

Support Project to the Biogas Programme for the
Animal Husbandry Sector in some Provinces of Vietnam

BP I FINAL REPORT



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Acronyms and Abbreviations

AEC	Agricultural Extension Centre
AITCV	Asian Institute of Technology Centre in Vietnam
BCT	Biogas Construction Team
BM	Biogas Mason
BPO	Biogas Project Office
BSP	Biogas Support Programme
BT	Biogas Technician
CDM	Clean Development Mechanism
DA	Department of Agriculture
DAFE	Department of Agriculture & Forestry Extension
DARD	Department of Agriculture and Rural Development
DGIS	Directorate General for International Cooperation
EU	European Union
FFI	Fauna Flora International
GHG	Greenhouse Gas
IoE	Institute of Energy
MARD	Ministry of Agriculture and Rural Development in Vietnam
NBSC	National Biogas Steering Committee
PBPO	Provincial Biogas Project Office
PBT	Provincial Biogas Technician
PID	Project Implementation Document
QC	Quality Control
R&D	Research and Development
SNV	SNV Netherlands Development Organisation
VBARD	Vietnam Bank for Agriculture and Rural Development

Executive Summary

Different domestic biogas digester programmes have been implemented in Vietnam over the past 50 years, but none have achieved large scale dissemination or long term operational success. This is despite the fact that conditions in Vietnam are favourable for biogas, people are in favour of the technology and there are obvious needs for the benefits that biogas can provide.

The Vietnamese government supports a significant growth of the livestock sector. Vietnam's high population density means that a considerable amount of this growth will be in semi-urban areas (e.g. within the limits of rural villages). This is likely to have public and animal health implications due to increased smell and groundwater pollution. In addition, it is still common for people to use fuel wood and other biomass sources for cooking and heating purposes. The smoke that results from this does not only increase the amount of time spent cleaning cooking implements and kitchens, but also poses a serious health risk, particularly to women and children who spend the most time in the kitchen. The purchase or collection of biomass fuel sources is costly or time consuming, and there are severe time inefficiencies in using biomass fuel for domestic purposes.

Against this background, the Vietnamese and Netherlands Governments signed a Memorandum of Understanding for the implementation of a domestic biogas dissemination project in 10 provinces of Vietnam in January 2003. The project –*Support Project to the Biogas Programme for the Agricultural Sector in some Provinces in Vietnam* or "BP I"– uniquely joined Vietnam's technical knowledge on fixed dome plant design and construction with Netherlands' experience with large-scale dissemination of domestic biogas. The Netherlands' Directorate General for International Cooperation (DGIS) financially supported the project with a grant of –initially– US\$ 2 million. Farmers were supposed to largely contribute to the construction costs of biogas plants. BP I was designed to close in January 2006.

As per the project implementation document, the overall objective of the project was "to further develop the commercial and structural deployment of biogas, at the same time avoiding the use of fossil fuels and biomass resource depletion".

The specific objectives contributing to this overall objective were:

- To develop a commercially viable, market oriented biogas industry;
- To increase the number of family sized, quality biogas plants with 10,000 in ten out of 64 provinces;
- To reduce GHG by an estimated equivalent of 64,600-119,200 tons CO₂ annually;
- To ensure the continued operation of all biogas plants installed under the project;

- To maximize the benefits of biogas plants particularly optimising bio-slurry;
- To develop technical and promotional capacity for further wide-scale deployment of biogas in Vietnam;
- To strengthen and facilitate establishment of institutions for the continued and sustained development of the biogas sector.

The main implementing partners were the Department of Livestock Production (DLP) of the Ministry of Agriculture and Rural Development (MARD) and SNV-Vietnam. These partners established in May 2003 a Biogas Project Office (BPO) in Hanoi as an executive agency for the project. The BPO was responsible for coordination and implementation of the project with key activities such as promotion and marketing, subsidy channelling and administration, quality management and technical training. Provincial Biogas Project Offices (PBPOs) were established in each province. As the counterpart to the BPO, the provincial offices were responsible for coordination and implementation of the project at provincial level. The Provincial Project Guidelines, enforced by the provincial agreement, detailed the modalities for management, implementation and administration, and the level of support from the national office. PBPOs were staffed by the provincial Department for Agriculture and Rural Development (DARD) and the Agricultural Extension Centre (AEC), and typically consist of a Director, Vice Director, Accountant and Biogas Technician. Provincial Biogas Steering Committees were established in all except four provinces. These four provinces preferred to operate with a more informal coordinating structure.

The Vietnamese and Netherlands cooperation proved to be successful; at an early stage the project expanded to 2 additional provinces and increased its quota from 10,000 to 12,000 biogas plants. Even so, many more provinces had to be disappointed when they requested participation in the project. In July 2005, 6 months ahead of schedule, the project reached its numerical goal. In anticipation of a second phase, the Netherlands Government agreed to increase its grant with US\$ 486,000 to fund the subsidy component for an additional 6,000 installations, thus bringing the project target to 18,000 biogas plants. The final number of plants constructed reached 18,022 plants by Mid December 2005.

BP I operated through a comprehensive programme set-up consisting of a wide range of activities: promotion/marketing, investment subsidy on plants, quality control, research and development, training, extension, monitoring and evaluation, institutional support and management by BPO and PBPOs. The project very effectively provided a flat-rate subsidy of VND 1 million to households that have a biogas plant constructed. At an average investment of VND 3 to 4 million for the complete installation (6 to 8 m³ digester volume), the subsidy consisted of 25 to 30% of the investment. It should be noted, however, that about 60% of the farmers took the opportunity to modernize / improve their stable, kitchen and latrine at the same time, increasing total investment costs to VND 6 - 10 million.

The total expenditures of BP I amounted to US\$ 2,391,424, out of which US\$ 2,321,399 financed from the DGIS fund and US\$ 70,025 paid by a few local donors making donations to BP I. This means that about 94% of the total committed DGIS has been used by BP I. The investments made by the farmers on biogas plant construction are estimated to be US\$ 2.2 – 3.3 million; if also improvements of stables, kitchens and latrines are included, their total investments are estimated at US\$ 5.6 – 10.0 million.

BP I was subject to five external evaluations: one quick review by DGIS in September 2004, a mid-term evaluation by a Vietnamese inter-ministerial delegation in October 2004, a biogas user survey consisting of 100 randomly selected biogas plants in 2005, an evaluation of the management and implementation by the Asia Institute of Technology Center in Vietnam (AITCV) in December 2005 and an audit by STT Company comprising 525 biogas units in February 2006. The outcome of these evaluations was largely very positive.

The main quantitative achievements of the project are summarised in the table below

Activity	Achievement
Construction of biogas plants	18,022 plants built by December 2005
Training of biogas users	18,022 biogas users trained in pre- and post construction trainings
Training of biogas masons	345 masons trained
Training of technicians	142 technicians of 12 provinces trained
Sanitation	40% of the plants have a toilet attached
Slurry use	About 55% of the farmers use bio-slurry
Reduction of workload	Average 1-1.5 hours per household per day
Saving on firewood and agricultural waste	About 1,500 kg (1,190 kg firewood, 172 kg agricultural waste and 34 kg charcoal) per household per year
Saving on other fuels	About 47 kg coal, 6.3 kg LPG and 30 kWh electricity per household per year
Greenhouse Gas reductions	A total of 34,920 to 54,720 tonnes of CO ₂ equivalent per year

As the demand for biogas plants has been growing considerably in Vietnam, MARD, SNV and DGIS have taken initiatives for the formulation of a second phase of BP. This phase aims to up-scale the programme to about 50 provinces with a target on production of 150,000 plants to be constructed within 5 years.

Section 1: General Information on the Project

Introduction

On the 29th of January 2003, the Governments of Vietnam and the Netherlands signed the Memorandum of Understanding on the implementation of the "Support Project to the Biogas Programme for the Animal Husbandry Sector in some Provinces of Vietnam". This MoU enabled the way for the implementation of the Biogas Project (BP) endowed by a fund from the Netherlands Directorate General of International Cooperation (DGIS) committed by letter dated 30 November 2001.

1.1 Project objectives

The project was based on the Project Implementation Document "Proposal for the Biogas programme for the Animal Husbandry Sector – Vietnam" of September 2000, prepared by the consortium for Biogas Development in Vietnam for DGIS, the Netherlands Development Organization (SNV), the Ministry of Agriculture and Rural Development of Vietnam (MARD) and the Vietnam Bank for Agriculture and Rural Development (VBARD). The relationships can be seen in Figure 1.

As per the project implementation document, the overall objective of the project was "to further develop the commercial and structural deployment of biogas, at the same time avoiding the use of fossil fuels and biomass resource depletion".

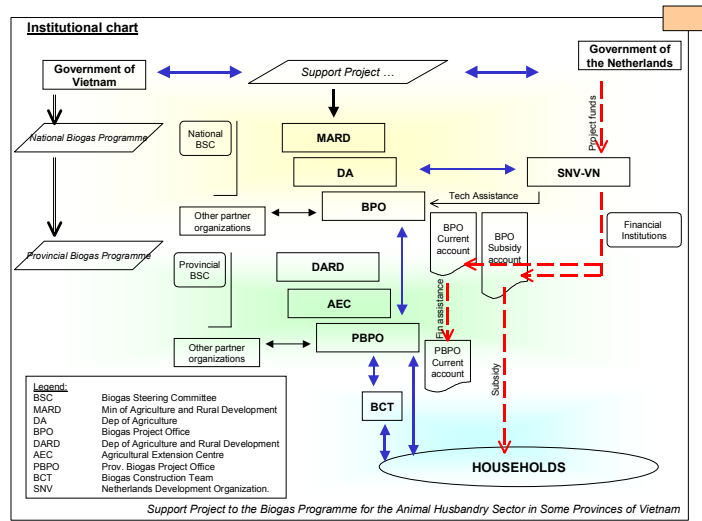
The specific objectives contributing to this overall objective were:

1. To develop a commercially viable, market oriented biogas industry;
2. To increase the number of family sized, quality biogas plants with 10,000;
3. To reduce GHG by an estimated equivalent of 64,600-119,200 tons CO₂ annually;
4. To ensure the continued operation of all biogas plants installed under the project;
5. To maximize the benefits of biogas plants particularly optimising bio-slurry;
6. To develop technical and promotional capacity for further wide-scale deployment of biogas in Vietnam;
7. To strengthen and facilitate establishment of institutions for the continued and sustained development of the biogas sector.

1.2 Key actors

The main implementing partners are the Department of Agriculture (DA) of MARD and SNV-Vietnam. To regulate the operation of the Biogas Project Office (BPO), the implementing partners signed a separate MOU on April 9th 2003.

Figure 1: Institutional Organisation Chart



The National Biogas Steering Committee (NBSC) was foreseen to coordinate the activities of the BPO in the perspective of national biogas and renewable energy framework. Fragmentation of responsibilities in these fields over various ministries and departments, however, caused project failure in establishment of this committee. In addition, the VBARD was also proposed to be one of the main partners of the project, but unfortunately, the small credit component and the transferring of project subsidy through its channel were not applied and that was why there was no official involvement of the bank in the project phase I.

Provincial Biogas Steering Committees have been established and are functional in all provinces except Bac Ninh, Dac Lac, Dong Nai and Tien Giang. These provinces indicated to prefer operating with a more informal coordinating structure.

The Biogas Project Office (BPO) is the executive agency for the project. It established its own office in Hanoi in May 2003.

The BPO is responsible for coordination and implementation of the project. Key activities include promotion and marketing, subsidy channelling and administration, quality management and technical training. The BPO organisational chart is shown as Figure 2.

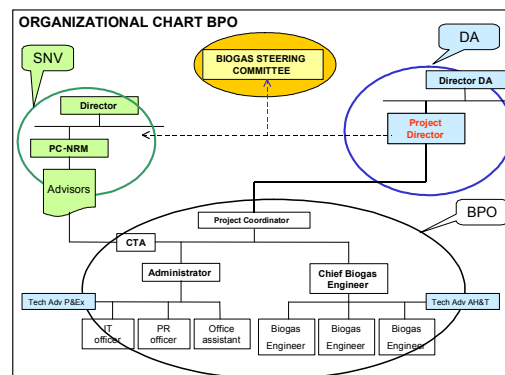


Figure 2: Organisational Chart BPO

Provincial Biogas Project Offices (PBPOs) are established in each province in which the project operates. As the counterpart to the BPO, the provincial offices are responsible for coordination and implementation of the project at provincial level. The Provincial Project Guidelines, enforced by the provincial agreement, detail the modalities for management, implementation and administration, and the level of support from the national office. PBPOs are staffed by the provincial Department for Agriculture and Rural Development (DARD) and the Agricultural Extension Centre (AEC), and typically consist of a Director, Vice Director, Accountant and Biogas Technician.

1.3 Project area

The project was designed to cater for 10 provinces out of Vietnam's 64. To select the provinces, the following criteria have been applied:

- Robust animal husbandry development (Statistical Yearbook 1998 and 2002).
- Critical environmental issues related with the animal husbandry sector.
- Representative for the specific economic regions of Vietnam.
- Expression of interest and motivation by concerned provincial authorities.

The selection resulted in participation of 12 provinces by the end of 2003. Hanoi and Thai Nguyen, both showing a high potential for success and offering a significant contribution from their own resources were accepted as extra-numerical participants. Consequently, the overall target of the project was raised from 10,000 to 12,000 plants right in early stage of the BPI. As construction targets were completed 6 months ahead of schedule in almost all provinces, BPO decided to apply for additional funds from DGIS for construction of additional 6,000 plants, that make overall target of BP I of 18,000 biogas plants. A list of participating provinces is shown below in Table 1.

