



Bhutan Biogas Project (BBP)

ADB Grant No.:0228-BHU (SF)



First Annual Progress Report

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Project Implementation Unit (PIU)
Department of Livestock
Ministry of Agriculture and Forests
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Abbreviations

ADB	: Asian Development Bank
BBP	: Bhutan Biogas Project
BDBL	: Bhutan Development Bank Limited
CTA	: Chief Technical Advisor
DLS	: Dzongkhag (District) Livestock Section
DoL	: Department of Livestock
DRE	: Department of Renewable Energy
DPA	: Department of Public Account
E4ALL	: Energy for All
GGC	: Gobar Gas (Biogas) Company
GNHC	: Gross National Happiness Commission
IEC	: Information, Education and Communication
LEO	: Livestock Extension Officers
MAGIP	: Market Access and Growth Intensification Project
MoAF	: Ministry of Agriculture and Forests
MoEA	: Ministry of Economic Affairs
MOU	: Memorandum of Understanding
NRDCL	: Natural Resources Development Corporation Limited
NWWFCC	: National Warm Water Fish Culture Centre
PIU	: Project Implementation Unit
O&M	: Operation and Maintenance
QC	: Quality Control
R&D	: Research and Development
RE	: Renewable Energy
RGOB	: Royal Government of Bhutan
RMA	: Royal Monetary Authority
RNR	: Renewable Natural Resources
SNV	: Netherlands Development Organisation
SRS	: Software Requirement Specifications
TOT	: Training of Trainers

Achievement/Progress Summary

Activity code	Activities	Target	Progress/Achievement	Remarks
2.1	Coordination at Policy Level	<ul style="list-style-type: none"> ▪ Official launching of BBP ▪ BBP Steering committee meeting ▪ BBP stakeholders' meeting 	<ul style="list-style-type: none"> ▪ Official launching of BBP done by the Minister of Agriculture and Forests on 6th July 2011 ▪ First meeting of BBP steering committee held on 23rd May 2011 ▪ Second meeting of BBP steering committee held on 13th December 2011 ▪ A consultative stakeholder's meeting conducted to discuss pertinent issues related to implementation of BBP 	The third meeting is planned for June, 2012.
2.2	Coordination at Operational Level	<ul style="list-style-type: none"> ▪ Office set-up ▪ Orientation meetings ▪ Work plan and budgeting ▪ Networking ▪ Dzongkhag level workshops ▪ Orientation workshops for Livestock Extension officers 	<ul style="list-style-type: none"> ▪ BBP office has been established within the premise of DoL ▪ 4 orientation meetings with district authorities in project districts have been conducted ▪ Annual as well as three-year work plan and budget has been prepared and approval has been received from BBP steering committee. ▪ Detailed work plan for 2012 prepared ▪ Networking with stakeholders in the centre and district level being done ▪ Dzongkhag level workshops conducted in all the four project districts in July and August. ▪ Livestock Extension officers in Chhukha (16 nos), Samtse (19.nos), Sarpang (24 nos.) and Tsirang (19 nos.) provided with one-day orientation on promotion and extension of biogas technology. 	The field activities were delayed due to the local election.
2.3	Promotion and Marketing	<ul style="list-style-type: none"> ▪ Preparation of IEC Materials ▪ Community Meetings ▪ Awareness raising at household level 	<ul style="list-style-type: none"> ▪ BBP information brochure, posters highlighting benefits of biogas plant, information leaflets, wall-hangings and sticker have been prepared, printed and distributed ▪ 5 community meetings in Tsirang, 5 meetings in Sarpang, 4 meetings in Samtse and 3 meetings in Chhukha conducted ▪ Potential farmers to install biogas have already been identified and listed. 	
2.4	Training and capacity building	<ul style="list-style-type: none"> ▪ Production of training materials ▪ Mason's Training ▪ Supervisor's Training ▪ Pre-construction training to users 	<ul style="list-style-type: none"> ▪ TOT training manuals (trainer's as well as trainee's manuals) prepared. ▪ 12 days theoretical and practical on-the-job training organised in all four districts in which 74 masons are trained ▪ 12 days theoretical and practical on-the-job training organised in all four districts in which 28 block livestock extension officers are trained as supervisors. ▪ 2 pre-construction meetings in Sarpang, 3 in Samtse, 2 in Chhukha and 3 in Tsirang organised 	The technical training programmes were delayed because of the local election.
2.5	R&D and standardisation	<ul style="list-style-type: none"> ▪ Formulation of standards ▪ Identification of R&D needs 	<ul style="list-style-type: none"> ▪ Quality standards on site and size selection, construction, and after-sale services formulated ▪ R&D needs identified and included in annual work plan 	

Activity code	Activities	Target	Progress/Achievement	Remarks
2.6	Construction and After-sales-services	<ul style="list-style-type: none"> ▪ Preparation of Construction and O&M Manuals ▪ Household Identification ▪ Construction of plant 	<ul style="list-style-type: none"> ▪ Biogas plant construction and O&M manuals have been prepared and printed ▪ List of potential households received from all the four districts ▪ Construction of 51 biogas plants completed ▪ 30 biogas plants are under-construction 	The construction works were delayed due to local election
2.7	Quality Assurance	<ul style="list-style-type: none"> ▪ Formulation of QC framework ▪ Preparation of QC forms and formats ▪ Preparation of web-based database 	<ul style="list-style-type: none"> ▪ BBP QC framework formulated ▪ QC forms and formats prepared and printed ▪ Software Requirement Specification (SRS) for web-based database formulated and database prepared 	Data entry work has just started
2.8	Extension	No target	<ul style="list-style-type: none"> • Users are being provided with on-the-spot instructions on effective use of biogas and bioslurry 	Structured Extension activities will start in March 2012
2.9	Operation and Maintenance	No target	<ul style="list-style-type: none"> • Users are being provided with on-the-spot instructions on effective operation and maintenance 	O&M training to users will start in April 2012
2.10	Monitoring and Evaluation	Routine visits to under construction and completed plants	<ul style="list-style-type: none"> • 2 monitoring visits in each of the 4 districts made by BBP technical advisors. • Routine visits to biogas plants by Block Livestock Officers 	
2.11	Financing of biogas plants	<ul style="list-style-type: none"> ▪ Calculation of Actual cost of biogas plant ▪ Formulation of credit and subsidy administration mechanisms ▪ MOU with BDBL ▪ Subsidy and credit administration 	<ul style="list-style-type: none"> ▪ Actual cost of biogas plants ranges from US\$550 for a 4 m³ biogas plants to US\$775 for a 10 m³ plant ▪ Credit and subsidy administration mechanisms formulated and agreed ▪ MOU on subsidy and credit channelling is signed with BDBL ▪ 28 households received credit ▪ 14 households received subsidy 	The cost of plant will increase as per the need to transport construction materials from road-head.
2.12	Institutional Development	<ul style="list-style-type: none"> • Capacitating Private Sector to produce biogas appliances 	<ul style="list-style-type: none"> ▪ PIU staff members visited three appliance manufacturing workshops in Nepal to collect data and information on establishment of similar companies in Bhutan to produce quality appliances ▪ One mechanical workshop in Gelephu and one in Sarpang trained to produce templates, main gas pipes and mixture machine. 34 sets of templates, 60 sets of main gas pipe and 55 sets of mixture machine manufactured and used in constructing biogas plants. Till now no private sector is producing stoves, water drains and gas valves in country. 	Private sector is being capacitated to strengthen the supply and distribution network rather than production.
2.13	Technical Support		<ul style="list-style-type: none"> ▪ BBP provided technical supports to different organisations including UNDP/GEF, WWF and GNHC funded biogas projects in non-programme districts to ensure quality of the installed plants 	
3	Financial Reporting		<ul style="list-style-type: none"> • A total of US\$ 484442.92 spent till the end of December 2011. • BDBL have released Nu.380,000 from credit account to twenty eight farmers and Nu.163,800.00 from subsidy account fourteen households. 	

1 Introduction

1.1 Background

Bhutan Biogas Project (BBP), a joint programme of Asian Development Bank (ADB), Department of Renewable Energy (DRE), Department of Livestock (DoL), SNV Netherlands Development Organisation and Bhutan Development Bank Ltd. (BDBL) is being implemented in four districts namely Tsirang, Sarpang, Chhukha and Samtse in Bhutan since March 2011. The contract negotiation for consulting services between SNV and ADB completed on 10th March 2011 and the final grant agreement between ADB and RGOB to implement Bhutan Biogas Project (BBP) was signed on 14th March 2011. With the recruitment of Project Manager from DoL and international and national biogas advisors from SNV, Project Implementation Unit (PIU) of BBP became fully operational from 1st March 2011. Subsequently, project implementation units have been established in all the four programme districts to ensure speedy dissemination of biogas technology across the country.

This annual report gives an overview of activities conducted and results achieved in the period between 1st March 2011 and 29th February 2012 as well as a financial statement till the end of December 2011 per activity. Furthermore the report also contains information on the sector situation, BBP structure and implementation modality. This report also incorporates lessons learnt mainly from field, opportunities and challenges to implement biogas project in Bhutan.

1.2 Bhutan Biogas Project in Nutshell

1.2.1 Sector Situation

Bhutan has been consuming about 1.0 to 1.2 million tons of fuel-wood per year; about 70% of this amount is used by households for cooking and heating. Bhutan's fuel consumption of about 1.2 tons per capita per year is among the highest in the world. In addition, Bhutan has been importing large quantities of fossil fuels – 5.7 million tons of LPG and 5.2 million tons of kerosene in 2008 – for cooking, heating and lighting. These data indicates that there is high need to provide alternative to supplement conventional cooking fuels, mainly fuel-wood and biogas plants could be suitable option.

Biogas was first introduced in Bhutan in the 1980s as a clean and renewable energy source for household cooking to help cut down firewood consumption. However, most biogas technologies have been abandoned due to poor technical design and lack of spare parts, repair and maintenance. To assess the biogas market potential in Bhutan, SNV, Netherlands Development Organization, conducted technical feasibility studies, and ADB subsequently undertook the market assessment studies with SNV. These studies have concluded that there are at least 16,000 households that have the potential to use biogas plants cost-effectively. The studies also assessed the major technological, financial, informational, and institutional barriers to biogas development. To realize the untapped biogas potential, the biogas development program must incorporate (a) financial incentives to help overcome the financial barriers, (b) selection of biogas designs that work well in high-altitude areas, (c) capacity building and institutional strengthening to help create a private sector-driven biogas market, and (d) promotional marketing to help overcome informational barrier to farmers.

ADB has been actively supporting rural electrification in Bhutan. Bhutan has improved the electrification ratio from 24% in 1999 to 60% in 2009. Since 1995, ADB has provided three loans and one grant for rural electrification projects, covering 30,000 households, or about 35% of the rural population. With parallel financing from the Austrian Development Agency and the Japan International Cooperation Agency, the proposed Project will support the government in achieving electricity for all.

ADB has also been actively supporting power sector restructuring, institutional strengthening, and capacity building. Its technical assistance has been highly effective in transforming the power sector from a government department into a profitable utility and an independent regulator, and employing state-of-the-art utility management practices. Since 1995, ADB has provided 13 technical assistance grants, including the on-going TA 7156-BHU: Promotion of Clean Power Expert Development (2008)

that has helped the government draft its Renewable Energy Policy. All these loans and technical assistance grants are fully aligned with the country partnership strategy made between ADB and the government.

ADB signed an agreement with RGOB in March 2011 to implement Rural Renewable Energy Development Project (Grant No.:0228-BHU) to help Bhutan expand rural electrification for all households, and sustain its operations and energy security through a mix of clean energy supply sourced from hydropower, solar, wind, and biogas. The Project has four components: (a) on-grid rural electrification (RE), (b) off-grid solar RE, (c) establishment and grid-connection of pilot wind power generation mills, and (d) a pilot program to promote biogas plants.

1.2.2 Introduction of BBP and Objectives

BBP is a joint programme of Asian Development Bank (ADB), Renewable Energy Division (RED) of Department of Energy, Department of Livestock (DoL), SNV Netherlands Development Organisation and Bhutan Development Bank Ltd. (BDBL). The project will build capacity in the public and private sectors to construct and operate 1,600 biogas plants in four southern districts in the country namely, Samtse, Chhukha, Tsirang and Sarpang, in the period of March 2011 to February 2014. The pilot project is intended to establish the capacity to enable Bhutan to run a large-scale biogas program in the subsequent phase.

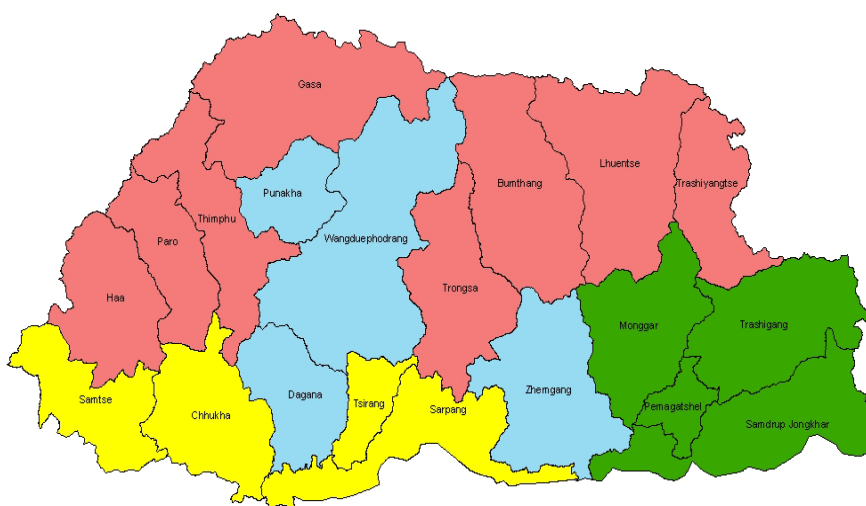


Figure-1: BBP Programme Districts (in yellow colour)

The overall objective of BBP is to contribute to national aim of poverty reduction by improving livelihoods & quality of life of rural farmers; reducing impacts of biomass resource depletion; and supporting national goals of food production and livestock development. The following are the specific objectives:

- To develop, strengthen and facilitate a commercially viable and market oriented biogas sector in Bhutan.
- To increase the number of family sized, quality biogas plants with 1600 in Bhutan by the end of 2014.
- To provide Technical Assistance to transfer know-how, experience and technical information available from the successful implementation of other biogas programs in Asia to Bhutan.
- To ensure the continued operation of all biogas plants installed under the program.
- To maximize the benefits of the operated biogas plants, in particular the optimum use of biogas and bio-slurry.

