

Netherlands Development Organisation (SNV)

Report on

**EVALUATION OF CAPACITY BUILDING IN NEPAL
AND ASIA BIOGAS PROGRAMME**



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Preface and Acknowledgment

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Acronyms and Abbreviations

AB	Apex Body
ABP	Asia Biogas Programme
ADB	Asian Development Bank
AFPRO	Action for Food Production, India
ASS	After-Sales Service
BMZ	Bundesministerium Für Wirtschaftliche Zusammenarbeit (German Federal Ministry for Economic Development Cooperation)
CD	Capacity Development
CDF	Capacity Development Framework
CDM	Clean development Mechanism
CER	Certified Emissions Reduction
CIDA	Canadian International Development Agency
COF	Carbon Offset Finance
DNES	Department of Non-conventional Energy Sources, India
GIZ	Gesellschaft für Internationale Zusammenarbeit (German Society for International Cooperation)
GS	Gold Standard
GS-VER	Gold Standard Voluntary Emissions Reduction
IFAD	International Fund for Agricultural Development
KfW	Kreditanstalt für Wiederaufbau (German Development Bank)
KVIC	Khadi and Village Industries Commission, India
LPG	Liquid Petroleum Gas
MFI	Micro-Finance Institute
NGO	Non-Government Organisation
O&M	Operation and Maintenance
ODA	overseas development aid
OECD	Organisation for Economic Co-operation and Development
PoA-DD	Program of Activities Design Document
PRAD	Planning Research and Action Division of the State Planning Institute of Uttah Pradesh, India
QSEAP	Quality and Safety Enhancement of Agricultural Products
R&D	Research and Development
RET	Renewable Energy Technologies
SNV	Netherlands Development Organisation
TA	Technical Assistance
ToT	training of trainers
UNCDF	United Nations Capital development Fund
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
VER	Voluntary Emissions Reduction
VGS	Voluntary Gold Standard
WB	World Bank
WWF	World Wildlife Fund

Specific to Nepal

ADB/N	Agriculture Development Bank, Nepal
ADBL	Agriculture Development Bank Limited
AEPC	Alternative Energy Promotion Centre
BC	Biogas Company
BCC	Biogas Coordinating Committee
BCF.	Biogas Credit Fund
BSP	Biogas Support Programme
BSP/N	Biogas Sector Partnership, Nepal
DCS	Development and Consulting Services
DPNWC	Department of National Parks and Wildlife Conservation
GGC	Gobar Gas and Rural Equipment Development Company Ltd
GoN	Government of Nepal
MoE	Ministry of Environment
MoF	Ministry of Finance
NBL	Nepal Bank Limited
NBPA	Nepal Biogas Promotion Association
NBPG	Nepal Biogas Promotion Group
RBB	Rastriya Banijya Bank
UMN	United Mission to Nepal

Specific to Vietnam

BCT	Biogas Construction Team
BPD	Biogas Programme Division
BPO	Biogas Programme Office
BPV	Biogas Programme in Vietnam
DARD	Department for Agriculture and Rural Development
GoV	Government of Vietnam
MARD	Ministry of Agriculture and Rural Development
NBSC	National Biogas Steering Committee
NSC	National Steering Committee
PAEC	Provincial Agricultural Extension Centre
PBPDs	Provincial Biogas Programme Division
PBPO	Provincial Biogas Programme Office
VACVINA	NGO in Vietnam encouraging VAC, a domestic garden system for vegetables
VBA	Vietnam Biogas Association

Specific to Bangladesh

BARD	Bangladesh Academy for Rural Development
BARI	Bangladesh Agricultural Research Institute
BAU	Bangladesh Agricultural University
BCSIR	Bangladesh Council of Scientific and Industrial Research
BPO	Biogas Programme Office
BSC	Biogas Steering Committee
CPO	Construction Partner Organisation
GoB	Government of Bangladesh
IDCOL	Infrastructure Development Company,
LCPO	Lending and Construction Partner Organisation
LPO	Lending Partner Organisation
MPEMR	Ministry of Power, Energy and Mineral Resources
NDBMP	National Domestic Biogas and Manure Programme
OC	Operations Committee
PO	Partner Organisation

