project cost is around 250 RMB more. So in 2008 the total cost of the project would be 5150 RMB. According to ID data the total cost of materials and technicians is 5200 RMB. ID's observation of costs in the field and this documents estimation of costs are very similar.
A beneficiary of the project activity with VER pays around 2400 RMB to complete the biogas tank, the toilet and animal pen, whereas a beneficiary from a governmental project has to pay at least 4100 RMB. If the households built biogas tanks through private markets they would then pay 5200 RMB.

[13] Energy and Environment Office Guizhou province (2005), Self evaluation report about rural biogas construction governmental program in Guizhou. Consulted online at:
http://ac.agri.gov.cn/ac/ViewContent.do?id=4affaa1f17812c5901178679370000d8

Comparison to household income
In **LI X.,XIAOPENG L., XIAOBO Z. (2006)**[14] it is shown that out of 1519 households surveyed in four townships of Puding County, Guizhou province, the average per capita yearly income is 1509 RMB with an average of 4.84 members per household. This study also shows that there are great inequalities between villages but also inside the same villages depending on various factors including good relationships with government members or local communist party members, education level, etc.
This is then understandable that even if some villagers in Guizhou provinces can afford to build a tank under the governmental program some others really cannot. As an NGO, ID's aim is to improve the livelihood of the more remote and poor households. That's why Guizhou province has been chosen (the poorest in China). Then ID's selection criteria for villages and households assure that they are among the poorest. ID is not looking to replace the government biogas dissemination program but to be complementary, so that the poorest households can also benefit from a biogas tank. ID selects those villagers who are prevented from getting a tank through private market methods or governmental projects by this initial investment.
This barrier does not apply to alternative ELB1 (the current situation).

- **Long Term Maintenance Barrier**

The Carbon Finance necessity to monitor the project's effect leads ID to give beneficiaries an efficient initial training and to set up a long term follow up plan for the length of the crediting period (until 2018). During this period a technician and a social facilitator will do the monitoring surveys twice a year and assure that the biogas tanks remain in good working condition.
In the governmental biogas tank dissemination program, beneficiaries' initial training is not very good and the maintenance service is inexistent. This situation results in a lot of problems and a short life span for biogas tanks according to a governmental document called "Set up plan for a rural biogas service system at the country scale (2006-2010)"[15].
Here is an English translation of one paragraph:

"At the end of 2006, more than twenty-two million rural biogas tanks have been built, which benefit about seventy-five million people. Now the main problems of the rural biogas service are that the breakdown maintenance is not done in time as well as the biogas fitting supply when needed. The desulfurization equipment is not often replaced and a lot of feeding and discharging equipment is missing. If the lamp shade or gauze cover is broken, villagers often have to walk dozens of kilometers in order to buy a new one.

Most of the families that have a biogas tank don't have the appropriate skills to run it. Some villagers have used biogas tanks for several years but have never completely reloaded the tank so that affects the gas production. Some villagers don't master the operating rules; they don't close the gas tap when they reload the tank which results in filter damage. Some don't know the safety measures so they open the cap and burn themselves. Some villagers don't know how to use the sludge from the tank, which reduces the global benefits of the installation. So the rural families who have a biogas tank are eager to get good quality and high standard maintenance service."

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[14] Li Xing, Shenggen Fan, Xiaopeng Luo, Xiaobo Zhang **(2006).** *Villages Inequality in Western China*, session on "Land Rights and Social Security in China" Annual American Economic Association Meetings Boston. Available online at: http://www.aeaweb.org/annual_mtg_papers/2006/0108_1300_0203.pdf
[15] this document is available in Chinese here: http://www.ahxf.gov.cn/xpmd/show.asp?id=6579

Even if this document is also stating the willingness of the government to set up a maintenance service, in Guizhou province it has not become a reality yet. So money from carbon financing will allow the projects to go through this barrier that leads the governmental biogas tanks to have a short life span and assure the biogas tanks built under the project activity to generate Emission Reductions in the long term.

This Barrier does not apply to alternative ELB1 (current situation).

Conclusion of step 3

As a consequence, even if Project Activity without VER can be financially more attractive than the current situation, two barriers prevent the Project Activity without VER to occur.

Step 4. Common Practice analysis

The use of biogas tanks is a well-known practice in China, since the Chinese government developed projects of construction and diffusion of biogas tanks in many parts of the country. But there are two essential distinctions between the proposed project activity with VER and the government subsidized biogas tanks.
First the initial investment from households is 70% higher for governmental projects (at least 4100 RMB against 2400 RMB for the VER project activity) so the targeted households are different.
Second, long term maintenance is inexistent for government subsidized biogas tanks unlike tanks built under the proposed VER project activity. The long term maintenance is covered by the revenue from VER credit. That leads to critical differences as far as life span of biogas tanks are concerned.
The proposed project activity is then additional.

There has been no ODA funding provided for this project activity. The funding is through the voluntary carbon market. Also there has been no public announcement for the project activity going ahead without the carbon revenues.

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

As per chapter I section II of the methodology, "*the physical, geographical site of the renewable energy generation delineates the project boundary*", in the case of this project, the physical boundaries are limited to the areas where the biodigesters are built. They are currently constructed in Danzhai and Weining districts and may be identified thanks to a sign with an identification number.

The greenhouse gases that could be included in the project boundary are listed in the table below:

	Source	Gas	Included	Justification/ Explanation
Baseline	Thermal energy need	CO_2	Yes	Major source of emission
		CH_4	No	Excluded for simplification, this is conservative
		N_20	No	Excluded for simplification, this is conservative
	Animal waste handling and storage	CO_2	No	Excluded as CO_2 emissions from animal waste are CO_2 neutral
		CH_4	Yes	Major source of emission
		N_20	No	Excluded for simplification, this is conservative
Project Activity	Direct Emission from biodigesters	CO_2	No	Excluded as CO_2 emissions from biogas incineration are CO_2 neutral
		CH_4	Yes	Emissions from physical leak or incomplete combustion of biogas
		N_20	No	Excluded for simplification, this is conservative

Table 4 – GHG included in the project boundaries

B.5. Details of baseline information, including the date of completion of the baseline study and the name of person (s)/entity (ies) determining the baseline:

Date of Completion

31/03/2008 for both Danzhai and Weining Baselines.