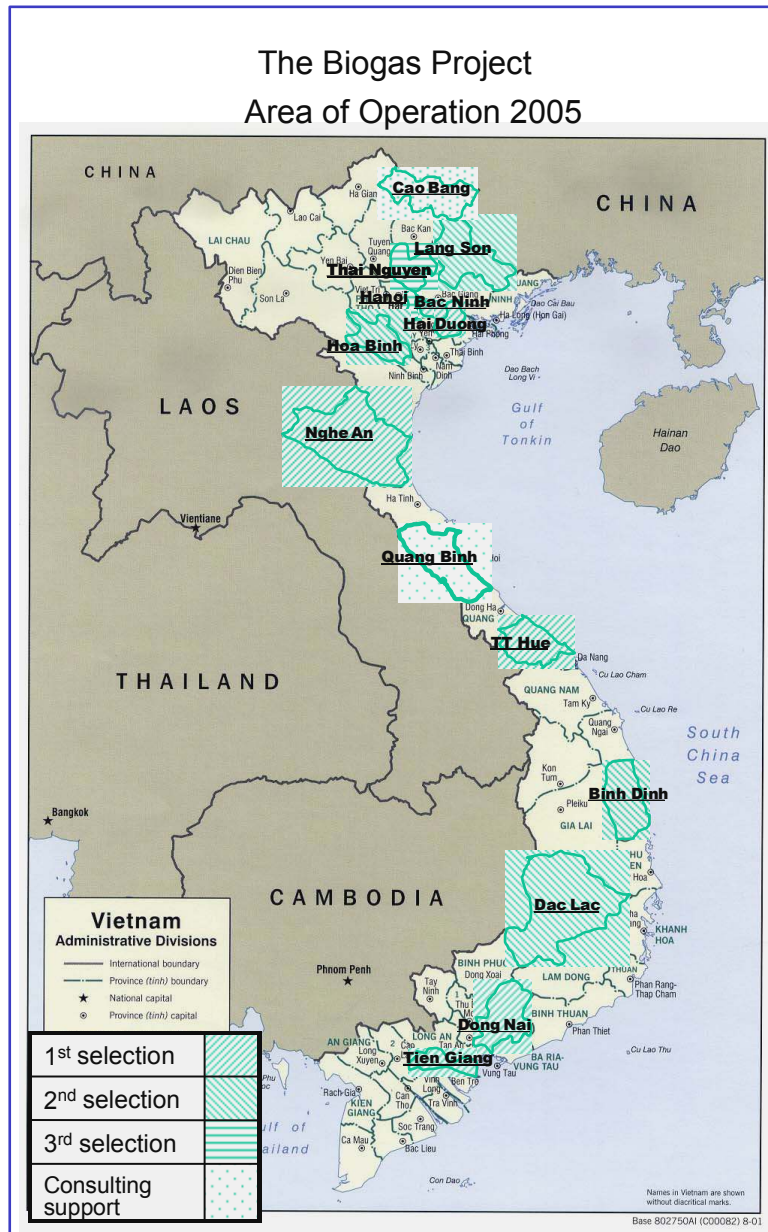
Table 1: Participating Provinces

Economic Region	1st Selection (1 st qtr 2000)	2nd Selection (3 rd qtr 2003)	3rd Selection (4 th qtr 2003)
Red-River Delta	Bac Ninh Hai Duong		Ha Noi
North-East		Lang Son	Thai Nguyen
North-West		Hoa Binh	
North Central Coast	Nghe An Thua Thien Hue		
South Central Coast		Binh Dinh	
Central Highlands		Dac Lac	
South East	Dong Nai		
Mekong River Delta	Tien Giang		

In addition to the 12 “regular” project provinces, the project provided consulting support to the initiation of domestic biogas projects in Cao Bang and Quang Binh province. These initiatives were financed by external funding from Fauna & Flora International (FFI) and the SNV / EU NAPA project respectively.

An overview of the project’s working area is provided in Figure 3.

Figure 3: Project Working Area



1.4 Selected biogas plant designs

The project supports fixed dome digesters with a digester capacity from 4m³ to 16m³. From the sectoral standard No. 10TCN 492-499-2002 – Small Biogas Plant, Part 8: Standard Design, issued by MARD, the project has selected the following 3 types of biogas plant that match with the project requirements.

The KT.1 model (1990) shown in Figure 4, of the Institute of Energy (IoE), is a further development of its 1984 design for a fixed dome biogas plant (see Figure 4).

The standard design allows for 7 different digester volumes (2, 3, 4, 5, 6, 8 and 10m³). For each size, three different gasholder / digester volume ratios (4, 5 and 6) are designed to adjust the hydraulic retention time to the specific climatic conditions.

This model has been promoted by the Institute of Energy and the DAFE over the past 10 years, particularly in the Red-River delta.

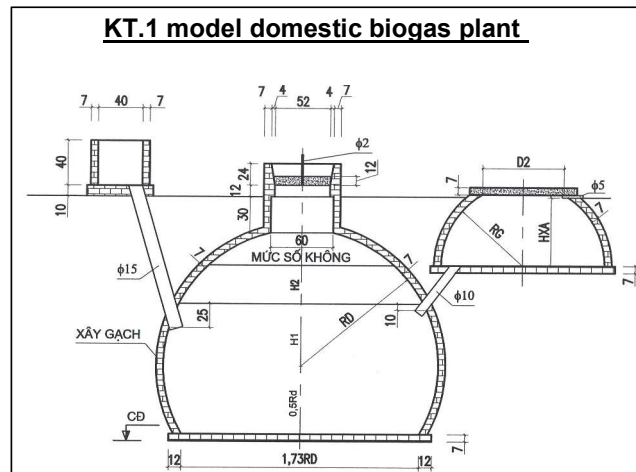


Figure 4: KT1 Biogas Plant Design

The KT.2 model, shown in Figure 5, is a further development of the TG-BP model designed by a Thai-German project in Thailand.

The semi spherical dome on top of the conical bottom makes the plant better resistant against the upward forces typical connected with high groundwater levels. The plant is therefore particularly suitable for the Mekong delta in South Vietnam. Similar to KT.1, the design for the KT.2 allows for 7 different digester volumes and 3 digester / gasholder volume ratios.

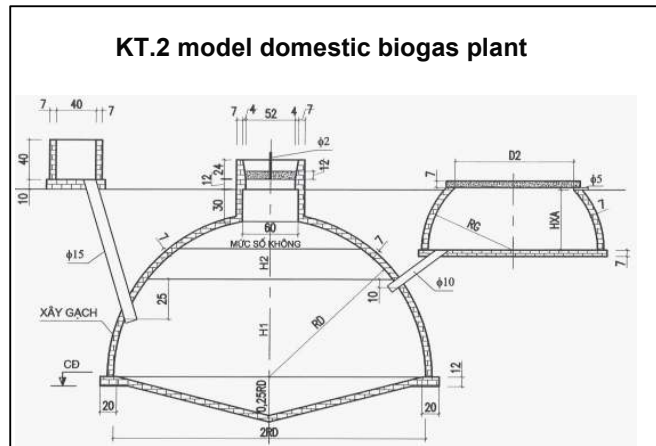


Figure 5: KT2 Biogas Plant Design

Initially, the project intended to support dissemination of the **KT.3 model**, promoted by the Rural Development Assistance Centre (RDAC), as well. This is a cylindrical digester with a prefabricated composite dome. However, since this model proves to work out more expensive than the KT.1 and KT.2 plants, RDAC does not strictly follow the KT.3 standard and RDAC and BPO so far failed to agree on redesign of the plant, support of this model is suspended.

1.5 Subsidy

The project provided a flat-rate subsidy of VND 1 million to households that have a biogas plant constructed. To be eligible for participation, households have to express their interest in operating a biogas plant, and meet basic technical and financial criteria. At an average investment of VND 3 to 4 million for the complete installation (6 to 8 m³ digester volume), the subsidy consists of 25 to 30% of the investment. It should be noted, however, that often farmers took the opportunity to modernize / improve their stable, kitchen and latrine at the same time, increasing total costs to VND 6 - 10 million.

Selected households entered into an agreement with the PBPO and the BCT. Upon completion of the installation, the biogas technician of the Agricultural Extension Centre visits the installation for acceptance and commissioning. When the installation is accepted, an acceptance form is submitted, through the PBPO to the BPO.

Initially, the project proposed an involvement of VBARD systems from national to district levels for disbursing project subsidy. After a long period of negotiations, the BPO decided for the Post Office Services to handle its subsidy transfers to biogas households instead of VBARD. In the end, compared with the service of the VBARD, the Post Office service turned out to be cheaper, the administrative procedure more simple, and its network more dense. "Door-to-door" transfer time will be 3-5 days. Total transfer time, from acceptance to actual payment, is kept under one month, the BPO procedure is -in general- completed in one week. Figure 6 visualizes the subsidy transfer procedure.

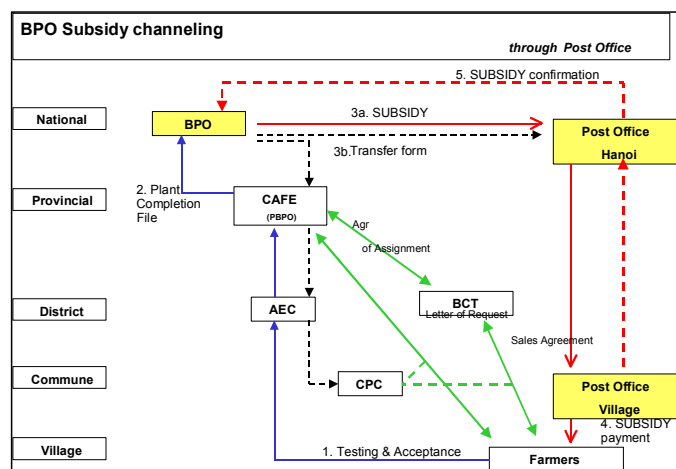


Figure 6: BPO Subsidy Channel

Section 2: Implementation

2.1 Overview

Overall, project progress has been very good. This can be largely attributed to the market potential for biogas in Vietnam, the smooth management of the programme, and the ongoing support from MARD and the Netherlands Government (through the Royal Netherlands Embassy and SNV Vietnam).

2.2 Biogas Project Phase I – Financing and overall expenditures

The initial DGIS commitment to the biogas project amounted to **USD 2,000,000**. To allow for the delayed start, an adjusted and rescheduled budget was proposed and approved at the start of the project in early 2003.

The original DGIS commitment was for the construction of 10,000 biogas plants. The project committed fund was later increased with **USD 81,629** by contributions of the two additional provinces of Ha Noi (**USD 38,086**) and Thai Nguyen (**USD 25,390**), SNV (**USD 10,000**) (support of Thai Nguyen participation), and FFI (**USD 8,153**) (support of Cao Bang province) for the increase in construction target up to 12,026 biogas plants.

In the first half of 2005, the project exceeded the initial cumulative target and reached 12,000 plants. To ensure the continuation of the momentum, the Netherlands Government (DGIS) provided funds for the construction of an additional 6,000 plants in the second half of 2005. The additional funding amounted to **USD 482,291**.

Table 2: Biogas Project Phase I - Budget vs Expenditure overview:

BP I project budget - expenditure overview			Committed fund		Available fund	
	from:	to:	DGIS	Local	DGIS	Local
Committed funds:						
Project commitment for 12,000 plants	Jan 01 2003	Jan 31 2006	2,000,000		2,000,000	
Additional fund for 6,000 plants	Jan 01 2005	Jan 31 2006	482,291		237,370	
SNV-VN contibution for TN	Jan 01 2004	Jan 31 2006		10,000		10,000
Thai Nguyen contribution	Jan 01 2004	Jan 31 2006		25,390		25,390
Ha Noi contribution	Jan 01 2004	Jan 31 2006		38,086		38,086
Cao Bang	Jan 01 2004	Jan 31 2006		7,486		4,881
Sub totals			2,482,291	80,962	2,237,370	78,357
Total committed funds:				2,563,253		2,315,727
Remain committed funds:					244,921	2,605
						247,526
Expenditures:						
	Jan 01 2003	Dec 31 2005			2,282,242	69,277
	Jan 01 2006	Jan 31 2006			39,157	748
Total expenditure:	Jan 01 2003	Jan 31 2006			2,321,399	70,025
						2,391,424
(Deficit)/Surplus of accumulated funds received over accumulated expenditure					-84,029	8,332
						-75,697

As a result, the total committed project fund was **2,563,920 USD** till by the end of 2005. Due to reduced activities and budget, the construction target for Cao Bang province was reduced in January 2006 from 26 to 22 plants.

The total committed fund was reduced with **667 USD** to **2,563,253 USD** for the construction of totally 18,022 biogas plant of the whole Project Phase I, see Table 2. **This fund was excluding the contributions made by the biogas farmers in cash and kind.**

The total expenditure for the whole reporting period was **US\$ 2,391,424**; in which US\$ 2,321,399 was spent from DGIS fund and US\$ 70,025 from the fund provided by local donors.

The total fund received by BPO at the end of phase I was US\$ 2,315,727; of which, US\$ 2,237,370 from DGIS, and US\$ 78,357 from local donors.