Specific to Cambodia

BCC	Biodigester Construction Company
BUNs	Biodigester User Networks
CEDAC	Centre d'Etude et de Development Agricole Cambodgien
CIEDC	Cambodian Indian Entrepreneurship Development Centre
DTW	Development Technology Workshop
GoC	Government of Cambodia
MAFF	Ministry of Agriculture, Forestry and Fishery
NBP	National Biodigester Programme
NBPO	The National Biogas Programme Office
NSC	National Steering Committee
PBPO	Provincial Biogas Programme Office
PIN	People in Need
PPI	Preah Polytechnic Institute
PRASAC	Programme de Rehabilitation et d'Appui au Secteur Agricole Cambodia
SGM	Small Group Meetings

Specific to Lao PDR

BPP	Biogas Pilot Programme
BSC	Biogas Steering Committee
DAFO	District Agriculture and Forestry Office
DLF	Department of Livestock and Fisheries
GoL	Government of the Lao PDR
PAFO	Provincial Agriculture and Forestry Office
PBPOs	Provincial Biogas Programme Offices

Glossary of terms

The actual words used for capacity development need to be defined, as they can mean different things, depending on the model used. The list of terms as used in this report are defined below in alphabetical order:

Actor:	An individual organisation involved in a programme and performing a defined set of activities required by the programme. Actors are often also Stake-holders.
Adoption:	Commitment by the client to purchase the technology, to have it installed and to use it to gain its benefits.
Apex body (AB):	The organisation (usually a government office) that takes ultimate responsibility for a biogas programme. The apex body is responsible for policy matters and for oversight of the work of the implementation organisations.
ASS:	After-Sales Service, visits by technicians/supervisors to clients after the technology has been installed to check that it is working properly as well as a readiness to make extra visits when requested by the client to make repairs.
Biogas plant:	A constructed unit that generates biogas and slurry from a biomass feed material through microbiological action. The Asia Biogas Programme uses biogas plants made underground from masonry (bricks and concrete) for individual households for domestic use in rural areas, fed with dung from animals (usually cattle or pigs, with the possible addition of human sewage). The microbes already exist in animal dung, so do not need to be added.
Bioslurry	The effluent from a biogas plant, which can be used as a compost/fertiliser. It can be used "as is" (a liquid) on some crops. It can also be air dried or mixed with dry biomass to make compost. This is better for other crops, such as vegetables.
CD:	Capacity Development: development of an enabling environment for the extension programme by encouraging stakeholders to gain skills, motivation, commitment and other resources relevant to the work required by the programme.
CDM:	Clean Development Mechanism: regulated by the Kyoto protocol, which determines how the fossil carbon saved by using a particular technology can be measured and given a financial value (defined as CER). CERs can be purchased by industrial countries to offset their use of fossil carbon.
CER:	Certified Emissions Reduction: Carbon Credits issued by CDM under the terms of the Kyoto Protocol, administered by UNFCCC.
Customer:	The person who purchases the technology together with the people who live in the same house and form the household who use the technology. The end-users of the technology.
COF:	Carbon Offset Finance, finance provided by groups who are releasing fossil carbon into the atmosphere to groups who are running programmes that save fossil carbon. COF can be provided by CDM, the European carbon market or by VER.
Education:	The second phase of extension, making sure people have a good understanding of the technology, its benefits and its use. This will involve the use of media, such as printed manuals or DVDs, often provided in the context of exhibitions and awareness raising courses.
Enabling environment:	A set of policies made by government departments and interpreted by the apex body that provide the means for a programme to function effectively.
Extension:	The overall process of diffusion of a technology, which includes several phases in which people are persuaded to purchase the technology and use it.