As the Baseline is evolving, the Baseline may be completed later with new studies. These eventual updated baseline studies would be made by ID.

Contact Information

Initiative Développement (in Annex 1)
GoodPlanet / Action Carbone www.goodplanet.org / www.actioncarbone.org

SECTION C. Duration of the project activity / Crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

The project activity started its construction phase on the 1st of September 2007. However, it takes approximately 3 to 4 months for the biodigesters to start up and begin producing biogas. Furthermore, monitoring activities were put in place until the summer period began. Therefore, the project will start claiming credits from the beginning of the summer period of 2008.

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

A biogas tank usually has an operational lifetime of more than 15 years. In the districts targeted, ID will implement a management and maintenance system . Therefore, the expected operational lifetime of the project activity is greater than 15 years.

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

The project activity will use a fixed crediting period.

C.2.1. Renewable crediting period

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

Not applicable

C.2.1.2. Length of the first crediting period:

Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

April 2008

C.2.2.2. Length:

10 years

SECTION D. Application of a monitoring methodology and plan

Note: The following monitoring methodology and plan has to be applied to each climate region identified in the project area.

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

Indicative programme, baseline, and monitoring methodology for Small Scale Biodigester Voluntary Gold Standard.

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

See section B.1.1.

D.2. 1. OPTION 1: Monitoring of the emissions in the project scenario and the baseline scenario

The project area is divided in climatic areas, and each climatic area in villages or groups of villagers. During each period *p* (summer or winter of a year *y*), a monitoring survey is carried out on each climatic area, and the sample has to be geographically representative of its climatic area. Then, the project emissions are assessed for each period *p* and for all the beneficiaries of the climatic area concerned by the monitoring survey. The baseline emissions are also assessed for each period *p* and the same climatic area. For more explanations, see annex 3.

D.2.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

The following data concern a period *p*.

ID number	Name	Data variable	Source of data	Data unit	Measured, calculated, estimated	Recording frequency	Proportion of data to be monitored	How will the data be archived?	Comment
PE.1	$N_{sample,p}$	*Number of households in the monitoring sample*	*ID*	*Households*	-	*Twice a year*	-	*Electronic*	*A monitoring survey is conducted during each period p.*
PE.2	$N_{hh,p}$	*Number of beneficiaries in the climatic areas*	*ID*	*Households*	-	*Twice a year*	-	*Electronic*	*Number of household in the climatic area that use their biogas tank at the beginning of the period p.*
PE.3	$F_{i,p,h}$	*Daily consumption of fuel i of households of the monitoring sample*	*Survey*	*Kg*	*estimated*	*Twice a year*	*Sample (at least 60 households)*	*Electronic and paper*	*The daily consumption concerns different activities according to the type of period and climatic area. Cooking is always one of these activities.*
PE.4	MS_p	*Average fraction of livestock's manure fed into the biodigester*	*Survey*	*%*	*estimated*	*Twice a year*	*Sample (at least 60 households)*	*Electronic and paper*	*The fraction is estimated for all the animals whose manure is put into the biodigester. No differentiation is made by type of animal.*
PE.5	$LC_{T,p,h}$	*Number of heads of livestock category T*	*Survey*	*Animals*	*estimated*	*Twice a year*	*Sample (at least 60 households)*	*Electronic and paper*	*The animals are the ones whose share of manure is put into the biodigester.*
PE.6	D_p	*Average duration of the considered period p*	*ID*	*Date*	*estimated*	*Twice a year*	-	*Electronic*	*This date is estimated by monitoring the period of heating of households in the climatic areas.*
PE.7	GWP_{CH4}	*Global Warming Potential of methane*	*IPCC Guidelines*	-	-	*According to IPCC's publications*	-	*Electronic*	-

PE.8	$\mu_{nr,h}$	*Non-Renewabilty Rate of the biomass consumed*	*Study*	*%*	*estimated*	*In case other project activities will impact on the NRB fraction*	*-*	*Electronic and paper*	*Original NRB studies have already been conducted. It may be updated whether indeed other project activities or any large-scale reforestation/ deforestation are observed that would possibly have a significant impact on the NRB fraction. The methodology is given in a specific document.*

D.2.1.2. Data to be collected in order to monitor project performance on the most sensitive sustainable development indicators:

Sustainable Development Indicator	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Comments
Livelihood of the poor	*Financial amount*	*Money savings of the beneficiaries*	*CNY*	*Calculated*	*The average price and the amount of the traditional fuels replaced by the biogas will be monitored. The Monitoring survey also asks for the benefits felt by the beneficiaries, which include the choice "Money Savings".*
Access to energy	*Percentage*	*Share of the biogas in the total energy mix of the household*	*%*	*Calculated*	*The amount of traditional fuel consumed by the beneficiaries for their energy needs will be monitored. The use of the biogas lamp will be also monitored.*

Besides monitoring the data shown above, the hygiene related improvements due to the project's implementation will be evaluated qualitatively (see Annex 3.)

D.2.1.3. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO2 eq.)

In the next formulae, the term "sample" refers to the sample of the monitoring survey conducted during the period *p*. The emissions are estimated for each climatic area, and the calculation has to be done as many times as there are climatic areas. The averages are made for the sample.

Project emissions of the period p

$$PE_p = (PE_{FC,d,p} + PE_{biogas,d,p}) \cdot N_{hh,p} \cdot D_p \cdot 0.001 \quad (1)$$

Where:

PE_p = Project emissions of the period p (tCO_2e).

$N_{hh,p}$ = Number of households within the climatic area participating in the project.

$\mu_{PE_{tot,p}}$ = Mean of project emissions of households of the sample for the period p (tCO_2e).

$\sigma_{PE_{tot,p}}$ = Standard deviation of project emissions for the period p.

$N_{sample,p}$ = Number of households in the sample.

$$\sigma_{PE_{FC,d,p}} = \sqrt{\frac{\sum_h \left(PE_{FC,d,p,h} - \mu_{PE_{FC,d,p}}\right)^2}{N_{sample,p} - 1}} \quad (2)$$

Where:

$PE_{tot,p,h}$ = Total project emissions of household h of the sample for the period p (tCO_2e).

$$\mu_{PE_{FC,d,p}} = \frac{\sum_h PE_{FC,d,p,h}}{N_{sample,p}} \quad (3)$$

$$PE_{tot,p,h} = PE_{FC,p,h} + PE_{biogas,p,h} \quad (4)$$

Where:

$PE_{FC,p,h}$ = Project emissions of household h of the sample for the period p due to fuel consumption (tCO_2e).