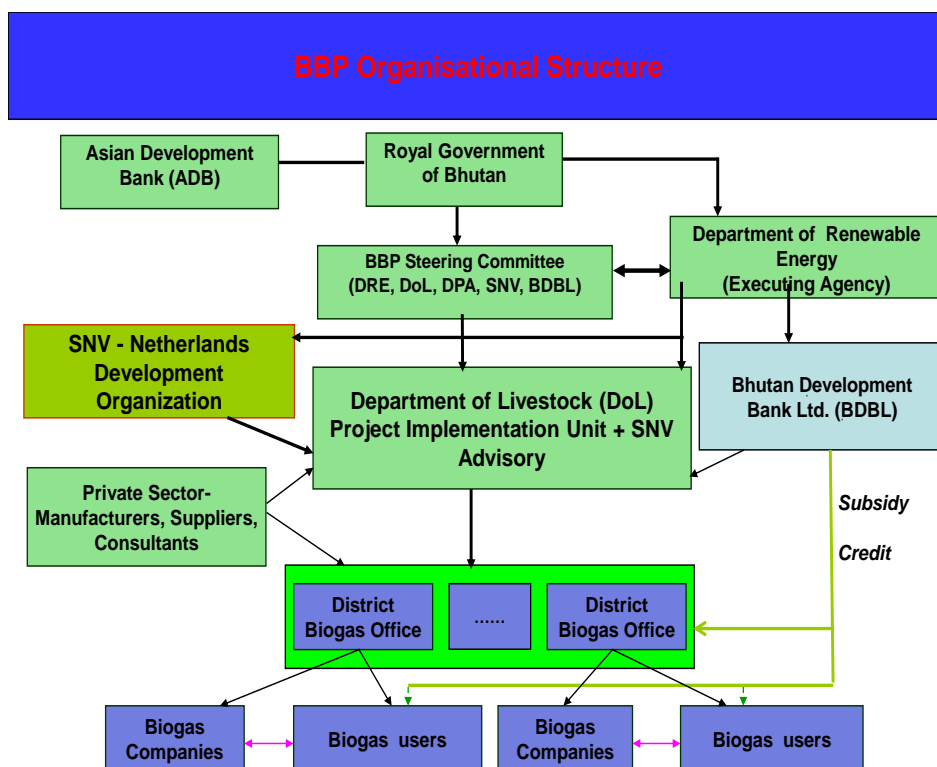
The BBP will undertake a multi-stakeholder sector development approach, creating a market- based biogas sector, involving locally trained contractors and masons. To reduce the cost-barrier, BBP will provide loans to the end-users through Bhutan Development Bank Ltd. (BDBL). The programme will offer an investment incentive of Nu.11,700 per biogas plant which will be about 35% (for bigger plants)

to 45% (for smaller plants) of the total investment cost. End-users are protected against construction errors through a warranty system. User’s training, on-time technical backstopping services, and capacity development of private sector to deliver quality services are integral parts of the project activities.

Biogas plants convert cattle dung to biogas to replace the polluting firewood and more expensive kerosene heavily used by households in rural areas where more than 90% of the poor live. Installation and proper use of biogas plants will: (a) improve access to modern household cooking and heating with clean, renewable energy, (b) reduce firewood smoke and greenhouse gases emissions, and (c) reduce deforestation. The by-product, an odourless bioslurry, is an excellent organic fertilizer that will increase farmer crop yields. Additional benefits include a reduction in harmful health effects from indoor air pollution resulting from firewood smoke in rural households, especially for women and children, and a positive social impact as the time required for collecting firewood for household needs will be reduced.

1.2.3 Organisational Structure

BBP is supported by ADB under the framework of Energy for All Partnership Programme. The Department of Renewable Energy (DRE) under the Ministry of Economic Affairs is the Executing Agency (EA), while the Department of Livestock (DoL) in the Ministry of Agriculture and Forests is the Implementing Agencies (IA) for BPP. SNV provides technical assistance while BDBL supports credit and subsidy administration. The DRE, as the EA, will be responsible for overall planning and renewable energy policy support for this component. A high-level Biogas Advisory Committee chaired by the Director General of the DRE and consisting of representatives from the DRE, DoL, BDBL, SNV Bhutan, and Department of Public Account (DPA) under the Ministry of Finance has been established to provide policy direction and oversee the program’s implementation. The DoL,



with its extensive livestock extension officers at the district and block levels, is responsible for marketing, promotion, implementation, monitoring and evaluation. SNV is taking the responsibility for the effective exchange of knowledge generated through its engagement in the set-up and implementation of national biogas programmes in other countries. This related to organisational and institutional development, planning and implementation of programme activities such as promotion, training, quality control, extension, biogas enterprise development, financial services related to the construction companies and end users, social inclusion and environmental sustainability.

To ensure effective administration of credit and subsidy components of BBP, separate imprest accounts and statements of expenditures (SOE) has been established and maintained by the RMA and BDBL. The government has established a first-generation imprest account at the Royal Monetary Authority, and a second-generation imprest account (SGIA) for the BDBL.

Fact Sheet of BBP

Name:	Bhutan Biogas Project (BPP)
ADB Grant No.:	0228-BHU (SF)
Executing Agency:	Department of Renewable Energy (DRE), Ministry of Economic Affairs
Implementing Agency:	Department of Livestock (DoL), Ministry of Agriculture and Forests in association with SNV-Netherlands Development Organisation and Bhutan Development Bank Ltd. (BDBL)
Funding Agency:	Asian Development Bank (ADB)
Technical Assistance:	SNV Netherlands Development Organisation
Project Duration:	March 2011-February 2014 (Three Years)
Project Area:	Samtse, Chhukha, Tsirang and Sarpang districts
Target:	1600 Family Sized Biogas Plants benefiting about 10,000 people directly
Project Budget:	US\$ 1,451,100 (Excluding RGOB and SNV Contributions)
Cost of Biogas Plant:	Nu. 25,000 to Nu.40,000 depending upon size and location.
Investment Subsidy:	Nu. 11,700/per biogas plant irrespective of size and location
Farmer's Contribution:	Nu. 10,000 to 25,000 depending upon sizes of biogas plant (Through cash or collateral-free loan from BDBL)
Sizes of plant:	4 m ³ to 10 m ³ .
Required Daily Feeding:	25 to 100 kilogramme of dung per day
Gas Production:	1 m ³ to 3 m ³ of Biogas per day
Main Impact Areas:	Energy, Agricultural Production, Family Health and Sanitation, Employment Generation, Environmental Protection

2. Progress till date

2.1 Coordination at Policy Level

2.1.1 Launching of BBP and National Workshop

The official launching of BBP and a national workshop on Promotion and Extension of Biogas Technology in Bhutan was successfully conducted on 6th July 2011. Lyonpo Dr. Pema Gyamtsho, Minister for Agriculture and Forests was the chief guest for the official launching of Bhutan Biogas Project. Representatives from different stakeholders including DOE, DOL, BDBL (former BDFCL), UNDP, Dzongkhag livestock divisions, BTFEC etc. participated the workshop and shared their insights. Mr. Tenzin Dhendup, Director General of Department of Livestock officially opened the national workshop on promotion and extension of biogas technology in Bhutan. The Project Manager, Chief Technical Advisor and Technical Advisor of BBP presented papers on various aspects of BBP implementation and technology dissemination.



The participants provided their suggestions and insights to successfully implement the biogas project in Bhutan. Various local media such as Bhutan Broadcasting Services and Kuensel covered the programmes and sessions of the launching ceremony and the national workshops and transmitted through local television. The launching ceremony as well as national workshop have been instrumental in positioning BBP and raising awareness of the stakeholders.

2.1.2 Meeting of BBP Steering Committee

The First Steering Committee Meeting of the Bhutan Biogas Project (BBP) was held on 23rd May 2011 at the NRDC Board Meeting Hall. The main objective of the meeting was to discuss and make decisions on various policy issues related to implementation of BBP. The meeting approved the annual work plan and budget prepared by PIU/BBP. Various pertinent issues related to roles, responsibilities and mandate of BBP Steering committee, financing of biogas plants, channelling of subsidy to biogas users, roles and responsibilities of Dzongkhag Livestock Sectors to implement the project activities, import of biogas appliances from Nepal, exception of import taxes for biogas appliances, private sector development, and, coordination and harmonisation of biogas related activities in the country were discussed and decisions taken. Likewise the second meeting of the Steering Committee was organised in DRE meeting hall on 13th December 2011 to review the progress. All the eight BBP Steering Committee members from the multi-sectoral agencies attended these meetings. These meetings have been instrumental to formulate the policy directions and to design future course of action for effective implementation of BBP activities. The minute of 1st meeting was submitted with half-yearly report and that of the 2nd meeting is attached with this report as Annex-2.



2.1.3 Meeting of BBP Stakeholders

A Stakeholders' Consultation Meeting of BBP was held on 17th February 2012 at the SNV Conference Hall. The meeting was conducted with a view to share the progress of the Bhutan Biogas Project with the stakeholders and to discuss on the issues and challenges being faced. Nine members from different stakeholders led by Mr. Karma Tshering, Director, Department of Renewable Energy, MoEA, attended the meeting. Pertinent issues such as coordination between sector organisations and streamlining of biogas initiatives being undertaken by different agencies, project ownership, proactive role of DRE and other policy matters were discussed and decision were taken. The participants expressed their full satisfactions on the progress of BBP.



2.2 Coordination at Operational Level

2.2.1 Office Set up

The office of Project Implementation Unit (PIU) of BBP has been established within the premises of Department of Livestock (DoL), Ministry of Agriculture and Forests (MoAF). DoL is mandated by MoAF to formulate and prepare policies and planning of programmes related to the development of the animal health and production sub-sector. This includes the management of animal waste. The office is equipped with all necessary furniture and office equipment. DoL has appointed a full time Project Manager while SNV has recruited one International Advisor and one National Advisor to support the activities of PIU. An Office Assistant has been hired from the project budget to support various administrative and logistic works of PIU/BBP. The name and function of four staff members of PIU/BBP is as follows:

Mr. Dorji Gyaltsen	: Project Manager
Mr. Prakash C. Ghimire	: International Biogas Advisor
Mr. Nar Bahadur Khatiwora	: National Biogas Advisor
Ms. Chador Tshomo	: Project Administrative Assistant

2.2.2 Orientation Meetings in Programme Dzongkhags

Series of orientation and familiarisation meetings have been conducted with the district stakeholders including the Dzongkhag administration offices, Livestock Offices, BDBL branch offices, Agriculture Offices in which the district authorities were familiarised with BBP, its mandate and expected cooperation at the district level between potential stakeholders. The first familiarisation visits were conducted during the month of April, 2011.



Based on recommendation from BBP Steering committee meeting held on 23rd May 2011, the PIU/BBP team again visited four districts in the months of June and July, 2011. The main objectives of these meetings were to discuss the issue of quality control mechanism and modality of support to district livestock offices to conduct quality control visits. The issue of selection of masons to take part in forthcoming Mason's Training was also discussed in these meetings. Representatives from relevant district administration offices led by respective Dzongdags (District Administrators) were present in these meetings.

These outcomes of these meetings have been beneficial for BBP to plan and implement quality assurance activities. Moreover, the district authorities were acquainted with the objectives, working modality and mandates of BBP. They were made aware of their roles and responsibilities and potential areas for further cooperation.

2.2.3 District Level Workshops for Block (Geog) Leaders

With a view to create awareness of the participants on biodigester technology and provide background information for the promotion and facilitation of biodigester extension activities at the grassroots level, district level workshops in all the project districts were organised for the recently elected Gups (Block leaders), Mangmis (Assistant block leaders), Tshokpas (Village leaders) and Geog administrative Officers. These workshops were conducted in Samtse on 10th August, in Chhukha on 11th August, in Tsirang on 23rd August and in Sarpang on 26th August. A total of 95 participants (27 members from Samtse, 22 members from Chhukha, 22 members from Tsirang, and 24 members from Sarpang) participated these workshops. These workshops were combined with the district planning meetings (DYT) to minimise the costs associated with travels, lodging and foods of the participants. These workshops have been instrumental in disseminating information on biogas technology, support services being provided under the framework of BBP, expected roles and responsibilities of elected leaders in promotion and marketing of biogas technology.



2.2.4 Work Plan and Budgeting

Annual Work Plan of 2011 as well as three-years work plan (March 2011-February 2014) of BBP were prepared and submitted to the Department of Energy, Department of Livestock, SNV and BDBL. Likewise, Annual Budget requirement for 2011 and the following subsequent years until February 2014 has been prepared and submitted to the concerned agencies. The work plan and budget have been approved by BBP Steering Committee. The detailed work plan and budget has been given in Annex-3. As it can be seen from the work-plan and budgeting calculations, there is substantial shortage of fund for implementing the minimum required activities to ensure sector development (Annex-6). PIU through SNV will submit the revised budget and justifications to DRE so that a formal request could be made to ADB to consider the allocation of the unallocated fund for proposed activities.

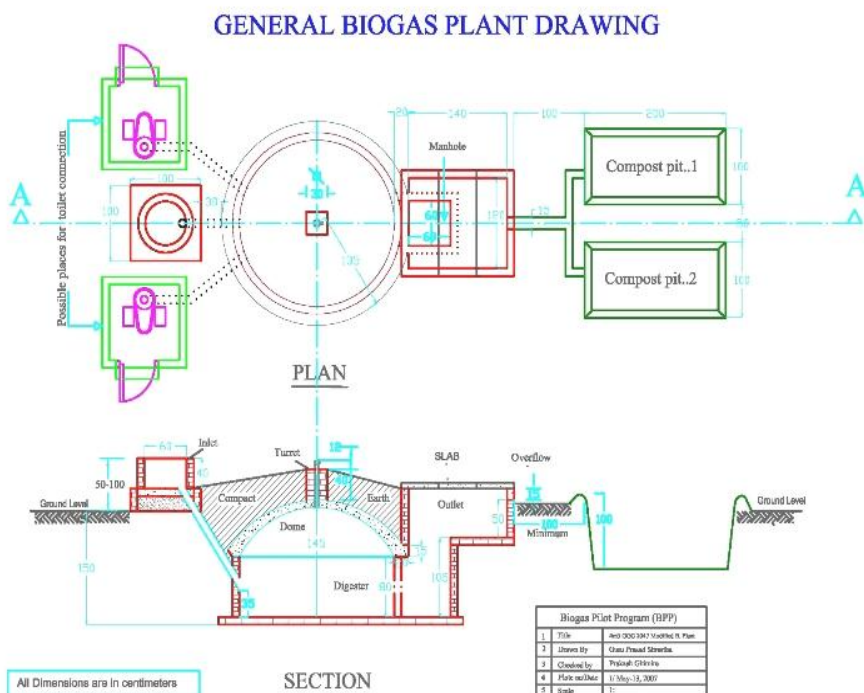
2.2.5 Networking

Formal and informal meetings with stakeholders are being conducted. BBP participated in series of workshops organised by the Department of Non Formal Education following a request from the Department of Energy to develop curriculum for Non Formal Education on Renewable Energy targeted for school drop-outs and other people in the villages. Curriculum related to the Renewable Energy Technologies in general and Improved Stoves and Biogas Technologies in particular were prepared and presented in the workshops held in Paro, Punakha and Thimphu. The draft curriculum for Non Formal Education on Renewable Energy have been developed in English and translated into Dzongkha. With a view to harmonise various biogas related initiatives in the country, BBP has been initiating dialogue with other stakeholders such as UNDP/GEF and WWF.

