CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

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SECTION A. General description of project activity

A.1. Title of the project activity:

Title:	Biogas Programme for the Animal Husbandry Sector of Vietnam (BP), Voluntary Gold Standard (VGS) Project (BP VGS)
Acronym:	BP (Project acronym)
Version:	1
Date:	07 October 2011

A.2. Description of the project activity:

Start date of the VGS project: 1-1-2007 (start date of BP Phase II)

The Biogas Program for Animal Husbandry sector of Vietnam (BP)

Project "Biogas Program for the Animal Husbandry Sector in Vietnam" is implemented by Livestock Production Department the Biogas Project Division (BPD) (under MARD) in cooperation with Netherlands Development Organisation – SNV. Overall objectives of project are (i) exploiting effectively biogas technology and develo Chris.scharfe@WWM-GFA.org ping a commercial viable biogas sector in Vietnam; and (ii) contributing to rural development and environmental protection via provision of clean and affordable energy to rural households, improvement of community's sanitation and rural people's health, creation of job for rural labour and reduction of greenhouse gas emission.

The purpose of the BP Vietnam Gold Standard Biogas VER Project:

The purpose of the project activity is to (further) develop the commercial and structural deployment of domestic biogas in Vietnam. To that extent, the project will:

- Promote the long-term utilization of renewable energy produced in an environmentally compatible and economically viable way;
- Increase the awareness of prospective livestock smallholder households and extension workers on the full extent of the potential costs and benefits of domestic biogas installations;
- Strengthen the supporting capacity of involved Biogas Construction Teams (BCTs) and (non-) Government officials regarding all aspects of marketing, construction, after sales service and quality management of domestic biogas installations;
- Support the development of a commercially viable, market oriented domestic biogas sector in Vietnam;
- Strengthen the institutional infrastructure for coordination and implementation of sustained dissemination of domestic biogas at national, provincial and district level.

The project will build on the achievements of the "Support Project to the Biogas Programme for the Animal Husbandry Sector in some Provinces of Vietnam" (BP I). Phase II of the project will cover 50 out of Vietnam's 65 provinces, supporting the construction of over domestic biogas installations over the period January 2007 – December 2012. Phase III will built on phase II and starts in 2013. Concrete targets for phase III have not been set due to lack of funding. Carbon finance is sought to enable BP top achieve the BP II targets and to finance phase III.

With implementation of this Project, greenhouse gas (GHGs) emissions will be reduced not only through the displacement of fossil fuels currently used in stoves with clean and efficient biogas technology, but also by introducing a proper animal waste management system (AWMS).

Contribution to Sustainable Development

The Project will contribute to sustainable development (SD) of Vietnam in several areas:-

(1) Contribution to environmental development

- Substitution of conventional household fossil fuels by biogas and efficient biogas stoves, resulting in cleaner indoor air;
- Substitution of biomass fuel that is unsustainably harvested, helping to alleviate deforestation;
- Mitigation of the GHGs emissions by switching a high GHG emissions AWMS practice to a lower GHG emission AWMS practice;
- Substitution of synthetic fertilizer with the organic residue from the digestion process – bio-slurry;
- Improvement of sanitary conditions on the farms through connection of latrines to sewers or biogas digester and regular collection and treatment of animal manure from stables;
- Reduction in environmental load on surface waters as a result of averted discharge of untreated manure; and
- Improvement of indoor (kitchen) air quality by substituting less efficient cooking fuels by biogas.

(2) Contribution to economic development

- Reduction in the expenses for domestic thermal energy;
- Reduction in expenses for synthetic fertilizer by applying bio-slurry;
- Increase in agricultural production yields by applying nutrient rich bio-slurry; and
- Creation of employment opportunities for the construction and maintenance of biogas digester systems in rural areas.

(3) Contribution to social development

- Reduction in domestic workload of women and children, increasing opportunities for education and other social activities; and
- Prevention of respiratory illnesses resulting from indoor air pollution and gastro-enteric diseases attributed to poor sanitary conditions.

(4) Conformation to the governmental policy and strategy of Vietnam

- The Project contributes to the Government's National Strategy for Environmental Protection with the major objectives:-
  - *"To halt pollution acceleration, remedy degraded areas and improve the environment quality and ensure sustainable development of the country is achieved"*;

- *"To guarantee that all people are entitled to live in an environment with good quality of air, land and water measuring up to standards stipulated by the State"*; and
- *"To increase the rate of clean energy use to 5% of the total annual energy consumption"*.

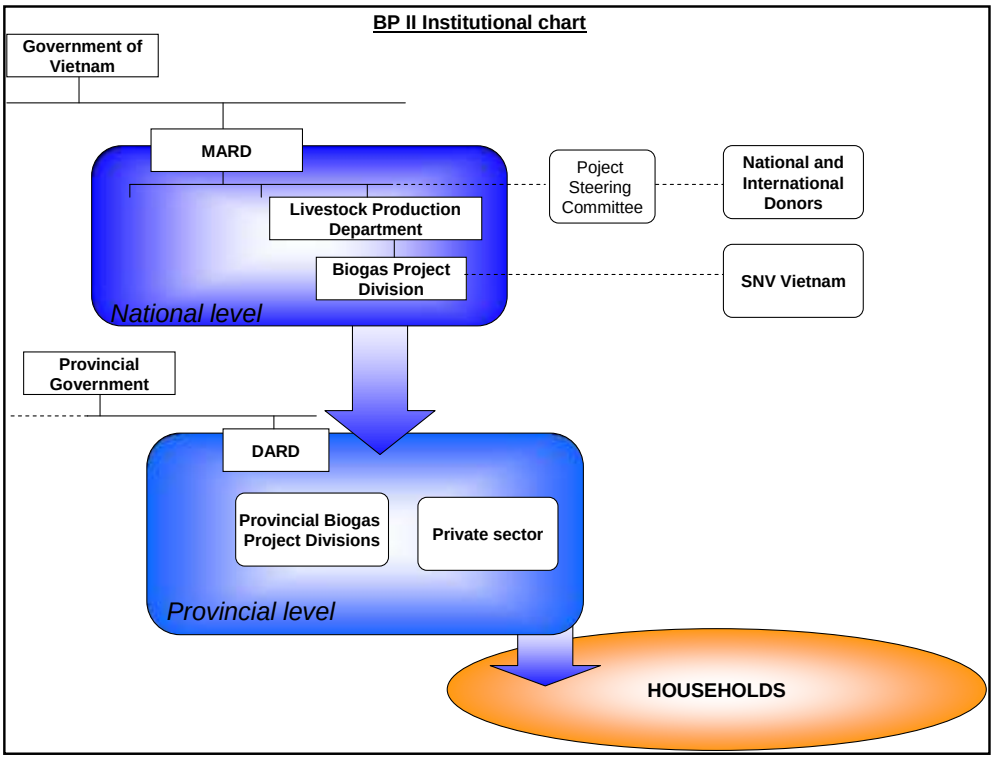
- The Project is also consistent with Vietnam's Global Environment Facility Strategy and Renewable Energy Action Plan which promotes the efficient use of energy sources.

BP has received international acclaim by winning the prestigious Energy Globe Award in 2006 and the Ashden Award in 2010. Both awards recognize the tremendous contribution that the programme has achieved in sustainable development, tackling energy poverty and the treat of climate change.

A.3. Project participants:

Name of the Party involved (*) (host) indicates a host party	**Private and/or public entity(ies) project participants (*)**	**Considered as a project participant**
Viet Nam (host)	Biogas Project Division	Yes
SNV Netherlands Development Organisation Viet Nam	INGO	Yes
Nexus-carbon for development (Project Developer)	INGO	no
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

The BP institutional chart of phase II is shown hereunder.



MARD = Ministry of Agriculture and Rural Development
SNV = Dutch Development Organisation
DARD = Department of Agriculture and Rural Development (at provincial level

The programme is executed by BDP, a division under the Department of Livestock Production (DLP) of the Ministry of Agriculture and Rural Development (MARD).

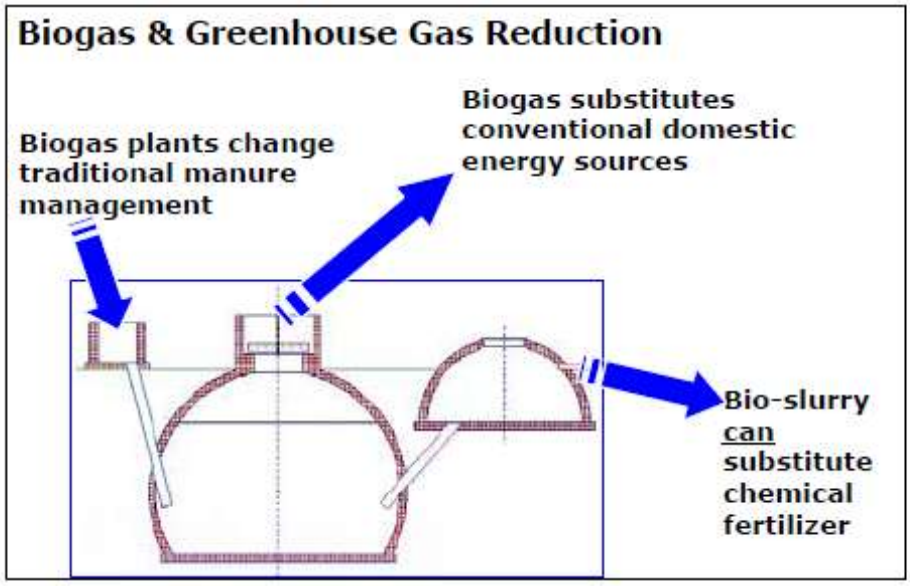
A.4. Technical description of the project activity:

BP is supporting the instalment of biogas units in households with livestock (cattle, buffalos or pigs). In this way the manure management type is improved leading to less GHG emissions and improved hygienic and environmental living conditions. The installed biogas units are of fixed dome type. The produced biogas is used to replace conventional fuels like firewood, coal, LPG, kerosene and agricultural residues for cooking. Apart from cooking, biogas lamps are installed that can replace conventional light bulbs (usually in the kitchen), or are used when the electricity fail-outs occur. The households who are in possession of only two cows or seven pigs can reach their daily need of energy for cooking from the biogas unit. Apart from biogas, the slurry produced from the digestion process can replace fertilizers.

The installed biogas units contribute to the reduction of GHG in 3 ways:

1. Avoidance of methane emissions from the baseline manure management system by capturing and destroying methane for energy services;
2. Fuel switch from non-sustainable energy sources for cooking and lighting to biogas;
3. The effluent from a biogas system, bio-slurry (digestate), replaces chemical fertilizers

However, due to the lack of data and for the simplification reasons, the emission reductions for the fertilizer substitution will not be accounted for, which is very conservative. Also some household might use biogas for water heating, stable heating and electricity generation. The emission reductions from the displacement of grid electricity by these activities will not be accounted for, this is conservative.



A.4.1. Location of the project activity:

Socialist Republic of Vietnam, since the inception of the first phase (BP I) the programme has gradually extended its coverage. In 2007 the programme was active in 24 provinces and this has increased steadily to 49 provinces in 2011. In 2013 the programme will virtually cover all provinces in Vietnam.