So the outstanding amount still to be received from DGIS amounts to US\$ 84,029, while a surplus of US\$ 8,332 was concluded on the fund from the local donors.

The project's Balance Sheet, the Profit and Loss Statement, and the Donor Fund Statement are provided in the Annexes.

2.3 BP I Budget vs Expenditure – Brief review on project activities

An overview of budget and expenditures by project activity is provided in Table 3. Expenses were made in the years 2003 up to January 2006.

Table 3: Expenditure by Activities

	Activities	Budget BP I	Expense 2003	Expense 2004	Expense 2005	Expense 01-2006	Total expense BP I	Deplete E/B	Balance BP I
A	Promotion and marketing	68,295	4,779	15,742	27,750	1,891	50,161	73%	18,134
B	Subsidy	1,200,653	-	536,929	625,430	-	1,162,358	97%	38,295
C	Credit support	-	-	-	-	-	-	0%	-
D	Quality control	90,571	2,350	30,982	44,833	3,561	81,726	90%	8,844
E	R&D/standardisation	40,000	5,677	16,356	6,257	-	28,289	71%	11,711
F	Training	196,000	49,233	60,968	73,242	2,876	186,319	95%	9,681
G	Extension	71,400	-	7,608	26,894	3,511	38,013	53%	33,387
H	Monitoring/evaluation	45,000	30	7,495	24,597	376	32,497	72%	12,503
I	Institution support	27,000	2,769	2,270	10,542	840	16,421	61%	10,579
J	BPO Project management	612,834	134,346	212,157	229,235	20,788	596,526	97%	16,308
K	PBPO Project management	211,500	34,449	85,114	73,487	6,063	199,113	94%	12,387
Total:		2,563,253	233,630	975,621	1,142,267	39,905	2,391,424		171,828

As shown in the Table 3, most budgets have been used as budgeted for

- Promotion and Marketing expenditures remained 27% of the budget, as the project decided not to print more posters and promotion films for the additional 6,000 plants due to the late availability of funds
- Subsidy: Although there was a the difference between initial set subsidy level and the applied one and exchange rate changes in 3 years only 3% of the budget remained unspent.
- Quality control activities were carried out well in line with the construction progress by BPO and PBPOs. QC trip were organised in an efficient manner to save costs. BPO arranged QC trips to all PBPOs at least once a year, and sometime twice in some provinces. During these

visits, BPO technicians accompanied PBPO technicians to physically inspect plants, documentation and operations. Generally the quality was good. Improvements, however, are still due in areas of pipefitting and appliances. QC support visits also focussed on maintaining proper reporting, information gathering, application and QC procedure. As mentioned above, the project will develop a clear and more effective QC procedure on both technical and financial activities for BPO and PBPO project officers in the next phase. The project spent 90% of the budget allocated for quality control.

- R&D/Standardization: Budgeted amounts were higher than actual expenses, e.g design software costed only 56% of the budgeted amount, and the printing of instruction leaflet costed only 57% of the budget amount; hence only 71% of the budget was spent.
- Training: The project organised a wide range of training activities during reporting period. Four training courses were organised for 142 biogas technicians in 12 project provinces. Mason trainings were carried out by PBPO for 345 biogas masons. Every biogas users were offered at least two training of pre and post construction, focusing on how to supervise plant construction work (pre) and how to operate and maintain the plant daily (post). Training materials were developed by leading biogas experts in Vietnam. The training budget was almost totally used (95% of the budget).
- Extension: Material on extension was developed. Courses on biogas extension were sometime combined with after construction user training, giving more specific knowledge on how to maximise the use of biogas and bio slurry in rural lives. Demo plots were set up in all project provinces which were the best way to prove about benefit of the technology. The project is still pending an extension poster which has been developed but not yet printed and an extension video which was budgeted but not (yet) done. In this phase of the project only 53% of the budget was used.
- Monitoring and Evaluation: At the national level, monitoring of the project was the responsibility of the BPO. The M&E indicators were formulated for successful implementation of the specific objectives as biogas plant construction, operation, and maintenance, development of biogas appliances and maximization of biogas benefits. A project database was developed to monitor the subsidy transfer, which has been evaluated as very efficient. Use of budget was monitored well. The project spent 72% of the budgeted amount for monitoring and evaluation.
- Institutional support: Steering Committees have not been established in national BPO and in 4 PBPOs of Dac Lac, Dong Nai, Tieng Giang and Binh Dinh. BPO provided general ad hoc support and advice to various individuals and organisations (ICD-MARD, GTZ, FFI, SNV Quang Binh...). This ranged from providing technical specifications to information on

project management. The budget for institutional support was not fully used (only 61%).

- BPO Project Management: Though some important changes in management team of BPO (changes in the positions of project director (2), project coordinator (2), project administrator (2)), BPO did perform a proper management on project activities at both national and provincial levels. Almost all project activities were carried out as per planned with considerable results.
- PBPO Project Management: By the end of 2003, all 10 regular provinces were established, implemented and staffed their Provincial Biogas Project Offices and started their activities as per the guidelines issued by the BPO. The two additional provinces (Ha Noi and Thai Nguyen) were specially included (having financial contribution from province sides) with full operation at the end of the 1st quarter 2004. In general activity management the PBPOs kept quite closely with the BPO allocated activity plan. However, financial reporting lagged significantly behind requested reporting date. Support office operation costs were saved as hotel expenses which were budgeted for but have not been claimed by provincial officers.

2.4 Activity Overview

This chapter provides a brief review on the different project's activities.

2.4.1 Promotion and Marketing

A considerable number of promotion and marketing activities were conducted. This included the production and distribution of the following **publications**:

- **Promotion Posters:** The project developed three posters: 1 biogas benefit poster, 1 health poster and 1 bio-slurry poster. The first 2 posters were printed totally 11,000 copies and distributed widely to project provinces for biogas promotion workshop and public areas.
- **Leaflets:** Two leaflets were developed and printed: one on Promotion (15,000 copies) and one on Safe Operation of Biogas Plants (19,000 copies). These print-outs were distributed to project provinces for promotion workshops and biogas user's post construction training courses.
- **Newsletters:** Four issues of Biogas Project internal newsletter were developed, printed and distributed to PBPOs. In the Biogas Newsletter, all information related to the project progress and innovative in biogas technology was updated. BPO also sent articles on the project to the Department of Agriculture Newsletter

Table 4: Promotion and Marketing Expenditure

Act code	Activity description	Budget BP I	Expense 2003	Expense 2004	Expense 2005	Expense Jan-06	Total Expense BP	Depletion E/B	Total Balance
A11	Development biogas promotion leaflet	100	-	-	-	-	-	0%	100
A12	Development biogas poster 1	200	-	-	563	-	563	282%	(363)
A13	Development biogas poster 2	-	-	-	-	-	-	0%	-
A14	Development biogas promotion video	2.000	640	-	-	-	640	32%	1.360
A15	Dev Biogas extension video	2.600	-	-	1.370	-	1.370	53%	1.230
A21	Print biogas promotion brochure	1.500	515	544	-	-	1.058	71%	442
A22	Print biogas poster 1	800	-	-	851	-	851	106%	(51)
A23	Print biogas poster 2	-	-	-	-	-	-	-	-
A24	Reproduce biogas promotion video	200	44	-	-	-	44	0%	156
A25	Repro Biogas prom video	480	-	-	-	-	-	0%	480
A31	Broadcast biogas TV/Radio program	5.500	219	2.370	76	-	2.664	48%	2.836
A33	Comm Biogas promotion Wsp	7.730	-	3.943	7.986	276	12.205	158%	(4.475)
A39	Other promotion activities	40.755	3.361	7.538	16.282	1.614	28.796	71%	11.959
A51	BPO Newsletter	3.100	-	648	623	-	1.270	41%	1.830
A52	Development BPO Website	1.580	-	699	-	-	699	44%	881
A53	Biogas awareness wrksp	1.750	-	-	-	-	-	0%	1.750
A	Promotion and marketing	68.295	4.779	15.742	27.750	1.891	50.161	73%	18.134

- **Promotional Film:** Two promotional films on project development and achievements had been produced. They are used for province level promotions and are distributed to the twelve participating provinces.

There was also a series of **workshops** conducted. These included:

- **Biogas International Workshop:** The "Biogas technology with sustainable agricultural development" was held in March 2005 and attended by internal and external delegations of MARD. It dealt mainly with the issues of the current situation of biogas technology development, animal waste management in Vietnam, nation wide dissemination experience in Nepal and the application of biogas technology to ecological agricultural models.



- **Biogas Construction Team Competition:** The competition was held in May 2005 in Tam Xa Commune, Dong Anh District, Ha Noi city. Each province nominated their top construction team to Hanoi to compete in building a plant to programme standards. Teams were judged on their practical construction skills and their theory knowledge. The top six provinces, Thai Nguyen, Nghe An, Tien Giang, Dong Nai and Hai Duong, were presented with awards. The major outcomes of the activity included the opportunity for the Biogas Construction Teams to exchange experiences, good media coverage of the event, and a chance to indicatively examine the skills and knowledge of the



Teams to exchange experiences, good media coverage of the event, and a chance to indicatively examine the skills and knowledge of the

construction teams. The activity was deemed very successful.

Important milestones in construction target completion of the project were also celebrated:

- **Project Inauguration Ceremony – 04 September 2003:** The official opening of the project was marked by the Project Inauguration Ceremony which was organised in Hai Duong province on 04 September 2003.



- **Completion Ceremony 6,000th plant:**



The project celebrated its first half achievement in Thai Nguyen project province on 19/11/2004. The celebration was to acknowledge the contributions of project partners and to promote both the technology and the dissemination experience of the project.

- **Completion Ceremony 12,000th plant:** A major event was held on 14th June 2005 in Hanoi to



celebrate the completion of the 12000th biogas



plant which was achieved 7 months ahead of schedule. Also in this ceremony, Mr. Felix ter Heedge, project Chief Technical Advisor from SNV was granted with certificate by MARD for his active contribution to the agricultural sector of the country.

- **Completion Ceremony 18,000th plant:** The last promotion event this phase of the project was the ceremony for the completion of the 18,000th biogas plant, held on 16th December 2005 in Hanoi. The ceremony was to highly appreciate the involvement and the enthusiasms of all project partners that made the project successful.
- **BP I activity overview meeting** was organised by an independent consultant company (AITCV) on 17-12-2005 for all BPO and PBPOs project officers. Project activities were briefed on the review by AITCV and a lot of suggestions from participants were summed up for improvement of project activities in the BP II.

In addition to these activities conducted by the BPO, the PBPOs also actively conducted **promotional activities**. These included organising promotional

commune workshop (around 900) for potential biogas users, issuing articles for newsletters and local magazines, television and radio broadcasts, receiving guests, and distributing promotional materials. After the commune workshops, potential biogas users understood more about the technology and the benefits when applying it into daily life. The users were also advised on what they will get when participating into the project (subsidy, trained mason, acceptance procedure done by biogas technician...). Hanoi, Thai Nguyen, Bac Ninh, Tien Giang, Dac Lac, Binh Dinh and Nghe An were particularly active in this regard. All project provinces organised Biogas Technician and Biogas Mason experience exchange meetings regularly in addition to training. Bac Ninh was the first province conducting a celebration ceremony for the completion of its 1000th plant that was attended by many local organisations and members of the BPO.

The project also developed and maintained its own **website** www.biogas.org.vn.

As per the Evaluation Report of AITCV, Promotion and Marketing activities have been very successful and received high attention and support of local authorities. Its success is proven by the project reaching its target in 11 out of 12 provinces several months earlier than schedule.

According to the evaluation report, advantageous conditions of the project regarding Promotion and Marketing are:

- Clear orientation, guiding and budget provided from BPO in organizing local promotion activities;
- Clear vision and support of provincial and district authorities;
- Good selection of biogas technology to be introduced;
- Involvement of a wide and strong agricultural extension network;
- Qualified and enthusiastic district technicians.

However, there are still some unfavourable conditions regarding Promotion and Marketing like:

- Previous defective biogas technologies hindering marketing efforts at the beginning;
- Not including local authorities and civil societies, from which resources and opportunities for biogas promotion could be mobilized;
- Insufficient budget allocated for activities, especially media programs;
- Lack of participation of PBPOs in planning and design of activities.

In phase 2, in order to boost up promotion and marketing more suitable to the provincial situations, the evaluation report recommended that:

- More investment should be spent on demonstration models and visits of users, while bulletins and leaflets need to be more attractive with fewer words and more pictures;

- The project should mobilize official participation of local authorities (province, district and commune) in order to benefit from their resources and influence at locality;
- Marketing efforts of technicians and masons need to be more recognized. There should be certain awarding schemes developed to motivate the contribution of these individuals in order to ensure sustainability of the project. In the first phase, financial support for technician activities in the project was considered as rather low.