2.2.6 Selection of Biogas Plant Model

Based upon various evaluation criteria, such as availability of construction materials, degree of building complexity, durability and maintenance demand, ease of use, appropriateness for construction in both hilly and plain areas and cost; the Nepalese Model of biogas plant popularly known as GGC Model was selected for dissemination under the framework of BBP. Several technical modifications were made to the original design to suit the local context. The following are the major modifications made in the design:

- The gas storage capacity of the biogas plant has been increased to 60% of the total daily production as contrary to 35% in the original design. This modification has been made based upon the cooking pattern of the people. This design ensures gas availability as per the requirement.
- The HRT has been adjusted to 50 days keeping in view the climatic condition of project districts in Bhutan.
- The size and relative location of outlet tank has been designed to ensure the required pressure of gas at the point of application.
- The overflow level has been modified to ensure the flow of bio-slurry by gravity to the slurry compost pit.



- The orientation of outlet tank has been changed for smooth hydraulic flow of the digester slurry.
- The thickness of masonry wall has been changed to suit the size of brick available in the local market

For the ease of reproduction, the biogas plant designs have been digitalised in AutoCAD format. Given the findings in the feasibility and detailed market studies on average available animal waste production per household, gas demand in the households and the climatic conditions of the project districts, the 6 m³ plant is expected to become the most popular plant size in Bhutan. For now, four different sizes of biogas plant have been incorporated under the framework of BBP: the 4, 6, 8 and 10 m³ plant volumes. An example drawing of the plant model is shown in the picture and the bill of quantities for the four different plant Volumes are annexed (Annex-4) to this report.

2.3 Promotion and Marketing

The objective of promotion and marketing component is to stimulate and inform stakeholders on the benefits and costs of household biogas and to publicize the project. The following activities have been undertaken during this reporting period.

2.3.1 Production of IEC Materials

Effective Information, Education and Communication (IEC) materials play vital role in speedy dissemination of biogas technology. BBP has developed the following IEC materials.

- BBP Information Brochure (in English) – 2,500 copies
- Banner for training and workshops – 2 nos.
- Information leaflet (both in English and Dzongkha) – 3,000 copies
- Wall-hanging illustrating benefits of biogas plant – 10 nos.
- Standing posture on project fact and figures – 5 nos.
- Poster on benefits of biogas plants (before and after scenario) – 290 copies
- Stickers with a slogan 'Use Biogas, Save Environment and Live Healthy - 250 nos.



The target groups of these promotional materials are besides all potential users also the government line agencies, village leaders, national and international agencies etc. The aim is to create awareness on the advantages of biogas technology and to raise interest in biogas technology.

2.3.2 Community Meetings

Community meetings were organised in the programme districts in which the participants were provided with basic knowledge on biogas technology, its benefits, incentive and support services being provided to install biogas plants and other issues related to the technology promotion and extension. Five meetings in Tsirang, five meetings in Sarpang, four meetings in Samtse and three meeting in Chhukha were conducted in which more than 150 potential farmers participated.

These meetings have been instrumental in assessing the views and perspectives of potential farmers towards adopting the technology. The outcome of these meetings also provided insights on niche areas where the critical mass is located. The overwhelming responses from the farmers to adopt the technology have encouraged BBP to start the construction activities as early as possible.



2.4 Training and Capacity Building

The objective of training and capacity building initiatives is to facilitate the construction and continued operation of installed biogas plants by providing the skills for local masons and eventually biogas construction companies to construct high quality biogas plants, and for biogas users to be able to operate their biogas plants effectively. Building of a quality biodigester requires good knowledge and skills on the part of the constructor, the mason and technical supervisor. Good functioning or performance of a biodigester is associated with the selection of the right size, choosing the right site for construction, selecting the construction materials and appliances to comply with the quality standards, constructing the components with strict adherence to the norms and ensuring effective operation and maintenance activities – all of which are the responsibilities of the supervisor and mason. In other words, the supervisors and mason have very important roles to play in the effective functioning of a biodigester. It is therefore important that the supervisor and mason responsible for all the works as mentioned above are provided with a well-designed training and orientation programme. BBP has realised this fact and initiated activities related to training and capacity building as described below:

2.4.1 Production of Training Materials

To facilitate technical training programmes related to biogas technology, a TOT Trainer's Manual and a Trainee's Manual have been developed. These manuals envisage helping the participants to know different aspects of the technology and preparing the participants as multi-skilled persons to construct/supervise the construction of biodigester as well as to promote the technology at the grass-roots level. It also helps in imparting effective technical training programmes related to biogas technology.

2.4.2 Induction Training to Dzongkhag/Geog Livestock Officers

Initial induction training of local livestock officers to act as supervisors for quality control and training of masons in promotion, construction, and after-sales service will be conducted in all the four BBP programme districts. The content of the induction training consisted of:



- Introduction of BBP
- Technical aspects of biogas technology and relevance of biogas technology in Bhutan
- Cost and benefits of biogas plant
- Incentive and support services being provided by BBP
- Technology promotion, motivation and quality control
- Roles and responsibilities of different stakeholders
- Roles of Livestock Officer in implementing BBP

Such induction training was successfully conducted in Chhukha district on 20th July, Sarpang district on 28th July, Tsirang district on 29th July and Samtse district on 10th August, 2011. All the Livestock Extension Officers (16 from Chhukha, 24 from Sarpang, 19 from Tsirang and 19 from Samtse) took part in the training. The participants in the training put forward issues related to viability of biogas plant, end-use application of biogas and bioslurry, failure of earlier biogas plants in the country etc. The training has been beneficial to make the participants aware of BBP's objective, implementation mechanisms and roles and responsibilities of livestock officers in the district to successfully implement BBP.

2.4.3 Technical Training for Supervisors

PIU/BBP conducted four 12-days technical training programmes for 28 Block Livestock Officers in all the four project districts during the period 28th August to 16th November 2011 to build their capacity to supervise biogas plant installation and carry out quality control responsibilities. The overall objective of the training was to build capacity of participants to construct and to supervise the construction of modified GGC model Biogas Plants according to the quality standards set by BBP.

The following are the specific objectives:

- a. To familiarise the participants on Biogas Technology, BBP and related issues
- b. To acquaint the participants on technological aspects of modified GGC model Biogas Plant being disseminated in Bhutan
- c. To build skills and enhance knowledge of participants on Biogas Plant construction and supervision
- d. To capacitate the participants in delivering quality services related to promotion and marketing, construction and installation, operation and maintenance, quality control and other aspects of biogas technology dissemination
- e. To build capacity of supervisors on imparting training on construction, monitoring, supervision and O&M of Biogas Plants by enhancing their training and facilitation skills.

The training course emphasizes equally on theoretical and practical aspects to enhance basic knowledge on biogas technology as well as to improve skills of participants to construct and supervise construction of biogas plant.



A total of twenty eight livestock officers from potential blocks in all the four project districts participated in the training. The following table shows the number of participants, time and venues of the training programmes.

District	Date	Total No. of participants	Venue	
			Theory	Practical
Sarpang	28-08 to 8-09-2011	06	Conference Hall, NWWFCC, Gelephu	Pelrithang & Dargeythang
Tsirang	10-09 to 23-09-2011	08	Conference Hall, Dzongkhag Veterinary Hospital, Tsirang	Jomlingthang, Gosaling
Samtse	19-09 to 30-09-2011	08	Conference Hall, RNR Centre, Yoseltse	Tsakaling, Yoseltse
Chhukha	03-11 to 16-11-2011	06	Conference Hall, RNR Centre, Tala	Ramitey, Phuntsholing

2.4.4 Technical Training for Masons

To ensure that the construction of biogas plant is done as per the set quality standards, it is important that the masons involved in construction are provided with knowledge on biogas technology and skills on construction. Poor quality plant will harm the reputation of biogas technology and will have serious negative effects on promotion and extension. PIU/BBP conducted a technical training on construction of biogas plants for masons in all the four project districts. The training was organised for 12 days in each of the four venues, in which 8 days were spent for practical on-the-job works. A total of 74 local masons were provided with the training. The following table shows the time and venue of the training programmes.

District	Date	Total No. of participants	Venue	
			Theory	Practical
Sarpang	28-08 to 8-09-2011	17	Conference Hall, NWWFCC, Gelephu	Pelrithang & Dargeythang
Tsirang	10-09 to 23-09-2011	17	Conference Hall, Dzongkhag Veterinary Hospital, Tsirang	Jomlingthang, Gosaling
Samtse	19-09 to 30-09-2011	27	Conference Hall, RNR Centre, Yoseltse	Tsakaling, Yoseltse
Chhukha	03-11 to 16-11-2011	13	Conference Hall, RNR Centre, Tala	Ramitey, Phuntsholing



The general methodology of this training consisted of classroom presentations on the related topic, group-discussions and brainstorming, illustration and demonstration of the practical works by the resource persons, and video show on construction methods. Theoretical deliberation which included pictures, illustrations and photographs along with video show provided enough grounds for the participants to internalise the learning. The practical on-the-job training was instrumental to enhance the skills of masons to construct quality plants.

2.5 R&D and Standardisation

2.5.1 Formulation of Quality Standards

Non-functioning and poorly functioning biogas plants do not only cause capital waste but also do a lot of harm and damage to the reputation of biodigester technology and eventually to the desired future expansion of the biogas program. In other words, the satisfied users are the most important and effective extension media for the promotion of the technology and vice-versa. To safeguard the quality of biogas plants, it is important that effective quality control mechanisms be formulated and get enforced properly. The quality of construction, operation and maintenance of biogas plants is a major concern and masons and supervisors have vital roles to play in this regard. Keeping these facts in view, quality standards have been formulated in the following aspects of biogas project implementation.

- Standards on Household selection
- Standards on construction site selection
- Standards on collection of construction materials
- Standards on supply and installation of biogas appliances, pipes and fittings
- Standards on construction
- Standards on operation, maintenance and after-sale-services

In biogas programme, quality control is involved in developing systems to ensure biogas plants are designed and constructed to meet or exceed users' requirements. As with cost control, the most important decisions regarding the quality of a biogas plant are made during the design and planning stages rather than during construction. It is during these preliminary stages that component configurations, material specifications and functional performance are decided. Quality control during construction consists largely of insuring conformance to this original design and planning decisions.

2.5.2 Identification of R&D Needs

While preparing three-years work plan and budget, emphasis was given to identify research and development needs related to dissemination of biogas technology. This issue was also discussed during the BBP Steering Committee meeting. The following R&D needs have been identified:

- Appliances need to be adapted to the locally available materials and mechanical production practices
- High altitude biogas plants
- Application of bioslurry

Moreover, the plant design will need regular upgrading as more experience is gained with the construction and operation. These R&D initiatives will be carried out as per the availability of fund.

2.6 Construction and After-sale-services

2.6.1 Preparation of Construction and O&M Manuals

The mason's role is vital in successful installation of biogas plants. The success or failure of any biogas plant depends not only upon the appropriateness of the design, suitability of site for construction but also on quality of construction works including quality of construction materials and workmanship involved during construction. A construction manual highlighting the methods for selecting appropriate size and site for construction as well as steps of construction works related to the Modified GGC Model of Biogas Plant has been prepared to facilitate the masons to carry out their task effectively.



Likewise, proper operation and maintenance (O&M) of different components of a biogas plant is very important for its efficient and long-term functioning. The users have a major responsibility of carrying out operational and minor maintenance activities as anticipated. It is therefore, necessary to orient users on these O&M activities upon the completion of the construction works of biogas plants. Users should learn from the masons and/or other technicians about the proper ways to carry out routine operational activities and minor maintenance works. It is not uncommon that users may face some problems to operate biogas plants. It may not be possible to receive immediate help of technicians at all times. Therefore, an Operation and Maintenance manual has been prepared to provide information to the users on effective operation and maintenance of biogas plants. It is expected that this manual will help the users to identify problems and provide solutions accordingly. This manual serves as a guide to the users in ensuring long term functioning of their biogas plants without any major problems.

2.6.2 Identification of Households for Plant Construction

District livestock offices in the four project districts have already sent list of potential households to install biogas plants. Detailed technical surveys are conducted in potential blocks and villages to assess technical feasibility of these households to install biogas plants. The following table shows the number of households who have already decided to construct biogas plants among the households found to be technically feasible.

District	Total No. of households which has applied for construction
Sarpang	88
Tsirang	58
Samtse	113
Chhukha	37
Total	296

2.6.3 Construction of Biogas Plants

The construction of biogas plant started immediately after the technical training programmes in Sarpang districts in October. However, in other districts, there was delay to commence construction works mainly because of national land survey, national census and festival season. The following table shows the construction progress till the end of February 2012.

District	Number of Plants		
	Completed	Under-construction	Total Number
Sarpang	30	11	41
Tsirang	10	5	15
Samtse	8	8	16
Chhukha	3	6	9
Total	51	30	81

The sizes of the installed plants ranged from 4 m³ to 8 m³. The most popular size has been 6 m³ capacity plants.



Though the target for the first year of project was set to be 100 biogas plants, the progress has been only 81% because of the following reasons:

Local Election: The election of local government was initially scheduled for the last week of May 2011. The election code of conduct did not allow gathering of people or conducting mass meetings in the districts for one month. The election was rescheduled for the last week of June, 2011. This resulted in 2 months delay to start training programmes for masons and supervisors in the districts which ultimately delayed the commencement of construction activities in the field.

Delay in Receiving Credit and Subsidy Fund: Because of the delay in submitting withdrawal applications, the initial advance of \$41,495 (\$25,435 for subsidy and \$16,060 for credit) was transmitted to the RMA First Generation Imprest Account from ADB Controller's Department only on 16th November 2011. The BDBL received the amount only on 24th December 2011. Therefore, the potential farmers were not able to receive loan till the end of the December 2011. The project has to limit the construction works in those households which did not require credit. There were considerable number of households waiting to receive credit which affected the progress considerably.