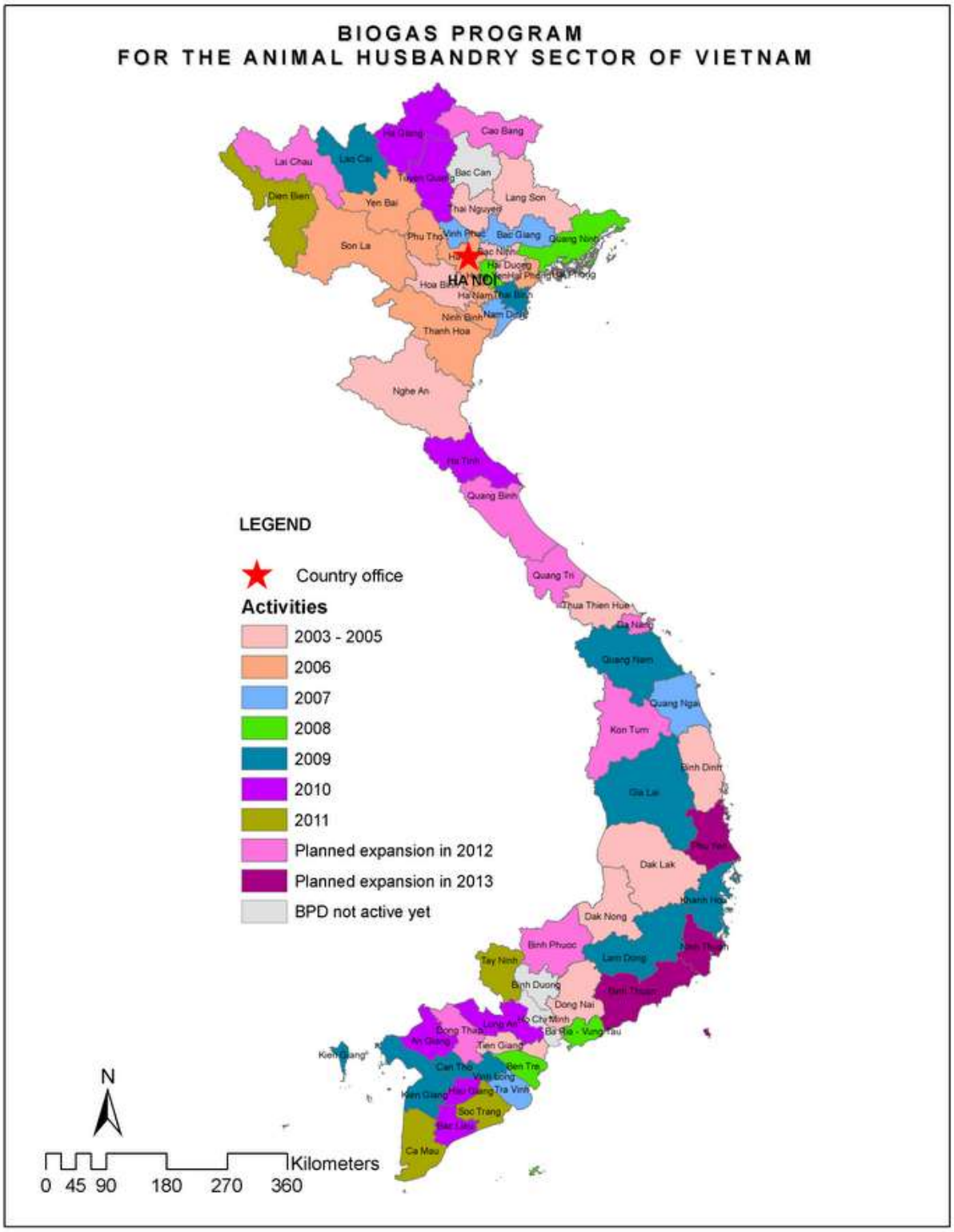
A.4.1.1. Host Party(ies):

The Socialist Republic of Vietnam.

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

Code	Province	2007	2008	2009	2010	2011	2012	2013
1	An Giang				x	x	x	x
2	Bà Rịa V.Tàu		x	x	x	x	x	x
3	Bắc Giang	x	x	x	x	x	x	x
4	Bắc Kạn					x	x	x
5	Bạc Liêu				x	x	x	x
6	Bắc Ninh	x	x	x	x	x	x	x
7	Bến Tre		x	x	x	x	x	x
8	Bình Định	x	x	x	x	x	x	x
9	Bình Dương							
10	Bình Phước						x	x
11	Bình Thuận							x
12	Cà Mau					x	x	x
13	Cao Bằng						x	x
14	Đăc Lăc	x	x	x	x	x	x	x
15	Đăk Nông						x	x
16	Điện Biên					x	x	x
17	Đồng Nai	x	x	x	x	x	x	x
18	Đồng Tháp						x	x
19	Gia Lai			x	x	x	x	x
20	Hà Giang				x	x	x	x
21	Hà Nam	x	x	x	x	x	x	x
22	Hà Tĩnh				x	x	x	x
23	Hải Dương	x	x	x	x	x	x	x
24	Hậu Giang				x	x	x	x
25	Hoà Bình	x	x	x	x	x	x	x
26	Hưng Yên		x	x	x	x	x	x
27	Khánh Hoà			x	x	x	x	x
28	Kiên Giang			x	x	x	x	x
29	Kon Tum						x	x
30	Lai Châu						x	x
31	Lâm Đồng			x	x	x	x	x
32	Lạng Sơn	x	x	x	x	x	x	x
33	Lào Cai			x	x	x	x	x
34	Long An				x	x	x	x
35	Nam Định	x	x	x	x	x	x	x
36	Nghệ An	x	x	x	x	x	x	x
37	Ninh Bình	x	x	x	x	x	x	x
38	Ninh Thuận							x

39	Phú Thọ	x	x	x	x	x	x	x
40	Phú Yên							x
41	Quảng Bình						x	x
42	Quảng Nam			x	x	x	x	x
43	Quảng Ngãi	x	x	x	x	x	x	x
44	Quảng Ninh		x	x	x	x	x	x
45	Quảng Trị						x	x
46	Sóc Trăng					x	x	x
47	Sơn La	x	x	x	x	x	x	x
48	T.Thiên Huế	x	x	x	x	x	x	x
49	Tây Ninh					x	x	x
50	Thái Bình			x	x	x	x	x
51	Thái Nguyên	x	x	x	x	x	x	x
52	Thanh Hoá	x	x	x	x	x	x	x
53	Tiền Giang	x	x	x	x	x	x	x
54	TP Cần Thơ			x	x	x	x	x
55	TP Đà nẵng							
56	TP Hà Nội	x	x	x	x	x	x	x
57	TP Hải Phòng	x	x	x	x	x	x	x
58	TP HCM							
59	Trà Vinh	x	x	x	x	x	x	x
60	Tuyên Quang				x	x	x	x
61	Vĩnh Long			x	x	x	x	x
62	Vĩnh Phúc	x	x	x	x	x	x	x
63	Yên Bái	x	x	x	x	x	x	x
	Total	**24**	**28**	**37**	**44**	**49**	**57**	**60**


BIOGAS PROGRAM
FOR THE ANIMAL HUSBANDRY SECTOR OF VIETNAM
HA NOI
LEGEND
Country office
Activities
2003 - 2005
2006
2007
2008
2009
2010
2011
Planned expansion in 2012
Planned expansion in 2013
BPD not active yet
N
Kilometers
0 45 90 180 270 360

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

The objective of the programme is to establish a commercially viable market for domestic biogas. The primary process, biogas construction teams selling high-quality domestic biogas plants to prospective smallholder agricultural households is key in reaching this objective. A consequence of the approach is that biogas dissemination follows market demand, and location details will only be available after households and biogas construction teams have entered into a contractual agreement.

BP however will target all cities, towns and communities in the provinces included in the programme.

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

Full details of the physical location of the biogas installation will only be available after commissioning and acceptance and are stored in an electronic database. Details include:

- Name of head of household, including personal ID-card number;
- Full address of household (Province / District / Commune);
- Unique plant ID code (PPP/DDD/CCC/xxx); (Province code, District code, Commune code/number).
- Name and ID of Mason that built the plant

The unique plant ID code will allow for unique identification of each biogas installation.

A.4.2. Category(ies) of project activity:

The project belongs to sectoral scope 1 and 13 and falls into category type I thermal energy to the user and type III methane recovery.

The proposed activity conforms with the type I category as biogas is used to generate thermal energy for cooking and or lighting and also conforms to type III methane recovery as methane being the main constituent of biogas is recovered from animal manure by anaerobic digestion in a bio-digester.

A.4.3. Technology to be employed by the project activity:

The project involves the installation and implementation of model types KT.1 and KT.2 domestic biogas plan or equivalent[1]. The KT1, KT2 and other models of biogas plants have been developed after 1990s in Vietnam. Development is done by the Institute of Energy as well as others based on earlier Chinese and German design. Design, construction and fitting has been standardized in MARD's "standards for small size biogas plants # 10 TCN 497 – 2005 –- Part 6".

[1] Biogas plants that are recognized in the MARD biogas standard for small scale biogas

The hemi-spherical fixed dome plants are made on-site, entirely out of brick work. The materials required for construction, including bricks, cement, iron bars, fitting materials etc. are all locally manufactured. Basic appliances, which are also widely available, consist of gas pipe, main valves, stoves and gas lamps. Upon the requirement of the households, biogas plants range in digester size from $4m^3$ to 50 m^3 with a current average size of $8m^3$ to $15m^3$ (11.35 m3 of units built between 1-1-2007 and 31-08-2011)

Both designs need a fair amount of construction skills, but have otherwise proven to be robust and virtually maintenance-free. With feeding of on-farm produced manure of pigs, cattle or buffalo to the digester, biogas will be produced to meet the energy demand of the household. The residue of the digestion process can be used as organic fertilizer.

The KT.1 model is a further development of the model NL.5 of the Institute of Energy and has been accepted widely in the programme.

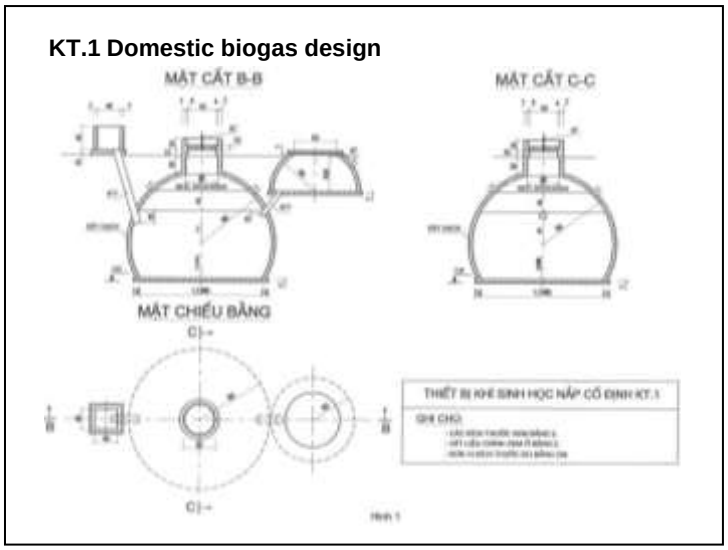


Figure 1: Blueprint of the KT1 domestic biogas plant

The KT.2 model follows the TG-BP design as applied in the Mekong Delta by the Can Tho University. Similar to KT.1, the revised design for KT.2 accommodates digester volumes able to digest 25 to 125 kg manure per day.