2.4.2 Subsidy

Table 5: Subsidy expenditure

Act code	Activity description	Budget BP I	Expense 2003	Expense 2004	Expense 2005	Expense Jan-06	Total Expense BP	Depletion E/B	Total Balance
B11	Subsidy transfer	1.176.872	-	528.999	612.069		1.141.068	97%	35.804
B12	Subsidy transfer fee	23.781	-	7.930	13.360		21.290	90%	2.491
B	Subsidy	1.200.653	-	536.929	625.430	-	1.162.358	97%	38.295

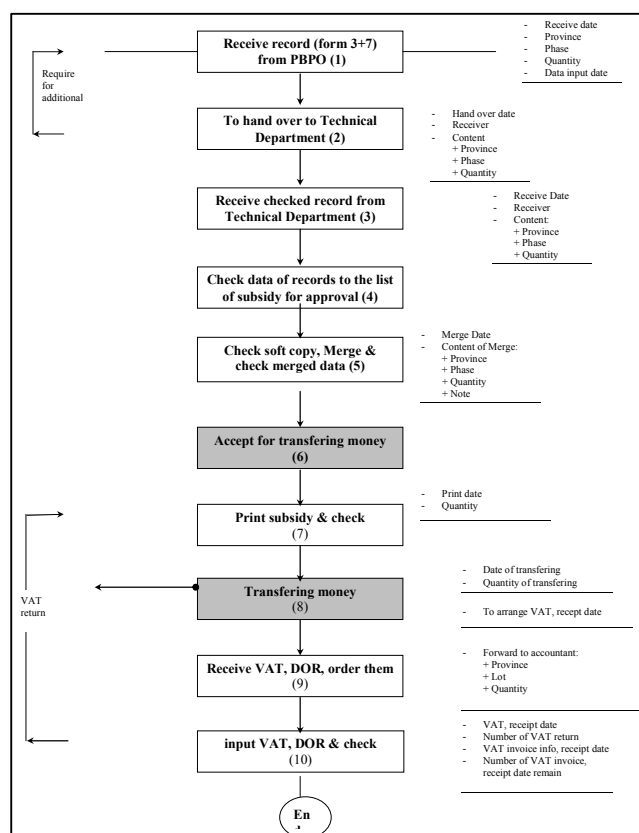
With the surplus funds from the subsidy budget due to a lower fixed subsidy level (US\$ 65/plant) in comparison with that of US\$ 75/plant by initial set in PID, the project initial target of 10,000 plants was increased with 2,000 plant more by the additional participation of Hanoi and Thai Nguyen province (end of 2003). The later increase of other 6000 biogas plants (end of 2005) for getting a head of the project target, and 26 plant (of FFI) support project had made total project construction target of 18,026 biogas plants. The project has paid out the subsidy of 18,021 plants. One household of Lang Son province is still pending now due to provincial wrong entry of the biogas user ID number for subsidy transfer. It is remarkable that all provinces except Lang Son met their target. The quota of Lang Son had to be reduced but other provinces were however eager to take of over the remaining quota.

Construction progress and subsidy transfer progress is shown in the Table 7. Please note that BPO had signed the contract with Flora & Fauna International (FFI) to assist FFI to build 26 biogas plants in Trung Khanh district, Cao Bang province by their fund. However, in actual, the project completed only 22 biogas plants. And due to that, the subsidy fees for these 22 biogas plant were also included in the total subsidy expenses of the project, but at different levels (VND 3 million/plant for the first 3 plants, VND 2.5 million/plant for the balance).

Table 6: Construction progress and subsidy transfer progress

	PBPO	BP I CONSTRUCTION TARGET					BP I	CONSTRUCTION PROGRESS				SUBSIDY PAYMENT PROGRESS		
		2003	2004	2005	Addn'l	Adjust		2003	2004	2005	Total BPI	2004	2005	Total BPI
1	HAI DUONG	180	630	265	600		1,675	182	629	864	1,675	811	864	1,675
2	BAC NINH	180	730	165	650		1,725	180	720	825	1,725	789	936	1,725
3	NGHE AN	120	630	325	700		1,775	133	712	930	1,775	711	1,064	1,775
4	THUA THIEN HUE	60	570	370	450	-35	1,415	24	530	861	1,415	475	940	1,415
5	DONG NAI	60	670	345	500	35	1,610	30	693	887	1,610	736	874	1,610
6	TIEN GIANG	60	710	280	700		1,750	60	738	952	1,750	550	1,200	1,750
7	DAC LAC	30	640	380	500		1,550	35	635	880	1,550	634	916	1,550
8	BINH DINH	30	540	430	450		1,450	5	568	877	1,450	418	1,032	1,450
9	LANG SON	30	340	130			500	17	153	330	500	114	385	499
10	HOA BINH	30	640	330	550		1,550	25	630	895	1,550	474	1,076	1,550
11	HA NOI		650	400	400		1,450	0	666	784	1,450	511	939	1,450
12	THAI NGUYEN		650	400	500		1,550	0	579	971	1,550	557	993	1,550
13	CAO BANG			26			26	0		22	22		22	22
		780	7,400	3,846	6,000	0	18,026	691	7,253	10,078	18,022	6,780	11,241	18,021

Reporting to BPO by PBPO on plant acceptance and subsidy transfers was done through e-mail and is randomly checked during BPO Quality Control visits. Below is the chart showing subsidy payment process at BPO:



2.4.3 Credit

As mentioned before, the PID foresaw a levy of US\$ 10 per sanctioned biogas plant credit, to be paid to the Vietnam Bank for Agriculture and Rural Development (VBARD). The project team decided not to budget any expenses under this heading for the following reasons:

- Meetings with Provincial authorities indicate that farmers qualifying for a biogas plant may not be very interested to apply for the investment credit at the VBARD. The farmers' reluctance is explained by the lengthy application procedure, the relatively modest amount required and the policy of the bank only to sanction new loans if there are no other outstanding loans.
- In a meeting with VBARD at central level, it transpired that the bank actually has fairly attractive arrangements in place for micro-credit to farmers, under which biogas credit could be accommodated as well. Therefore, the project team found it hard to justify the proposed significant levy of US\$ 10.

- Provinces report that mass organizations (Farmers’ Union, Women’s Union, Veterans’ Union etc) are actually assisting farmers with biogas-credit

2.4.4 Quality Control

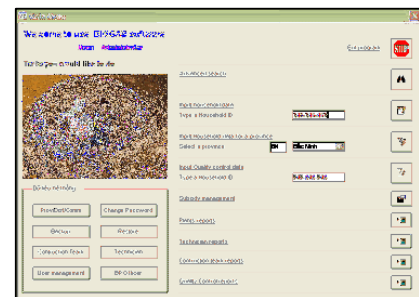
Table 7: Quality Control Expenditure

Act code	Activity description	Budget BP I	Expense 2003	Expense 2004	Expense 2005	Expense Jan-06	Total Expense BP	Depletion E/B	Total Balance
D11	Construction Supervision	8.280	1.175	2.138	-	-	3.313	40%	4.967
D12	Q - Testing & acceptance	9.338	1.175	7.997	-	-	9.172	98%	165
D13	QC Construction UC	2.990	-	612	2.161	163	2.937	98%	53
D14	QC Acceptance	51.496	-	18.006	29.890	3.042	50.938	99%	558
D15	Q - ASS	1.423	-	678	242	94	1.014	71%	409
D16	QC - ASS	3.789	-	562	2.528	261	3.350	88%	438
D17	QC - Complaints	1.154	-	108	249	-	357	31%	797
D21	QCE construction UC	800	-	72	691	-	762	95%	38
D22	QCE construction Complete	10.602	-	808	9.073	-	9.881	93%	721
D23	QCE after sales service	700	-	-	-	-	-	0%	700
D31	Random checking	-	-	1	-	-	1	0%	(1)
D	Quality control	90.571	2.350	30.982	44.833	3.561	81.726	90%	8.844

The demand for biogas was high among the livestock households but failures of previous biogas technologies had loose people’s trust in it. After 2 years of operation, the quality control system provided by the project has helped livestock community to regain their trust. In this aspect, the project had shown to be very unique and successful.

So far, within the project lifetime, the quality of biogas plants was good. There have been no major quality problems or complaints on the construction and operation of biogas plants. Technicians and masons were experienced, qualified and enthusiastic. Trainings of biogas user to equip them with necessary knowledge on biogas plant construction, operation and maintenance showed to be helpful. The users could monitor the construction themselves following technical drawings. Since the outcome of quality was good, we could say that the designed quality control system of the program has worked effectively, which enable to help project management team improving quality control procedures in the next phase.

- **Reporting:** a reporting regime is in place, with the same format for all PBPOs to make sure all required information was there in their reports.
- **Project Data Base:** The project data base software had been installed in 11/12 provinces. These provinces entered their own data and transferred to BPD via email for importation to BPD database. Plant and household related information of 18,000 plants were there for subsidy transfers.
- **Forms and Procedures:** Quality Control procedures and guidelines were



developed and improved during the first phase of the biogas programme. The improved QC forms included more quantitative assessment. The changes in these procedures have been supported directly by BPO and PBPO' technicians. However, a more elaborated QC procedure should be developed in the BP II.

- **Technical issues:** In general the plants built under the project are functioning well. It has been however found that some of the provinces are not using the most suitable materials and appliances for biogas plant construction and use. For example sometimes **soft** plastic pipes are being used as main gas pipelines and inefficient stoves are being used in among others Hanoi and Thai Nguyen. BPO started a process of developing a plan to support PBPOs and suppliers addressing these issues.

- **QC Visits:** Support visits were conducted by BPO technicians to the PBPOs. During these visits, BPO technicians accompanied PBPO technicians to physically inspect under construction and completed plants (rated at 0.5% and 1% respectively), in Generally the quality was good, but some problems were found such as some provinces still use plastic pipe for main gas pipeline as in Nghe An provinces or use simple design cook stove with low heat efficiency as in Hanoi and Thai Nguyen provinces... that were to be corrected by the PBPOs. QC support visits focussed more on maintaining proper reporting, information gathering, application and QC procedure. At PBPOs, PBT performed QC checks on under construction and construction complete plants as per required rate (5% and 10% respectively). DBT also visited a minimum of 3 visits to every of 100% project plants for construction supervisory, testing and acceptance. Provincial Boards of Management were also very active in coordinating and managing construction progress, especially focusing provincial technicians' tasks in QC activities.



As per the AITCV evaluation report, the major strengths of the current quality control system, according to all stakeholders, are:

- The good biogas technology selected by the project,
- The enthusiastic and experienced district technicians and their availability in case of problems, through phone calls or visits,
- The effective training and certification provided to masons,
- The close management of masons by district technicians, and
- Participation of users in monitoring construction

For further improvement of the quality control system, the evaluation report recommended certain actions for considerations, specifically:

- BPO should set up and provide QC checklist for the whole biogas construction process including construction, acceptance, and the guarantee.
- Put codes on the biogas plants to facilitate monitoring and inspection. This could also help to avoid virtual biogas plants.
- Standardize QC procedure with detailed guidelines. Develop criteria to assess quality and durability of biogas plants.

At SNV's request, the independence audited STT Company had carried out a physical check on the existence, validity and eligibility of the selected sample 525 biogas plants over 18,000 built during the Project Phase I. As mentioned in their report, 100% of selected biogas plants have been physically built with the similar time mentioned in the minutes of completion and handover. Also 100% of these households have received full amount of 1,000,000 VND for subsidy from the project through money transfer service of the post office. All households are aware of the application procedures for biogas plant and the Programme's activities and confirm the presentation of the technical staff and related project staff during the construction and at the completion and handover of biogas plant.

2.4.5 R&D/Standardization

- **Design Software:** The Company CENTECH was contracted to develop design software to allow the Biogas Project to improve plant design and to tailor plants for specific geographical contexts. This software had been designed and technology transfer had been done (software installation and training) by the end of December 2005.
- **Slurry Research:** Two large bio-slurry studies were commissioned in the 3rd quarter of 2003. Both studies, one for bio-slurry application as organic fertilizer for vegetable production, and one for bio-slurry as food-supplement for piggery, were finalised in 2004. Another third research was carried on for intensive trial of applying bio-slurry and fertiliser for crops. The final data analysis and report were issued for BPO and will be incorporated in extension manual of the project in the next phase.



Table 8: R&D/Standardisation Expenditure

Act code	Activity description	Budget BP I	Expense 2003	Expense 2004	Expense 2005	Expense Jan-06	Total Expense BP	Depletion E/B	Total Balance
E11	Design software	6.000	-	-	1.135		1.135	19%	4.865
E12	Effluent application fertilizer	6.347	1.286	3.369	1.757		6.412	101%	(65)
E13	Effluent application Animal Feedstock	4.735	1.698	2.368	-		4.066	86%	669
E14	Applications of biogas	1.000	-	71	-		71	7%	929
E21	Develope Plant Operation Manual	200	-	537	-		537	268%	(337)
E22	Develope Technician Manual	800	999	478	-		1.477	185%	(677)
E23	Develope Biogas Mason Manual	-	-	-	-		-	0%	-
E24	Develope construction video	600	595	-	-		595	99%	5
E25	Dev technician QC manual	200	-	-	-		-	0%	200
E26	Dev technician Ext Manual	400	-	-	-		-	0%	400
E27	Dev User pre-construction leaflet	100	-	-	-		-	0%	100
E28	Dev Biogas instruction leaflet	500	-	-	-		-	0%	500
E31	Print Plant Operation Manual	5.988	90	5.159	205		5.453	91%	535
E32	Print Technician Manual	1.130	408	622	-		1.030	91%	100
E33	Print Biogas Mason Manual	200	570	42	-		612	306%	(412)
E34	Reproduce construction video	200	31	-	-		31	15%	169
E35	Print Technician QC Manual	450	-	-	215		215	48%	235
E36	Print technician Ext manual	2.225	-	1.173	-		1.173	53%	1.052
E37	Print User pre-constr leaflet	4.125	-	2.539	285		2.824	68%	1.301
E38	Print Instruction leaflet	3.900	-	-	2.221		2.221	57%	1.679
E41	STD evaluation workshop	900	-	-	439		439	49%	461
E	R&D/standardisation	40.000	5.677	16.356	6.257	-	28.289	71%	11.711

• **Development of Sector Standards:**

PBPOs were asked to contribute comments on developing sector standards for small biogas plants that also were discussed at the BT Refresher Training course in August. The Board of Sector Standards Development has arranged some site visits and joined in the BT Refresher training. Currently the Sector Standard for Domestic Biogas Plant has been completed and accepted by the Ministry.