National Census and Land Survey: Most of the people in Samtse and Chhukha districts were busy with participating in national census as well as the national land survey that was undertaken during the whole months of October and November, 2011. Considerable number of potential farmers in these districts postponed the construction of biogas plants till the completion of these surveys.

2.7 Quality Assurance

The objective of quality assurance components of the project is to maximize the effectiveness of the investment made by the biogas owners and to maintain consumer confidence in household biogas technology. The use of market forces, letting different masons or companies compete for clients, will lead to more efficient building practices and company management and therewith lower prices for the users. At the same time, competition and the quest for lower prices can lead to cost-cutting on material and manpower resulting in a lower quality of the product. Therefore, it is essential to control the quality of the biogas plants installed by the masons or companies. The trained supervisors from District/Block Livestock offices have been mobilised to carry out the tasks related to quality assurance. The project has ensured compulsory visit of technical persons in all the under-construction plants. The data and information received from the field as part of quality assurance process are being entered into a computer database for analysis.



2.7.1 Formulation of Quality Control Framework

Quality control on plants in operation and under construction is a key aspect of quality enforcement and the long-term success of the programme. The controls will be conducted by supervisors of the District/Geog Livestock Extension Officers with regular assistance from the PIU/BBP. In the case of BBP, the quality control framework is basically related to the following aspects of biogas project implementation:

- Quality of the design of biogas plant: The biogas plant should be cost-effective; users' friendly; easy to construct, operate and maintain.

- Quality of training and capacity building activities: Correct training need assessment; proper selection of training participants, proper selection of facilitators, suitable training contents, session plans and scheduling; appropriate training methods; effective practical sessions; effective evaluation of training; timely follow-up of the evaluation findings.
- Quality of promotion and extension works: Potential customers should fully be aware and understand all the benefits and costs. They should be provided with factual data and information and should be aware of their roles and responsibilities for quality control.
- Quality of the construction (including selection of construction materials and appliances): Strict adherence of set quality standards on site selection, selection of construction materials and appliances and construction.
- Quality of the operation and maintenance by the users and technical backstopping from the installer: Effective training to users', timely follow-up visits by the installer.
- Quality of after-sale-services on behalf of the installers: Strict adherence of terms and condition of after-sale-service provisions including timely actions to the complaints from users, routine visits and problem-solving.
- Quality of financial and administrative procedures and practices: Proper utilisation of fund, timely disbursement of subsidy amount, proper book-keeping, less-lengthy procedures, fast, friendly and useful customer services.

2.7.2 Preparation of Quality Control Forms and Formats

To ensure effective quality control of above mentioned quality framework, different quality control forms and formats have been prepared. These simple and easy-to-use forms and formats will be the basis for collecting information from the field. Because all masons will be new in the art of digester construction in 2011, all registered plants will be inspected to ensure effective compliance of quality standards. The following forms and formats have been developed and printed.

- Form-1: Listing of Potential/Interested Farmers – 500 copies
- Form-2(a): Survey of HHs to assess Feasibility Level – 2,020 copies
- Form-2(b): HH Baseline Survey – 2,000 copies
- Form-3: Construction Contract – 1,700 copies
- Form-4: QC Monitoring of Under-construction Plants – 1,700 copies
- Form-5: QC Monitoring of Completed Plants – 1,000 copies
- Form-6: Guarantee and After-sale-service Monitoring – 500 copies
- Form-7: Performance Monitoring of Biogas Plants – 1,000 copies
- Form-8: Reporting Form – Developed but not printed
- Form-9: Subsidy Monitoring Form - Developed but not printed
- Form-10: Credit Monitoring Form - Developed but not printed
- Guarantee Card- 1,700 copies
- Promotional Flex hangings – 11 sets (33 Nos.)

2.7.3 Preparation of Web-based Database for Quality Monitoring

A Software Requirement Specification (SRS) document for the BBP web-based database was prepared. This SRS provided an overview of the product for the client and a more detailed specification for the developer. This document discussed the project goals, parameters, target audience, user interface, requirements, design issues and users' views. Based upon this document, potential database developers were asked to participate in the BBP bidding process. Among four interested bidders, the one quoting the lowest cost, Chilliquet, was awarded the job. A contract agreement was signed with the selected software company. The draft version of the database was submitted to BBP in the last week of December 2011. The updated version has recently been submitted and data and information from field are being fed into the database.

2.8 Extension Activities

The objective of extension initiatives is to provide information and training to allow biogas users to effectively exploit all the benefits of biogas, in particular the use of bio-slurry. The work related to extension started only after some biogas plants were fully operational. Staff members from the BBP are working with the extension partners to develop extension strategies and materials, and will provide as much support as possible in conducting extension. The Extension component will pay special attention to maximizing the benefits of biogas beyond the basic benefit of using gas for cooking. Particular attention will be paid to ways in which biogas plant can benefit enterprises and income generation activities. No extension activities were planned for the initial year of project implementation and hence not much have been done till now, however, bioslurry extension initiatives have already started with the provision of bioslurry pits. The users have been instructed on the methods to properly utilise bioslurry on their farms.



2.9 Operation and Maintenance

The objective of Operation and Maintenance activities is to ensure that the installed biogas plants functions properly so as to provide the users with anticipated benefits. One day users' training on effective operation and maintenance will be commenced soon.

2.10 Monitoring and Evaluation

The objective of monitoring and evaluation component of the project is to identify program progress and impact on stakeholders in order to facilitate knowledge transfer, and improve program performance. Monitoring will focus on three main areas: (1) Program implementation, (2) Quality Control of biogas plant construction and maintenance and (3) Impact on Biogas Users. It is important to conduct thorough monitoring to ensure financial and statistical transparency and accountability and to make sure that the inputs and efforts are the most efficient possible. It will also be important to make sure that program activities are monitored closely to identify as many lessons learned as possible in order to adapt in subsequent years any aspects that are not performing well.



Technical Advisors from BBP have been visiting installed biogas plants and plants under-construction to monitor the quality of construction.

2.11 Financing of Biogas Plant

The objective of financing activities is to lower the financial threshold and improve access to credit and repayment assistance, to facilitate easier access to household biogas, with particular emphasis on the poor, women and other disadvantaged groups. The Financing Component has three distinct aspects namely Farmer Contributions, Credit and Subsidy.

2.11.1 Actual Cost of Biogas Plants

Based upon experiences from fields, actual cost of construction of biogas plants including appliances as well as warranty and after-sales-services is given in the table below. This cost implies to households which are accessible by road facility. The cost will increase slightly if construction materials are needed to be transported with manual labour.

Cost heading	Size of Biodigester in Cum and Cost of Installation in Nu.							
	4 m ³		6 m ³		8 m ³		10 m ³	
	Cost	%	Cost	%	Cost	%	Cost	%
Construction Materials	12,500	47	14,500	49	16,600	50	19,000	51
Appliances	4,500	17	4,500	15	5,000	14	5,000	13
Human Resources	6,000	23	6,800	23	7,500	23	8,500	23
Total Cost	23,000	87	25,800	87	29,100	87	32,500	87
Equipment and Warranty	3,500	13	3,700	13	4,200	13	4,700	13
Grand Total Cost (Nu.)	26,500	100	29,500	100	33,300	100	37,200	100
Grand Total Cost (US\$)	550		625		700		775	

As shown in the table above, the actual cost of biogas plants ranges from US\$550 for a 4 m³ biogas plants to US\$775 for a 10 m³ plant. The share of construction materials is about half of the total cost.

2.11.2 Credit Administration

Even though farmer households will be mainly funding the biogas plant construction themselves, some farmer households will not have the cash means with which to do so. In this case, the gap is fulfilled by the collateral-free loan provided by the programme through BDBL. The following procedure has been proposed and agreed to sanction credit to potential biogas user.

- Step-1: Geog, LEO submit list of interested/eligible farmers to DLS verified by Gups (the elected leader in the block).
- Step-2: DLS carries out feasibility study in the farmer's premise and then submits the list of eligible farmers to PIU/BBP.
- Step-2: PIU/BBP in consultation with LEO further crosschecks the level of feasibility.
- Step-4: PIU/BBP submits lists of eligible farmers with recommendation to BDBL branch office for loan processing.
- Step-5: BDBL then releases the loan to the farmer as per set rules and finalizes repayment procedures.

The actual loan amount has been decided based upon the size of biogas plants. Till 15th February 2012, a total of twenty eight (28) households have taken loans from BDBL to install biogas plants.

2.11.3 Subsidy Channelling

The subsidy is a promotion tool to improve people's access to biogas technology by reducing the cost, and is also a quality control incentive as it is not paid until after the biogas plant has received final approval. The following procedures has been proposed and agreed on the modality of subsidy transfer from BDBL subsidy account to the biogas farmer.

- Step 1: A plant construction contract (Form No.-3) is signed between farmer, mason and district livestock office;
- Step 2: The mason constructs the plant under the technical super vision of the district livestock office;
- Step 3: Upon completion of construction, the district livestock office inspects the plant and fills out a plant completion form (Form No. 5). Herewith the plant is officially handed over to the farmer. A copy of the form signed and stamped by the District Livestock Officer, Supervisor and the farmer

goes to the farmer, one copy goes to the District Livestock Office and one to the BDBL. At this moment the farmer also receives the plant guarantee certificate;

- Step 4: Together with a recognized ID, the farmer hand over his completion form at the local BDBL branch office. BDBL verifies the form with the ID, and issues Nu.11,700 to the claimant who in return signs a receipt. The completion form is returned to the claimant;
- Step 6: On a monthly basis BDBL provides the PIU/BBP with a list of plant code numbers and bank branches on which subsidy has been provided.

The subsidy has been fixed at Nu.11,700 per plant irrespective of the size of biogas plants. The contribution of subsidy ranges from 44% for a smaller plant (4 m³) to 31% for bigger plants (10m³). Out of the total 51 completed plants, fourteen (14) households have received subsidy amount from BDBL in this reporting period.

2.12 Institutional Support/Private Sector Development

In addition to supporting biogas construction companies and biogas appliance manufacturing workshops, an important function of the program is to support biogas related institutions to strengthen their capacity to provide synergy to BBP. As there is no proven track record of installation of biogas plants in Bhutan in the past, there are also no locally manufactured appliances available in the market. There is an option to import appliances: stoves with gas taps, moisture traps, gas pressure meter, lamps, etc. from Nepal and Bangladesh but as sector development is the overall goal of the programme, the possibility to manufacture appliances locally has been explored. Contacts have been made with local mechanical workshops in the country to have proven appliances designs adapted so they can be manufactured by local workshops.

Though, BBP aims at building the capacity of interested manufacturing mechanical workshop within the country to produce these appliances in the longer term, it has to depend upon exported appliances until the production is made in the country. Therefore, possibilities for importing these appliances from other countries were explored. In the process, preliminary meetings were conducted with Nepal Biogas Promotion Association (NBPA), an apex organisation of more than 80 biogas construction companies and 17 appliance manufacturing workshops in Nepal. One of the manufacturing workshops located in Banepa, Nepal was also visited to conduct preliminary discussions. The outcome of the discussion suggested that it is both convenient and economical to import biogas appliances from any of the recognised mechanical workshops located in the south-eastern part of Nepal as the transportation costs will be relatively less.

The issue of importing of biogas appliances from Nepal was also discussed during the first meeting of BBP steering committee held on 23rd May 2011. The committee suggested BBP/PIU going ahead and visiting some of the mechanical workshops in Nepal to expedite the process. A visit to few of the biogas appliances manufacturing workshops in south-eastern Nepal was made by PIU personnel (Project Manager, CTA, and TA) with the following objectives:

- To observe the appliance manufacturing workshops (at least three) in southern Nepal and collect information on appliance manufacturing process including, costs of establishment of facility, cost of production per unit, supply of raw materials, requirements of skilled persons, marketing of the products etc. to assess possibility of establishing similar facilities in Bhutan
- To collect invoices and shipment details to import biogas appliances from Nepal to Bhutan.
- To purchase and transport 20 sets of biogas appliances for immediate use (during on-the-job trainings)

This visit facilitated BBP/PIU to process for tax exemption on the appliances to be imported which ultimately is benefiting the biogas users. It also helped the local manufacturing workshop(s) to assess the level of feasibility and take decision whether or not to add-on facilities to produce biogas appliances.



During the visit, Shiva Engineering Works in Biratnagar, National Biogas Appliances Manufacturing Company in Bharatpur and Nepal Urja Engineering Pvt. Ltd in Banepa were visited. Sealed quotations were collected from these manufacturing workshops to supply biogas stoves, water drains, gas taps and main gas pipes. The rates quoted by Shiva Engineering Works were found to be lowest of all the three and a supply order was issued to the company. First batch of appliances consisting of 732 biogas stoves, 700 water drains, 850 gas taps, 610 dome gas pipes, 150 nozzles, and 50 gas pressure meters has been delivered in the first week of February 2012. The costs of these appliances imported from Nepal have been pre-financed through the subsidy account maintained in BDBL.

To explore the possibilities of production of biogas appliances in Bhutan, a couple of workshops in Gelephu and Sarpang have been trained and now two workshops are producing templates, mixing machine and main gas pipes needed for installing biogas plants. However, given the limited technical knowledge and expertise, as well as high cost involved in adding facilities, these local workshops are yet to be able to produce biogas stoves, gas taps and water drains.



Keeping in view the low level of interest from local manufacturing workshop to produce biogas appliances in the country, BBP has decided to strengthen the supply chain. In this process, couple of local suppliers are being consulted to involve them in importing biogas appliances from Nepal and distribute them in the project districts as long as there is no in-country production facility.