$PE_{biogas,p,h}$ = Project emissions of household h of the sample for the period p due to biogas leakage (tCO_2e).

Project emissions per household of the period p due to fuel consumption

$$PE_{FC,d,p,h} = \sum_i F_{i,p,h} \cdot NCV_i \cdot EF_{CO_2,i} \quad (5)$$

Where:

D_p = Average duration of the considered period p (days).
$F_{i,d,p,h}$ = Daily amount of fuel i consumed by household h of the sample during the period p (kg/day)
NCV_i = Net Calorific Value per mass unit of fuel i
$EF_{CO_2,i}$ = CO_2 Emission Factor per unit of energy of fuel i

Fuel i is a fossil fuel or non-renewable biomass. If fuel i is non-renewable biomass,

$$F_{nr\ biomass,p,h} = F_{biomass,p,h} \cdot \mu_{nr,h} \quad (6)$$

Where:

$F_{nr\ biomass,p,h}$ = Daily amount of non-renewable biomass consumed by household h of the sample during the period p (kg)
$F_{biomass,p,h}$ = Daily amount of biomass consumed by household h of the sample during the period p (kg)
$\mu_{nr,h}$ = Non-renewability rate of the biomass consumed by household h of the sample

Project emissions per household of the period p due to biogas leakage

$$PE_{biogas,d,p,h} = \left(\sum_T LC_{T,p,h} \cdot EF_{biodigester,T}\right) \cdot MS_p \cdot PL + \left(\sum_T LC_{T,p,h} \cdot EF_{Biodigester,T}\right) \cdot MS_p \cdot \left(1 - \mu_{biogastove}\right) \cdot (1 - PL) \quad (7)$$

Where:

$LC_{T,p,h}$ = Number of livestock of category T in household h during the considered period p.
$EF_{biodigester,T}$ = Daily CH_4 emission factor for livestock category T and manure management system corresponding to anaerobic digester (tCO_2e/animal/day).
PL = Physical Leakage of the biodigester (default IPCC value 10%)
$\eta_{biogastove}$ = Combustion efficiency of the biogas stove (default value 98%)

$$EF_T = VS_T \cdot GWP_{CH_4} \cdot Bo_T \cdot 0.67 \cdot MCF_{biodigester} \quad (8)$$

Where:

VS_T = Daily volatile solid excreted for livestock category T (Kg dry matter/animal/day).
GWP_{CH_4} = Global Warming Potential of methane.

Bo_T = Maximum methane producing capacity for manure produced by livestock category T (m^3 CH_4/Kg of VS_T).
$MCF_{biodigester}$ = Methane conversion factor for manure managed in an anaerobic digester.
0.67 = Conversion factor of m^3 CH_4 to Kg CH_4.
MS_p = Average fraction of livestock's manure put into the tank for the period p

D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived:

The baseline emissions are assessed less than three months after biogas tanks are built. The beneficiaries are asked to distinguish their fuel consumption in winter and in summer.

ID number	Name	Data variable	Source of data	Data unit	Measured, calculated, estimated.		Proportion of data to be monitored	How will the data be archived?	Comment
BE.1	$N_{sample,p}$	*Number of households in the baseline sample*	*ID*	*Households*	-		-	*Electronic*	*The baseline sample is representative of the climatic area concerned.*
PE.2	$N_{hh,p}$	*Number of beneficiaries in the climatic areas*	*ID*	*Households*	-		-	*Electronic*	*Number of households that are using their biogas tank at the beginning of the season*
BE.2	$F_{i,p,h}$	*Daily consumption of fuel i of households of the baseline sample*	*Survey*	*Kg*	*estimated*		*Sample (at least 60 households)*	*Electronic and paper*	*The daily consumption concerns different activities according to a period p and a climatic area. Cooking is always one of these activities.*
PE.4	MS_p	*Average fraction of livestock's manure fed into the biodigester*	*Survey*	-	*estimated*		*Sample (at least 60 households)*	*Electronic and paper*	*This data comes from the monitoring survey conducted during the period p.*
BE.3	$LC_{T,p,h}$	*Number of head of livestock category T*	*Survey*	*Animals*	*estimated*		*Sample (at least 60 households)*	*Electronic and paper*	*This data comes from the baseline survey.*
PE.6	D_p	*Average duration of the considered period p*	*ID*	*Date*	*estimated*		-	*Electronic*	*This date is estimated by monitoring the period of heating of households in the climatic areas.*

PE.7	*GWP_{CH4}*	*Global Warming Potential of methane*	*IPCC Guidelines*	*-*	*-*		*-*	*Electronic*	*-*
PE.8	*$\mu_{nr,h}$*	*Non-Renewabilty Rate of the biomass consumed*	*Study*	*%*	*estimated*		*-*	*Electronic and paper*	*NRB studies have already been conducted. It may be updated whether indeed other project activities are initiated that would possibly have a significant impact on the NRB fraction. The methodology is given in a specific document.*

Incase the increase in fuel-wood consumption is identified reassessment of the baseline from approach 1 to approach 3 of the baseline will be considered.

D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO2 eq.)

In the next formulae, the term “sample” refers to the sample of the monitoring survey conducted during the period *p*. The emissions are estimated for each climatic area, and the calculation has to be done as many times as there are climatic areas. The averages are made for the sample.