- The **Technician Manual, Mason Manual and Construction Video** were all developed and printed, and have been distributed to the participating provinces in 2003.

2.4.6 Training

A significant number of training activities were conducted during the project among others:

- **Biogas User Training:** All PBPOs have conducted users' trainings including 678 pre construction training and 913 post-construction training for all farmers.
- **Biogas Mason Training:** All PBPOs have conducted mason trainings, a total of 345 masons was trained by the project.
- **Biogas Technician Training:** All provincial (12) and district technicians (130) of the PBPOs have been trained in 4 trainings conducted by BPO.

Table 9: Training Expenditure

Act code	Activity description	Budget BP I	Expense 2003	Expense 2004	Expense 2005	Expense Jan-06	Total Expense BP	Depletion E/B	Total Balance
F11	Print training certificates	225	23	3	-		26	12%	199
F21	Prov Partner workshop	24.550	5.938	7.750	7.081		20.769	85%	3.781
F22	Biogas Technician training	23.031	18.501	7.903	-		26.404	115%	(3.373)
F23	PBT refresher trg	10.637	-	-	9.760		9.760	92%	877
F24	BT refresher training	13.929	-	12.717	1.253		13.970	100%	(41)
F25	Dbase training PBPO	2.400	-	-	2.456		2.456	102%	(56)
F26	BRTC trg. China	8.000	-	-	7.402	376	7.778	97%	222
F27	BCT skills contest	4.400	-	-	3.739		3.739	85%	661
F31	Biogas Mason training	42.082	23.960	16.085	1.575		41.619	99%	463
F32	BT & BCT refresher exchange WS	12.980	315	3.251	9.229	193	12.989	100%	(9)
F41	ToT User training	-	-	-	-	-	-	0%	-
F42	User training	30.981	496	7.745	18.517	1.500	28.258	91%	2.723
F43	User pre construction WS	22.785	-	5.514	12.230	807	18.551	81%	4.234
F51	Bank loan officer training		-	-	-		-	0%	-
F52	Bank promotion & marketing training		-	-	-		-	0%	-
F	Training	196.000	49.233	60.968	73.242	2.876	186.319	95%	9.681

- Refresher Training for Biogas Technicians Planning:** Two BT Refresher trainings were organized in 2004 and 2005 in Lang Son and Thua Thien Hue provinces respectively with the participation of all project Biogas Technicians. These trainings also served as information sharing and planning sessions.
- Study Tour to China:** A study tour to China for Biogas Technicians was organized in September 2005 with the participation of 12 Biogas technicians from the PBPOs, 2 BTs from the BPO and 2 participants from the Department of Agriculture. An extra purpose of the trip was to observe large-scale biogas plants in Chengdu and Sichuan Provinces of China.
- Project Database:** The installation of the project database software and the subsequent training has been conducted by the BPO IT Officer in all project provinces except for Lang Son.
- Training and Information Materials:** Handouts for biogas users such as a technology handout and a user's guidebook on plant operation and bio-slurry use have been distributed to the PBPOs.



Some recommendations as per the AITCV Evaluation Report for the improvement in the project phase II are as follows:

- Training Needs Assessment for BPO, PBPOs, technicians and masons should be conducted.
- The project should organize more study tours and visits for project staff and technicians in order to promote learning and experience exchange.

- Training plan, as well as other activities, should be developed with the participation of local levels to capitalize local experiences and ensure it is matching with the specific local conditions.
- Establish and maintain users clubs for sharing experiences in terms of operation, application and maintenance. The activities of these clubs could be opened to people outside for the purpose of promotion as well.
- Standardize all kinds of training materials and provide clear guidelines for provincial and district technicians how to arrange training for users.

2.4.7 Extension

To extend the use of biogas products, the project provided guidance to users through user's training, technicians, project leaflets, media programs, and demonstration models. Feedback from biogas users showed that the use of biogas in households and production activities has been very efficient. The most effective forms of use included using biogas in cooking, lighting, cooking pig feeding, warming up chicks, and drying tea. Farmers have used bio-slurry as fertilizers for their crops or as feed for livestock. Successful harvest was gained with applications on tea, vegetables, corn and rice. The above uses have helped households to save significant amounts of money previously spent on fuel, fertilizer and associated pesticide. Once the amount of biogas produced exceeded the using capacity of households, efforts have been made in some places to share it to neighbour through pipes. Excessive bio-slurry was sometimes shared with neighbours for fertilizing their fields.

However, as the expense table shows, extension activities still lag behind planning.

- **Extension Poster:** A poster promoting for the uses of biogas slurry was developed but not yet printed.
- **Extension training for BTs:** This included the provision of 6 extension plans for various farming and animal feed purposes and the presentation of experiences from demonstration plots in Dac Lac (bio-slurry for pig feeding) and Hoa Binh (bio-slurry for vegetable raising).
- **Extension training for Biogas Users:** There were 1,004 extension training courses organised for all biogas users. However, most of these courses were combined with post construction user trainings, budget was used only 78%.
- **Provincial Demo Plots:** All PBPOs had set up extension demonstration plots, such as Hanoi: demo plot for winter rice and spring peanut, Hoa Binh: demo plot for cabbage, Thai Nguyen: demo plots for tea, Nghe An: demo plots for cabbage and maize.

Table 10: Extension Expenditure

Act code	Activity description	Budget BP I	Expense 2003	Expense 2004	Expense 2005	Expense Jan-06	Total Expense BP	Depletion E/B	Total Balance
G11	Dev BPO extension plan	1.000	-	-	-	-	-	0%	1.000
G12	Develope slurry poster 1	200	-	-	-	-	-	0%	200
G13	Develope slurry poster 2 - Fertilizer	600	-	-	257	-	257	43%	343
G14	Develope health poster 1	800	-	-	-	-	-	0%	800
G15	Develope health poster 2	-	-	-	-	-	-	0%	-
G16	Develope environment poster 1	800	-	-	-	-	-	0%	800
G17	Develope environment poster 2	-	-	-	-	-	-	0%	-
G18	Develop extension video	1.500	-	-	-	-	-	0%	1.500
G21	Printing slurry poster 1 - Animal	4.000	-	-	-	-	-	0%	4.000
G22	Printing slurry poster 2 - Fertilizer	3.600	-	-	-	-	-	0%	3.600
G23	Printing health poster 1	4.000	-	-	1.705	-	1.705	43%	2.295
G24	Printing health poster 2	-	-	-	-	-	-	0%	-
G25	Printing environment poster 1	4.000	-	-	85	-	85	2%	3.915
G26	Printing environment poster 2	-	-	-	-	-	-	0%	-
G28	Repro extension video	240	-	-	-	-	-	0%	240
G31	Set up Slurry demo-plot	6.525	-	582	623	426	1.632	25%	4.893
G32	Extension Class	44.135	-	7.026	24.224	3.085	34.334	78%	9.801
G	Extension	71.400	-	7.608	26.894	3.511	38.013	53%	33.387

With the common assessment of the BPO and PBPOs, the use of biogas product could be expanded further. Certain actions of extension and R&D should be developed in order to explore the forms of use and to solve problems arisen during process of use.

As per the evaluation report, recommendations for improving extension activities could be as follows:

- Evaluate existing user efforts and user needs to improve the use of biogas products.
- Cooperate with the Institute of Agricultural Chemicals and Soil Fertility in research for use of bio-slurry; and with the Institute of Energy for optimizing biogas use.
- Research on ways to share excessive biogas and bio-slurry to non-users, especially the poor.
- Provide more consulting services for users on the application of biogas products.
- Build at least 1 demonstration model per district and organize user/potential user visits to these models.

In BP II, important actions could be handled to promote experience sharing among users and technicians of different provinces by organizing more seminars, site visits, or information programs in CDs, video, radio and television. These activities for experience sharing can inform users on different forms of use, techniques required for efficient use as well as the development of biogas sector. More seminars or meetings also should be organised for biogas users where biogas applications will be spread around efficiently.

2.4.8 Monitoring and Evaluation

Through their quality control activities, the BPO Biogas Technicians conducted general monitoring and evaluation activities. The full outcome of this activity can be found in the section on Quality Control.

Table 11: Monitoring and Evaluation Expenditure

Act code	Activity description	Budget BP I	Expense 2003	Expense 2004	Expense 2005	Expense Jan-06	Total Expense BP	Depletion E/B	Total Balance
H11	Develop BPO Database	5.000	-	2.202	-	-	2.202	44%	2.798
H12	Maintain & upgrade BPO Database	2.000	-	-	-	-	-	0%	2.000
H13	Develop P-sat question	100	-	-	-	-	-	0%	100
H14	Develop Testing & Acceptance form		-	-	-	-	-	0%	-
H15	Develop P-Sat Question		-	-	-	-	-	0%	-
H21	Print form (Reg; T&A; P-sat)	4.445	30	2.052	1.596	-	3.677	83%	767
H31	Develop ToR Biogas User Survey	4.200	-	-	-	-	-	0%	4.200
H32	Biogas User Survey	15.756	-	3.242	9.809	169	13.219	84%	2.536
H33	BP external evaluation	10.000	-	-	9.394	207	9.601	96%	399
H34	BP concluding workshop	3.500	-	-	3.798	-	3.798	109%	(298)
H	Monitoring/evaluation	45.000	30	7.495	24.597	376	32.497	72%	12.503

At the national level, monitoring of the project was the responsibility of the BPO. The M&E indicators were formulated for successful implementation of the specific objectives as installed biogas plants, operation and maintenance, developing of appliances and maximization of benefits. A database was developed to monitor the subsidy transfer, which has been evaluated as very efficient. As the maintenance and upgrading of BPO database were carried out by BPO IT officer, no extra expenses were involved. Also the development of ToR for Biogas User Survey was handled by BPD.

The AITCV Evaluation Report suggested the following improvements regarding Monitoring and Evaluation activity:

- Develop clear indicators for monitoring and evaluation,
- Develop mechanism to monitor activities of district technicians,
- Putting some codes on the biogas plants could assist to avoid virtual biogas plants.
- The project could share the monitoring responsibilities with local government through involvement of district agricultural extension and commune PCs.
- Using more advanced technical appliances as GPS to locate the biogas plants.

2.4.9 Institutional Support

Table 12: Institutional Support Expenditure

Act code	Activity description	Budget BP I	Expense 2003	Expense 2004	Expense 2005	Expense Jan-06	Total Expense BP	Depletion E/B	Total Balance
I11	Provincial Training support	3.210	2.551	1	-		2.552	79%	658
I12	Biogas workshop	17.000	-	-	8.910	840	9.750	57%	7.250
I21	Biogas Steering Committee	6.790	218	2.269	1.632		4.120	61%	2.670
I	Institution support	27.000	2.769	2.270	10.542	840	16.421	61%	10.579

In addition to the regular BPO activities, a considerable amount of institutional support has been provided to various organisations among others:

- **Provincial training support:** The project usually combined these activities in QC trips that made no separate charge in this budget line.
- **Biogas Steering Committee:** Provinces (except Bac Ninh, Dong Nai, Tien Giang and Dak Lak) established their provincial Biogas Steering Committees. The National Biogas Steering Committee, however, was not established in BP I, as explained in Section 1 of this report.
- **Fauna Flora International:** BPO completed the support to FFI in disseminating 22 biogas plants in the two communes of Ngoc Khe and Phong Nam in Cao Bang Province. Subsidies were transferred for 22 plants and were monitored with BPO Acceptance Procedures.
- **GTZ:** BPO provided technical support and a site visit to assist GTZ in conducting a feasibility study for installing biogas in a boarding school.
- **ICD-MARD:** International Cooperation Department of MARD hosted a workshop for its staff and associates on the Clean Development Mechanism and the opportunities it provides for Vietnam. BPO and SNV supported this workshop by providing technical advice, financial support and sourcing expert speakers (including Mitsubishi Securities in Japan). The workshop was very well attended.
- **General Institutional Support:** BPO provided general ad hoc support and advice to various individuals and organisations. This ranged from providing technical specifications to information on project management.

2.4.10 Project Management BPO

BPO was the executive agency for the project. Its main function was to implement the plan set by the Department of Agriculture/MARD and SNV. BPO was organized into two departments: Administration and Technical Departments. The activities of the BPO were synchronized by the Program Coordinator whom was advised by the Technical Advisor assigned by SNV and who reported directly to the project director.

With a staff of 13 employees by the end of BP I, BPO supervised project activities in 12 provinces and 18,022 biogas plants throughout the country.

The management challenge was made achievable thanks to the set of guidelines for operation and maintenance. The guidelines provided sufficient rules and regulations on all steps of project implementation processes from planning to construction. BPO considered the guidelines as a key factor contributing to the success of the project. Overall, BPO had a moderate level of capacity in managing the project. The project management at BPO level was implemented as per the project planning.