2.13 Other activities

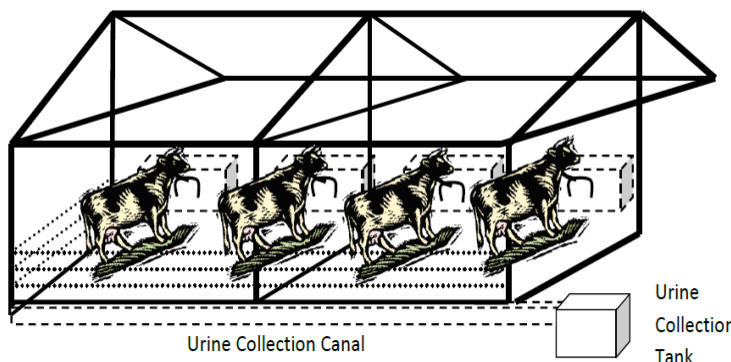
a. First flame dedicated to royal wedding

BBP in association with Netherlands Development Organisation (SNV), organised a ceremony on 12th October 2011 to commemorate the royal wedding by dedicating the first blue flame from biogas plant constructed under the framework of BBP. The ceremony was organised in Mr. T.P. Homagai's farm located in Dargaythang village of Shompangkha block in, Sarpang district. The District Administrator (Dzongdag) of Sarpang district, as the chief guest, inaugurated the function by igniting the biogas stove. This ceremony was attended by about 50 community people, local government leaders, staff members from the project and representatives from SNV. The media coverage of this event has been instrumental in promotion of the technology across Bhutan.



b. Proposal for Cattle-shed Construction

BBP developed and submitted a proposal to construct quality cattle sheds in the BBP programme area to Bhutan Trust Fund for Conservation of Environment. The overall objective of the project is to support livestock raising farmers to improve cattle management practice and systematize cattle-wastes handling practice with the construction of systematic and hygienic cattle-sheds which will help to enhance the quality and increase the quantity of cattle-wastes to be fed into biogas plants by stopping leaking of nutrient from farm-yard-manure and enhance nutrient security through effective collection of cattle dung and urine. The project envisages helping in: (i) enhancing agricultural production with the effective application of nutritious bio-fertiliser, (ii) improving cattle health and increase the productivity by keeping cattle in systematic and hygienic cattle-sheds, (iii) optimising the production of biogas with the effective utilisation of cattle dung and urine, (iv) decreasing the use and minimise the adverse environmental consequences arising because of the excessive use of chemical fertiliser, and (v) reduce GHG emissions mainly, the methane escape, through proper management of farm-yard-manure.



c. Bhutan Climate Summit 2011

Recognizing the urgent need for Himalayan nations to build resilience to buffer the impacts of Climate Change and generate resources for adaptation, capacity building, and technology transfer, the Governments of Bangladesh, Bhutan, Nepal and India convened the Bhutan 2011 Climate Summit with the following objectives:

- Adopt and endorse a 10-year road map for adaptation to climate change in the Eastern Himalaya's sub-region for ensuring food, water and energy security while maintaining biodiversity and ecosystem services.
- Secure pledges from partner countries, institutions and individuals to fund and collaborate in the implementation of the road map.
- Create and operationalize regional expert groups to advice Governments in implementing the road maps and addressing emerging challenges.

A presentation was made by BBP in the side events during this summit. The presentation led to interesting discussions among participants from various Bhutanese and international organisations on the contribution of biogas programmes on mitigating climate change.

d. International Biogas Workshop

A five members-team of officials from DRE, BBP and BDBL participated an International Workshop on Domestic Biogas held in Bandung, Indonesia during the period November 22-24, 2011 organised by SNV in cooperation with the ADB/E4ALL and Hivos/Indonesia Domestic Biogas Programme organised targeting representatives of government institutions, private and civil society organisations, knowledge centres, development agencies, multilateral banks and international donors. A total of 68 participants from 18 countries participated in the workshop. The objective of the workshop is to provide a dedicated forum for in-depth discussion between



the participants on the possible transformation of national biogas programmes towards commercial biogas sectors and on the feasibility of the proposed Asian Rural Biogas Facility. In the workshop, Mr. Prakash C. Ghimire, the technical advisor for BBP presented a paper on 'Market development of domestic biogas plants through technical innovation' as the member of expert group on technical innovation formed under the Working Group on Domestic Biogas, Energy for All Partnership Programme of ADB.



e. Livestock Conference 2012

ON behalf of BBP, Mr. Nar Bahadur Khatiwora, Technical Advisor, presented a paper on objectives and achievements of BBP on 8th Feb 2012 in the 'Livestock Conference 2012' organised by Department of Livestock, Ministry of Agriculture and Forests with the theme 'Livestock for enterprise development and Poverty Reduction'. Participants of the workshop raised queries on the past failure of biogas plants in Bhutan, modality of technical supports from BBP for biogas plants in non-project districts and roles and responsibilities of different stakeholders. It is encouraging to note that Department of Livestock has targeted installing 3,000 biogas plants during the 11th Plan Period (2014-19).

f. Technical Supports

BBP has been providing technical supports to various organisations/projects to help quality construction as well as effective operation and maintenance of biogas plants. In this process, projects being supported by Gross National Happiness Commission (GNHC) in Onger village in Lhuntse, Thrumshingla National Park project (WWF) and Project Facilitation Office of MAGIP have been provided with technical support from time to time. Likewise, the biogas programmes being supported under UNDP/GEF in Samtse, Mongar and Trashigang districts are also supported to ensure effective operation and maintenance. The reason behind such support is the realisation of fact that the failure of any biogas programme will have direct effect on BBP.



Likewise, the biogas programmes being supported under UNDP/GEF in Samtse, Mongar and Trashigang districts are also supported to ensure effective operation and maintenance. The reason behind such support is the realisation of fact that the failure of any biogas programme will have direct effect on BBP.

2.14 BBP in Local Media

Since the onset of BBP in March 2011, its activities have been covered by local print as well as audio-visual media in Bhutan. It has helped BBP immensely to familiarise the activities of the project and share the success stories. Information related to BBP covered by different media could be viewed in the following web-links.

http://www.bhutantoday.bt/index.php?option=com_content&view=article&id=436:bihutan-biogas-project-launched

<http://www.moaf.gov.bt/moaf/?p=2832>

<http://www.kuenselonline.com/2011/?p=18513>

<http://www.bbs.bt/news/?p=6789>

<http://www.bhutanobserver.bt/project-implementation-unit/>

<http://www.bbs.bt/news/?p=9489>

<http://southasia.oneworld.net/todaysheadlines/biogas-for-green-development-in-bhutan>

<http://www.bhutanobserver.bt/from-dung-to-clean-energy/>

<http://www.bbs.bt/news/?p=9930>

<http://www.kuenselonline.com/2011/?p=16282>

2.15 Visits of ADB Review Mission

A mission from the Asian Development Bank (ADB) led by Mr. Hiroki Kobayashi, Principal Portfolio Management Specialist visited BBP/PIU on 26th July 2011 to review the progress of BBP till date. Representatives from SNV, BDBL, DRE and BBP/PIU attended the review meeting with the members of the mission. The mission was informed about the progress as well as various activities, such as demonstration plant construction, training of masons and supervisors, import of appliances. The mission agreed to follow up ADB process of the submitted withdrawal application for the initial deposit for the imprest account for BDBL's credit line. The mission expressed satisfaction over the progress made till date by BBP.



Another mission in the second week of December 2012 from ADB was led by Mr. Kaoru Ogino, Senior Energy Expert and BBP presented the progress on 8th December 2012. Mr. Ogino expressed his satisfaction over the progress of the project and provided his constructive comments and feedbacks.

3. Financial Reporting

The BBP has made good progress in terms of financial expenses; US\$ 484,442.92 has been spent in ten months' time, from March to December 2011 while executing various planned activities. The detailed expenses on the subsequent activities are provided in table 1. The training of masons and supervisors in the three districts – Sarpang, Tsirang and Samtse, were conducted in August and September, during which a relatively larger expense has been made. The expenses for the months of January and February 2012 could not be provided as it is not reflected in the system. However, the booking has been made and the expenses will be shown in the next financial progress report.

Particulars	Budget	Actual Expenditure					Budget Balance
		March-July	Aug-Sep	Oct-Nov	Dec	Total	
A. Remuneration	408,024.00	56,670.00	22,668.00	22,668.00	11,334.00	113,340.00	294,684.00
B. Project administration costs	25,000.00	1,569.47	2,409.15	1,104.79	3,400.33	8,483.74	16,516.26
C. Transportation for project supervision	28,000.00	4,241.37	2,066.26	1,946.01	907.52	9,161.16	18,838.84
D. Equipment & other office supplies	20,000.00	8,210.75	1,255.97	418.56	190.24	10,075.52	9,924.48
E. Training information, Dissemination & Monitoring	136,000.00	4,032.84	7,299.39	10,362.95	12,801.48	34,496.66	101,503.34
F. Contingency	42,976.00	0.00	0.00	0.00	0.00	0.00	42,976.00
TOTAL	660,000.00	74,724.43	35,698.77	36,500.31	28,633.57	175,557.08	484,442.92

Note: Exchange rate as of 11.02.2012: 1 US\$ = 48.9 Nu

On credit and subsidy part, different branches of BDBL have released Nu.380,000 from credit account to twenty eight farmers and Nu.163,800.00 from subsidy account to fourteen households.

4. Challenges and Ways Forward

During a short period of twelve months, BBP has realised that the future of biogas technology in Bhutan is bright. The overwhelming positive responses from different stakeholders, including the district administration and livestock sectors to participate in the programme indicates that BBP would be successful in creating a multi-stakeholders' platform to effectively implement the programme. However, there are also some challenges that call for due attention in the future. These challenges and steps being taken are divided into two categories as summarised below:

4.1 Demand Side Challenges and Steps Being Taken

- Limited understanding of the potential farmers on biogas technology and its benefits; promotion and technology extension have not yet been widely practiced in Bhutan : Rigorous information dissemination initiatives such as cluster meetings, spreading of success stories through media, house-to-house visits etc. are being organized by BBP to overcome this challenge.
- Negative impression created due to failure of past initiatives: The reasons for failure of previous initiatives have been one of the main topics discussed during community meetings. The potential farmers are made aware of the fact that the failure was mainly due to improper selection of technology, inadequate quality control during construction, ineffective operation and maintenance mechanism, lack of access to spare parts, lack of users' training and lack of ownership.
- Accessibility of other fuel sources and relatively lower competitiveness of biogas: BBP is trying its best to make people aware of the multiple benefits of biogas technology. The benefit of bio-slurry to improve agricultural production has been promoted as one of the 'unique selling point'.
- Tendency of potential farmers to 'wait and see' before taking decision to install biogas plants: Biogas plants are carefully monitored during construction to ensure quality so that the installed plants function efficiently. BBP has realised the fact that positive 'words of mouth' of the users are the most effective promotion tool to motivate potential farmers.
- Requirement of security clearance from the government for potential farmers to receive credit from BDBL: This issue has been discussed in informal meeting of BBP Steering Committee. BDBL has started to consult with concern government agency to explore the possibility of exemption of security clearances.
- Fully or heavily subsidised biogas initiatives being practices in an ad-hoc manner by other organisations: This issue has been discussed in detail in the BBP steering committee meeting. The Department of Renewable Energy has assured that it will provide efforts to harmonise and coordinate different initiatives to ensure that basic standards are followed by all the implementing agencies.

4.2 Supply Side challenges and Steps Being Taken

- Drop-out of trained Masons/ Improper selection of masons: Despite BBPs genuine efforts to ensure lower rate of drop out of trained masons, higher drop out has been encountered. BBP fully realises that the selection of right person to work as mason is very important, and hence, it has set minimum quality criteria to select masons for training among which primary education is one of the criteria to ensure that they can read drawings as well as construction and O&M manuals. However, the experience indicated that it is very difficult to find trainees to fulfil this criterion. BBP has now realised that those who cannot read and write properly but are working as masons for long time will construct plant of good quality. Moreover, these uneducated but skilled masons remain in the business permanently. The risk of drop-out after training could be minimised. BBP is of the opinion to revise these criteria while organising similar training in the future.

- Low level of awareness of District/Block Livestock Extension Officers: The district/block livestock extension officers are very new to biogas technology. They are overloaded with their routine activities and biogas, being the recently added responsibility, falls in the lower level of their priority lists. Mobilisation of already overloaded extension staff members for promotion of biogas technology and quality control of under-construction plant is not easy. As the success of the project depends heavily on the responses from District and Block Livestock Extension officers, a performance based incentive, in the form of exposure visits; capacity building etc. is being designed and implemented to motivate them to work effectively.
- No competent private sector to take lead role on construction and appliance production: Though BBP fully realises that private sector should be capacitated to take the lead role of construction as well as manufacturing and supplying of biogas appliances, it is facing difficulties in mobilising the private sector in an organised way. The main reason for lack of interest of private sector to produce biogas appliances is the limited market in the country. They have realised that import of such appliances from Nepal would be far cheaper than producing in country. BBP is therefore involved to strengthen the supply network rather than production.
- Local Government's interest to spread programme across districts: Though the initial strategy of BBP was to follow a cluster approach to install biogas plants, the local government bodies wanted to spread the programme across the districts. BBP is therefore forced to implement programme in all the blocks across the project districts. Identification of niche areas and concentration of resources in those particular areas would have been more effective in service delivery. Given the limited resources (human as well as financial) with BBP, it is facing difficulties in ensuring quality of installed biogas plants spread in a larger area. BBP technical advisors have increased the frequency of field visits to ensure the quality of installed biogas plants which has implications on resource allocation.
- Demands from non-project districts: BBP has been receiving overwhelming demands from individuals as well as development projects from non-project districts in the country to support them installing biogas plants. In one hand, it is important to ensure quality of such initiatives as failure of such initiatives would impose negative impact on dissemination of the technology in the country, but in the other BBP has limited resources to provide support. It has been made clear that the monitoring works outside the project area is not under the scope of BBP and any cost associated with such support, if any, in non-programme districts will have to be borne by the respective project proponent. BBP would try its best to provide technical supports, but the associated cost has to be borne by the respective organisations.

5. Conclusion

During this reporting period, BBP has been successful in carrying out preliminary activities aimed at identification of critical mass, preparation of promotional tools, awareness raising at the community and households level, capacity building of stakeholders, technical training to masons and supervisors, and commencement of construction of biogas plants. As mentioned earlier, the number of plants installed is bit short of the set target because of various reasons. BBP is fully satisfied with the progress and feels that a strong foundation has been built to disseminate biogas technology in the future. All the installed plants are functioning satisfactorily, and the users are happy with the performance of their biogas plants. These functional plants have been spreading positive message to potential farmers to install biogas plants. BBP is confident that the positive words of mouth from the satisfied users would be instrumental in speedy promotion and extension of biogas technology in the country.