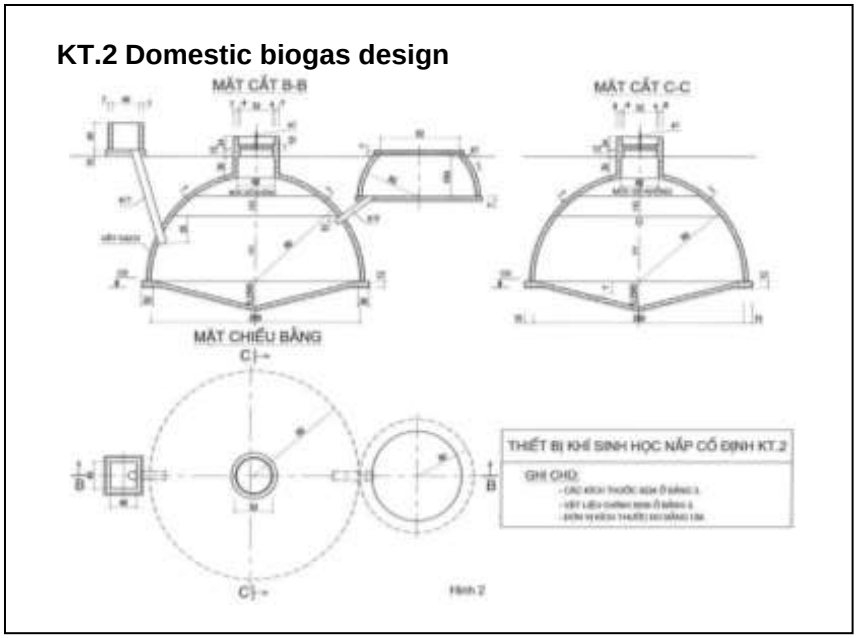


Figure 2: Blueprint of the KT2 biogas plant design

Although the KT.1 model optimizes material economy best, it needs deeper excavation. For areas with a high water table or rocky ground, the KT.2 is then better suited. For both models, design variations allow for the type of manure (pig and cattle/buffalo), the dilution ratios of water and manure (1/1, 2/1 and 3/1) and the specific climatic conditions (the North with a cold winter and the South with a warm winter).The programme uses an elaborate design manual, combining over 100 design variations.

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

Credit period: The project applies for a renewable crediting period of 7 years.

The project start date is 1/1/2007 and therefore the first credit period runs from 1/1/2007 – 1/1/2014. Retroactive Gold standard certification of the credits is sought from the 1st of January 2010 until date of VGS registration.

Crediting year		Credit type	Estimated Units	Estimated annual emission reductions in tCO2e
1	2010	GS-VER	78,230	334,483
2	2011	GS-VER	88,952	423,845
3	2012	GS-VER	88,952	221,461
4	2013	GS-VER	88,952	221,461
5	2014	GS-VER	88,952	221,461
6	2015	GS-VER	88,952	221,461
7	2016	GS-VER	88,952	221,461
Total estimated emission reductions(tCO2e)				1,865,633
Total number of credits years				7
Total number of GS credits years				7 years
Average number of credits per year (tCO2e)				266,519
Average emission reduction per biodigester				5.11

A.4.5. Public funding of the project activity:

The "Biogas Programme for the Animal Husbandry Sector", including this project, has received and will receive public funding from Annex I Parties. Such funds have not been, and will not be, used to purchase VERs, nor will they result in diversion of ODA. The non-ODA diversion declaration is provided in the Gold Standard Passport report (GSPR).

SECTION B. Application of a baseline and monitoring methodology

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

Technologies and practices to displace decentralized thermal energy consumption, version 1.0 Sectoral scope 1,3,13. Available online: http://www.cdmgoldstandard.org/fileadmin/editors/files/6_GS_technical_docs/manuals_and_methodolgies/110411_TPDDTEC_Methodology.pdf

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

This methodology is applicable to programs or activities introducing technologies and/or practices that reduce or displace greenhouse gas (GHG) emissions from the thermal energy consumption of households and non-domestic premises. Examples of these technologies include the introduction of improved biomass or fossil fuel cookstoves, ovens, dryers, space and water heaters (solar and otherwise), heat retention cookers, solarcookers, bio-digesters.

The BP installs bio-digesters and this activity is covered by the methodology. The methodology lists the following conditions for application:

1. The project boundary can be clearly identified, and the technologies counted in the project are not included in another voluntary market or CDM project activity (i.e. no double counting takes place). Project proponents must have a survey mechanism in place together with appropriate mitigation measures so as to prevent double-counting in case of another similar activity with some of the target area in common.	The technologies all have a unique identification numbers, based on that numbers double counting can be avoided. A system to avoid double counting is described after this table.
2. The technologies each have continuous useful energy outputs of less than 150kW per unit (defined as total energy delivered usefully from start to end of operation of a unit divided by time of operation).	The average generation capacity of a household in 1.22 kW[2], being much lower than 150 kW

[2] Calculations can be provided if necessary. However, considering the size of the biogas plants, up to 50 m3, each biogas plant will have a much lower biogas generation capacity.

3. The use of the baseline technology as a backup or auxiliary technology in parallel with the improved technology introduced by the project activity is permitted as long as a mechanism is put into place to encourage the removal of the old technology (e.g discounted price for the improved technology) and the definitive discontinuity of its use.	BP will only install new biogas plants
4. The project proponent must clearly communicate to all project participants the entity that is claiming ownership rights of and selling the emission reductions resulting from the project activity.	This is ensured in the sale contract between the household and the biodigester installer
5. Project activities making use of a new biomass feedstock in the project situation (e.g. shift from non-renewable to green charcoal, plant oil or renewable biomass briquettes) must comply with relevant Gold Standard specific requirements for biomass related project activities, as defined in the latest version of the Gold Standard rules	The project does not make use of new biomass source. The project utilizes manure to produce biogas.

Double counting

Since in parallel to this BP VGS a CDM PoA the Vietnam Biogas Programme[3] (VBP) is being developed there is a risk of double counting. The PoA includes 2 CPAs that contain around 42% of all units built between 22 June 2007 and 31 December 2009. The next table show which units are included in which project.

3 http://cdm.unfccc.int/ProgrammeOfActivities/Validation/DB/FYHTWZ3QLWM91NKR9DB47YIHGQ5KSU/view.html

Table 1: Overview of units included in the VBP PoA and the BP VGS project

Units built in time →						
Timeline	1/1/2007 to 22 June 2007	22 June 2007-31 December 2009	1/1/2010 – PoA registration date	PoA registration date (around half 2012)	Credit start date of new CPAs not included in the PoA at time of validation	Credit start data of new CPAs included in the PoA
CDM Programme of Activities, the Vietnam Biogas Programme						
CPA 01 under the PoA		Around 21% of the units are included in CPA 1		CPA 01 credit period start date		
CPA02 (not yet developed)**		Around 21% of the units are included in CPA 2			CPA 02 credit period will start later after DOE desk review and inclusion	
*CPA0x (potential)***			*Potential start data of CPA0x*	*Potential start data of CPA0x*	*Potential start data of CPA0x*	*Potential credit period start date of CPA0x*
Biogas Program for Animal Husbandry Sector of Vietnam Voluntary Gold standard Project						
BP VGS	1/1/2007 BP VGS start data. All units are included in the VGS project	All units built are included in BP VGS	1/1/2010 Anticipated VGS retroactive credit period start date. All units built are included	All units excluding the units included in CPA1*	All units excluding the units included in CPA1 and CPA02*	All units excluding the units included in CPA1, CPA02 and CPA 03*
Double counting risk						
Double counting risk	No, all units included in VGS	No, counting of CPA01/ 02 only starts after PoA registration date	No, counting of CPA01 and 02 only commences after PoA registration date	Yes, will be mitigated by excluding units included in the CPA included in the PoA from the VGS project* and cross checking of the CPA and PoA databases with the BP VGS database using the unique ID codes of biogas plants		

* all units might remain in the VGS project if this is more attractive to BDP compared to the CDM-PoA.
** CPA 02 is not yet developed and until the date of CPA02 inclusion, the units remain in the VGS project. CPA 0x is only included to illustrate how new CPAs can affect the BP project. Both CPA02 and CPA0x will not be developed if the VGS project turns out to be more attractive. The units will remain in the BP VGS project in that case.

In conclusion

- All units built from 1/1/2007 until the PoA registration data are included in the BP VGS project;
- All units from the VGS credit period start data until the PoA registration data are credited under VGS;

- After the PoA registration data, the units included in CPA 01 will be transferred from VGS to the PoA, unless the VGS project is more attractive. The remaining units will remain in the VGS project.
- After the inclusion of CPA02 in the PoA, the units included in CPA 02 will be transferred from the VGS to the PoA, unless the VGS project is more attractive. The remaining units will remain in the VGS project.
- Units built under BP after the PoA registration data will be included in the VGS project, unless a new CPA is developed and included. The units includes in any other CPA will be excluded from the VGS project until the date of CPA inclusion.

B.3. Description of the sources and gases included in the project boundary:

The project boundary encompasses the geographical sites all the units built from 1/1/2007 of all biodigester under the project[4].

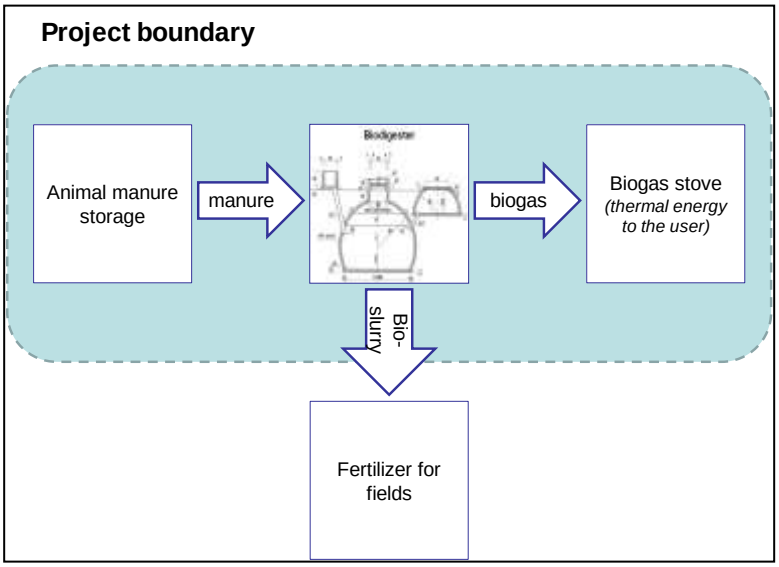


Figure 3: Overview of emission sources included in the project boundary

The next table shows the GHGs included in the project boundary.