Baseline emissions of the period p

$$BE_p - (BE_{FC,d,p} + BE_{aw,d,p}) \cdot N_{hh,p} \cdot D_p \cdot 0.001 \quad \textbf{(9)}$$

Where:

BE_p = Baseline emissions of the period p (tCO_2e).
$N_{hh,p}$ = Number of households participating in the project in the climatic area.
$\mu_{BE_{tot,p}}$ = Mean of baseline emissions of households of the sample for the period p (tCO_2e).
$\sigma_{BE_{tot,p}}$ = Standard deviation of project emissions for the period p.
$N_{sample,p}$ = Number of households in the sample.

$$\sigma_{BE_{FC,d,p}} = \sqrt{\frac{\sum_h \left(BE_{FC,d,p,h} - \mu_{BE_{FC,d,p}}\right)^2}{N_{sample,p} - 1}} \quad \textbf{(10)}$$

Where:
$BE_{tot,p,h}$ = Total baseline emissions of household h of the sample for the period p (tCO_2e).

$$\mu_{BE_{FC,d,p}} = \frac{\sum_h BE_{FC,d,p,h}}{N_{sample,p}} \quad \textbf{(11)}$$

$$BE_{tot,p,h} = BE_{FC,p,h} + BE_{aw,p,h} \quad \textbf{(12)}$$

Where:
$BE_{FC,p,h}$ = Baseline emissions of household h of the sample for the period p due to fuel consumption (tCO_2e).
$BE_{aw,p,h}$ = Baseline emissions of household h of the sample for the period p due to animal waste handling (tCO_2e).

Baseline emissions per household of the period p due to fuel consumption

$$BE_{FC,d,p,h} = \sum_i F_{i,p,h} \cdot NCV_i \cdot EF_{CO_2,i} \quad \textbf{(13)}$$

Where:
D_p = Average duration of the considered period p (days).
$F_{i,p,h}$ = Daily amount of fuel i consumed by household h of the sample during the period p (kg/day)
NCV_i = Net Calorific Value per mass unit of fuel i
$EF_{CO_2,i}$ = CO_2 Emission Factor per unit of energy of fuel i

Fuel i is a fossil fuel or non-renewable biomass. If fuel i is non-renewable biomass,

$$F_{nr\ biomass,p,h} = F_{biomass,p,h} \cdot \mu_{nr,h} \qquad \textbf{(14)}$$

Where:

$F_{nr\ biomass,p,h}$ = Daily amount of non-renewable biomass consumed by household h of the sample during the period p (kg/day)
$F_{biomass,p,h}$ = Daily amount of biomass consumed by household h of the sample during the period p (kg/day)
$\mu_{nr,h}$ = Non-renewability rate of the biomass consumed by household h of the sample

Baseline emissions per household of the period p due to animal waste handling

$$BE_{aw,d,p,h} = \left(\sum_T LC_{T,p,h} \cdot EF_{T,h}\right) \cdot MS_p \qquad \textbf{(15)}$$

Where:
$LC_{T,p,h}$ = Number of livestock of category T in household h during the considered period p. $EF_{T,h}$ = Daily CH_4 emission factor for livestock category T and manure management system corresponding to the one of household h ($kgCO_2e$/animal/day).

$$EF_T = VS_T \cdot GWP_{CH_4} \cdot Bo_T \cdot 0.67 \cdot MCF_h \qquad \textbf{(16)}$$

Where:
VS_T = Daily volatile solid excreted for livestock category T (Kg dry matter/animal/day).
GWP_{CH_4} = Global Warming Potential of methane.
Bo_T = Maximum methane producing capacity for manure produced by livestock category T (m^3 CH_4/Kg of VS_T).
MCF_h = Methane conversion factor of the manure management system of the household h.
0.67 = Conversion factor of m^3 CH_4 to Kg CH_4.
MS_p = Average fraction of livestock's manure put into the tank for the period p.

D.2.3. Treatment of leakage in the monitoring plan

No significant sources of leakage are identified.

D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO_2 eq.)

Emission reductions of the period p

$$ER_p = (BE_p - PE_p)$$

Where:

ER_p	=	Emission reductions of the period p (tCO_2e).
BE_p	=	Baseline emissions of the period p (tCO_2e).
PE_p	=	Project emissions of the period p (tCO_2e).

D.3. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored

Data	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
PE.1;BE.1	*Low*	*The samples of the surveys have to be geographically representative of the climatic area concerned. A climatic area is divided in villages or groups of villages. The geographical repartition is made thanks to a simple proportion formula, so that the representativeness of a sample shouldn't be uncertain. Moreover, as the baseline is updated as long as new tanks are built, the sample of the baseline is also evolving and need to be corrected in order to be representative, with the same simple proportion formula.*
PE.2	*Low*	*The construction of tanks is checked in each climatic area by local coordinators. As they have a certain quantity of biogas tanks to build each year and they are the responsible of the construction follow-up, they are aware of the number of beneficiaries of each climatic area.*

BE.2	*Medium*	*During the baseline survey, the daily consumption of traditional fuel for both winter and summer period is asked. Then, the best approach is to conduct the survey during those 2 periods. However, due to time and methodology restrictions, it's not possible. Therefore, surveyors should know quite well the situation on the field and the concept of conservativeness (see Annex C.)*
PE.3	*Medium*	*The uncertainty on this data is lower than the previous one as the survey is conducted during the period for which daily consumption of traditional fuel is expected. In order to get accurate data, the survey should take place during average days of summer or winter (this does not mean during the warmest or coldest days of a season).*
PE.4	*Medium*	*It's quite hard for households to distinguish the quantity of manure put into the biodigester for each type of animal.*
PE.5;BE.3	*Low*	*Household members know quite well the number of animals they own. Only the ones whose manure is put into the biodigester are taken into account.*
PE.6	*Low*	*The average duration of seasons is quite fixed from a year to another. However, the question is asked in every monitoring survey in order to verify the duration of the period considered.*
PE.7	*Low*	*Data comes from IPCC guidelines.*
PE.8	*Low*	*The Monitoring of the non-renewable biomass rate is done for the baseline situation. Then, local coordinators are in charge to inform the team in case a project is locally initiated that would possibly have an impact on the NRB fraction (implementation of economic stoves, reforestations projects…).*

The increase or decrease of the fuel consumptions that results from the activities other than the project will be reported and taken into account for the ER calculations.

D.4. Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

The electronic database will be developed by ID China and translated at least into English and partly into Chinese. It constitutes the heart of the monitoring of the emission reductions. In Guizhou province, a person of ID China will be in charge of the monitoring of the emission reductions. His work will consist in the following main tasks:

- Train the local coordinators. As they have good knowledge of the situation on the field, they will be in charge of the collection of most of the data.
- Formalize the necessary documents for the monitoring (records sheet, questionnaires, monitoring reports) in collaboration with the local coordinators.
- Contact people with competences required for the assessment of the renewable/non-renewable character of the biomass consumed by beneficiaries in new project areas.
- Ensure the encoding of the data, which can be done by ID members or external trained people.