Annexes

Annex-1: Work Progress 2011 and Work Plan 2012 (Bar charts)

a. Planned vs. Actual -2011

Activities/Months	Year	2011												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
A. Project Management and Office Establishment														
Establishment of BBP office within DOL		x	x											
Development of TORs and Jobs description for project staff		x	x											
Recruitment of Project Manager, Consultants and Support Staff				x	x	x								
Office Supplies and logistics				+	+	+	+	+	+	+	+	+	+	+
Hiring of vehicle				+										
Orientation to project staff on technology and management aspects				x	x									
Familiarization/introductory visits to Dzongkhag by BBP staffs				+	+									
Project Steering Committee Meeting				x									x	
Formal launching of the project				x										
Development of Credit & Subsidy regulation								x	x					
Half-yearly progress report								x						
Project Completion Report														
B. Promotion, Marketing & Construction														
Development of promotion strategy and promotion materials				x	x	x								
Distribution of information materials				+	+	+	+	+	+	+	+	+	+	+
Conduct National Level Workshop				x										x
Conduct Dzongkhag Level Workshops					x	x								
Conduct Geog Level Workshops/Meeting (Selected Geogs)								x	x					
Identify most potential villages for programme implementation						x	x	x	x	x	x	x	x	x
Organization of Village Meetings (Selected villages)						+	+	+	+	+	+	+	+	+
Construction of Biogas Pilot Plant						x	x	x	x	x	x	x	x	x
C. Capacity Building														
Development and review of training curricula, training materials				x	x	x								
Trainers' Training (Theoretical and On-the-job)				+	+		x	x	x					
Private sector development and capacity building										+			x	x
Identification and capacitating potential Biogas Construction Enterprises									x	x	x	x	x	x
Mason and supervisor's training								x	x				x	x
Post construction training on operation and maintenance									+	+	+			x
Exposure visit for PIU Staffs and other Stakeholders to Nepal/Cambodia														x
D. R&D and Standardization														
Finalization & Review of standards, actual cost and quantity estimation				x	x	x								
Activities related to use of bioslurry				+	+									
Inspection (by PIU Staffs) and Import of stoves and other accessories					x									
Identification and capacitating potential manufacturing workshops														
E. Quality control and Subsidy/Credit Management														
Development/Review Quality control system and strategy										x	x	x		
Development and Review of Data base and Quality Standards										+	+	+		
Quality control visits by BBP personnel & district technicians										x	x	x	x	x
Data Entry, Analysis and Interpretation										+	+	+	+	+
F. Monitoring and evaluation														
Development of Monitoring and Evaluation systems						x	x							
Routine process monitoring of activities						+	+							
Routine performance monitoring of activities						x								
Biogas User Survey						+								
Evaluation for Yearly Activities														
G. Target biogas plants for construction (1600)														
									15	20	15	25	25	
									5	10	6	9		

x Planned

+ Executed

- Carried forward

Bhutan Biogas Project Work Schedule for 2012							
Activities/Quarters	Jan-Mar	Apr-June	July-Sept	Oct-Dec			
A. Project Management and Office Establishment							
Strengthening & Capacitating of BBP office within DOL							
Office Supplies and logistics							
Hiring of vehicle							
Advisory Board Meeting							
Half-yearly progress report							
B. Promotion, Marketing & Construction							
Review/fine-tuning of promotion strategy and promotion materials							
Distribution of information materials							
Conduct Geog Level Workshops (Selected Geogs)							
Identify most potential villages for programme implementation							
Organization of Village Meetings (Selected villages)							
Construction of Biogas Pilot Plant							
Followup/refresher workshop on promotion (for extension officers)							
Development of Promotional audio-visual aid							
C. Capacity Building							
Review/fine-tuning of training curricula, training materials							
Refresher training for masons & supervisors							
Private sector development and capacity building							
Identification and capacitating potential Biogas Construction Enterprises							
Post construction training on operation and maintenance							
Exposure visits to DLOs							
Exposure visit for PIU Staffs and Supervisors/masons							
D. R&D and Standardization							
Finalization & Review of standards, actual cost and quantity estimation							
Activities related to use of bioslurry							
R&D support to potential workshops to produce biogas appliances							
Applied R&D activities as per demand from field							
E. Quality control and Subsidy/Credit Management							
Review/fine-tuning of quality control system and strategy							
Review/fine-tuning of Data base and Quality Standards							
Quality control visits by BBP personnel & district technicians							
Data Entry, Analysis and Interpretation							
F. Monitoring and evaluation							
Development of Monitoring and Evaluation systems							
Routine process monitoring of activities							
Routine performance monitoring of activities							
Biogas User Survey							
Evaluation for Yearly Activities							
G. Target biogas plants for construction (1600)	85	120	145	150			

Annex-2: Annual and Three year Budget

ACTIVITIES	Total Required Budget US\$	2011 Outlay	2012 Outlay	2013 Outlay	2014 Outlay
NO OF BIOGAS PLANTS	1,600	100	500	850	150
CONSULTANCY SERVICES	678024	188340	226008	226008	37668
Consultancy Services (ADB)	408,024	113,340	136,008	136,008	22,668
SNV	270,000	75,000	90,000	90,000	15,000
CREDIT LINE (BDFCL)	663,500	41,495	207,300	352,410	62,295
Subsidy	406,500	25,435	127,000	215,900	38,165
Credit	257,000	16,060	80,300	136,510	24,130
FARMERS EQUITY	257,000	16,060	80,300	136,510	24,130
Farmers contribution	257,000	16,060	80,300	136,510	24,130
GOVERNMENT CONTRIBUTION	150,000	41,670	50,004	50,004	8,322
In kind contribution	150,000	41,670	50,004	50,004	8,322
PROJECT ADMINISTRATION COST	33,125	8,632	11,104	11,476	1,913
Project Administration & Management-SNV	21,000	5,833	7,000	7,000	1,167
Support Staff-BBP	12,125	2,799	4,104	4,476	746
TRANSPORTATION FOR PROJECT SUPERVISION	38,993	9,477	13,332	13,872	2,312
Hiring of vehicle	38,993	9,477	13,332	13,872	2,312
EQUIPMENT AND OTHER OFFICE SUPPLIES	25,000	11,800	5,750	7,050	400
TRAINING, INFORMATION, DISSEMINATION AND MONITORING	216,708	51,662	79,691	75,707	9,648
Promotion & Training material development & Dissemination	14,303	8,346	2,000	3,957	-
Promotion and Marketing	52,941	11,200	22,041	18,200	1,500
Workshop & Meetings	16,050	5,404	4,113	4,113	2,420
Ex-country Training	35,400	10,750	16,750	7,900	-
In-country Training	25,114	4,162	9,988	9,988	977
Quality Control and Subsidy/Credit Management	41,800	11,800	13,500	14,250	2,250
Monitoring and Evaluation	26,100	-	9,800	14,300	2,000
Users Training	5,000	-	1,500	3,000	500
RESEARCH, DEVELOPMENT & DEMONSTRATION	36,350	-	21,350	15,000	-
Research on Appliances design and material development	5,000	-	3,000	2,000	-
Research activities related to use of bio-slurry-Consultancy services	11,700	-	7,800	3,900	-
Technical Audit of Biogas Plants-consultancy services	6,000	-	6,000	-	-
Research on low cost high hill plants-consultancy services + pilot plants	9,100	-	-	9,100	-
Private sector development - consultancy services	4,550	-	4,550	-	-
SUB-TOTAL	2,098,700	369,136	694,839	888,037	146,687
CONTINGENCY	42,976	-	-	-	-
TOTAL AMOUNT (US\$)	2,141,676	369,136	694,839	888,037	146,687

Annex-3: Minutes of Second BBP Steering Committee Meeting

Time: 2:00 pm – 5:30 PM

Date: 13 December 2011

Venue: DoE CONFERENCE HALL

I. Introduction

The Second Steering Committee Meeting of the Bhutan Biogas Project (BBP) was held on 13th May 2011 at the Energy Conference Hall. The meeting was conducted with a view to educate on the progress of the Bhutan Biogas Project to the Committee members and more importantly to discuss on the issues and challenges faced by the PIU.

Seven BBP Steering Committee Members from the multi-sectoral agencies attended the meeting. The meeting was chaired Mr. Mewang Gyeltshen, the officiating Director, Department of Renewable Energy, MoEA.

II. List of Participants

The following participants attended the meeting:

a. BBP Steering Committee Members:

1. Mr. Mewang Gyeltshen, Officiating Director, Department of Renewable Energy, MoEA
2. Mr. Karma Tenzing, Livestock Officer, Department of Livestock, MoAF
3. Mr. Kencho Wangdi, Portfolio Coordinator, SNV Netherlands Development Organisation
4. Mr. Chimi Dorji, Program Coordinator, Department of Renewable Energy, MoEA
5. Ms. Tashi Pelden, Program Officer, Department of Public Accounts, MoF
6. Mr. Karma Thinlay Dorji, Project Manager, Bhutan Development Bank Ltd.
7. Mr. Dorji Gyaltschen, Project Manager, Bhutan Biogas Project, DoL, MoAF.

b. Non-BBP Steering Committee Members:

1. Mr. Bhawani Shankar, Dy.General Manager, Bhutan Development Bank Ltd.
 2. Mr. Prakash C. Ghimire, Chief Technical Advisor, SNV/Bhutan Biogas Project
 3. Mr. Nar Bahadur Khatiwora, Technical Advisor, SNV/ Bhutan Biogas Project
-

III. Adoption of English Language for the Meeting

The Project Manager sought approval from the Chairperson on the language to be used during deliberation. Noting the presence of international experts in the meeting, the Chairperson granted permission for the adoption of English language for the entire meeting.

IV. Welcome address by Mr. Dorji Gyaltschen, Project Manager, BBP

The Project Manager welcomed the Bhutan Biogas Project Steering Committee Members . In his address, he thanked all the members for making available in this important meeting despite their busy schedule in their office. He also presented himself to dedicate with full commitment in this project to make it successful, although he is still in the learning process of Biogas technology.

V. Opening remarks by Officiating Director, Dept. of Renewable Energy

The Chair opened the Biogas Project Steering Committee Meeting by welcoming all the participants. He informed the floor on the assumption of his duty as chair for the 2nd Steering Committee Meeting as the Director, Department of Renewable Energy was out of station. He highlighted the importance of the BBP Steering Committee Meeting and informed the PIU management to present the underlying issues clearly so that the Committee Member are informed about the decisions taken. Finally, the Chair thanked everyone for making their time available to this important meeting and solicited active participation and valuable comments / suggestions to make the meeting a fruitful one.

VI. Adoption of Agenda

The tentative agenda was presented to the forum. As there were no other issues presented for discussion by the members, the agenda for the meeting was adopted. In case there were any other items that the members wished to discuss, the chair said that the same could be put up once the agenda items have been discussed.

VII. Review of the decisions taken during the First BBP Steering Committee Meeting

Presentation, Issues and Discussion

Mr. Dorji Gyaltsen, Project Manager, Bhutan Biogas Project presented the minutes of the meeting of the first BBP Steering Committee Meeting Minutes and highlighted the important decisions made and on the directives given on the follow ups. Also, the Project Manager presented on the findings from the Dzongkhag consultations and the way forward. The Committee Members recognising the efforts being made to present in the concise manner felt that there lacked a clear connections to follow on the decisions and the required update on the review of the decisions made during the first BBP steering committee meeting by the PIU. It was felt that the presentations will have to be made on a tabular form so that the contents would become clear to make important decisions. Lot of deliberations were made on the evaluations of the project mainly on the type – internal or external, mid-term or end evaluation and whether there is any budget allocated for the same. It was discussed on the submission of reports to the PSC and the stakeholders – quarterly or half yearly. The loan repayment duration and subsidy channelling were also discussed and deliberated.

Decision

- i. From next time onwards, the presentation on the recap of the decisions taken in the BBP Steering Committee Meeting to be presented on tabular form detailing decision and action taken report.
- ii. The views of the majority of the Dzongkhag were taken for consideration regarding the funds required for quality control. The quality control funds in the form of cash will not be provided. However, as requested by the Dzongkhag, the direct staffs involved in the Biogas programme will be incentivised in the form of exposure visit or study tour to enhance their motivation. For long term sustainability, the Department of Livestock (DoL) is requested to regularise the monitoring funds in concerned Dzongkhag through regular budgetary support under RGoB.
- iii. Evaluation of the project is very important, but the different aspects of evaluation to be covered needs to be elaborated. Further, to carry out the evaluation ADB should be considerate of the resources reallocation for third party evaluation. The Department of Renewable Energy (DRE) shall undertake assessment of the project on regular basis to ensure that biogas project is implemented in line with project agreement and policies of the Royal Government.
- iv. It was decided that the reports submission to the Stakeholders would be half yearly and not quarterly.
- v. The loan repayment was fixed for tenure of 3 years recognising the assessment carried out by BDBL against 5 years mentioned in the MOU.
- vi. The subsidy channelling would be done through mobile banking. However, BDBL will deposit the amount in the users account for which the users' are required to open a saving account with the BDBL.

VIII. Progress Reporting of Field Activities

Presentation, Issues and Discussion

Mr. Prakash C. Ghimire, Chief Technical Advisor, presented the project progress overview achieved over nine months' time. It was presented that the progress made thus far was as per the work plan and most of the planned activities were achieved. However, due to delay in the training, the said targets of installed plants were yet to be achieved. So far about, 34 biogas plants were installed in four Dzongkhags, 74 masons were trained and about 28 field extension officers from the Department of Livestock were trained as supervisors. It was also mentioned that due to improper selection of masons,

a dropout of about 60% masons is expected. The progresses were also made on the development and distribution of different awareness and training materials. The achievement on the dedication of the first flame by BBP to the Royal Wedding was also highlighted. The development of project database – web based and project website was also discussed. The data security issues were also discussed. It was also discussed and deliberated on the need of the private sectors to take up the construction activities and fabrication/retail of biogas appliances and accessories. However, it was felt that due to small market size, local fabricators were not interested, but there are small business enterprises interested to take up the wholesale and retail of biogas appliances and accessories.

Decision

- i. Train as many masons as possible so that even dropout rate increases, still project can find some sincere mason in the vicinity to fulfil the demand of that location. However, benefits have to be optimized while utilizing resources for such activities.
- ii. Flexible approach to be followed in the development of private sectors. Let a free market based on competition flourish in the wholesale and retail activities in importing and marketing of biogas appliances and accessories.
- iii. In the initial start, the PIU could introduce the interested business enterprises to the firms in Nepal. However, there should not be any cost implication to the project on the interested entrepreneur's visit to Nepal.
- iv. Development of web based data base is excellent. However, a proper security measures to be provided to avoid misuse of information by hackers.
- v. Overall, the progress made and the target achieved within this short period of time by the PIU was noted and acknowledged.

IX. Issues and Challenges

Presentation, Issues and Discussion

Mr. Dorji Gyeltshen, Project Manager presented on the issues and challenges faced. The issues were of minor nature, presented one by one, the deliberations were heard from the floor and the important decisions were made. The following were the issues discussed and the decisions taken.

Issue No.1 – Revival of Biogas Plants Constructed in Lhomenzingkha (Kalikola) in the Past

The need for the revival of biogas plants constructed in the past in Lhomenzingkha was presented. The floor was informed that the failure of the Biogas plants constructed during late 80s and early 90s is spreading in the villages rapidly. The negative message of the past initiatives has an impact on the present programme and approach as the farmers have lost their motivation and confidence. Therefore, in order to gain confidence of the farmers, the BBP proposed to include Lhomenzingkha under the present programme so that revival/construction of the biogas in the potential households/villages where biogas plants have failed to operate. Reconstruction and successful implementation of biogas initiatives in these areas could rebuild the good perception of the Biogas plants thereby building the confidence of the farmers in the country. It was discussed that though the initiative is very pertinent, it might be too early to start the reconstruction/revival works at this stage.