[4] Excluding units included in the CDM PoA, see on the next page on double counting

Table 2: GHG Emission sources included in the project boundary

	Source	GHG	Included?	Justification / explanation
Baseline & project situation	Thermal energy need	CO_2	Yes	Major source of GHG emission
		CH_4	Yes	Major source of GHG emission
		N_2O	Yes	Major source of GHG emission
	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 emissions
		N_2O	No	Excluded for simplification; conservative
Project activity	Direct emissions from the biodigester	CO_2	No	Excluded as CO_2 emissions from biogas incineration are CO_2 neutral
		CH_4	Yes	Emissions from physical leakage and incomplete combustion of biogas
		N_2O	No	Excluded as a biodigester does not produce N2O gasses

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

As described under section B.3, the GHG emissions under the baseline condition comprise two sources:

1. CO_2 , CH4 and N2O emission from combustion of non-renewable cooking and lighting fuels;
2. CH_4 emission from the animal waste management system.

The total average baseline emissions per household are calculated as the sum of the total CO_2 emission of the pre-project and baseline emission from the animal waste handling as:

$$\boldsymbol{BE_h = BE_{th,h} + BE_{aw,h}}$$

Equation 1: Estimation of baseline emissions

Where:

BE_h	=	Total baseline emissions in the pre-project situation (tCO_2e/year)
$BE_{th,h}$	=	Baseline emissions from fuel consumption for thermal energy needs of households (tCO_2e/year)
$BE_{aw,h}$	=	Baseline emissions from animal waste handling of households (tCO_2e/year)

The voluntary Gold Standard biodigester methodology proposes different options for the baseline calculation depending on whether the project activity is implemented under a situation where energy services provided are sufficient or insufficient to meet the needs of stakeholders. According to the methodology, the baseline emissions caused by the consumption of fuel for thermal energy demand can be determined in three separate ways:

1. Pre-project situation
2. Project level energy service demand using a fossil fuel and appliance as in situation with satisfied demand
3. Satisfied demand with fossil fuel mix and technology different from pre-project

Of the three baseline options, option 1 is chosen, this is conservative.

1. Baseline emission (BE) from thermal energy use

Baseline scenario

A baseline scenario is defined by the typical baseline fuel consumption patterns in a population that is targeted for adoption of the project technology. Hence, this "target population" is a representative baseline for the project activity. BPD collects of each household fuel data before a biogas plant is installed in that respective household; the data collected is therefore by definition representative for the identification of the baseline. This baseline is appropriate as biogas will only be used for cooking and lighting, and hence the baseline fuels used for this purposes is identified as the baseline scenario. Other uses of biogas, such as electricity generation or displacement of electricity by, for example biogas water heaters, is only practiced by a minor part of the biogas population. Emission reductions arising from electricity generation are not accounted for, this is conservative.

The baseline of this project is not fixed as the technologies are adapted progressively through the credit period. Therefore, the baseline will be updated each time when new users are included in the project.

The project scenario are all the users that have installed a biogas plant, of all these users baseline fuel data is available. The emission reductions are credited by comparing the fuel consumption in the project scenario with the baseline fuel use of the biogas users.

Baseline studies

The baseline scenario is defined by the typical fuel consumption among the target population prior to adopting the project technology. The baseline studies executed are:

A. Baseline non-renewable biomass (NRB assessment)
B. Fuel data collection of each household that installs a biogas plant

A. Baseline Non-Renewable Biomass Assessment

The fraction of NRB is identified following the guidelines of applied methodology 'Technologies and practices to displace decentralized thermal energy consumption' version 1.0. The NRB assessment may be updated prior to verification if further analysis and or surveys are conducted after the baseline study. The NRB assessment will be reassessed when applying for a renewable of the crediting period based on the most recent information available.

In projects where woody biomass is a component of either the baseline or project scenario, project proponents must specify the extent to which the CO2 emissions of that biomass are not offset by re-growth in the fuel collection area.

The non-renewable biomass (NRB) assessment is conducted following the CDM EB 23 Annex 18 definition of "renewable biomass" (by inversion) and by collecting evidence through field surveys, literature review and resource/population mapping studies. Depending on the depth and quality of information available on biomass supply and growth in the collection area, project proponents may or

may not be able to pursue a quantitative approach. If possible, project proponents should adopt the quantitative approach below; otherwise the qualitative approach should be used. The best method is to combine both approaches and include conservative estimates.

The fNRB is studied by:

- **A.** Quantitative NRB assessment
- **B.** Qualitative NRB assessment

Both options (a) and (b) assume it is possible to estimate the locations and extent of the areas from which woody biomass fuel used by the project participants is collected. If estimating the collection area is difficult, project proponents can aggregate all reachable woody biomass fuel collection areas within the relevant country and apply a single fraction derived from all collection areas in the country, with respect to the options above.

The project aims to cover whole Vietnam and therefore the geographical boundaries of Vietnam are considered to be the woody biomass fuel collection area. The fNRB is calculated using the following steps:

Step 1

The annual wood fuel increment is which could be harvested sustainable is determined of the identified wood collection area. For this purpose, tools like satellite data, regional statistics, regional or IPCC algometric equations to estimate the above ground biomass increment etc. may be used. This is the mean annual increment (MAI).

Step 2

Estimate the average harvest of wood fuels derived from this area (H)

Step 3

Calculate the shortage of woody biomass in the area:

$$NRB = H - MAI$$

Where:

MAI:	Annual biomass increment (tons/year) on area A
H:	Annual biomass harvest (tons/year) on area A
NRB:	non-renewing biomass or excess harvest over and above-regrowth, which is the amount of woody biomass removed with attendant CO2 emissions which are not reabsorbed by regrowth.

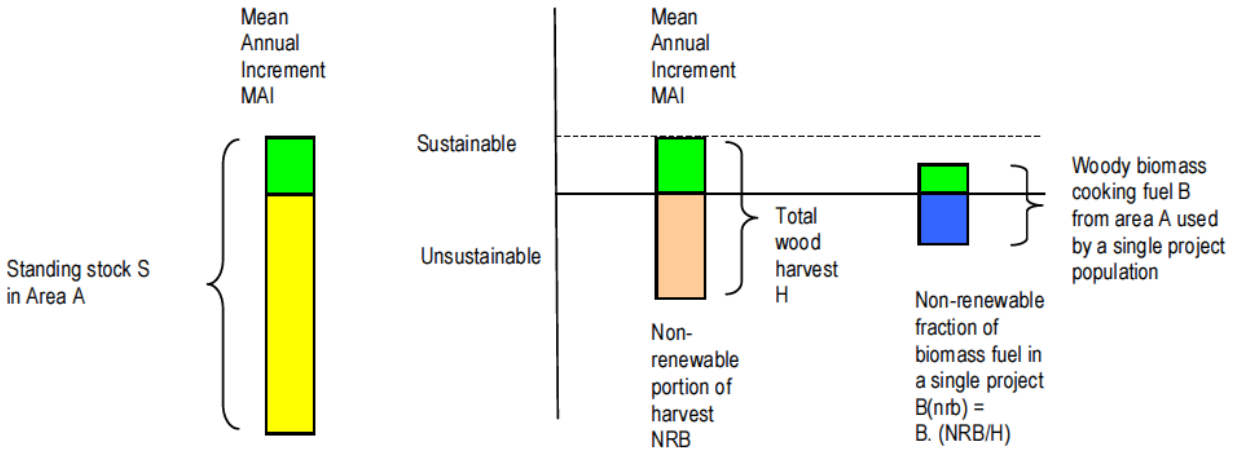


Figure 4: Illustration of the share of wood that can be considered NRB

The diagram illustrates sustainable and unsustainable woody biomass extracted from fuel collection area A. MAI is a percentage of the total standing stock S, and NRB is the harvest taken from area A, net of MAI. The fraction of the harvest which is non-renewable is NRB/H.

Step 4

Ascertain the fraction of extracted woody biomass that is non-renewable, denoted as fNRB. If a quantity of woody biomass supplied from fuel collection area A is used as a fuel for thermal energy production, the fraction fNRB is assumed to be non-renewable with CO_2 emissions that are not reabsorbed by re-growth.

$$\mathbf{f_{NRB} = \frac{NRB}{H}}$$

Equation 2: Calculation of the share of NRB

Where:

f_{NRB}	=	Share of non-renewable biomass
NRB	=	Non-renewable biomass harvest (tons/year) on the project area i.
H	=	Annual biomass harvest (tons/year) on the project area i.

The fraction of NRB is only applied to the biomass fuels charcoal and wood, agricultural residues are considered 0% NRB with the exception of the non-CO2 emissions, which are not renewable.

Qualitative NRB assessment

The quantitative NRB assessment will be supplemented with a qualitative NRB assessment. According to the applied methodology, non-renewable woody biomass (NRB) is the quantity of wood fuel used in the

absence of the project activity minus the quantity designated as demonstrable Renewable biomass (DRB), as long as either:

A. Survey results, national or local statistics, studies, maps or other sources of information such as remote sensing data show that carbon stocks are depleting in the project area;

Or at least two of the following supporting indicators are shown to exist (or one of the following combined with above):

B. Trend showing increase in time spent or distance travelled by users (or fuel wood suppliers) for gathering fuel wood or trend showing increase in transportation distances for the fuel wood transported into the project area;
C. Increasing trends in fuel wood price indicating scarcity;
D. Trends in the type of cooking fuel collected by users, suggesting scarcity of woody Biomass;
E. Inadequate access to energy for cooking, or scarcity of wood fuel resources, are significant components of poverty.

Under these conditions, the fraction of woody biomass saved by the project activity in year y that can be established as non-renewable is given by:

$$fNRB = NRB / (NRB + DRB)$$

B. Fuel data collection of each household that installs a biogas plant

Fuel data is collected of each household providing maximum achievable reliability and representativeness of the data collected. Renewability and non-renewability indicators are collected separately see A above. The $BE_{th,h}$ for the adopted baseline option 1 for the baseline emission from thermal energy demand is for the pre-project situation calculated as:

$$\boldsymbol{BE_{th,h} = \sum_{i} (f_{NRB,y} F_{b,i,h} \times NCV_i \times EF_{CO2,i} + F_{i,bl,h} \times NCV_i \times EF_{nonCO2,i})}$$

Equation 3: Baseline emissions from thermal energy demand by household

Where

$BE_{th,h}$	=	The total baseline emissions from the thermal energy demand of one household (tCO_2/year)
$f_{NRB,i}$	=	Fraction of biomass during year y that is non-renewable (100% for fossil fuels)
$F_{b,i}$	=	Quantity of fuel *i* consumed in the baseline during year y (kg/household/year)
		Total amount of fuel type *i* in the baseline scenario (kg/year) of one household
NCV_i	=	Net Calorific Value of fuel type *i* (TJ/ton of fuel)
$EF_{CO2,i}$	=	The CO_2 emission factor per unit of energy of fuel *i* (tCO_2/TJ)
$EF_{nonCO2,i}$	=	The nonCO_2 emission factor per unit of energy of fuel *i* (tCO_2/TJ)

2. Baseline emission from Animal Waste Management Systems ($BE_{AWMS,h}$)

For the calculation of the $BE_{aw,T}$ the IPCC tier 1 approach is followed. This approach is followed because local data required for an estimation of the methane emission factor per category of livestock is not available. A number of survey on AWMS have been conducted, however, the manure management categories identified were not comparable with the IPCC 2006 Manure management system (MS) categories. In addition, animal waste is partly collected for utilization. Under these conditions, the applied methodology allows for a baseline emission estimate using the IPCC Tier 1 approach. This is conservative.