Implementation:	The background work (at the meso level) that is required to enable a biogas programme to happen. It includes activities such as management, purchasing, logistics, financing and accounting, human resources, etc.
Installation:	The activities required to build biogas plants, including the supply of materials and equipment to clients, the construction of the technology on sites and the training of clients in the use of the technology.
Governance:	The way a organisation, project or programme is run by the board of directors and senior management. Governance is usually subject to a set of policies defined by the board.
Level:	See Sphere. The three concentric spheres can also be seen as three levels (Micro, Meso and Macro).
Market-oriented:	An approach that gives a high priority to client satisfaction. The technology must work well and continue to work well for many years. The client must have a sense of ownership of the technology and be comfortable in its use. If the client has any problems, they must know how to obtain support easily. The problem must be solved quickly.
Masons:	Fixed dome biogas plants are mainly built of masonry: bricks and concrete, so the skilled people to build these plants are usually called masons.
Micro:	The activities at the micro level are those involved in the installation of biogas plants.
Meso:	The activities at the meso level are those involved in the implementation of a biogas programme.
Macro:	The wider enabling environment in which a programme is enabled to function. It includes the policies of government departments and the interpretations of those policies by the apex body.
Multi-sectoral:	Working across different sectors of a country's economy, such as government/NGO/private sectors, or agriculture/energy/finance sectors.
ODA:	Overseas Development Aid provided by bilateral aid agreements or by UN agencies.
Organisation type:	Organisations are defined according to which sector they belong: Government (GO), non-government (NGO) or private. GOs are funded directly by government from tax revenues. However, GOs also include government corporations (GCs), such as electricity corporations, which also earn income providing services. NGOs in Asia are usually funded by grants, usually from other countries. The grants maybe from international or national charities, or from development organisations, either bilateral or UN. NGOs are given grants to do defined tasks, such as the promotion of renewable energy technologies. NGOs can be International: INGOs. NGOs can also be associations of other groups, and/or individuals, which help fund the organisation through subscriptions. Private companies earn income from installation, selling goods or services. They are registered with a national body, which usually requires them to file details of their accounts yearly. Private companies can also operate internationally.
Partner:	A local organisation with whom SNV is working to establish and grow in their work in running a development programme.
Policy:	A set of guidelines, regulations and defined priorities under which a programme is carried out. Policies are set at government level, but must be interpreted by the apex body which formulates plans for their implementation. Policies cover provision for subsidy and loan finance, guidelines to encourage quality control and yearly budgets and targets for the programme.

Programme:	A planned, coordinated set of activities that are carried out in order to achieve a broad aim. A biogas programme is the set of activities that are required to enable clients to obtain and use biogas technology to gain its benefits.
Programme agency:	The organisation that is concerned with the implementation of the programme, supervising and coordinating the activities that need to be done to achieve the programme aim.
Project:	A series of activities aimed at bringing about clearly specified objectives within a defined time-period and with a defined budget. A project may be a sub-set of activities within a wider programme.
Promotion:	The first phase of extension, in which people are made aware of the technology usually through national and local media, such as leaflets, newspapers, radio and TV.
Sector:	A subdivision of a larger category. Examples include: 1 renewable energy sector, as part of the wider energy supply provision in a country; 2 biogas sector, as part of the renewable energy provision in a country; 3 private sector, as part of the wider provision of goods and services in a country.
Sphere:	The programme operates in several spheres which can be seen as concentric, with the centre being the client; the installation sphere covers the practical activities required to provide the technology to clients; the implementation sphere provides a set of other activities that enable installation work to occur; the policy sphere provides an enabling framework and is usually defined by government, with advice from other groups.
Stake-holder:	A person, group, or organisation that has direct or indirect stake in a programme because they can affect or be affected by the work of the programme. Stake-holders in the biogas programme include policy makers, organisers and managers in different spheres, installation companies and their employees, and the clients who purchase and use biogas plants.
Subsidy:	Finance made available to the client to offset the total cost of the installation. Subsidy can be provided by GOs, ODA or from COF, such as CDM or VER.
Supervisors:	Also called Technicians - see definition.
Sustainable:	A programme that will continue to function well, once external support is removed.
Technicians:	The people who supervise the installation of biogas plants: who relate to the clients, organise the logistic aspects, such as getting materials and masons on site, check the quality of installation against standard drawings and quality check lists, train the client in the use of the technology and make follow-up visits to clients.
Training:	The provision of practical information that enables people to gain skills in the installation and use of the technology. Clients, masons, and technicians/supervisors all require training to enable them to gain the necessary skills for their role in the programme.
VER:	Voluntary Emissions Reduction: Carbon Credits issued by a group working outside the Kyoto Protocol. These groups are more and more working to internationally recognised standards that are based on those used by CDM (e.g. CDM Gold Standard).

Executive Summary

The Biogas Programme in Nepal and the Asia Biogas Programme (ABP) organised by the Netherlands Development Organisation (SNV) is a success, building up the capability of the stake-holders involved in the programmes so that, working together, the programmes in each country become sustainable. The evaluation team visited Nepal and the four countries in which ABP is considered well established: Vietnam, Cambodia, Bangladesh and Lao PDR and interviewed key stake-holders. They also made short field visits in each country, to have a sense of the programme working in practice. The team were also provided with a large number of SNV reports, both published and unpublished, which they used to provide a picture of Nepal and ABP, as they have developed and also as they now function.