Decision

While the intention of such proposal is appreciated, the proposal could not be endorsed by the Meeting since the proposed village is located outside the focus Dzongkhag and has the financial implication while monitoring the systems construction in view of the larger spread. The PIU was directed to focus in the primary programme areas and if the need of revival/reconstruction arises, it can be reviewed for consideration at an appropriate time.

Issue No.2 - Support from DRE/involvement in Operational level in Dzongkhag

Due to non-technical existence of the DoL, the Department is facing difficulties in providing quality monitoring of Biogas plant construction and supervision in the four Dzongkhags. Also, due to time

restriction and the vast area for coverage, the technical team from the BBP could not monitor all the plants constructed in the field regularly for quality assurance. It was felt that there is a need for technical supervision - at least two fresh personal either to be appointed as Monitoring Officers or from the Department of Renewable Energy to monitor and transfer the technical skills - one person for two Dzongkhags each. The matter was discussed and deliberated.

Decision

DRE will discuss the matter in-house and will provide a sustainable solution. Meanwhile, a technical staff from DRE will be attached, as and when possible with PIU staff to build the institutional capacity within the DRE in construction and monitoring the quality aspects of the Biogas technology.

Issue No.3 - Extension of Contract of the Project Support Staff or Appointment of a Regular Staff from DOL

The BBP presented on the issue for a need to extend the contract of the project support staff or the DoL could recruit a regular employee to have experiences in the Biogas Project so that the institutionalisation process could be slowly transformed to undertake such projects in future. The matter was discussed and deliberated.

Decision

The proposal to be discussed further during the Mid-term Project Review Meeting with the ADB mission in February 2012.

Issue No. 4 – Translation and Production of Promotional and Training Materials in Language as Demanded by Users and Masons

The PIU presented the issue of requirement of awareness and training materials in local dialect. Mainly the demand has come from the field. There is a request from the masons and users if the materials provided to them could be made in local Nepali language.

Decision

Since the issue pertains to understanding about the construction and monitoring aspects of the biogas plants by the locals, and the same materials are intended to be used nationwide at latter date, the meeting suggested simplification of promotional materials using extensive visual aids than translation in regional languages.

Issue No.5- Exposure Field Trip for Relevant Sector Heads to Cambodia/Nepal

The BBP presented that the exposure visit to the relevant sector heads to abroad as planned could not be carried out in 2011. The exposure visit could be postponed in 2012. Mainly because there were not enough plants constructed to gain more insights, experiences by different sectors for the construction and operation of Biogas plants and share the experiences with different countries and bring back home some useful tips and information. The matter was discussed and deliberated.

Decision

The proposal was endorsed in principle but PIU would need to submit details of the cost and under which component the cost will be covered. After the cost estimates and schedule have been firmed up, the Executing Agency shall seek the concurrence of the Asian Development Bank. The exposure visit could be done during rainy seasons to avoid hampering the progress of the project activities.

Issue No. 6 – Appointment of Authorised Distributor for Importing and Marketing of Biogas Appliances and Accessories

The issue on the need of an authorised distributor for importing and marketing of Biogas Appliances and Accessories was presented. Mainly it was found that fabrication of these appliances seems expensive looking at the market size, the BBP proposed to authorise an interested small business

enterprises for importing and marketing of biogas appliances and accessories for sustainable private sector development.

Decision

The BBP Steering Committee endorsed the proposal. in principle. However, PIU was directed to exercise transparency mechanisms giving equal opportunities to all potential firms/individuals and proper documentation/records are maintained to this end.

Issue No. 7 – Field Support/Extension Kits for BBP and Supervisors

One of the outcomes of the Dzongkhag Consultation on the need for quality control funds was that to provide some sort of incentives such as field support and extension kits to the supervisors rather than the monetary benefits. The BBP presented on the need to procure port field support kits for the plant supervision and monitoring and extension kits for the welfare of the supervisors. A minimum of a trekking boots, hand bag and an umbrella could be given to the supervisors to effectively carryout their works. The matter was discussed and deliberated.

Decision

The proposal was endorsed in principle. However, the PIU was directed to submit the detailed cost estimates for review by the PSC and seek necessary concurrence from ADB before such purchases are made.

Issue No.8 – MoU between BBP and BDBL on Credit and Subsidy Channelling

The credit and subsidy management will be carried out by BDBL. It was also mentioned in the MoU to work out the subsidy and credit channelling to the farmers. It was felt to sign a MoU between the BBP and BDBL on mutual agreement for subsidy and credit channelling to the farmers. The members were in an opinion that the requirement of a separate MoU is not seen as there exists an umbrella MoU between all the stakeholders. However, a separate implementation guidelines for credit and subsidy channelling could be prepared and signed between BBP and BDBL.

Decision

A separate MoU is not required to be signed between BBP and BDBL. However, an implementation guideline could be prepared and signed between BBP and BDBL.

Issue No. 9 - Biogas Loan from BDBL outside the framework of BBP in other Dzongkhag

Since the start of the launching of the Bhutan Biogas Project, there are lot of farmers expressing interest to construct Biogas Plants in their respective homes/farms. In addition, there are some farmers seeking loan from BDBL for a financial support. The matter was discussed and the members raised that providing loan to interested farmers in other Dzongkhag can be done only if the users intend to construct with technical support from BBP.

Decision

The BBP Steering Committee stated that based on the outcome of the current pilot project, the Department of Renewable Energy could upscale the project activities in the other areas on the similar model. However, if the applicants do wish to go ahead and not wait for future upscale projects, their request could be considered if BDBL is able to accommodate their request. However, subsidy to those farmers will not be provided from the current project and any farmers intending to develop biogas projects with loans from BDBL, they would need to seek technical support from the current BBP programme to ensure the quality standards are maintained.

X. Closing Remarks

The Chairman thanked all the participants for their time and active participation in the meeting, due to which almost all the issues that were put up for decisions were able to be resolved properly. He thanked the Project Manager and the Consultants for comprehensively presenting the issues for

discussion. He commended the Project Implementation Unit (PIU) for the good progress made thus far and hoped that they would be able to smoothly take forward the implementation of the project under the guidance and directions made in this Steering Committee meeting. He further provided guidance to the PIU in making presentation mainly on the review of decisions made in tabular form so that the contents would become clear and important decisions could be made. He summed up the decisions taken on the important issues discussed in the meeting for noting by the PIU one by one. Lastly, he thanked the PIU for successful implementation of the activities and keep up the good job.

The meeting ended with a vote of thanks to the Chair and all the members for their valuable inputs and their guidance by Mr. Nar Bahadur Khatiwora, Technical Advisor.

(Dorji Gyaltshen)
Project Manager, BBP

(Chimi Dorji)
Programme Coordinator, RED

(Karma Tenzing)
Livestock Officer , DoL

(Tashi Pelden)
Program Officer, DPA

(Karma T. Dorji)
Project Manager, BDBL

(Kencho Wangdi)
Portfolio Coordinator, SNV

(Mewang Gyeltshen)
Officiating Director,DRE,MoEA
(Chairman)

Annex-4: List of Households receiving Credit and Subsidy from BDBL

Households who received Credit

SN	Name	Dzongkhag	Amount
1	Sonam Choden	Samtse	15,000.00
2	Sherab Choden	Samtse	20,000.00
3	Langa Dema	Samtse	15,000.00
4	Langa Dorji	Samtse	12,000.00
5	Pema Eden	Samtse	15,000.00
6	Sonam Dorji Tamang	Sarpang	15,000.00
7	Phuntsho	Sarpang	15,000.00
8	Dhil Bdr. Rai	Sarpang	12,000.00
9	Bhim Bdr. Tamang	Sarpang	12,000.00
10	Damalal Rai	Sarpang	12,000.00
11	Sonam	Sarpang	15,000.00
12	P.L. Mongar	Sarpang	15,000.00
13	Dataram Acharya	Sarpang	15,000.00
14	Rudra Narayan Ghimire	Sarpang	15,000.00
15	Mandosh Rai	Sarpang	12,000.00
16	Mon Bdr. Rai	Sarpang	12,000.00
17	Chandra Maya Tiwari	Sarpang	12,000.00
18	Tsagay	Sarpang	12,000.00
19	Nagchung	Sarpang	12,000.00
20	Pushpalal Khadal	Sarpang	15,000.00
21	Monarath Acharya	Sarpang	12,000.00
22	Dal Bdr. Zimba	Sarpang	12,000.00
23	T.P. Homagai	Sarpang	15,000.00
24	San Bdr. Subba	Sarpang	12,000.00
25	Nar Bdr. Chetteri	Sarpang	12,000.00
26	Govin Panda	Sarpang	12,000.00
27	D.B Gurung	Sarpang	15,000.00
28	Sonam Tshering	Sarpang	12,000.00

Households who received Subsidy

	Name	Dzongkhag	Amount
1	Sonam Choden	Samtse	11,700.00
2	Sherab Choden	Samtse	11,700.00
3	Langa Dema	Samtse	11,700.00
4	Langa Dorji	Samtse	11,700.00
5	Pema Eden	Samtse	11,700.00
6	T.P Homogai	Sarpang	11,700.00
7	Dawa Tamang	Sarpang	11,700.00
8	Monarath Acharya	Sarpang	11,700.00
9	Nar Bdr. Chetri	Sarpang	11,700.00
10	Narat Muni Khrka	Sarpang	11,700.00
11	Pushpalal	Sarpang	11,700.00
12	Gopi K Khatwora	Sarpang	11,700.00
13	Monarath Katel	Sarpang	11,700.00
14	Kharananda Khatiwora	Sarpang	11,700.00

Annex-5: List of Masons and Supervisors receiving technical training

SARPANG DZONGKHAG

List of Trained Supervisors

Sl.No.	Name of Supervisors	Designation/Grade	Work Station	Geog	Contact No.
1	Phuntsho Dorji	ALO - 8	LEC, Gelephu	Gelephu	17691201
2	Shekharpa	AEO - 8	DVH, Sarpang	Shompangkha	1761638317
3	Dorji Rinchen	EO - 8	LEC, Gakiling	Gakiling	06 365373
4	Sumda Wangchuk	LHS - 9	RNR Centre, Samtenling	Samtenling	17710590
5	Kinzang Wangchuk	ALO - 8	RNR Centre, Dekiling	Dekiling	17800878
6	Yuden	LHS - 9	LEC, Gelephu	Gelephu	17678473

List of Trained Masons

Sl.No.	Name of Masons	Village	Geog	Contact No.
1	Gopi Krishna Khatiwora	Pelrithang	Gelephu	17727813
2	Dhanapati Katel	Pelrithang	Gelephu	17822213
3	Rinchen Wangdi	Zomlingthang	Gelephu	17458744
4	Bhakti Prasad Bhandari	Lhayul	Chuzom	17843173
5	Kul Prasad Dungana	Dungay	Jigmechoeling	17613912
6	Madhubir Rai	Balatung	Singay	17538524
7	Jagat Bahadur Basnet	Samtenling	Samtenling	17670741
8	Krishna Prasad Rai	Kagatey	Gakiling	17594600
9	Deoman Rai	Dorjitse	Tareythang	17501838
10	Sangay Dorji	Pemaling	Sershong	16916664
11	Pema Wangda	Thongjabi	Chuzergang	17615626
12	San Dorji Tamang	Norbugang	Shompangkha	17656800
13	Prem Kumar Pulami	Norbugang	Shompangkha	77331187
14	Karma	Sarpangtar	Shompangkha	17404532
15	Nar Bahadur Ghallay	Choekhorling	Dekiling	17468516
16	Duba	Linger	Umling	17539447

TSIRANG DZONGKHAG

List of Trained Supervisors

Sl.No.	Name	Designation	Work Station	Geog	Contact No.
1.	Laxuman Biswa	LHS - 10	RNR C Sergithang	Sergithang	17639957
2.	Sherman Tamang	ES 9	RNR C Phuntenchu	Phuntenchu	17898836
3.	Norbu Wangdi	ALO - 8	LEC Kamichu, Wangdi	Athang	
4.	Jampel Tshering	LPS 9	RNR C Mendrelgang	Mendrelgang	77305611
5.	Aita Ram Urao	Sr.LPS - 8	RNR C Dunglagang	Dunglagang	17628791
6.	T.D.Subba	LHS - 10	RNR C Shemjong	Shemjong	17693810
7.	R.B.Chuwan	LHS - 13	LEC Barshong	Barshong	17795986
8.	Pema Khandu	ES - 9	RNR C Goseling	Goseling	17759756

List of Trained Masons

Sl.No.	Name of Masons	Village	Geog	Contact No.
1	Krishna Prasad Sanyasi	Tashithang	Sergithang	17800015
2	Mani Kumar Tamang	Gangtokha	Barshong	
3	Dhan Bdr.Mongar	Chunikhang	Barshong	17856803
4	Nima Dorji	Dhamsang	Tsirangtoe	
5	Birkha Bdr.Lungeli	Tashiling	Shemjong	
6	Amber Bdr.Mongar	Zomling	Shemjong	17553389
7	Bal Bdr.Tamang	Dupchegang	Tsholingkhor	17879247
8	Ash Bir Subba	Tongsinggang	Phuntenchu	17544083
9	Bir Bdr.Rai	Shemdenjong	Sergithang	17939604
10	Sithar Dorji	Mendrelgang	Mendrelgang	17538652
11	Durga Subba	L/Lobsibotey	Goseling	17553004
12	Tankanath Powdel	Beechgaon	Dunglagang	
13	Dawa Tshering	Samthang	Athang	77308184
14	Kinzang Tshering	Samthang	Athang	17443492
15	Robin Rai	Dhansiri	Phuntenchu	17510905
16	Bhim Kumar Tiwari	Dhansiri	Phuntenchu	
17	Lakhu Tamang	Dhajay	Rangthangling	77297059

SAMTSE DZONGKHAG

List of Trained Supervisors

Sl.No.	Name of Supervisor	Designation/Grade	Place of work	Geog	Contact No.
1.	Sonam Dorji	LPS-II, 10	RNR Centre	Yoeseltse	17952992
2.	Khamsang Wangdi	LPS-II, 10	DVH, Samtse	Samtse	17685748
3.	Dorji Wangchuk	ES-I, 9	LEC, Dumtey	Dumtey	
4.	Wangchuk	ES-I, 9	LEC, Chargarey	Chargarey	17559097
5.	Budiram Uroan	LPS	DVH, Samtse	Samtse	17656682
6.	Ramesh Uroan	LPS	RNR C Chengmari	Chengmari	
7.	Mani Kumar Subba	LHS -10	-do-	-do-	77382816
8.	D.B.Mongar	LHS -12	LEC, Pagli	Pagli	17649403