- **Budget Transfer and Reporting:** Project budgets for project operation were usually provided upon liquidity application. BPO quarterly financial reports were submitted to the Department of Agriculture, MARD and SNV in time.
- **Increased Targets:** The arrangements to request and implement the initial target increase (10,000 – 12,000) were conducted. The subsequent arrangements for the increase of a further 6,000 (under a new separately administered budget line), were completed and administration of those funds was been done.
- **Performance Planning:** A Work/Performance Planning system was developed for the BPO. This system involves integrating individual responsibilities for planned tasks and activities into a performance management system to increase accountability and efficiency. The development of this system was supported with training.
- **Personnel Support:** Ad hoc contract labour was hired to support the increased data entry and other administrative jobs generated by the increased targets.
- **Technical assistance:** Mr. Felix ter Heegde was the Chief Technical Advisor from the project start till end of 2005. He got from May till September 2005 assistance from Mrs. Gisela Ervin-Ward. Since September 2005, Mr. Bastiaan Teune has started in the project as Junior Advisor Renewable Energy. Mr. Reindert Augustijn was recruited as Chief Technical Advisor and started his duties in January 2006, but has visited Hanoi several times to already start the handing over.
- **Support of PBPOs:** Ad hoc support and systems and financial checking was given to all project provinces. The result of this was to approve PBPO payment as per BPO financial regulations and PBPO guidelines. This support also focussed technical issues and strengthened QC procedures.

As shown clearly in the BPO Project Management, expenditures were higher mainly in the salary budget lines for BPO staff, resulting from rearrange of salary scaling. Through efficient management on TA/DA and travelling of project officers, costs were saved.

Table 13: BPO Project Management Expenditure

Act code	Activity description	Budget BP I	Expense 2003	Expense 2004	Expense 2005	Expense Jan-06	Total Expense BP	Depletion E/B	Total Balance
J11	Costs CTA	139.200	46.400	46.400	46.400	3.867	143.067	103%	(3.867)
J21	Salary Director	7.916	2.002	3.069	3.052		8.123	103%	(207)
J22	SalaryTA- P&Ex	6.072	1.502	2.529	2.574	206	6.811	112%	(739)
J23	Salary TA-AH&T	6.072	1.502	2.529	2.574	206	6.810	112%	(738)
J24	Salary Director	-	-	-	111	268	379	0%	(379)
J30	Staff recruitment costs	2.955	1.379	1.307	540		3.226	109%	(271)
J31	Salary Coordinator	45.895	9.928	31.783	21.435	599	63.745	139%	(17.850)
J32	Salary Bio/Agriculture Engineer	21.905	-	690	12.518	1.055	14.263	65%	7.643
J33	Salary Administrator	33.183	6.058	19.229	19.970	(658)	44.598	134%	(11.415)
J34	Salary Chief Biogas Engineer	34.209	5.824	15.628	15.932	939	38.323	112%	(4.113)
J35	Salary Biogas Engineer - QC officer	26.652	3.611	11.874	13.031	1.207	29.723	112%	(3.071)
J36	Salary Biogas Engineer - Training officer	27.202	836	8.628	13.936	983	24.383	90%	2.819
J37	Salary administration officer	22.647	2.772	10.826	10.577	716	24.892	110%	(2.245)
J38	Salary IT Officer	24.813	2.276	6.511	9.501	604	18.893	76%	5.920
J39	Salary Office Assistant	9.095	1.497	4.085	5.289	506	11.377	125%	(2.282)
J41	Develop office admin software	2.650	1.501	1.677	170		3.348	126%	(698)
J42	System installation	850	847	924	-		1.771	208%	(921)
J43	Upgrading admin software	1.000	-	-	600		600	60%	400
J44	Upgrading BP dbase software	1.000	-	-	1.516		1.516	152%	(516)
J50	Annual audit costs	10.500	1.893	3.598	4.805	2.200	12.496	119%	(1.996)
J61	Office rent	41.650	10.457	14.097	16.357	1.500	42.411	102%	(761)
J62	Office utility costs	7.950	978	3.099	1.191	20	5.288	67%	2.662
J63	Office phone/fax/mail/internet	15.740	2.496	4.492	6.071	362	13.420	85%	2.320
J64	Office transport costs	17.400	1.802	2.864	778		5.443	31%	11.957
J65	Office supplies	8.670	1.976	2.614	2.603	312	7.504	87%	1.166
J66	Office books / magazines etc	3.950	179	290	1.277	8	1.754	44%	2.196
J67	Office furniture BSU	4.600	3.228	-	481		3.709	81%	891
J68	Computer / printer / beamer	23.500	12.389	4.930	3.782		21.101	90%	2.399
J69	Other office costs	10.190	2.552	1.011	2.826	5.889	12.278	120%	(2.088)
J70	TA/DA BPO staff	47.967	7.738	6.255	5.332		19.326	40%	28.641
J80	Professional training	-	35	459	-		494	0%	(494)
J91	Annual staff meeting	3.400	687	760	1.093		2.540	75%	860
J92	BPO staff training	4.000	-	-	2.915		2.915	73%	1.085
J	BPO Project management	612.834	134.346	212.157	229.235	20.788	596.526	97%	16.308

Comments of AITCV evaluation report:

On the organizational capacity of BPO

- Maintaining the present enthusiasm and commitments.
- BPO should formulate a vision reflecting an inspiring view of the future; demanding but achievable.
- BPO should set up in writing its policy and procedures (P&P) on all aspects of human resources development such as those related to recruitment, job placement, performance evaluation, training, reward and promotion. P&P should be reviewed and get approval from MARD and SNV.
- Hire additional staff to share the increasing workload.
- Assess training needs and offer training for administrative staff.

On the involvement of PBPO:

Management of BPO could be improved a lot if assistance from the PBPOs was well mobilized. There are a number of tasks and contributions that the

PBPOs can perform very well to share responsibilities with BPO. Some recommendations to implement this decentralisation are:

- Review and update the current guidelines with a special attention to the quality control and verification of built biogas plants.
- Apply the participatory approach in planning and implementing project activities.
- Support institutional capacity building for PBPO especially in planning and monitoring
- Conducting P&M activities from designing and planning to implementation, assistance from BPO.
- Conducting some R&D activities on specific applications of local needs.
- Recognizing and enhancing PBPO's roles in management of quantity and quality of biogas plants.
- Indicating possibilities for cooperation between provinces, and between province and BPO.
- Allocating a full-time project officer at provincial level

2.4.11 Project Management PBPO

Table 14: PBPO Project Management Expenditure

Act code	Activity description	Budget BP I	Expense 2003	Expense 2004	Expense 2005	Expense Jan-06	Total Expense BP	Depletion E/B	Total Balance
K11	Supp p/off operational cost	72.300	7.578	31.322	30.829	2.676	72.404	100%	(104)
K21	Supp p/off salary cost	67.514	8.352	28.132	26.206	2.240	64.930	96%	2.584
K22	Support district activities costs	30.000	-	12.096	13.651	954	26.702	89%	3.298
K31	Supp p/off IT- equipment	9.600	8.086	1.696	166		9.948	104%	(348)
K32	Support p/office furniture	1.200	-	1.080	-		1.080	90%	120
K41	Supp p/off transport	14.386	7.635	3.957	2.636	193	14.422	100%	(36)
K51	Biogas market assessment	16.500	2.797	6.829	-		9.626	58%	6.874
K	PBPO Project management	211.500	34.449	85.114	73.487	6.063	199.113	94%	12.387

- At provincial level, PBPOs were established to manage the project activities within the province. As PBPO directors and deputy directors are keeping decision-making power of vertical chain of DARD, the coordination between provincial (DARD, P-AEC) and district levels (D-AEC) has shown to be effectively. PBPOs also had very clear directions and supports from provincial government and political bodies that help biogas activities in some provinces were mandated officially to the agricultural extension section and media organizations.
- In general the activity management of the PBPOs kept quite closely with the BPO allocated activity plan. However, financial reporting lagged significantly behind and this is reflected in BPO level financial reports.
- Plans have been developed to combine agricultural extension activities with project activities to attract more farmers and to strengthen plant monitoring and use of slurry.

- The project got much support from biogas technicians at provincial and district levels who performed their tasks effectively and in a very enthusiastic manner.

Section 3: Realisation of Project Objectives

The proposal for BP I was more or less based on the experiences with the implementation of the Biogas Support Programme (BSP) in Nepal. The BP I overall objective was to further develop the commercial and structural deployment of biogas, at the same time avoiding the use of fossil fuels and biomass depletion. A total of seven specific objectives with indicators for successful achievement were formulated, see Table 15.

Table 15: Specific objectives, indicators for successful implementation and achievements of BP I

Specific Objective	Indicator	Achievements
To develop a commercially viable and market oriented biogas industry	Minimum 3 private biogas construction companies per province	BP I trained 345 masons. This resulted in the formation of a total of about 300 Biogas Construction Teams (BCTs) in 12 provinces, an average of 25 BCTs per province
	Relevant company staff trained in management	Biogas Construction Teams (BCTs) preferred to operate on an informal basis. Hence, management training was not provided to BCTs but to the PBPOs
	Relevant company and bank staff trained in marketing	VBARD stayed out of BP I as potential customers were not interested in getting a loan. Also BCTs were not trained as they preferred to operate on an informal basis. In stead, emphasis was given to promotional activities by BPO and the PBPOs
To increase the number of biogas plants with 10,000	Minimum 7,500 plants installed	A total of 18,022 plants were installed with a total public budget of US\$ 2,391,424 (US\$ 132 per plant). The proposal aimed to install 10,000 plants with a total budget of US\$ 2,000,000 (US\$ 200 per plant)
	Quality standards for construction established, less than 10% defaults	BP I used the standards from No. 10 TCN 497 – 2005 –Small Size Biogas Plant – Part 6: Standard Designs, issued by MARD. According to the survey 11% of the checked plants had defaults but all could be rectified. According to a sample check of 525 plants in February 2006 carried out by STT Audit & advisory Partnership 4% were not functioning mainly due absence of animals or not functioning of stove.
Reduction of GHG with an estimated 64,600-119,200 tonnes of CO ₂ annually	-	The reduction of Greenhouse Gases is estimated at 34,920 to 54,720 tonnes of CO ₂ equivalent

		per year, see annex 4.
To ensure the continued operation of all biogas plants installed	Maximum 2% failure rate (no biogas use)	According to a sample check of 525 plants in February 2006 carried out by STT Audit & advisory Partnership 4% were not functioning mainly due absence of animals or not functioning of stove.
	Minimum 85% use of plant capacity	According to the biogas user survey the capacity of the plants was only used for 36 to 43%. Based on the project database and the default values for dung; the project estimate the capacity use of the plants on 65 to 80%.
	Minimum 75% of all users trained	Through pre, post -construction and extension user training sessions, each of all biogas users received three kinds of user training.
	Appliances standardised and produced in Vietnam	Almost all appliances are produced in Vietnam but not standardised by BP I.
To maximise the benefits of the operated biogas plants, in particular the optimum use of bio-slurry	Average saving of minimum 2,550 kg/year on firewood and agricultural waste per household	Annual saving of 1,190 kg of firewood, 172 kg of agricultural waste and 34 kg of charcoal.
	Average saving of minimum 153 kg/year on coal per household	Annual saving of 47 kg of coal briquette, 6.3 kg of LPG and 30 kWh of electricity.
	Average reduction of workload of minimum 1.5 hours per day per household	Reduction of 1-1.5 hours per day for each household, mainly on cooking and washing of cooking tools.
	Minimum 50% of households have composting systems in place within 1.5 year of the construction	About 40% of households used slurry in planting, 14% in raising aquatic products and 1% as pig feed (mostly in liquid form).
Technical and promotional capacity development for further wide scale deployment of biogas	-	-BPO and 12 PBPOs established and capacitated (142 provincial and district technicians trained); -345 masons trained; -all 18,022 households trained.
To strengthen and facilitate establishment of institutions for the continued and sustained development of the biogas sector	Financing of a minimum of 50% of plant construction by VBARD	VBARD stayed out of BP I as potential customers were not interested in getting a loan. Plants were financed on cash basis and/or through other sources beyond the scope of BP I.
	National standards on plant construction and repair & maintenance are established and accepted	BP I used the standards from No. 10 TCN 497 – 2005 –Small Size Biogas Plant – Part 6: Standard Designs, issued by MARD.

Overall, it can be concluded that BP I has been quite successful in achieving the targets, especially those fitting within the Vietnamese context. Government organisations (MARD, BPO and PBPOs) played a very important role, much more than within BSP in Nepal. Construction and maintenance activities were conducted by the private sector, but most of the BCTs operated on an informal basis, not as a registered company as is the case in Nepal. The foundation of the structural deployment of biogas has been laid; commercialisation is yet to be achieved. The level of investment subsidy of VND 1,000,000 compared to an average total investment of VND 3,800,000 still amounts to 26% public financing. However, about 60% of all biogas farmers combined the installation of a biogas plant with the rehabilitation and/or construction of toilets, animal stables and kitchens at their own costs. Hence, the investment subsidy for the plant triggered additional development. It is envisaged that carbon financing in the post-project period will further contribute to the intended commercialisation.

What the others say...

The project received four external evaluations (two mid term evaluations, a general project end evaluation and a biogas user survey). What follows in this chapter is a brief selection of the most striking observations, findings and recommendations of evaluators. The provided selection – entirely under the responsibility of BPO – is not meant to be exhaustive, interested readers can apply for the full reports at the BPO.