The following equation is applied to estimate the baseline emissions from animal waste management systems

$$BE_{awms,h} = GWP_{CH4} * \sum_{T} \left(EF_{awms(T)} * N_{(T),h} \right)$$

Equation 4: Equation to estimate baseline emissions from AWMS

Where:

$BE_{awms,h}$	The baseline emissions from handling of animal waste in premise h (tCO2e/year)
GWP_{CH4}	Global warming potential of methane (tCO2e per tCH4): 21 for the first commitment period. It shall be updated to any future COP/MOP decisions
$N_{(T),h}$	The number of animals of livestock species per animal category T
$EF_{awms,T}$	Emission factor for the defined livestock population category T, (ton CH4 per head per yr). The relevant Default methane emission factor for livestock for default animal waste methane emission factors by temperature and region can be found in tables 10.14, 10.15 & 10.16 in Chapter 10: Emissions from Livestock and Manure Management, Volume 4 - AGRICULTURE, FORESTRY AND OTHER LAND USE, 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

The Gold Standard requires that either one of the UNFCCC or Gold Standard approved additionality tools provided in toolkit 2.1, irrespective the scale and type of the project and whatever the stream you are applying for (VER, CDM or JI).

For this project the latest additionality tool available (as of Sep 2009) on the UNFCCC website is used. The tool used is: *Tool for the demonstration and assessment of additionality*" version 5.2[5]. According to the tool the following step-wise approach should be followed:

Step 1:	Identification of alternatives to the project activity;
Step 2:	Investment analysis to determine that the proposed project activity is not the most economically or financially attractive;
Step 3:	Barriers analysis
Step 4:	Common practice analysis.

An additional step is added to the additionality analysis, and that is the early consideration of carbon revenues.

The prior consideration of carbon finance

The second phase of the BP has started since 1/1/2007. Already at the time of the program planning in 2006 it was clear that the program goals could only be achieved with carbon financing. This is why BPD developed a PIN for a CDM project and received a Letter of Endorsement from the Vietnamese DNA in 2006 and started at the same time with the help of Mitsubishi Securities UFJ the development of a PDD. In 2007/2008 the CDM development was cancelled by the government. BPD then with help of SNV started the development of a voluntary Gold Standard project in 2008. In 2009 GFA Envest developed a PoA manual for mini household biogas in Vietnam. GFA Envest recommended developing a VGS project until the moment a CDM PoA is developed and registered. In 2009 ADB stepped in and it was decided to develop the PoA. No financing was made available for the VGS project. In 2011 BPD contacted Nexus – Carbon for Development to finalize the VGS project with the objective supplement the PoA as an approach for the units that cannot be included in the PoA or to substitute the PoA if the VGS project is more interesting.

Table 3: Timeline of the carbon finance activities

Programme Activity	Year
PIN Development and Reception of Letter of Endorsement (LoE) from Vietnam DNA	2006
PDD Development by Mitsubishi Securities UFJ as bundle CDM project	2006- 2007

[5] Tool can be found here: http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html

with credit period start date 1-10-2006	
Approval on the Biogas Programme phase 2 with consideration of CDM revenue in financing mechanism	October 12th, 2006
Beginning of the Biogas Programme phase 2	1-1-2007
Baseline development and GS PDD development by SNV (Felix ter Heegde) (draft PDD developed: Nov 2008, start date crediting period 1-1-2008	January 2008
Approval on the QSEAP-BDP by MARD with consideration of CDM revenue in financing mechanism	20 November 2008
PoA methodology development and project documentation by GFA Envest	24-3-2009 to September 2009
Submission to UNFCCC EB for public comment	December 30th 2009
Exploration of VGS	December 2010
Contract signed with Nexus – Carbon for Development	September 2011

Step 1: Identification of alternatives to the project activity

Sub-step 1a: Define of alternative scenarios to the proposed project activity.

If the BP would not have been supported with carbon finance, the following scenarios are plausible:

1) Continued use of unsustainable fuel wood and fossil fuel for cooking and kerosene for lighting;
2) The proposed project activity undertaken without being registered as VGS activity;
3) Switch to fossil fuel;
4) Development of BP based on donor and/or public funding;

Alternative 1: The business as usual scenario of using unsustainable fuel wood and fossil for cooking and kerosene for lighting. Around 64% of the population uses firewood. In terms of thermal energy output for cooking this scenario would deliver similar thermal output compared to the biogas stove and for most users a lower output for lighting with kerosene compared to biogas lamps.

Alternative 2: Option 2 is not applicable because it is foreseen in the initial plan that revenue from carbon offsets are needed to implement the BP II. Without carbon finance it is not possible for BP to develop a sustainable market sector by continuing to support mason trainings, quality control and assurance and to support the household[6]. In addition, the ODA financing from the Dutch government will cease in 2012 and hence BPD will rely almost completely on carbon finance from 2013.

Alternative 3: The most credible alternative fossil fuel would be coal or LPG for cooking. LPG however is only used by 23% of the households and coal by 22%.

Alternative 4: Development of BP based on donor and/or public funding

[6] Currently a subsidy is provided of 1.2 Million VND for KT1 and KT2 biogas plants.

Alternative 4 is not applicable as the Vietnamese government does not have the funds to finance the subsidy component and therefore the same obstacle as described in alternative 2 remains. Donor support for BP will end in 2012 and from that moment on BP will mostly rely on carbon finance.

Outcome of sub-step 1.A

The most realistic and credible alternative scenario is the continuation of the current situation: the reliance on non-sustainable firewood, fossil fuel and kerosene for lighting. Fuels that cause substantial GHG emission, indoor air pollution and drudgery.

Sub-step 1b: Consistency with mandatory rules and regulations

Alternative 1: Continued use of unsustainable fuel wood, and fossil fuel for cooking and kerosene for lighting.

The procurement of wood for cooking is in full compliance with applicable laws and regulations; unless firewood originates from logging activities in national and protected forests. The procurement of fossil fuels and kerosene for lighting is conform national regulations.

Alternative 2: Continuation of the project activities without carbon finance

The BP activities without carbon finance are consistent with mandatory rules and regulations.

Alternative 3: Switch to fossil fuels

A switch to LPG is in compliance with all mandatory applicable legal and regulatory requirements.

Outcome of Step 1.b:

All the options are consistent mandatory rules and regulations.

Proceed to Step 2 (Investment analysis) or Step 3 (Barrier analysis). (Project participants may also select to complete both Steps 2 and 3.)

Step 2 is skipped for step 3

Step 3: Barrier analysis

Investment barrier at the level of the BP

Attracting commercial investments. The BP is the national program to support the dissemination of biogas facilities managed by public entities. It is not designed to attract commercial investment for the generation of revenues.

Attracting public funding. The national biogas program is financed by farm holders' contributions and by public funding. To assess the investment barrier of the national biogas program with regard to public funding, the financing history of the overall program is briefly outlined.

The national biogas program started its phase 1 program (2003-2005) with support from the Government of Netherlands. The phase 1 program implemented 18,000 biogas facilities in the years 2003 to 2005. With considerable success of the phase 1 program, the MARD decided to expand the program.

From 2007, the BPD, with support from the Government of Netherlands, has prepared the phase 2 program, aiming at the installation of 140,000 biogas facilities in 58 provinces of Vietnam. At the start of the phase 2 program, the BPD pursued financing options via the Clean Development Mechanism (CDM) or Voluntary Gold Standard (VGS) in order to close the financial gap. The carbon revenues were considered as an integral and crucial mean for ensuring the project's financial viability. Without the structuring of carbon revenues, the project cannot reach its goals. The MARD and the Government of the Netherlands confirm that a) the funding without carbon revenues is not sufficient to implement the phase 2 program, and b) the CDM is considered to be an integral component of the phase 2 program. Phase III, the period from 2013 to 2018 is facing even higher barriers as the Government of the Netherlands will cease to support the project financially.

Investment barrier for biogas facilities at household level

Small farm holders face an investment barrier due to the high upfront investment of biogas facilities.

The implementation of a biogas facility involves significant investment costs at the time of construction. The average costs of a biogas digester per m3 installed capacity amount to 0.95 million VND. The average size of a biogas facility comprises 11.35 m3[7]. The table hereunder shows the average cost of a digester by for the four most common sizes, the prevalence and the support cost.

Most common digester size (m3)	**12**	**9**	**15**	**8**
Prevalance	39%	28%	19%	14%
Average price	9.4	7.4	10.6	6.8
Average Support Costs in million VND/facility	2.2	2.2	2.2	2.2
Total Average Costs (including support) in million VND/facility	11.3	9.3	12.5	8.8

Thus, the average price of the most common facility amount to 9.4 million VND (the 12 m3 digester) comprising material and labor. Biogas appliances are bought by the households themselves. This is complemented by costs arising from support activities amounting to on average 2.2 million VND. The support comprises

- Pre-construction and promotion workshops where farm holders are informed on the opportunities of biogas facilities,
- Post-construction user training workshops;
- During construction and post construction quality control on the biogas plant;
- 12 months guarantee on the biogas facility,
- Training in the sound operation of biogas facilities;
- Mason and biogas technician trainings, masons certification, refreshment trainings
- Subsidy of 1.2 million VND

[7] Of digesters built between 1-1-2007 and 31-08-2011

Above services, summarized as support, are crucial to the success of the national biogas program and inherently connected to the implementation of biogas techniques. The costs of support amount to approx. 20% of a facility's investment cost. The average support costs amount to 2.2 million VND resulting in an average total costs of 11.3 million VND for the most common digester (the 12 m3 digester, see the above table).

This is a significant amount for a small farm holder. The Biogas User Survey of 2009 for instance estimated that the income of the average biogas household is around 6.70 to 14.89 million VND/person/year, on average 10.8 million VND (BUS 2009 page 34). Thus biogas investment costs make up make up 87% of the average annual income in case the household would install the most common digester of 12 m3. Even with the smallest most common digester of 8 m3, the biogas investment is very high (63% on average). This poses a significant barrier to the implementation of biogas facilities.

In another study, the micro credit survey of 2009, hold amongst 407 respondents showed that 64.0% of the respondents say they cannot afford to pay all the costs incurred by the construction of biogas works. This shows that the investment is a considerably investment for the majority of the households.

(b) Technological barrier

Biogas digesters were first introduced to Vietnam more than a decade ago. However, to date, the dissemination level remains low. This is due not only to the investment barriers elaborated above, but also due to the suspicion many farmers have towards the biogas digester system. Although the Project's digesters have been proven to work, it has been common in the past for fly-by-night "technology providers" to sell unreliable digesters, at the huge expense of the unsuspecting farmers. The Project thus faces an uphill battle in promoting the biogas technology. The poor quality of biogas digesters is a well-known barrier for the dissemination of biogas digesters worldwide.

In the absence of a proper quality control program, suppliers of biogas plants would compete solely on price. Users cannot determine the quality of biogas units. Thus without the proposed BP activity, biogas constructors would have an incentive to save on costs and provide poor quality systems.

BP provides quality control on all plants constructed under the program. The carbon revenues will support the quality control and the construction standard. Without the carbon revenues the program objective of establishing a viable commercial biogas sector would probably fail and the planned target would not be achieved. It is also evident that in the absence of the project activity the households would continue to use conventional fossil fuels and to dispose the manure in the conventional ways. The Project thus faces an uphill battle in promoting the biogas technology.