List of Trained Masons

Sl.No.	Name of Masons	Village	Geog	Contact No.
1.	Kharka Bdr.Mongar	Malabasey	Namgay Choeling	
2.	Nar Bahadur Ghallay	Thakurey	Ugyentse	17825945
3.	Birkhaman Rai	Dumtey	Dumtey	16903879
4.	Ram Kumar Rai	-do-	-do-	17483292
5.	Ganga Bahadur Rai	Mandeni	Samtse	16926295
6.	Dhan Bahadur Bhujel	Khempa Gaon	Tading	17843656
7.	Sabin Subba	Belbotey	Sibsoo	17592221
8.	Padamlal Chettri	-do-	-do-	
9.	Jai Bahadur Sunwar	Gumadara	Samtse	17715975
10.	Indra Bahadur Sunwar	-do-	-do-	
11.	Santa Bahadur Rai	Khempa Gaon	Tading	17961960
12.	Dal Bahadur Rai	Namgay Choeling	Namgay Choeling	77270321
13.	Bir Bahadur Ghallay	Talay	Biroo	77359314
14.	Rudra Singh Ghallay	Thakurey	Ugyentse	77366930
15.	Botuman Darjee	Dorokha	Dorokha	17952906
16.	Man Bahadur Chettri	Manedara	Biroo	
17.	Bupen Pradhan	Chargarey	Chargarey	
18.	Mandeep Chettri	-do-	-do-	17866797
19.	Phuntsho	Dungkar	Yoeseltse	17907504
20.	Pema Gyaltsen	-do-	-do-	
21.	Harka Raj Rai	Sengden	Dorokha	17951425
22.	Har Bahadur Gurung	Pungthra	Denchukha	77338150
23.	Dhan Doj Tamang	Kuchin	Tendu	17599668
24.	Devendra Limbu	Kalapani	Pagli	77302546
25.	Cho Tshering Lepcha	Geshing	Pagli	77351208
26.	Ram Prasad Sunwar	Dhappar	Chengmari	77256390
27.	Gyan Bdr.Sunwar	Katarey	Chengnari	17550936

CHUKHA DZONGKHAG

List of Trained Supervisors

Sl.No.	Name	Designation	Work Place	Contact No.
1.	Ram Chandra Khati	LHS - 10	RNR C Metekha	17778673
2.	Bala Ram Sharma	LHS -10	RNR C Darla	17629518
3.	Pema Lepcha	LPS - 9	LEC Gelling	16912862
4.	Nanda Ghalley	ES - 10	LEC Dungna	17989862
5.	Tashi Jamtsho	AEO - 9	LEC Bongo	17723663
6.	J.P.Sharma	LHS - 11	LEC Samphelling	17655631

List of Trained Masons

Sl.No.	Name of Masons	Village	Geog	Contact No.
1.	Harka Man Rai	Gurungdara	Samphelling	77284237
2.	Sangay Tashi	Yukha	Metekha	17446401
3.	Penjor	Ngalachong	Dungna	77719835
5.	Mani Raj Rai	Lalikhha	Phuentsholing	77339788
6.	Dhan Kumar Mongar	Tabjee	Darla	17724859
7.	Phuntsho Wangdi	Pana C	Samphelling	77343568
8.	Phub Dorji	Kamji	Gelling	17523781
9.	Bhim Bdr. Chhetri	Dargaythang	Shompangkha	17735894
10.	Ran Maya Ghalley	Ramitey	Phuntsholing	17671910
11.	Tshering Dorji	Meritshemo	Bongo	17503251, 17467458
12.	Bhim Bdr. Mongar	Lasarini	Darla	
13.	Nado	Goemba	Metekha	17431549
14.	Kencho Tshering	Pakshikha	Bongo	17446451

Annex-6: BBP Budget Review and Justification for Additional Budget

Bhutan Biogas Project (BBP) is being implemented in four southern districts of Bhutan since March 2011. The main objective of the project is to establish a viable, sustainable and commercially oriented domestic biogas market with good prospects for continued deployment of biogas plant construction even after the project period. To develop, strengthen and facilitate a commercially viable and market oriented biogas sector in Bhutan is therefore the prime objective of the project. To ensure this to happen, BBP needs to implement different functions as described below:

- a. **Promotion and marketing:** The objective of promotion and marketing functions is to stimulate and inform stakeholders on the benefits and costs of domestic biogas and to publicize the project.
- b. **Financing:** The aim of financing function is to lower the financial threshold and improve access to credit and repayment assistance and to facilitate easier access to household biogas, with particular emphasis on the poor, women and other disadvantaged groups.
- c. **Training in Construction, Supervision and After-sales Service:** The objective is to facilitate the construction and continued operation of installed biogas plants by providing the skills for local masons and eventually biogas construction companies to construct high quality biogas plants, and for biogas users to be able to operate their biogas plants effectively and to ensure the continued operation of all biogas plants installed under the program.
- d. **Quality Control:** The objective is to maximize the effectiveness of the investment made by the biogas owners and to maintain consumer confidence in household biogas technology.
- e. **Extension:** The objective is to provide information and training to allow biogas users to effectively exploit all the benefits of biogas, in particular the use of bio-slurry. Extension activities envisage maximizing the benefits of the operated biogas plants, in particular the optimum use of bio-slurry.
- f. **Monitoring and Evaluation:** The objective is to identify program progress and impact on stakeholders in order to facilitate knowledge transfer, and improve program performance.
- g. **Research and Development:** The objective is to assess and apply innovative solutions to optimise the benefits of biogas plants and make it accessible to maximum number of people in need.
- h. **Institutional Support:** The objective is to maximize the ability of key biogas related institutions to be able to provide the services and support required by the biogas sector to facilitate access to household biogas and the development of quality biogas products.
- i. **Project Management:** The objective is to support and coordinate the activities driving the development of a commercially viable biogas sector. This includes technical assistance to the program.

All these functions have to be carried out in a coordinated manner. BBP has realised the importance of these functions and various activities are planned to be implemented to ensure biogas sector development in the country. The allocation of budget for each activity has been done in a manner that there is provision of budget to implement the most important activities. Experience of SNV in other countries in Asia while implementing national biogas programmes for the last 20 years has suggested that the project management as well as promotion, capacity building, quality control, monitoring and evaluation, generally referred to as sector development cost falls in the range of US\$ 150 (in Vietnam where the programme is matured) to US\$712 (in Laos where the programme is relatively new). Such sector development costs are US\$ 519 in Cambodia and US\$ 431 in Bangladesh. Keeping in view, the newness of the project in Bhutan, the situation is comparable with Laos. Based upon the allocated sector development budget in Bhutan, the per plant sector development cost is calculated to be less the US\$ 120, which is even less than the cost per plant in Vietnam where almost 20,000 biogas plants are installed each year. Keeping in view the limitation of budget, BBP has made efforts to propose the minimum required activities and budget are allocated accordingly.

It has been realised that the allocated budget under the framework of BBP is not sufficient to efficiently carry out the proposed minimum activities as stated above. Table-1 given below illustrates the allocated and required budget to carry out the identified activities.

Table-1: Allocated and Required Budget for Each Component of BBP

S.NO	PARTICULAR	TOTAL BUDGET [USD]		BUDGET DEFICIT IN US\$				
		ALLOCATED	REQUIRED	2011	2012	2013	2014	TOTAL
1. CONSULTANCY SERVICES		617,024	721,850	0	-2,903	-88,871	-13,052	-104,826
A.	Remuneration	408,024	408,024	-	-	-	-	-
B.	Project Administration & Management	25,000	33,125		-2,903	-4,476	-746	-8,125
C.	Transportation for Project Supervision-BBP Vehicle	28,000	38,993	-	-	-8,335	-2,658	-10,993
D.	Equipment and other Office Supplies	20,000	25,000	-	-	-5,000	-	-5,000
E.	Training, Information Dissemination and Monitoring	136,000	216,708	-	-	-71,060	-9,648	-80,708
2. UNALLOCATED FUND		170,600						
A.	Contingency	42,976						
B.	Approved but unallocated budget	127,624						
3. R&D ACTIVITIES		-	36,350		-21,350	-15,000		-36,350
TOTAL		787,624	758,200	0	-24,253	-103,871	-13,052	-141,176

As it can be seen from the table, no budget has been allocated for research and development activities. There is high demand for conducting R&D activities to effectively utilise bioslurry and design a plant that can operate in relatively cold climate. Likewise the budget allocated for training, information dissemination and monitoring is also not sufficient even to implement the minimum required activities. The budget allocated for support staff under the heading 'project management' is less than the required and the project will suffer if timely allocation is not made immediately to pay the salary of support staff. The budget allocated for hiring a vehicle will finish in the end of 2012 and additional budget is required for 2013 and 2014. In total, there is a deficit has been calculated to be US\$ 141,176. It is therefore strongly requested to compensate this deficit from the unallocated budget of US\$ 170,600 (including contingency).

The details of proposed activities, estimated costs and justification for such activities are given in Table-2 below.

Table-2: Proposed Activities, Budget Need and Justifications

ACTIVITIES	Total Required Budget US\$	Justification
PROJECT ADMINISTRATION COST INCLUDING SUPPORT STAFF	Required - 33,125 Allocated - 25,000	The allocated budget is not sufficient for project administration staff. BBP needs one admin assistant to support administrative and logistic issues. Increasing number of field activities in days to come will necessitate more support services. This staff will also involve in data entry and data management task.
TRANSPORTATION FOR PROJECT SUPERVISION	Required - 38,993 Allocated - 28,000	The allocated budget is not sufficient. To ensure that the field activities are carried out as per the set standards, it is necessary to do frequent monitoring in the field. This necessitates frequent visits of BPP personal to the sites.
EQUIPMENT AND OTHER OFFICE SUPPLIES	Required - 25,000 Allocated - 20,000	Major bulk of the budget has been spent for the initial phase. However, it is envisaged that additional amount is needed for routine maintenance of photo-copy machine, computers and other equipment.
TRAINING, INFORMATION, DISSEMINATION AND MONITORING	Required - 216,708 Allocated - 136,000	The budget allocated for this heading is not sufficient for ensuring quality services needed to ensure sector development. The activities as well as breakdown of the budget proposed is given below:

ACTIVITIES	Total Required Budget US\$	Justification
Preparation, printing and distribution of Promotion & Training materials	14,303	Promotion is key to stimulate and inform stakeholders on the benefits and costs of household biogas and to publicize the program. For ensuring effective promotion it is important that quality promotion materials in required quantity is produced and distributed.
Promotion and Marketing	52,941	Different promotional and marketing tools such as audio-visual programmes such as promotional video, radio jingles, and advertisement in print medias, web-sites design and management are important to ensure effective promotion of the technology.
Community Workshop & Meetings	16,050	Because of the failure of past initiatives, it is important to carry out effective promotion of biogas technology and disseminate the technology at all levels. Workshops and community meetings at various levels are important to raise the understanding of the technology. Periodic progress review meetings and BBP steering committee meeting are necessary to ensure effective implementation of the project.
Ex-country Training and exposure visits	35,400	The concerned officials from Executing Agency, Implementing Agency, and other Partners should be provided with training and exposure visits to enhance the level of understanding of the technology. Such capacity building packages will work as incentive to work more effectively in the sector. Two exposure visits: one for senior level officials to Cambodia and the other for field officers to Nepal has been proposed. These visits will be instrumental in internalising the process and challenges of sector development. Likewise, to build capacity of private sector to produce quality appliances in Bhutan, it is necessary to train and capacitate them.
In-country Training and exposure visits	25,114	Capacity building of masons to construct quality biogas plants, of supervisors to supervise, control quality and provide back-stopping services; and senior officers in managing the project activities are very important to ensure quality service delivery. Likewise, routine refresher training and enhancing entrepreneurship skill of private sector to take lead role in construction and after sale services is important.
Quality Control and Subsidy/Credit Management	41,800	Quality assurance of field activities is important to maximize the effectiveness of the investment made by the biogas owners and to maintain consumer confidence in household biogas technology. This necessitates frequent visits from livestock extension officers to construction sites. To motivate them to effectively carry out quality control tasks, it is necessary to capacitate them and provide them with minimum tools and equipment to carry out their tasks in the field. Preparation of database and management of data and information plays vital role in ensuring effective quality control.
Monitoring and Evaluation	26,100	M&E is important to identify program progress and impact on stakeholders in order to facilitate knowledge transfer, and improve program performance. Biogas users' survey is very important to assess the effect of biogas plant on users. It helps in getting user's perspective and feedback which will be instrumental in future project design. Likewise, a mid-term evaluation of the project from external parties will provide BBP with suggestions to improve.
Users Training	5,000	To ensure effective operation and routine maintenance of biogas plants and appliances it is important that the biogas users are provided with one day practical training.
RESEARCH, DEVELOPMENT & DEMONSTRATION	Required - 36,350 Allocated - None	R&D activities have not been planned while allocating budget. However to assess and apply innovative solutions to optimise the benefits of biogas plants and make it accessible to maximum number of people in need such activities are important. The identified R&D activities are listed below:
Research on Appliances design and material development	5,000	For the sustainability of production and supply chain, it is important that the biogas appliances are produced in the county. Prior to building capacity building packages, it is necessary to research on suitability of different appliances and prepare design accordingly.
Research activities related to use of bio-slurry- Consultancy services	11,700	Activities on bioslurry are prosed to provide information and training to allow biogas users to effectively exploit all the benefits of bio-slurry. Extension activities envisage maximizing the benefits of the operated biogas plants, in particular the optimum use of bio-slurry.

ACTIVITIES	Total Required Budget US\$	Justification
Technical Audit of Biogas Plants-consultancy services	6,000	Technical Audit of Biogas Plants is required to make a comprehensive technical assessment of the hardware (technology) as well as software (performances) aspects of biogas plants installed under the framework of BBP.
Research on low cost high hill plants-consultancy services + pilot plants	9,100	Considerable market of biogas plant on Bhutan is located in high hill areas. There is need to conduct research to develop suitable design for areas with relatively low temperature. The government partners are putting high emphasis on designing suitable model to suit these areas.
Private sector development - consultancy services	4,550	To maximize the ability of key biogas related institutions to be able to provide the services and support required by the biogas sector to facilitate access to household biogas and the development of quality biogas products it is important to allocate fund for private sector development.