D.5 Name of person/entity determining the monitoring methodology:

Initiative Développement

SECTION E. Estimation of GHG emissions by sources

E.1. Estimate of GHG emissions by sources:

In March 2008, ID carried out two surveys in Danzhai and Weining (two different climatic regions) in order to assess the annual baseline and project emissions.

Climate region	Place targeted by the project	Project emissions (PE) per household (tCO_2e/year)		
		PE due to traditional fuel consumption	PE due to biogas leakage	Total PE, after correction by the Standard Deviation
Weining District	Dongshan & Dajie Municipalities	5.08 (coal) 5.58 (firewood)	0.29	6.74
Danzhai District	Jiaogui village	3.92	0.40	4.56

Place	Key Data for Project Emissions	Mean[1]	Unit
Dongshan	Daily coal consumption during winter (for cooking, boiling water, boiling animal food and space heating activities).	13.72	Kg
Dongshan	Daily coal consumption during summer (for cooking activities).	0.76	Kg
Dongshan	Duration of summer period	7	Months
Dongshan	Duration of winter period	5	Months
Dongshan & Dajie	Number of pigs owned by the respondents	2.88	-
Dongshan & Dajie	Number of piglets owned by the respondents	3.56	-
Dongshan & Dajie	Number of buffalos owned by the respondents	0.40	-
Dongshan & Dajie	Number of horses owned by the respondents	0.05	-
Dongshan & Dajie	Average share of manure put into the biogas tank	58.5%	-
Dajie	Daily firewood consumption during winter	16.33	Kg, dry matter
Dajie	Daily firewood consumption during summer	6.20	Kg, dry matter
Dajie	Non-renewability rate of the biomass consumed	63.19%	
Jiaogui	Average daily firewood consumption during a year (for cooking, boiling water, boiling animal food and space heating activities).	13.03	Kg, dry matter
Danzhai	Non-renewability rate of the biomass consumed	61.09%	-
Jiaogui	Number of pigs owned by the respondents	2.42	-
Jiaogui	Number of piglets owned by the respondents	0.76	-
Jiaogui	Number of buffalos owned by the respondents	1.14	-
Jiaogui	Number of horses owned by the respondents	0.26	-
Jiaogui	Share of manure put into the biogas tank	100%	

1. The mean values concerning fuel consumption are adjusted with the standard deviation of the distribution. The mean values of the other data are not adjusted. Then, this data only give a rough idea of the situation. For more details concerning the assessment of the project emissions, please refer to the separate documents called "Emission Reductions Assessment in Weining" and "Baseline Situation & Emission Reductions Assessment in Jiaogui"

For the factors coming from IPCC guidelines, see Annex 2.

E.2. Estimated leakage:

No significant sources of leakage are identified.

E.3. The sum of E.1 and E.2 representing the project activity emissions:

See E.1.

E.4. Estimated anthropogenic emissions by sources of greenhouse gases of the baseline:

Climate region	Places targeted by the project	Baseline emissions (BE) per household (tCO_2e/year)		
		BE due to traditional fuel consumption	BE due to animal waste handling	Total BE, after correction by the Standard Deviation
Weining District	Dongshan and Dajie Municipalities	13.06 (coal) 8.26 (firewood)	0.05	10.61
Danzhai District	Jiaogui village	10.08	0.07	9.70

Place	Key Data for Baseline Emissions	Mean[1]	Unit
Dongshan	Daily coal consumption during winter (for cooking, boiling water, boiling animal food and space heating activities).	18.53	Kg
Dongshan	Daily coal consumption during summer (for cooking activities).	6.76	Kg
Dajie	Daily firewood consumption during summer	10.01	Kg, dry matter
Dajie	Daily firewood consumption during winter	22.46	Kg, dry matter
Jiaogui	Average daily firewood consumption during a year (for cooking, boiling water, boiling animal food and space heating activities).	22.97	Kg, dry matter

1. The mean values are adjusted with the standard deviation of the distribution.

For the number of animals, the duration of the periods in Dongshan, the non-renewability rate of biomass used in Jiaogui and the share of manure put into the tank, see E.1. For the factors coming from IPCC guidelines, see Anne

E.5. Difference between E.4 and E.3 representing the emission reductions of the project activity:

Climate region	Place targeted by the project	Emission reductions (ER) per household (tCO_2e/year)
		Total ER
Weining District	Dongshan & Dajie Municipalities	3.87
Danzhai District	Jiaogui village	5.14

The above assessment of the ERs doesn't take into account the failures of the biogas system.

E.6. Table providing values obtained when applying formulae above:

In 2007, 300 biogas tanks were built. In 2008 and 2009, 600 and 400 tanks will be built respectively. The future biogas tanks will be implemented in an area very similar to Dongshan or Jiaogui. In the Monitoring Reports, the distinction between the different climatic areas (hence noticeably different baseline emissions) will be made.
The calculations are based on seasons. The following considerations have been used:

	Period	Duration of the period	
Weining	Winter	5 months	1st October to 1st March
	Summer	7 months	1st March to 1st October
Danzhai	Winter	4,5 months	1st November to 15th March
	Summer	7,5 months	15th March to 1st November

The tanks of a year Y are assumed to be built at the end of the year Y. In the table, we have considered the tanks operational at the beginning of the summer of the year Y+1.

Period	Number of biodigesters used		Estimation of Baseline Emission (tCO_2e)	Estimation of Project Emissions (tCO_2e)	Estimation of Emission Reductions (tCO_2e) considering a break down rate of 17 %
	Weining	Danzhai			
1st April to the end of summer 2008	200	100	1624	940	567
Winter 2008-2009	200	150	1427	819	505
Summer 2009	350	550	5495	2945	2116
Winter 2009-2010	350	550	3544	1925	1344
Summer 2010	550	750	7942	4302	3021
Winter 2010-2011	550	750	5153	2829	1929
Summer 2011/Winter 2011-2012	550	750	13095	7131	4950
Summer 2012/Winter 2012-2013	550	750	13095	7131	4950
Summer 2013/Winter 2013-2014	550	750	13095	7131	4950
Summer 2014/Winter 2014-2015	550	750	13095	7131	4950
Summer 2015/Winter 2015-2016	550	750	13095	7131	4950
Summer 2016/Winter 2016-2017	550	750	13095	7131	4950
Summer 2017/Winter 2017-2018	550	750	13095	7131	4950
Beginning of Summer 2018 to 1st April 2018	550	750	788	452	279
Total	**-**		**117638**	**64130**	**44411**

SECTION F. Environmental impacts

F.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

The host country legislation does not require an EIA to be performed. The preliminary consultations have not identified any significant negative environmental impacts and no indicators were negative in the Sustainable Development Matrix. Hence, no EIA was required for the project.