There are at the moment 2 competing household biogas technologies in Viet Nam with the KT1 and KT2, the nylon bag and the VACVINA biogas plant.

SEDCC[8] (2010) showed in an evaluation study for household Biogas Plant Models in Viet Nam that the technologies promoted by BP have a longer pay back period and la lower initial rate of return compared to the nylon back digester. However, the reliability and the quality of the nylon back is much lower. Users facing the high investment barrier will not choose the KT1 and KT2 but will install a Nylon bag digester. Farmers investing in a Nylon bag however will install a digester that is unreliable and after a few years the digester will breaks down. This will not only impact the opinion of that farmer regarding biogas, but he/she will spread the impression to other farmers that biogas does not work. The project hence faces an uphill battle to persuade farmers to invest in a better quality digester which includes proper support arrangements.

Another alternative cheaper than the KT1 and KT2 is the Vacvina. In a report of the Consulting Engineers Mekong (2005) the Vacvina was compared with the KT2. The evaluation study showed that the VACVINA is a less appropriate model than the KT2. The digester has several weaknesses compared to the KT2, such as weaker structural design, higher operation, repair and maintenance costs and the safety of the biogas plant is much lower. The VACVINA biogas plant had the lowest score of safety and the KT2 the highest. The VACVINA has a low score because gas is not captured in an integrate gasholder but in a plastic bag. The plastic bag is often placed directly under the roof in the stables. The gas pressure is very low in the plastic bag and hence households often have to compress the bag with strings or by putting stones on the bag. Consequently the bag is easily and frequently damaged leading to a situation that gas escapes leading to a potential dangerous situation.

In conclusion, the KT1 and KT2 is a better quality biogas plant compared to the nylon bag and the VACVINA. Without the BP household however will due to the investment barrier choose lower quality alternatives and will not opt for the KT1 and KT2.

(b) Barriers due to prevailing practice

Current practice in households in Vietnam is to burn fossil fuels and biomass for cooking. The households with higher living standard also cook on electricity. However, these households are neither the target group nor the programme participants. In order to change the prevailing practice it is necessary to implement the programme to coordinate biogas units installation on a wide scale and offer subsidy and support to encourage households to participate.

The number of fixed dome biogas units installed in Viet Nam is less than 100,000 while the potential is 1,34 million, hence less than 10% of the potential is reached[9]. According to the applied methodology the technology can be qualified as “first of its kind” and hence a credible barrier due to prevailing practices is shown according to the applied methodology.

Step 4 Common Practice Analyses

[8] Sustainable Energy Development Consultancy Joint Stock Company

[9] ADB 2010 TA 7251-VIE Developing Strategies and Options for Biogas Development Program Expansion

The project has demonstrated to be first of its kind and therefore it is not necessary to execute the common practice analysis[10]

Based on the guidance provided in the methodological tool 'tool for the demonstration and assessment of additionality' BP is considered additional

[10] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.1.pdf

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

Emission reductions are calculated as the difference between the baseline emissions and the project emissions. This project uses 2 methodologies for two sources of emission:

1. Displacement of non-renewable biomass and fossil fuel
2. Avoidance of methane emissions from AWMS

See section B.4 for elaboration

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

(Copy this table for each data and parameter)

Data / Parameter:	**$EF_{b,CO2}$**
Data unit:	$kgCO_2/TJ$ fuel
Description:	CO2 emission factor arising from use of fuels in the baseline scenario
Source of data used:	2006 IPCC Guidelines defaults, see chapter 2 Stationary Combustion: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html
Value applied:	**Fuel *b*** / **$EF_{CO2,}$ (kg/TJ)** LPG / 63100 Charcoal / 112000 Coal / 94 600 Firewood / 112000 Agriculture residues / 112000 Kerosene / 71900
Any comment:	The CO2 emissions from agricultural residues are considered renewable, hence the CO2 emission will be zero.

Data / Parameter:	**$EF_{b,ch4}$**
Data unit:	kgCH4/TJ fuel
Description:	CH4 emission factor arising from use of fuels in the baseline scenario
Source of data used:	2006 IPCC Guidelines defaults, see chapter 2 Stationary Combustion: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html. Charcoal production from Good Practice Guidance and Uncertainty Management in National GHG inventories: http://www.ipcc-nggip.iges.or.jp/public/gp/bgp/2_2_Non-CO2_Stationary_Combustion.pdf
Value applied:	**Fuel *b*** / **$EF_{CH4,}$ (kg/TJ)** LPG / 5 Charcoal / 200 Coal / 300

	Firewood	300
	Agriculture residues	300
	Kerosene	10
	Charcoal production	1000
Any comment:		

Data / Parameter:	**$EF_{b,N2O}$**
Data unit:	kgN2O/TJ fuel
Description:	N2O emission factor arising from use of fuels in the baseline scenario
Source of data used:	2006 IPCC Guidelines defaults, see chapter 2 Stationary Combustion: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html
Value applied:	
Any comment:	

Fuel *i*	**$EF_{N20,}$ (kg/TJ)**
LPG	0.1
Charcoal	1
Coal	1.5
Firewood	4
Agriculture residues	4
Kerosene	0.6
Charcoal production	N/A

Data / Parameter:	**NCV_b**
Data unit:	TJ/ton
Description:	Net calorific value of the fuels used in the baseline
Source of data used:	2006 IPCC Guidelines defaults, see chapter 1 Energy http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html
Value applied:	
Any comment:	

Fuel *i*	**NCV_i (TJ/Gg)**
LPG	47.3
Charcoal	29.5
Coal	25.8
Firewood	15.6
Agriculture residues	15.6
Kerosene	43.8

Data / Parameter:	**GWP_{CH4}**
Data unit:	tCO2e per tCH4
Description:	Global Warming Potential (GWP) of methane
Source of data used:	SAR IPCC
Any comment:	21 for the first commitment period. Shall be updated to any future COP/MOP decisions

Data / Parameter:	**GWP_{N2O}**
Data unit:	tCO2e per tN2O
Description:	Global Warming Potential (GWP) of nitrous oxide
Source of data used:	SAR IPCC
Any comment:	310 for the first commitment period. Shall be updated to any future COP/MOP decisions

Data and parameters not monitored AWMS

Data / Parameter:	$VS_{(T)}$
Data unit:	kg dry matter per animal per day
Description:	Daily volatile solid excreted for livestock category T
Source of data used:	Volume 4 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, chapter 10 (online: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html)
Value applied:	Animal / VS(T); T / kg/day Pig: 0.3 Buffalo: 3.9 Dairy cow: 2.8 Cattle: 2.3
Any comment:	Any comment: 365 = basis for calculating annual VS production, days per year

Data / Parameter:	$Bo_{(T)}$
Data unit:	m^3 CH_4 per kg of VS excreted
Description:	Maximum methane production capacity for manure produced by livestock category T
Source of data used:	Volume 4 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, chapter 10 (online: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html)

Value applied:	

Animal	VS(T)	Bo(T)
T	kg/day	m3CH4/kgVS
Pig	0.3	0.29
Buffalo	3.9	0.1
Dairy cow	2.8	0.13
Cattle	2.3	0.1

Any comment:	

Data / Parameter:	**$MCF_{(k)}$**
Data unit:	[-]
Description:	Methane conversion factor for each manure management system by climate region k
Source of data used:	Volume 4 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, chapter 10 (online: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html)
Value applied:	10% for biodigester systems
Any comment:	

Data / Parameter:	**$EF_{awms,T}$**
Data unit:	$kgCH_4$ per animal per year for livestock type T
Description:	Animal waste methane emission factor by average temperatures
Source of data used:	IPCC default values for the region Asia from volume 4 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, chapter 10 (online: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html)
Value applied:	

Animal	EF(T)
T	kgCH4/head/year
Pig	5.37
Buffalo	2.00
Dairy cow	23.19
Cattle	1.00

Any comment:	The IPCC default value depends on the average annual temperature. Therefore the value is determined for the average conditions in each provinces and the average is obtained by the weighted average based on the animal (T) population in each province. The values for buffalo and cattle were the same in each province.

Data / Parameter:	**$\eta_{biogasstove}$**
Data unit:	[-]%
Description:	Combustion efficiency of the biogas stove
Source of data used:	98%, the default value from the GS methodology: Indicative Programme, baseline, and monitoring methodology for Small Scale Biodigester (can be found here http://www.cdmgoldstandard.org/Gold-Standard-

	Methodologies.347.0.html?&L=0)
Value applied	98%
Any comments	

B.6.3. Ex-ante calculation of emission reductions:

Details of the Baseline

The baseline for this project is determined in accordance with the following paragraph from the applied methodology:

"the baseline emissions involve emission from use of fossil fuel and non-renewable biomass for cooking and heating, and emissions from the handling of animal waste in the baseline situation"

A. Calculation of the baseline emission from the thermal energy demand (BE_{th})

This estimation of these emissions involves two steps:

1. Determination of annual per household energy consumption
2. Determination of applicable emission factors
3. Determination of the fraction of non-renewable biomass
4. Calculation of the average greenhouse gas emission per household

1. Thermal energy demand

The total amount of the fuel used for thermal energy demand of the households with the technical potential is listed hereunder.

Table 4: Thermal energy demand of the households with the technical potential

Fuel *i*	**Average per household (kg/year)**	**NCV_i (TJ/Gg)**	**Thermal energy demand (TJ/year)**
LPG	17.8	47.3	0.000840390
Charcoal	93.2	29.5	0.002748859
Coal	362.8	25.8	0.009359734
Firewood	1855.6	15.6	0.028947201
Agriculture residues	556.5	15.6	0.008680770
Kerosene	0.7	43.8	0.000028955

2. Applicable emission factors

In absence of national relevant emission factors the default emission factors from the IPCC 2006 Guidelines for National Greenhouse Gas Inventories, volume 2: Energy, Chapter 1 are used, see the next table.

Table 5: CO2, CH4 and N2O emission factors

Fuel *i*	**$EF_{CO2,}$ (kg/TJ)**	**$EF_{CH4,}$ (kg/TJ)**	**$EF_{N20,}$ (kg/TJ)**
LPG	63100	5	0.1
Charcoal	112000	200	1
Coal	94600	300	1.5
Firewood	112000	300	4
Agriculture residues**	112000	300	4
Kerosene	71900	10	0.6
Charcoal production	61805	1000	NA

* Other bituminous coal ** woody waste

3. Fraction of Non-Renewable biomass (fNRB)

The fNRB is estimated to be 48.424%. The NRB assessment can be found in Annex 3 of the PDD. The fNRB value is applicable to CO2 emissions from firewood, agricultural residues and charcoal consumption and production. Methane and nitrous oxide emission is 100% NRB by definition.

4. Baseline emissions by fuel, GHG and total

The baseline emission is the baseline thermal energy consumption multiplied by emission factors and the global warming potential of each GWP. The GWP applied are taken form the Second Assessment Report of the IPCC, 21 and 310 for CH4 and N20 respectively. The GWP will be updated by decision of the COP/MOP.