• Quick review of the Biogas Programme of Vietnam:

Mr. Julio de Castro of SEM, commissioned by DGIS, reviewed the project in September 2004. His observations were documented in the report "Quick review of the Biogas Programme of Vietnam".



- In relation with the subsidy provision, the report mentioned: "... it was not quite clear how one could differentiate between installation built under BPO assistance, and those constructed with subsidies provided under other schemes". Mr. de Castro recommended this issue to be resolved to avoid "... double counting of an installation by two different subsidy schemes".
- Most of the installations were sized between 6 and 12 m³, investment costs averaging between VND 2.5 and 3.5 million. It should be noted, however, that many farmers take the opportunity to improve stable, kitchen and latrine, often increasing the combined investment to VND 6 to 10 million.

- The flat-rate subsidy scheme, although simple to administer and a powerful tool for promotion and quality management, favoured rich and poor equally. The report recommended the project to consider subsidy levels that should be adjusted to the economic development levels of the provinces.
- Quality control should be reinforced, and the project should consider to "... make it truly independent from the local authorities".
- Most of the installations, due to lack of space, did not have a slurry pit, reducing the potential environmental benefits of the installation. It was recommended that the project looks into solutions that enable farmers to effectively utilize the bio-slurry.
- The evaluator recommended including civil society – relevant NGO's, mason organization and mass organizations - in the Biogas Steering Committees.
- The market position of biogas in Vietnam was characterized as "... a situation of suppressed demand". Main limitations to capture the market were the subsidy quota system and the limited amount of trained masons.
- To create a commercially viable and market oriented biogas sector in Vietnam, the project should consider to reduce the role of government institutions to project supervision and quality management, and to allocate subsidies as per the true demand of farmers.
- Biogas Construction Teams were proto-companies at best. It was suggested to support market consciousness of these teams.
- "A very positive and reassuring indicator of the interest that the project is creating –and that the project is answering a real need- is that the two provinces that entered the project later are financially contributing to it". Hence the recommendation to take this modality into account in "... an eventual new phase of this project".

- **Mid-term evaluation carried out by an inter-ministerial delegation:**

In October 2004, the Department of Agriculture commissioned an inter-ministerial delegation for a mid-term evaluation of the project. The findings of this evaluation had been documented in the report "Mid-term evaluation on the Support Project to the Biogas Programme for Animal Husbandry Sector in some Provinces in Vietnam", dated October 27, 2004.



The delegation concluded: "...after 2 years implementation, an efficient structure in terms of both operation and management was established..." The report further mentioned:

- The concept of project financing by a mix of foreign aid, provincial contribution and contribution of the beneficiary, as practiced in Hanoi and Thai Nguyen, should be replicated for phase II of the project.
- Although all installations had been constructed as per the standards for model KT.1 and KT.2, a number of plants was found not meeting the technical requirements (e.g. faulty floor levels, under-sized installations, open gas valves)
- Households reported fuel savings of VND 50,000 to 70,000 per month, masons earn VND 50,000 to 60,000 per day.
- Subsidy payment directly to the plant owner though the post-office was simple, convenient economic. In general, authorities and households reportedly welcomed the tight financial management.

Recommendations of the delegation included:

- Establishment of the biogas steering committee
- Intensification of R&D and promotion and marketing efforts
- Professionalization and commercialization of the Biogas construction Teams to improve quality and –through increased competition- reduce construction price.
- Promotion of integrated biogas systems (3 in 1 and 4 in 1, VAC model)
- Organizing local technicians.

The delegation therefore concludes: "... [the project] has brought about the benefits to society in terms of economy and environment, and assisted in improving the living standard of farmers. For this reason, a second phase, with wider coverage to meet the demands of the farmers in the country, should be taken notice by the Vietnamese Government and the Donor".

- **Biogas User Survey:** To get feedback of the users and to assess how the biogas plants were functioning, the Biogas Project Office requested the Consultant Group of the Institute of Energy to carry out a biogas user survey. The Consultant Group visited 100 random selected plants. Some findings were:
 - Most of the households, who constructed a biogas plant, were not considered poor.
 - Most of the households had different reasons to construct a biogas plant but all mentioned the aim of reducing environmental pollution.
 - The households produced on average 1.24m³ of biogas, which is mainly used for cooking.
 - The households saved on average 4,000 VND per day due to fuel substitution.
 - Many households were not aware of all the possibilities for the use of

slurry.

- Most households indicated that a considerable amount of time (a few hours per day) was saved by reduction of cooking and cleaning time and by not having to collect firewood.
- More than 85% of the households were satisfied with the quality of the masons and the information provided.

Some recommendations were:

- The project should try to focus on households from lower income groups.
- The project should start more activities to promote the use of slurry.
- More responsibility should be given to the masons (like providing one year warranty period instead of 6 months, recording all related maintenance activities and reporting these records to PBPOs).
- More attention should be given on the monitoring of the use of the biogas plants.

-
- **Biogas Project Evaluation 2005:** In order to get an independent view on the management and implementation of the domestic Biogas Project BPO initiated an evaluation. This evaluation was carried out by the Asian Institute of Technology Center in Vietnam (AITCV) in December 2005

The main conclusions of the evaluation were:

- Generally, the biogas project had been able to achieve all its objectives.
- Although the project did not take on poverty reduction initiatives, it had indirectly done so through creating construction jobs and contributing to community development with environmental sanitation efforts.
- Regarding marketing and promotion the project could make more use of the masons and local authorities and made materials a bit more attractive.
- Timing and set-up of training should be more made location specific.
- Subsidies were well appreciated and seen as an asset but should have different levels to assist the poorer households more.
- The quality control should be improved further by standardisation of methods and by giving plants specific codes.
- The project should provide more assistance for biogas users on the application of biogas products (especially on appliances and on the use of slurry).
- The project should develop clear criteria to monitor the implementation of different project activities.

- The project should try to increase bottom-up planning and to simplify the administrative system.
- The project should link with other biogas related projects and programmes.

Generally, the biogas project has been able to achieve all its objectives in Phase 1. The provinces have completed their construction plans in advance. The goal to commercialize the biogas sector can be said to be within reach when the masons, trained and provided opportunities by the project, have been able to develop their own business in places without project supports. Although the project did not take on poverty reduction initiatives, it has indirectly done so through creating construction jobs and contributing to community development with environmental sanitation efforts.

Among most concerned queries about project activities, physical existence of 18,022 biogas plant stayed at top. To respond to this, BPO always makes sure with provincial offices on the physical existence of all claimed biogas plants under annual BPO-PBPO agreements. BPO regularly organised quality control random check to all project provinces, in which both administration procedure (financial document) and training, promotion, construction activities were focussed. On the other hand, these concerns were also considered as the most important activity at PBPOs. District biogas technicians paid at least 3 visits to the under construction plant. Provincial biogas technicians paid random QC visits to both under construction and construction completed plants as required to the project, to make sure the plants were existing and built with good quality for operation. Cross checking name of the household owner between required documents (forms) such as Letter of Application, Certificate of Acceptance, training lists of participants is also a solution. Overall, the clear and strong instructions from boards of provincial management that makes all project activities carried out in project provinces success.

Besides, by project end, an independent consultant company was contracted to check the physical existence of 500 plants of the whole final construction batch. All plants were existing and built under this project. In the next phase, this issue is still the main focus as we aim to support right beneficiaries.

Regarding multiple subsidy level, many researches were carried out by both BPO advisors and independent consultants on which level will be appropriated most to whom, based on general economics lives of specific localities. It is concluded that the project should continue with only one flat rate subsidy scheme for BP II due to its simple implementation and management.

About QC activity, the project had gone through all QC forms to make sure all requests are fit with actual requirement. BPO also frequently requests all PBPOs strictly follow project QC procedures. The numbers of QC check visit to project provinces have been doubled to make sure that all biogas plants under the project can function well. For BP II, a clearer QC procedure is

developed and updated. A more specific QC plan of BPO technical staff is also developed for a better reflection of this most important activity.

The project recognizes the importance of involvement of mass organisations and they are also proposed to support the BP II in promoting benefit of the biogas technology.

The project also have plans to support some capable project biogas mason teams with business development training to help them to be able to continue their biogas career event after the project end.

With the BP II project proposal of an expansion in number of participating provinces from 12 to about 50, the project contribute to modernize and improve the livelihood of rural households.

Section 4: Scope of BP II

As the demand for biogas plants in Vietnam is very high, especially now a days when increasing investment is mobilized for the development of animal husbandry sector of Vietnam, the demands on waste treatment for more sanitary environment, domestic energy for daily cooking and clean organic fertilizer are increased as well. MARD has foreseen the situation and has developed in cooperation with SNV Vietnam a Project Document for Phase II.

Strategic partnerships are being developed to facilitate the continuation of the programme. This includes discussions with DGIS of the Netherlands Government about programme funding, Mitsubishi Securities about the development of a Clean Development Mechanism methodology to facilitate CDM approval and KfW/German Embassy in relation to programme funding and carbon financing.

Phase two will involve up-scaling the programme to about 50 provinces and will have a target of 140,000 plants to be constructed within 4 years. In the bridging year 2006 about 10,000 plants will be built.

The overall goal of the programme is:

“to improve the livelihoods and quality of life of rural farmers in Vietnam through exploiting the market and non-market benefits of domestic biogas”. This objective is in line with the policies of the Party, priorities of the Government and the Sector stated in resolutions of rural and agricultural development and policies of economy transition and consumption of agricultural products.

Basing on the above objectives, overall goal of the project was developed. The overall goal is “to develop a commercially viable domestic biogas sector”.

The project will be implemented in 4 years and in about 50 provinces nationwide with more than 600,000 beneficiaries. The specific objectives of the project include:

Continue the programme operations in 20 provinces and start in another 30 to build a total of 140,000 plants.

Provide training for at least 1 biogas technician and 2 biogas mason teams per district, and support to establish 1-2 biogas enterprises and a biogas programme office per province;

Provide three training courses for all biogas users (pre and post construction training and extension);

Contribute to reduce environment pollution due animal husbandry development and improve sanitation on the farms;

Reduce the time spent on firewood collection, cooking and cleaning.

Reduce GHG emission with about 420.000 CO₂eq tons/year and produce good fertilizer for cropping and food for animals;

Substitute yearly about 200,000 tons of firewood or agricultural wastes with clean energy source in order to improve livelihood environment and health in rural areas;

Create at least 2,500 jobs for "biogas plant construction and services" in rural areas.

The preparations for the total second phase have not been concluded yet due to the rather complicated funding structure of the Phase II. A deficit of about 10 millions Euro is expected to be covered by a soft development loan of KfW, which the project will try to partly pay back with CDM revenues. A Memorandum of Understanding for BPII was signed on July 6th 2006 but bilateral and tripartite agreements especially regarding the loan still have to be finalised.

In order to continue the project without any gaps and to have more time to complete the project proposal for BP II (2007-2010), the Vietnamese and the Dutch Government have agreed with MARD and SNV-VN to implement the bridging phase 2006 for the project "Biogas program for the Animal husbandry sector of Vietnam" through an official signing ceremony of the Memorandum of Understanding on 27 April 2006. The bridging phase will receive a non refundable ODA grant of 1.15 million Euro from the Dutch Government, financial contribution of 0.24 million Euro from 24 project provinces and a lion share from investments of biogas users in order to build 9,455 biogas plants. Besides, SNV makes also available technical advisory services to the project.

Annexes

Annex 1: Balance Sheet as at 31-01-06

Description	Acc.	Balance as at 31-12-03	Balance as at 31-12-04	Balance as at 31-12-05	Balance as at 31-01-06
Assets					
A. Current assets					
I. Liquid assets					
1. Cash on hand in VND	1201	562,70	55,94	21,08	335,88
2. Cash on hand in USD	1202	,	-	-	-
3. Cash at bank in VND	1222	3.811,63	33.484,67	1.660,87	24.606,91
4. Cash at bank in USD	1223	67.745,67	34.006,60	123,38	5,40
5. Subsidy	1224	,	-	-	-
6. Cash saving in USD	1225	3.028,83	11.315,09	11.337,93	11.338,41
Total liquid assets		75.148,82	78.862,30	13.143,25	36.286,60
II. Account receivable					
1. Private advances	1001	(1,60)	-	82,48	82,43
2. Work advances	1002	18.147,82	22.798,56	30.122,04	15.010,04
3. Receivable VAT	1003	,	-	5.582,40	(0,02)
4. Various receivables	1004	,	4.349,27	4.723,35	4.720,40
5. Debtors VK <> HK	1006	,	-	-	-
6. Debtors PBPO	1009	,	-	-	-
7. Debtors SNV	1010	,	-	-	-
Total accounts receivable		18.146,22	27.147,83	40.510,27	19.812,85
III. Accrued assets					
1. Prepaid funds/other accrued assets	1101	550,25	2.500,08	2.500,01	998,45
2. Safety deposits	1103	,	1.497,39	1.484,68	1.483,75
Total accrued assets		550,25	3.997,47	3.984,68	2.482,19
IV. Other suspense accounts					
1. Suspense account in VND	2103		-	-	-
2. Suspense account in USD	2101		-	(0,01)	(0,01)
3. Currency conversions	2104		-	-	-
4. Suspense account balances	2112		-	-	-
Total other suspense accounts		0,00	0,00	(0,01)	(0,01)
TOTAL CURRENT ASSET		93.845,30	110.007,59	57.638,20	58.581,64
B. Fixed assets					
I. Cost					
1. Buildings/terrain	1	-	-	-	-
2. Vehicles	2	-	-	-	-
3. Equipment	3	-	-	-	-
4. Inventory	4	-	-	-	-
Total costs		-	-	-	-
II. Depreciation					
1. Building depreciation	11	-	-	-	-
2. Vehicles depreciation	12	-	-	-	-
3. Equipment depreciation	13	-	-	-	-
4. Inventory depreciation	14	-	-	-	-
Total depreciation		-	-	-	-
III. Results previous financial year					
Total previous financial year		-	-	-	-
TOTAL FIXED ASSET		-	-	-	-
TOTAL ASSETS		93.845,30	110.007,59	57.638,20	58.581,64