Evaluation of CD in Nepal and ABP

A key aspect of SNV's support to Nepal and the ABP countries has been that of Capacity Development (CD). This evaluation was part of the process of defining the SNV's CD contribution to the success of the biogas programmes in the five countries and was carried out by three international consultants. The **main purpose** of the evaluation is to extract lessons that can inform further development of the biogas and other RE programmes in Asia and other parts of the world. The **main objective** of the assignment is to evaluate the specific capacity development approach of the national programmes on domestic biogas in the five countries. This is in order to recommend further improvement of SNV's CD approach and CD support to the programmes it supports in the five countries. The evaluation was based on the understanding that CD has contributed significantly to the success of the biogas programme in the ABP countries. The SNV CD contribution has ensured partnership and collaboration of stake-holders at macro, meso and micro levels and encouraged a sense of national ownership of the biogas projects in Nepal and the ABP countries.

The evaluation focuses on issues of capacity development at all levels and from SNV's perspective as they have emerged over the past 22 years. It also focuses on CD approaches aimed at looking at the enhanced capacity of visionaries, their transformational leadership capacity, their innovative management and their ability to translate vision/strategy into practice. The evaluation focuses on the capacity (skills and competencies), the process, systems and structure in place that enables SNV, and the partner organisations with which they work in the different countries, to succeed in translating strategy into implementation and expand its success to other countries.

While the concept of Capacity Development (CD) is fairly new in development circles, SNV developed an approach which can be described in CD terms as the work progressed in Nepal. As the work further developed in ABP, the CD aspects could be defined more explicitly. CD is seen as multi-dimensional and multi-sectoral and can be viewed from many different aspects. The report attempts to describe the approach that SNV has been using in Nepal and ABP in terms of CD and involves a range of viewpoints. ABP involves all levels, from the practical tasks involved in installation at the micro level, through the support work required by implementation groups at the meso level up to influencing policy making at the macro level in order to create an enabling environment in each of the five countries. ABP works with different organisational types, especially government departments and agencies, NGOs and private companies and seeks to balance the different approaches of each type to achieve development goals. It is involved in a wide range of activities including: promotion, using different media; training, technical, management, financial; organising financial support, with subsidy and loan finance; quality control, setting of technical standards, organising an effective quality control mechanism; institutional support at all levels, policy, implementation, installation; evaluation, with regular user surveys; and research and development. A high priority in recent years has been the writing of methodologies for the Clean Development Mechanism (CDM) and the negotiation of contracts for carbon-offset finance.

Model of CD in ABP

Biogas technology is seen as having real benefits for local families and the local environment, as well as the global environment, but is expensive in financial terms. The provision of subsidy enables local families, as well as national governments, to receive these benefits at an acceptable financial cost. SNV's aim to make programmes sustainable means replacing subsidy from overseas development aid (ODA) with income from other sources. SNV has been working with national governments to encourage them to provide local subsidy finance within a well defined policy framework, which includes an apex body, to supervise the work of biogas extension. The availability of carbon offset finance offers another dimension to this process, providing new finance, but at the expense of greater complexity.

The model of CD in the ABP places all these activities within three concentric spheres or levels: installation work at the micro level; implementation or support work at the meso level; and the creation of an empowering environment through policy formulation at the macro level. Different approaches to CD are needed at the various levels. Training is seen as a core task of CD, providing and enhancing the skills of people. SNV uses an "on-the-job" approach to training, where staff "learn by doing" the job while being supervised by experienced workers. The training of trainers (ToT) is another aspect to this approach. Encouraging and motivating stake-holders in the programme is wider aspect of CD.

CD must relate to different types of organisations in the programme. SNV aims to use private companies in the installation sphere, as they are motivated by the need to earn an income from the work. A subsidy enables them to sell biogas plants, and can also be used to encourage good performance along with high quality. NGOs are more involved in the implementation sphere, as people are motivated by aspirations such as seeing biogas extension as offering benefits to people and the environment. People are involved in promotion and management and are encouraged by results. Work at the macro level involves working with government ministries and agencies involved in policy planning and making. Governments are motivated by political pressures, so effective CD requires persuasion and gentle influence to help government staff make decisions that enhance the programme.