Table 6: Baseline emission of each fuel and total from thermal energy use

Fuel	**Baseline emissions from CO2 (tCO2e/yr)**	**Baseline emission from CH4 (tCO2e/yr)**	**Baseline emission from n20 (tCO2e/yr)**	**Total (tCO2e/yr)**
LPG	0.053	0.00	0.000	0.053
Charcoal	0.149	0.01	0.001	0.161
Coal	0.885	0.06	0.004	0.949
Firewood	1.570	0.18	0.036	1.788

Agriculture residues**	0.000	0.05	0.011	0.065
Kerosene	0.002	0.00	0.000	0.002
Charcoal production	0.082	0.06	0.000	0.140
Total	**2.742**	**0.365**	**0.052**	**3.159**

The average annual per household emissions from cooking and lighting is 3.159 tCO2.

B. Estimation of emissions from AWMS

The following equation is applied to estimate the baseline emissions from animal waste management systems

$$BE_{awms,h} = GWP_{CH4} * \sum_{T} \left(EF_{awms(T)} * N_{(T),h} \right)$$

Equation 5: Equation to estimate baseline emissions from AWMS

Where:

$BE_{awms,h}$	The baseline emissions from handling of animal waste in premise h (tCO2e/year)
GWP_{CH4}	Global warming potential of methane (tCO2e per tCH4): 21 for the first commitment period. It shall be updated to any future COP/MOP decisions
$N_{(T*\),h}$	The number of animals of livestock species per category T
$EF_{awms,T}$	Emission factor for the defined livestock population category T, (ton CH4 per head per yr). The relevant Default methane emission factor for livestock for default animal waste methane emission factors by temperature and region can be found in tables 10.14, 10.15 & 10.16 in Chapter 10: Emissions from Livestock and Manure Management, Volume 4 - AGRICULTURE, FORESTRY AND OTHER LAND USE, 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

The IPCC lists for each regions default values for methane emissions from AWMS at various average temperatures in chapter 10 volume 4 of the IPCC 2006 guidelines. As Vietnam has more than 1 climate zones, for each province the IPCC default emission factor has been determined. Once the average annual temperature was determined for each province and the respective IPCC default value was found the average emission factor could be determined in Vietnam. As some provinces have a much higher population of animals, the average was weighted with the population. The IPCC default emission factor

of buffalos and cattle is the same over the range of temperatures observed in Vietnam. The excel file belonging to this PDD details the calculation.

Table 7: Baseline emissions from animal waste management systems

Animal T	N(T),h #	EF(T) kgCH4/head/year	GWPCH4 tCO2/tCH4	Beawms,h tCO2/head/year
Pig	20.68	5.37	21	2.330
Buffalo	0.21	2.00	21	0.009
Dairy cow	0.03	23.19	21	0.014
Cattle	0.36	1.00	21	0.008
			Total	**2.36**

The average annual emissions from AWMS are 2.36 tCO2 per household.

C. Estimation of project and leakage emissions

The project proponent should investigate the following potential sources of leakage:

Table 8: Leakage emission assessment

Leakage source	Applicability
a) The displaced baseline technologies are reused outside the project boundary in place of lower emitting technology or in a manner suggesting more usage than would have occurred in the absence of the project.	The baseline technologies are not reused outside the project boundary. Furthermore, the baseline technologies outside the project boundary are the same with the same efficiencies
b) The non-renewable biomass or fossil fuels saved under the project activity are used by non-project users who previously used lower emitting energy sources.	Most household rely on wood in Vietnam. The small share of household that use a lower emitting energy source, such as LPG, will not switch back to NRB or coal due to the project activity.
c) The project significantly impacts the NRB fraction within an area where other CDM or VER project activities account for NRB fraction in their baseline scenario.	There are no other CDM or VER activities that account for NRB in their baseline in Vietnam registered.
d) The project population compensates for loss of the space heating effect of inefficient technology by adopting some other form of heating or by retaining some use of inefficient technology	Space heating in an infrequent occurrence in Vietnam and confined to the mountainous areas with limited biogas potential. There are only 2 provinces with an average annual temperature lower than 20oC. Lâm Đồng (19.9) and Lào Cai (16.5), in these provinces only 206 digesters are built, or around 0.3%.
e) By virtue of promotion and marketing of a new technology with high efficiency, the project	The baseline is not fixed in this project, and the combustion of biogas always leads to lower

stimulates substitution within households who commonly used a technology with relatively lower emissions, in cases where such a trend is not eligible as an evolving baseline.	emissions compared to all baseline fuels as it is 100% renewable.

Space heating may be the only source of leakage emissions, this source is likely small. Also, some households install biogas heaters and biogas lamps that warm the house.

Not all fuels will be replaced by biogas. The fuels that people continue to use in the project scenario will be obtained from the monitoring surveys. The next table shows the estimated remaining fuel consumptions from BUS 2011.

Table 9: Estimate project and leakage thermal energy use

Fuel *i*	**Average per household (kg/year)**	**NCV_i (TJ/Gg)**	**Thermal energy demand (TJ)**
LPG	2.2	47.3	0.0001
Charcoal	0.0	29.5	0.0000
Coal	0.0	25.8	0.0000
Firewood	43.7	15.6	0.0007
Agriculture residues	98.7	15.6	0.0015
Kerosene	84.6	15.6	0.0013

The ex-ante estimated project emission are shown in the next table by fuel and GHG.

Table 10: Estimate ex-ante project and leakage emission from thermal energy use

Fuel	Baseline emissions from CO2 (tCO2e/yr)	Baseline emission from CH4 (tCO2e/yr)	Baseline emission from n20 (tCO2e/yr)	Total (tCO2e/yr)
LPG	0.007	0.00	0.000	0.007
Charcoal	0.000	0.00	0.000	0.000
Coal	0.000	0.00	0.000	0.000
Firewood	0.100	0.01	0.003	0.116
Agriculture residues**	0.148	0.01	0.002	0.158
Kerosene	0.000	0.00	0.000	0.000

Charcoal production	0.000	0.00	0.000	0.000
Total	**0.254**	**0.022**	**0.004**	**0.281**

The total project emission are 0.281 tCO2.

The project emissions involve emissions from the bio-digester, which include physical leakage and incomplete combustion of biogas, as well as emissions from the animal waste not treated in the bio-digester.

The assumed manure management system in the project scenario is that all manure is fed to the digester. This will monitored for each verification period. The remaining emissions are therefore only physical leakage and incomplete combustion. The EF_{AWMS} in the project scenario has been calculated using the IPCC Tier 2 approach with the manure management category biodigester.

Table 11: Emission factor for the defined livestock category T of the project situation

Animal	**VS (kg/day)**	**Bo_T**	**MCF.MS**	**EF_{AWMS} (kgCH4/year)**	**EFAWMS (tCO2/year)**
Pig	0.3	0.29	10%	3.1755	0.067
Buffalo	3.9	0.1	10%	14.235	0.299
Dairy cow	2.8	0.13	10%	13.286	0.279
Cattle	2.3	0.1	10%	8.395	0.176
			total	**39.092**	**0.821**

The project emissions are then the multiplication of the EF_{AWMS} with the physical leakages emissions and the stove efficiency.

Table 12: Leakage emission parameters

Item	**Value**	**Source**
Physical leakage	**10%**	IPCC default value for biodigesters independent on annual temperatures
Stove combustion efficiency	**98%**	**Old GS methodology** http://www.cdmgoldstandard.org/Gold-Standard-Methodologies.347.0.html?&L=0)

In the next table the physical leakage emission from the biogas plant are calculated.

Table 13: Physical leakage emission from biodigester

Animal	**N(T),h**	**EF_{AWMS} (tCO2/animal)**	**PL_{stove} tCO2/animal)**
Pig	20.68	0.14	0.025

Buffalo	0.21	0.01	0.001
Dairy cow	0.03	0.00	0.000
Cattle	0.36	0.01	0.001
	Total	**0.151**	**0.027**

The total leakage emissions are 0.151 + 0.027 = 0.124 tCO2/household/year

With the above values the leakage emissions are calculated:

Table 14: Physical leakage emissions

Animal	**PL (tCO2/year)**	**PL biogas stove (tCO2/year)**	**PL total (tCO2/year)**
Pig	0.152	0.027	0.180
Buffalo	0.018	0.003	0.021
Dairy cow	0.002	0.000	0.003
Cattle	0.015	0.003	0.018
total	**0.188**	**0.034**	**0.221**

The leakage emissions physical leakage and incomplete combustion of methane are 0.221 tCO_2/year.

D. Ex-ante estimate of the emission reductions

The ex-ante emission reductions are then BE-PE=ER

Table 15: Average annual emission reductions

Emission source	BE (tCO_2/h/year)	PE (tCO_2/h/year)	ER (tCO_2/h/year)
Fuel use	3.16	0.28	2.88
AWMS	2.36	0.12	2.24
Sum	**5.52**	**0.40**	**5.11**

The estimated emission reductions are 5.11 tCO2 per household per year.

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

Crediting year		Credit type	Estimated Units	Estimated annual emission reductions in tCO2e
1	2010	GS-VER	78,230	334,483
2	2011	GS-VER	88,952	423,845
3	2012	GS-VER	88,952	221,461
4	2013	GS-VER	88,952	221,461
5	2014	GS-VER	88,952	221,461
6	2015	GS-VER	88,952	221,461
7	2016	GS-VER	88,952	221,461
Total estimated emission reductions(tCO2e)				1,865,633
Total number of credits years				7
Total number of GS credits years				7 years
Average number of credits per year (tCO2e)				266,519
Average emission reduction per biodigester				5.11

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

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)

Data / Parameter:	**$F_{NEB,y}$**
Data unit:	Fraction of non-renewability
Description:	Non-renewability status of woody biomass fuel in scenario I during year y
Source of data to be used:	Literature review, surveys
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Fixed by baseline study for each crediting period
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	**$P_{b,y}$**
Data unit:	Quantity of fuel that is consumed in the baseline scenario in year y
Description:	The baseline is continuously updated with new households that install a biogas plant.
Source of data to be used:	BP database
Monitoring frequency	Once, before the biogas plant is installed at the household that wants to install a biogas plant
QA/QC procedures to be applied:	Fuel data is collected by the district technician before the biogas plant is installed and inspected by the provincial biogas technician before the data is entered into the database
Any comment:	100% representativeness is achieved as fuel data is collected of each household

Data / Parameter:	**$P_{h,y}$**
Data unit:	kg/household
Description:	Quantity of fuel that is consumed in the project scenario in year y
Source of data to be used:	Monitoring survey
Monitoring frequency	Updated for every 2 years or more frequently
QA/QC procedures to be applied:	Fuel data is collected using a stratified random selection method. Consisting of a random selection of 8 provinces out of the total number of provinces in which BP is active. Gathering of all the households of these 8 provinces included = A. Random selection of 120 households from A for the monitoring survey.
Any comment:	

Data / Parameter:	**$U_{p,y}$**
Data unit:	Percentage
Description:	Percentage of bio-digesters in use in monitoring period y
Source of data to be used:	Monitoring survey
Monitoring frequency	Updated for every 2 years or more frequently
QA/QC procedures to be applied:	
Any comment:	

AWMS data and parameters monitored over the crediting period

Data / Parameter:	**$MS_{(T,S,k)}$**
Data unit:	[-]&
Description:	Fraction of livestock category *T*'s manure fed into the biodigester, *S* in climate region *k*
Source of data to be used:	Monitoring survey

Monitoring frequency	Updated for every 2 years or more frequently
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	**$N_{(T)}$**
Data unit:	[-]
Description:	Number of animals of livestock category T
Source of data to be used:	Monitoring survey
Monitoring frequency	Updated for every 2 years or more frequently
QA/QC procedures to be applied:	.
Any comment:	

Data / Parameter:	**PL**
Data unit:	%
Description:	Physical leakage of the biodigester
Source of data to be used:	IPCC default value
Monitoring frequency	Updated with new IPCC guidance
QA/QC procedures to be applied:	.
Any comment:	The physical leakage is not monitored, this is not possible.