Continued next page

Annex 1 continued

Description	Acc.	Balance as at 31-12-03	Balance as at 31-12-04	Balance as at 31-12-05	Balance as at 31-01-06
Liabilities and equity		0,00			
		0,00			
A.Liabilities		0,00			
I. Short-term debt					
1. Transfer of funds	1302	0,00	-	-	-
2. Creditors	1303		-	-	-
3. Payable VAT	1304	0,00	-	141,24	0,00
4. Withdrawal P.A.Y.E	1305	1.670,43	-	-	385,01
5. Withdrawal social security premiums	1306		-	-	-
6. Withdrawal local pension premiums	1307	1.358,40	11.315,09	30.555,18	15.806,19
7. Reservation Leave Allowance	1308		-	-	-
Total short-term debts		3.028,83	11.315,09	30.696,42	16.191,20
II. Accrued liabilities					
1. Payable funds/accrued liabilities	1401	2.369,13	113.071,97	164.388,39	119.742,43
Total accrued liabilities		2.369,13	113.071,97	164.388,39	119.742,43
Total liabilities		5.397,96	124.387,06	195.084,81	135.933,63
B. Equity					
1. Commitments RNE projects	1800	2.000.000,00	2.000.000,00	2.482.291,00	2.482.291,00
2. Receivable RNE projects	1810	-1.667.922,28	-851.867,96	(346.609,67)	(246.609,67)
3. Receivable from Donor	1812		-	-	-
4. Interest bank charges donor money	1819		-	-	-
5. Commitments third parties projects	1700		81.628,98	81.628,98	80.961,98
+ Ha Noi	1700		38.085,59	-	-
+ Cao Bang	1700		8.153,00	-	(667,00)
+ Thai Nguyen	1700		25.390,39	-	-
+ SNV	1700		10.000,00	-	-
+ Additional	1700		0,00	-	-
6. Receivable third parties projects	1710		-34.922,92	(3.271,92)	(2.604,92)
+ Ha Noi	1710		-19.042,79	-	-
+ Cao Bang	1710		-3.182,51	-	667,00
+ Thai Nguyen	1710		-12.697,61	-	-
+ SNV	1710		-	-	-
+ Additional	1710		-	-	-
7. Received from third parties	1712		-	-	-
8. Interest bank charges third parties money	1719		-	-	-
9. Fund to be justified - RNE	1820		-	-	-
10. Expenditures RNE projects	1830		-1.170.084,86	(1.899.518,53)	(1.899.518,53)
11. Funds to be justified - third parties	1720		-	-	-
12. Expenditures third parties projects	1730		-39.132,71	(451.966,47)	(491.871,85)
Total equity		332.077,72	32.326,59	(137.446,61)	(77.351,99)
Total liabilities & equity		337.475,68	156.713,65	57.638,20	58.581,64

Annex 2: Profit and Loss Statement

Description	This period 01/01/06- 31/01/06	Previuos periods 01/01/03- 31/12/05	Accumulated from beginning of project
A. Expenses			
I. Personnel cost			
1. Personnel recruitment	-	3,423	3,423
2. Training fees	-	552	552
3. Cost EUN/TCN	3,867	141,051	144,918
4. Cost local staff	6,864	309,257	316,121
5. Cost external consultants	-	-	-
6. Other personnel costs	-	382	382
Total personnel costs	10,730	454,665	465,395
II. Operational costs			
1. Office costs	7,924	91,556	99,480
2. Transportation costs	193	21,087	21,281
3. Equipment costs	-	35,149	35,149
4. Inventory costs	-	3,613	3,613
Total operational costs	8,118	151,405	159,523
1. General expenses	6,213	157,733	163,946
2. Other costs	(144)	24,177	24,033
Total general costs	6,070	181,910	187,980
1. Direct programme support	6,360	1,301,217	1,307,577
2. Indirect programme support	8,692	265,528	274,220
Total programme support	15,051	1,566,745	1,581,797
A. Total expenses	39,969	2,354,724	2,394,694
1. Proceeds of interest	64	3,206	3,270
2. Other proceeds	-	-	-
3. Fixed assets disposal	-	-	-
4. Service delivery charges(ext	-	-	-
B. Total income	64	3,206	3,270
C. Profit/Loss	39,905	2,351,519	2,391,424

Annex 3: Donor Fund Statement

For the period from 1 January 2006 to 31 January 2006

	The DGIS USD	Local donors USD	Total USD
Donors' commitment at the beginning of the Project	2,000,000	81,629	2,081,629
New Donors' commitment	482,291	-	482,291
Reduce Donor's commitment during the period		(667)	(667)
Total Donors' commitment	2,482,291	80,962	2,563,253
Accumulated funds received as the beginning of the period	2,232,291	78,357	2,310,648
Funds received during the period	-	-	-
Accumulated interest income at the end of the period	5,079	-	5,079
Accumulated funds received from the donors at the end of the period	2,237,370	78,357	2,315,727
Outstanding donors' commitment at the end of the period	244,921	2,605	247,526
<u>Donor funded expenditure</u>			
Accumulated expenditure at the beginning of the period	2,282,242	69,277	2,351,519
Expenditure of the period	39,157	748	39,905
Accumulated expenditure at the end of the period	2,321,399	70,025	2,391,424
(Deficit)/Surplus of accumulated funds received over accumulated expenditure at the end of the period	(84,029)	8,332	(75,697)

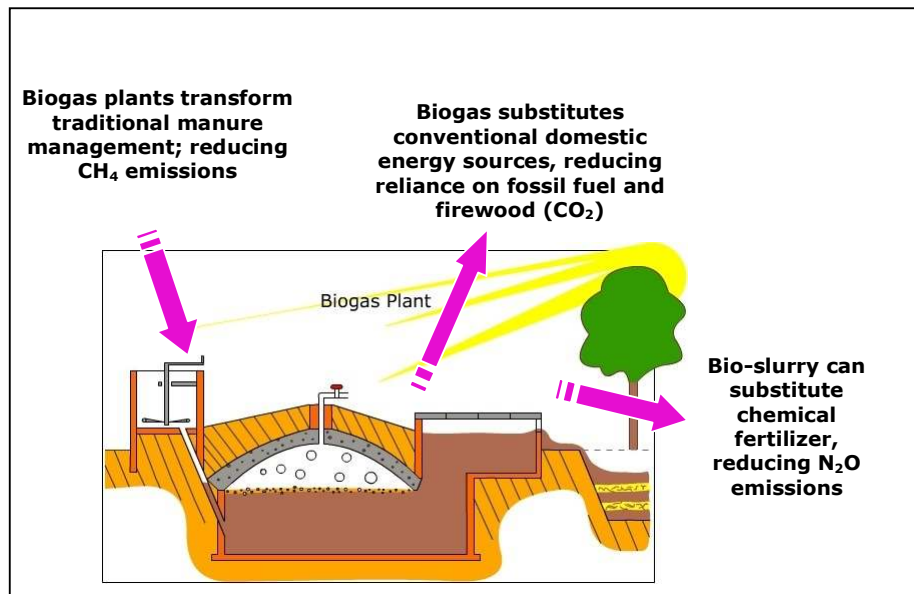
Annex 4: Greenhouse Gas Reductions

Different ways of GHG reductions

Application of a biogas plant by a farmer reduces the emissions of greenhouse gases compared to his current farming and cooking practices in three different ways:

- 1) The use of biogas replaces the use of conventional energy sources like fuel wood or kerosene, preventing the emissions of CO_2 . This is what it is called '**fuel switch**'.
The replacement of fuels can be divided into two subcategories:
 - A) the switch from **fossil fuel (e.g. kerosene) to renewable energy** sources and
 - B) the switch from **non-renewable biomass (e.g. non-renewable firewood) to renewable energy** sources.
- 2) **Change in manure management:** the use of manure as input for the digester prevents the emissions of CH_4 , as normally the manure would be on the field or in a pit, where it will degrade slowly emitting CH_4 and CO_2 .
- 3) **Change in fertilizer use.** The bioslurry is a good fertilizer and can replace the use of a chemical fertilizer, preventing N_2O emissions from the chemical fertilizer.

A reliable calculation of the emission reductions achieved in the third way (change of fertilizer use) is very hard or even impossible to achieve. So this third option will not be further taken into account in this annex.



Assessment of GHG reductions

For the indicative calculations beneath information is taken from data of surveys conducted 2005 and the draft Project Design Document produced by Mitsubishi Securities.

To calculate the emission reductions by EB approved small scale methodologies are used, or methodologies which are proposed by the small scale working group of the EB. It is chosen to use small scale methodologies, because no large scale methodologies exist for this type of project. The emission reduction through the switch from non-renewable biomass is not yet approved and still under discussion

GHG reductions 1.A: Switch from fossil fuel to renewable energy

The emission reduction from both fossil fuel and electricity displacement is about **0.97 tCO₂-eq / year** is reduced.

GHG reductions 1.B: Switch from non-renewable biomass to renewable energy

To determine which share of the firewood used has to be considered as non-renewable and which as renewable you need a by the EB accepted methodology. At this moment there is no methodology available. Therefore the methodology applied by the Worldbank for the biogas programme in Nepal "Methodology to claim non-renewable biomass as a source of emission reductions following appendix B of the small scale CDM guidelines" (Annex 3, registered PDDs biogas programme Nepal, bundle 1 and bundle 2), is used. However this methodology is used under the old methodology AMS-I.E, so it is unclear if this methodology is still acceptable to EB.

Indicative calculations using the methodology of Nepal, show that all firewood in Vietnam can be considered as non-renewable so all saved firewood is relevant in terms of GHG reductions. (This will have to be proved with more detailed data.). On an average about 2.000 kg of firewood is saved per year by a family using a biodigester.

Per plant per year about **1.1 tCO₂-eq / year** will be reduced, when this methodology is applied.

GHG reductions 2: change in animal waste management

The project emissions are defined as the amount of methane that would be emitted to the atmosphere due to the presence of the project activity. With reference to the project designs, an anaerobic digester will be installed in each household and will replace the existing methods for treatment of animal wastes. Four types of animals, which include swine, dairy cattle, non-dairy cattle and buffalo, are concerned in this project. In the context of this Project, project emissions therefore will arise from the methane that may leak from the digester into the atmosphere.

The amount of the methane can be estimated in accordance with the Section 4.2.5 of the Revised 1966 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual. The estimated methane emissions are calculated with the formulas described below.

Per digester about **0.97 tCO₂-eq / year** is reduced.

Based on the above the total greenhouse gas reduction is:

Way of green house gas reduction	Reduction
Fuel switch (fossil fuels)	0.97 tCO₂-eq / year
Manure management	0.97 tCO₂-eq / year
Fuel switch (non renewable biomass)	1.1 tCO ₂ -eq / year
Change in fertilizer	PM
Total	1.94 tCO₂-eq / year or 3,04 tCO ₂ -eq / year

Annex 5: BP I – BIOGAS PLANTS VS AREA WISE & PLANT TYPE WISE PER PROJECT PROVINCES

Note: Excluding 22 biogas plants financed by FFI

Province	2003			2004			2005			Total BPI in all province			Total BP I
	KT.1	KT.2a	KT.2b	KT.1	KT.2a	KT.2b	KT.1	KT.2a	KT.2b	KT.1	KT.2a	KT.2b	
Hai Duong	182			737	2	11	691		52	1,610	2	63	1,675
Bac Ninh	187			732			806			1,725	0	0	1,725
Nghe An	121			763	5	23	808	6	49	1,692	11	72	1,775
TT Hue	16	6	2	428	128	29	529	15	262	973	149	293	1,415
Dong Nai	17		2	710	5	4	727	30	115	1,454	35	121	1,610
Tien Giang	45			733	1	18	798	2	153	1,576	3	171	1,750
Lang Son				203		1	277	2	17	480	2	18	500
Hoa Binh	7			715	2		809	6	11	1,531	8	11	1,550
Dac Lac	1			664	3	1	875	6		1,540	9	1	1,550
Binh Dinh				581	23	22	765	24	35	1,346	47	57	1,450
Ha Noi		1		712	12		708	15	2	1,420	28	2	1,450
Thai Nguyen				281	595	41	153	385	95	434	980	136	1,550
Sub-total:	576	7	4	7,259	776	150	7,946	491	791	15,781	1,274	945	
Total			587			8,185			9,228			18,000	18,000

Plant Vd (m3)	No. of plant per year		
	2003	2004	2005
3	4	130	
4	35	918	463
5	83	1713	1568
6	176	1981	1918
7	25	58	715
8	250	2270	2646
9		48	271
10	14	859	930
11		23	116
12		55	180
13		65	164
14		25	66
15		14	33
16		24	136
17		2	22
Total per year:	587	8185	9228
Total BP I:			18000