For a brief description of the impacts of the project on environment, see section A.2.

F.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:

There are no negative impacts on the environment by the biogas project. Therefore no EIA is necessary to be carried out by the project participants.

SECTION G. Stakeholders' comments

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

Preliminary consultation

A meeting with stakeholders of the project took place on the 28th of February 2008 in the village of Jiaogui in Danzhai where 100 biogas tanks were built in 2007. Other meetings were organized in Weining with local stakeholders before the implementation of biogas tanks.
In Danzhai, the following stakeholders were identified:

- The beneficiaries of the project
- The chief of Jiaogui village
- The Agriculture Offices of Danzhai and Weining which finance a percentage of the project and provide technicians to build the tanks.
- Members of Initiative Développement
- Members of the local government of Danzhai and Weining
- ActionCarbone, which is a French program of voluntary offsetting interested in the carbon credits of the project. This organization financed a percentage of the project in 2007.
- French volunteers, members of the French organization Objectif Développement Durable, who helped ID in the writing of the PDD and the implementation of the monitoring plan of the project.

These stakeholders met before the meeting in Danzhai and were informed about it. The Designated National Authority of China, the Gold Standard foundation and two NGOs supporters of this foundation present in China (Greenpeace and WWF) were also informed about the whole process of consultation by email. As the villages of the beneficiaries (as well in Danzhai as in Weining) are of difficult access and are quite far from the headquarters of the previously mentioned organizations, they were not expected to attend the meeting but only give their general comments on the project.

For the meeting consultation, two documents were written:

- A summary of the environmental impacts of the project
- A non-technical summary of the draft version of the PDD

These documents as well as the report of the meeting are available in separate annexes.

G.2. Summary of the comments received:

Preliminary and potentially complementary consultations

In Danzhai, some beneficiaries mentioned many advantages concerning the use of biogas (see section A.2 and the report of the consultations) and this is really positive for the project. Their main questions were about the solutions to technical problems and about security. In each project area (one or several groups of villagers), a biogas committee is set up in order to facilitate the implementation of the project. The director of the energy office of the agriculture bureau of Danzhai suggested changing the biogas committee into an association of biogas beneficiaries, which would be a non-profit organization managed by trained beneficiaries of the village. This new association would help villagers with the maintenance of the biogas system and make people more aware of security issues.

Air quality and *Livelihood of the poor* were the two most important indicators of sustainable development for the participants. *Water quality* and *Soil conditions* were also important indicators for beneficiaries. No negative environmental impact was identified as significant.

No comment was received from the organizations contacted by internet.

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

Preliminary and potentially complementary consultations

The comments received in Danzhai constituted the basis on which the monitoring of significant sustainable indicators was elaborated (see section D.2). ID will be involved in the setting up of the association of biogas beneficiaries, which was officially suggested to the beneficiaries during the meeting. Finally, as water quality and soil conditions were also relevant indicators for beneficiaries, ID will strengthen links with the Agriculture Office of Guizhou, which is currently undertaking in-depth studies on the advantages linked to the use of residual waste.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

BASELINE INFORMATION

Data	Description	Value	Unit	Source
$EF_{firewood}$	CO_2 emission factor for combustion of firewood	112	Kg/GJ	IPCC 2006 Guidelines, Table 1.4
$EF_{charcoal}$	CO_2 emission factor for combustion of charcoal	112	Kg/GJ	IPCC 2006 Guidelines, Table 1.4
EF_{coal}	CO_2 emission factor for combustion of anthracite	98.3.	Kg/GJ	IPCC 2006 Guidelines, Table 1.4
$NCV_{firewood}$	Net Calorific Value of firewood	15.6	TJ/Gg	IPCC 2006 Guidelines, Table 1.2
$NCV_{charcoal}$	Net Calorific Value of charcoal	29.5	TJ/Gg	IPCC 2006 Guidelines, Table 1.2
NCV_{coal}	Net Calorific Value of anthracite	26.7	TJ/Gg	IPCC 2006 Guidelines, Table 1.2
Bo_{pig}	Maximum methane producing capacity for manure produced by pig[1]	0.29	M^3 methane/Kg of VS excreted	IPCC 2006 Guidelines, Table 10A-5
Bo_{piglet}	Maximum methane producing capacity for manure produced by piglet[1]	0.29	M^3 methane/Kg of VS excreted	IPCC 2006 Guidelines, Table 10A-8
$Bo_{Buffalo}$	Maximum methane producing capacity for manure produced by buffalo	0.1	M^3 methane/Kg of VS excreted	IPCC 2006 Guidelines, Table 10A-6
Bo_{Horse}	Maximum methane producing capacity for manure produced by horse	0.26	M^3 methane/Kg of VS excreted	IPCC 2006 Guidelines, Table 10A-9
Bo_{Sheep}	Maximum methane producing capacity for manure produced by sheep	0.13	M^3 methane/Kg of VS excreted	IPCC 2006 Guidelines, Table 10A-9
Bo_{Goat}	Maximum methane producing capacity for manure produced by goat	0.13	M^3 methane/Kg of VS excreted	IPCC 2006 Guidelines, Table 10A-9
VS_{pig}	Daily volatile solid excreted for pig[1]	0.3	Kg dry matter/animal/day	IPCC 2006 Guidelines, Table 10A-5
VS_{piglet}	Daily volatile solid excreted for piglet[1]	0.3	Kg dry matter/animal/day	IPCC 2006 Guidelines, Table 10A-8
$VS_{Buffalo}$	Daily volatile solid excreted for buffalo	3.9	Kg dry matter/animal/day	IPCC 2006 Guidelines, Table 10A-6
VS_{Horse}	Daily volatile solid excreted for horse	1.72	Kg dry matter/animal/day	IPCC 2006 Guidelines, Table 10A-9
VS_{Sheep}	Daily volatile solid excreted for sheep	0.32	Kg dry matter/animal/day	IPCC 2006 Guidelines, Table 10A-9
VS_{Goat}	Daily volatile solid excreted for goat	0.35	Kg dry matter/animal/day	IPCC 2006 Guidelines, Table 10A-9
$MCF_{Solid\ Storage}$	Methane conversion factor for manure managed as Solid storage[2]	0.02	-	IPCC 2006 Guidelines, Table 10.17
$MCF_{Biodigester}$	Methane conversion factor for manure managed in an anaerobic digester	1	-	IPCC 2006 Guidelines, Table 10.17
$GWP_{Methane}$	Global Warming Potential of methane	21	-	IPCC 2007, Table 2.14