B.7.2. Description of the monitoring plan:

BPD uses a number of monitoring tools at its disposal, quality control measures and the carbon monitoring survey.

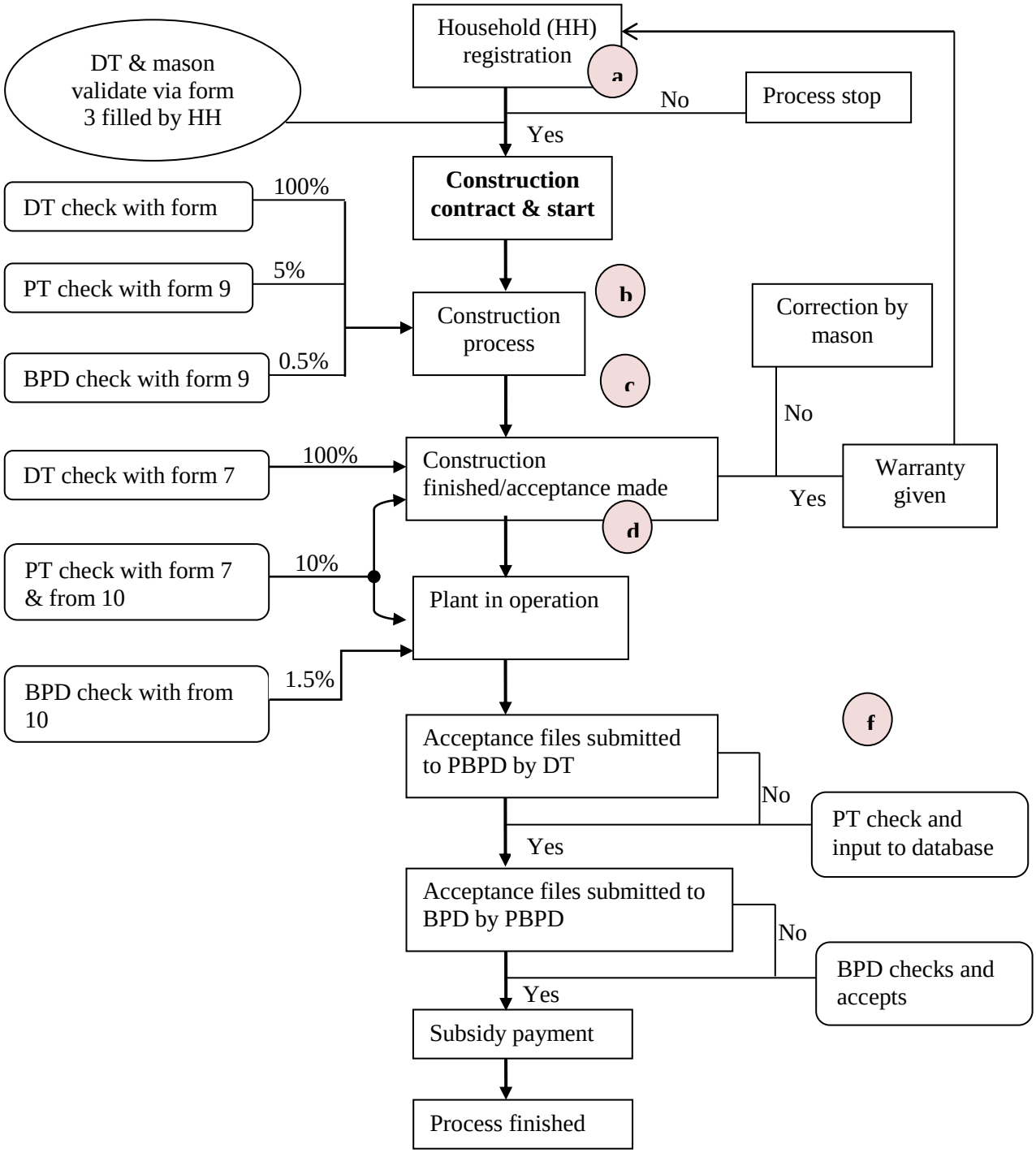
A. Quality control

The Quality control on construction is executed by a number of persons: DT (district technician), PT (provincial technician), BPD (Biogas Project division), PBPD (provincial biogas project division) and the masons. The objectives are:

- Guarantee the accomplishment of a unique standard for the unification of all steps of QC at all levels
- Manage QC in accordance with the project requirements, at all levels
- Make sure that biogas plants are constructed under the project standard in terms of design and year of construction permitted in the province
- Ensure subsidy provision for each household

The next chart shows the QC procedure:

Quality Control and Enforcement Flow Chart



B: Carbon monitoring survey (CMS)

In addition, BPD will undertake a carbon monitoring survey (CMS), for the carbon monitoring and the sustainable development monitoring. It will combine 4 project studies:

1. Project non-renewable biomass (NRB) assessment;
2. Project survey (PS) of target population characteristics;
3. Project performance field test (PFT) of fuel consumption;
4. Monitoring of the SD parameters.

1. NRB Assessment

The non-renewable biomass fraction is fixed based on the results of the NRB assessment. Over the course of a project activity the project proponent may at any time choose to re-examine renewability by conducting a new NRB assessment. In case of a renewal of the crediting period and as per Gold Standard rules, the NRB fraction must be reassessed as any other baseline parameters and updated in line with most recent data available. According to Annex 5 of the methodology the NRB assessment shall be updated as proposed by the project proponent (PP). The PP proposes to update the fNRB for each crediting period. As shown in the NRB assessment the FAO (see annex 3) expects that fuel wood deficits will continue in 2020 and therefore the PP assumes that the fNRB will remain stable throughout the first credit period.

2. Project survey (PS) of the target population characteristic

Parameters monitored are described in section B7.1.In addition to this, household size, digester size, ID code of the monitored digester will be recorded

3. Performance Field test

The baseline and project performance field tests (BFT and PFT) measure real, observed technology performance in the field. Consumption must be measured with a representative sample of end users under each defined baseline scenario (in the absence of the project technology) and project scenario.

The PFT will measure the performance of the biogas plant, which is defined as degree that biogas displaces baseline fuels. The degree is measured in kg/year of baseline fuel and performance ratio (number of biogas plants in use).

4. Sustainability assessment

The GSPP details the SD monitoring; the output of the SD monitoring will be a separate chapter in the CMS report.

CMS survey design

The CMS can be part of existing monitoring surveys, the Biogas User Survey. Please note that the BUS itself is not a CMS survey but meant to monitor user satisfaction and other program relevant parameter. The monitoring procedure applied will consist of the following steps:

I. During the selection of new programme participants the data about the fossil fuel consumption in the baseline will be collected;
II. When the biogas plant has been constructed it has to be accepted by the District Biogas Technician. Only after the acceptance the subsidy is sent to the programme participant. At this point the plant is registered with a unique number in the database;

III. The annual performance ratio will be determined by surveys on a sample of households participating in the BP VGS project;
IV. The data about the fossil fuel consumption in project case will be collected annually via survey on a sample amongst end-users

The sampling plan

- **Sampling objective:** The objective of the sampling effort is to obtain reliable data for the CMS survey;
- **Field Measurement Objectives and Data to be collected**: The survey will consist of household visit in random selected end-users to collect data described in section B.7.1. Data will be collected using interview methods, the interviewee will be either the head of the household or the wife of the head of household;
- **Target Population and Sampling Frame:** The sampling frame will be drawn from the database; all households in the sampling frame represent the target population. Target population membership is recorded in the database and uniquely identifiable based on the ID code of the biogas plant
- **Sampling method (approach):** Simple random sampling, each observation is chosen randomly and entirely by chance, such that each observation has the same probability of being chosen.
- **Desired Precision/Expected Variance and Sample Size.** The VGS methodology prescribes confidence precision level of 90/10. Based on this guidance, the sample size is 120, see the sample size calculation hereunder:

Sample size:

The surveys will be conducted on a sample size estimated by using the "General Guidelines for Sampling and Surveys for Small-scale CDM Project Activities" (CDM EB 50, 2009, Annex 30) which require in case of monitoring 90% confidence interval at 10 % error margin. The VGS methodology applied specifies that if the sample size is large enough to satisfiy the 90/10 rule, the overall emission reductions per unit can be calculated per unit or MEAN fuel annual savings per unit. The sample size is calculated using the next equation[11].

$$n = \frac{N}{1 + N(e)^2}$$

Where:

n: minimal sample size
e: level of precision (10%)
N= the BP VGS population

The size of the VGS data is as of 31-10-2011 85,380 units. The minimum sample size is consequently

$$n = \frac{N}{1 + N(e)^2} = \frac{85{,}378}{1 + 85{,}378 \times (10\%)^2} = 100\ households$$

[11] http://edis.ifas.ufl.edu/pd006 and Yamane, Taro. 1967. *Statistics, An Introductory Analysis*, 2nd Ed., New York: Harper and Row.

It is good practice to employ oversampling not only to compensate for any attrition, outliers or non-response associated with the sample but also for the reason that in the event the required reliability is not achieved additional sampling efforts would be required to determine the parameter value (CDM EB 50, 2009, Annex 30).

Oversampling is employed by increasing the sample size by 20% to 120 households to compensate for any attrition, outliers or non-response.

All data obtained from the CMS will be stored in a database, which will contain the data of the sampled households for a monitoring period.

- Location of each biogas plant surveyed
- Name of the each biogas plant owner
- Unique code of each surveyed biogas plant;
- Size of the each surveyed biogas plant;
- Type of biogas plant
- Name and ID of mason that built the biogas plant
- Number of animals (Pig, buffalo, cattle and dairy cow)
- Fuel consumption (kg/year) of surveyed households
- Date of commissioning for each plant;
- The annual performance ratio (sample).

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

The baseline is not fixed and hence the study is open ended. The other information is finished by.

06 October 2011

By Eric Busyman
Ericishier@gmail.com

Eric Buysman who is responsible for the application of the baseline study and monitoring methodology are not project participants.

Commissioned by Nexus – Carbon for Development

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:

1/1/2007

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

25 years

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

C.2.1. Renewable crediting period:

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

1/1/2010

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Not applicable

C.2.2.2. Length:

Not applicable

SECTION D. Environmental impacts

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

The project only has positive impacts on the environment.

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

There are no mandatory requirements for the waste management for small-scale household farms. Only for large farms with more than 1000 pig heads and 20000 poultry head requires the EIA and waste management facilities according to decree 149 and circular 02.

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SECTION E. Stakeholders' comments

A separate local stakeholder consultation report (LSCR) is compiled for this project according to GS requirements.

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

See the LSCR

E.2. Summary of the comments received:

See the LSCR

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

See the LSCR

Annex 1

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

See the non-ODA diversion declaration in the Gold Standard Passport Report (GSPR)

Annex 3

BASELINE INFORMATION

Will be included in a later version of the PDD

Annex 4

MONITORING INFORMATION

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