1. *Pig* refers to *Mature Swine* and *Piglet* to *Growing Swine* (See IPCC 2006 Guidelines for National Inventory, Volume 4, Table 10.1). In IPCC Guidelines, Mature Swine and Growing Swine in Asia have the same methane default emissions factors for manure management.

2. This value corresponds to cool temperature. As methane project emissions are higher than baseline ones, it's conservative. In Jiaogui and Dongshan villages, manure is managed as solid storage when it's not introduced in the tank.

Annex 3

MONITORING PLAN

The objective of this monitoring plan is to describe how the data needed for the assessment of the emission reductions resulting from the project as well as the key sustainable indicators will be collected and archived. It has to be implemented for each of the climate areas of the project.

METHOD OF COLLECTION OF THE DATA

There are three methods for the collection of data: Surveys based on questionnaires, Collection of record sheets regularly filled in and Field investigation.

Surveys based on questionnaires

The surveys concern the assessment of the baseline and project emissions as well as the key sustainable indicators. They're carried out on a representative sample of beneficiaries. The interviews have to be conducted by especially trained personnel who have extensive knowledge about:

- Country or regional customs;
- Local farming practices;
- The technical design of the biodigester system;
- The amount and type of fuel used for each household; and
- How households handle their animal waste.

A team of at least two persons will perform the surveys. The local coordinators will be in charge of the surveys and will be trained by the staff member of ID in charge of all the monitoring of the project.

Selection of beneficiaries to interview

Households will be selected randomly from the project boundary.

Guizhou province is located in the subtropical mountain system, according to the IPCC guidelines (Volume 4 chapter 3) and FAO (FRA2000 – Global Ecological Zones).
However, there are small differences between the two project areas, such as the altitude and the duration of seasons. That is why we consider that Weining and Danzhai are two different "climatic areas".
In a climatic area, the fuel types used by the beneficiaries for their energy needs are identified. The fuel mix is also identified. A survey concerns one climatic area and its sample of beneficiaries should be geographically representative of this global area, so that the geographical repartition of the beneficiaries is needed. Once the repartition is known, the selection of respondents should be locally random.

A survey should be made on a sample of around 100 respondents, and at least 60 respondents.

Questionnaires

Experienced people on fuel consumption patterns in the different climatic areas designed the questionnaires. During the elaboration of the questionnaires, tests are carried out on several beneficiaries to ensure its relevance.

Record sheets

The record sheets are used for the identification of all the beneficiaries, the assessment of the construction stage as well as the beginning date of use of the biogas. These are documents filled in by local coordinators, which are the ones in charge of the implementation of the biogas system for some villages or group of villagers. In each group, the project is coordinated by one of them. Then, the records concern all the beneficiaries of the project.

Field investigation

The field investigation concerns the assessment of the non-renewable rate of the biomass used as a fuel for cooking by beneficiaries.

DATA STORAGE

All the questionnaires, record sheets and reports are archived in the offices of ID in China. They are all available for verification. All the data monitored is also stored in the electronic database (php / mysql). A complete extract is available for verification. ID is in charge of the regular encoding of the data in the electronic database. The data will be kept for two years after the end of the crediting period of the last issuance of the project's VERs.

BASELINE AND PROJECT EMISSIONS SURVEYS

In a year, two periods are considered for the assessment of the emission reductions: winter and summer. Therefore, baseline and project emissions depend on these periods.

Period characterizations and activities monitored

The baseline and project emissions are assessed by asking beneficiaries for their daily traditional fuel consumption for specific activities (including at least cooking activities). In a year, this daily consumption mainly depends on the outside temperature and the activities performed. In order to simplify the assessment of the emission reductions, two periods have been identified in a year, corresponding to specific patterns of energy consumption. They are basically the winter and summer periods.

Winter period

In Guizhou province, winter lasts from about November-December to February-March. The temperatures could vary from 0°C to 15°C. During this period, people use traditional fuels for cooking, boiling water, boiling animal food and space heating. Their eating habits could also vary from season to season. The duration of the winter period is determined with the beginning and ending dates of space heating. These dates are controlled by the person in charge of the monitoring of the project by taking into account the advices of the local coordinators.

Summer period

The summer period lasts from about March-April to October-November. The temperatures could vary from 15°C to 30°C. During this period, people do not heat their houses anymore. In some villages, they do not even boil animal

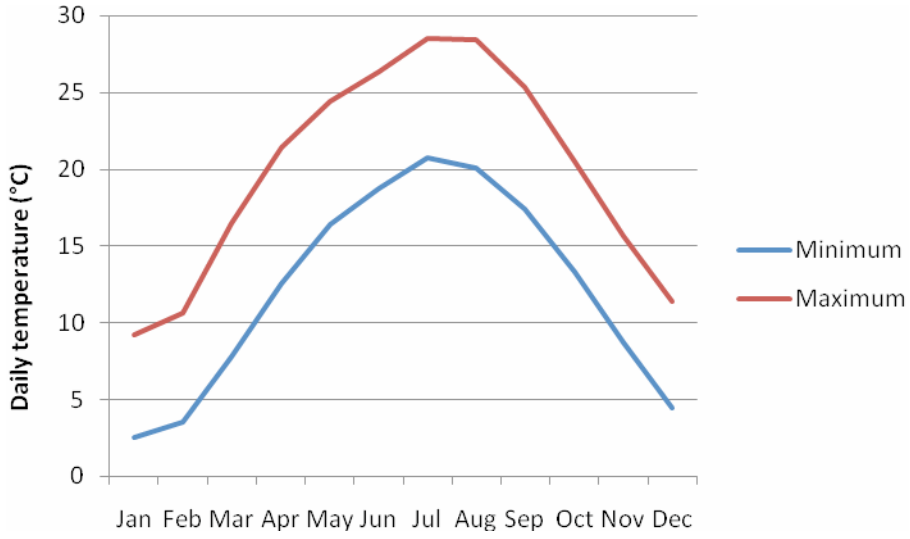
food because grass is available for animals. The duration of this period is also determined by the beginning and ending dates of space heating.

Activities monitored

The biogas stove is used for cooking and boiling water purposes. It's possible to monitor the daily consumption of traditional fuel for these specific activities only if there is no leakage. As a matter of fact, there could be a leakage from one activity to another when they're done at the same time. For example, during winter period, people could take advantage of the energy produced when they heat the house for cooking purposes. Even if they stopped cooking with traditional fuel, it would not mean that all the traditional fuel consumption used for cooking purposes would be reduced. Then, for each period, the daily consumption should concern all the activities from which there is a leakage to the cooking and boiling water.

An average daily consumption

In any given period, the daily consumption of traditional fuel could vary due to the variation of the outside temperature. The lower the outside temperature is, the higher the daily fuel consumption will be. Moreover, the production of biogas varies also. The higher the outside temperature is, the more biogas will be produced. In winter, there is clearly less biogas produced than in summer. Then, for the assessment of the baseline and project emissions, the answers given by the beneficiaries should not concern the coldest or the warmest days of a period. They should concern "average" days. The surveyors have to ensure beneficiaries are aware of this specificity.



Daily temperature variations in Guiyang (capital of Guizhou Province)
Source: World Weather Institute, 2007

Baseline emissions surveys

Each year, ID may install biogas systems in new villages. Since the baseline surveys have to be geographically representative of the population of the beneficiaries, the original baseline surveys have to be updated. In case the new beneficiaries are in a new climatic area, a whole new baseline survey should be conducted.

In case a new survey is needed, 100 respondents (at least 60) have to be interviewed.
In case an update of an old baseline survey is needed, less than 100 respondents may be interviewed. X old interviews can be recycled from an old survey and Y new interviews conducted in the new area, with X + Y = 100, and X and Y geographically representative of the new global population of beneficiaries.

The survey should be held before the implementation of the biodigester or within 3 months after the implementation of the biodigester. The main data asked to the beneficiaries is the quantity of traditional fuels daily consumed for specific activities during winter and summer periods before they get the biogas system (surveyors should be able to weigh this quantity). In the case of biomass consumption, the percentage of biomass residues used is asked to the beneficiaries. This data is necessary for the determination of the non-renewability rate of biomass used by the beneficiaries.
During the survey, the type of management of the animal waste is also identified for each beneficiary.

An example of the baseline questionnaire is added in Annexes on the Gold Standard registry.

Project emissions surveys (monitoring surveys)

Monitoring surveys are conducted twice a year, during summer and winter periods. They only target people who haves used biogas for at least three months (in this way, respondents are able to give relevant answers about their consumptions). A monitoring survey is conducted on beneficiaries from one climatic area. The sample should be geographically representative of the climatic area concerned and should contain around 100 respondents (at least 60).

The followings data is collected from the beneficiaries:

- Quantity of traditional fuel consumed in the period during which the survey is conducted
- Number of animals owned and proportion of manure put into the biogas tank (this data is also useful for the assessment of the baseline emissions)
- Social and environmental impacts of the project, from the point of view of the beneficiaries.

An example of the monitoring questionnaire is given in Annexes on the Gold Standard registry.

DATA COLLECTED WITH RECORD SHEETS

The data collected with record sheets is the following:

- Total number of beneficiaries in each village
- Number of beneficiaries who use biogas at the beginning of each season

The total number of beneficiaries and their geographical distribution (in different municipalities) is needed to select the samples for the baseline and project surveys. In the electronic database, each beneficiary will be identified by name, identity number and the name of the village and climatic area he/she belongs to. The data should be encoded in the electronic database before conducting the baseline and monitoring surveys

FIELD INVESTIGATION

A field investigation is necessary to determine the rate of non-renewable biomass consumed by beneficiaries for their energy needs. The methodology proposed by the Gold Standard is followed. A report should be delivered for each new field investigation done. In the electronic database, a non-renewability rate is associated to a forest, including one or several groups of beneficiaries.

Assessment of the key sustainable indicators

The savings of the beneficiaries as well as the share of the biogas in the whole energy mix consumed by the households are the two sustainable indicators monitored. For this, the following data will be asked to the beneficiaries during the monitoring surveys to assess the project emissions:

- Use of the biogas lamp
- Daily traditional fuels consumption for all their energy needs

The monitoring surveys also ask for the benefits of the project viewed by the beneficiaries.

With the previous data and those specifically needed for the assessment of the project emissions, it's possible to evaluate the sustainable indicators mentioned above.

ASSESSMENT OF THE EMISSION REDUCTIONS

Emission reductions by period and by climatic area

The emission reductions are assessed by subtracting the project emissions from the baseline emissions. They're assessed using a computer with the electronic database.

Every climatic area has at least one corresponding baseline survey (there could be more than one if during the project activity a new survey was conducted in order to keep a representative sample). Then, it's possible to calculate the baseline emissions for each climatic area.

A monitoring survey encompasses one climatic area and a specific period. Then, it's possible to calculate the project emissions for every climatic area.

Consequently, the emission reductions of a specific period can be assessed for every climatic area and from which more than 60 people were interviewed during one or more baseline surveys. Then, the emission reductions are calculated at the frequency of the monitoring survey (twice a year).

Note: The emission reductions depend on the exact duration of the periods and on the number of beneficiaries who started using biogas. This data could be updated in the electronic database after the monitoring survey, correcting the emission reductions calculation.

MAINTENANCE

A biogas committee formed by some beneficiaries is set up in order to facilitate the building of the infrastructures and manage the usual breakdowns of the biogas system. For unusual problems, which cannot be solved by the beneficiaries themselves, a technician from the local Agriculture Bureau will intervene.

Note: The problems are first taken into account thanks to a 5 % correction factor of the ER; second, during a monitoring survey the respondents will answer depending on if they have or haven't had problems, and will give their consumption taking into account that their biodigester might have been deficient. Since the sample is representative, the problems are also taken into account this way.