Country Specific Aspects of CD in ABP

The CD work in ABP was evaluated in five countries and the overall approach to biogas extension work extracted. Differences in issues and approaches in the five countries are also identified. The oldest programme is in Nepal. At the macro level, the government has appointed an apex body, AEPC (Alternative Energy Promotion Centre) under the Ministry of Environment (MoE) which works with the Biogas Coordinating Committee (BCC) to coordinate the interests of the Government of Nepal (GoN). SNV has offered guidance and advice. At the meso level, SNV worked through BSP (Biogas Support Programme) and offered training and motivation to build up skills, competencies and commitment. As the programme was seen as becoming more sustainable, BSP/N (Biogas Sector Partnership, Nepal) was registered as an independent NGO under AEPC, to continue to manage the programme. The micro level work is done by the Biogas Companies (BCs) who have formed NBPA (Nepal Biogas Promotion Association), which works alongside BSP/N to keep the programme running. The BCs are private companies and fund themselves through selling biogas systems. Loan finance is provided by AEPC via MFIs, which work independently of the BCs and deal directly with customers.

In Vietnam, the Ministry of Agriculture and Rural Development (MARD) is involved in biogas extension at every level. There is a National Steering Committee (NSC), but SNV have had to work hard to persuade other ministries of the Government of Vietnam (GoV) to be involved. They have also needed to persuade other development agencies, such as ADB (Asian Development Bank) to work alongside the Vietnam Biogas Programme and not in competition. At the meso level, the BPD (Biogas Programme Division) implements the extension work through the PBPDs (Provincial Biogas Programme Divisions), under MARD. Technicians from the programme work with local Biogas Construction Teams (BCTs), which consist of trained masons and helpers. While much of the programme comes under a government agency, the BCTs are run by local people in the informal private sector. Loan finance is not available for biogas plants.

A similar approach is adopted in Cambodia, where the Ministry of Agriculture, Forestry and Fishery (MAFF) is responsible for the macro level policy aspects of the programme and relates the rest of the Government of Cambodia (GoC) and to the aid agencies supporting the programme through a National Steering Committee (NSC). The National Biogas Programme Office (NBPO) in Cambodia works with Provincial Biogas Programme Offices (PBPOs) and also an NGO, Centre d'Etude et de Développement Agricole Cambodgien (CEDAC) to implement the work. Local Biogas Construction Companies (BCCs), run by trained masons, actually do the installation work. Loan finance is supervised by the NBPO through two MFIs, PRASAC (Programme de Réhabilitation et d'Appui au Secteur Agricole Cambodia) and AMRET, that deal directly with clients. A unique feature of the programme in Cambodia is the creation of Biodigester User Networks (BUNs) in villages, instigated by People In Need (PIN). The Cambodian BP has been successful in involving local training institutes such as PPI (Preah Polytechnic Institute) and CIEDC (Cambodian Indian Entrepreneurship Development Centre) in the work of training masons and technicians.

The approach in Bangladesh involves the private sector, with minimum of government involvement. NDBMP (National Domestic Biogas and Manure Programme) is run by IDCOL (Infrastructure Development Company), a private company set up by GoB to handle energy projects. The IDCOL board of directors effectively acts as the apex body. There is a Biogas Steering Committee (BSC) with representatives from

GoB Ministries and Aid Organisations. IDCOL implements NDBMP through POs (Partner Organisations), registered as private companies, although many have a history as NGOs, installing solar PV home systems. The POs employ masons to do the construction work, supervised by the PO staff. Some of the POs run their own MFIs, while others use separate MFIs.

The biogas programme in Lao PDR is still seen as a pilot: the Biogas Pilot Programme (BPP), run under the direction of the Department of Livestock and Fisheries (DLF) of GoL. There is a Biogas Steering Committee (BSC) that allows representation from other GoL Ministries. The programme is run in a similar way to that of Vietnam, with provincial and district technicians doing the work of implementation and local mason groups doing the actual installation. The programme works with only 5 Provincial Biogas Programme Offices (PBPOs), but aims to expand to other areas of the country.

Evaluation Conclusions

The SNV biogas initiative has a successful history in the Asian Region. The programme can be said to be reaching maturity as the technology has been adapted to changing circumstances. The numbers of biogas plants that have been built in Nepal and the ABP countries have been impressive (418,423 by the end of 2011), although the targets in each country programme have not been fully achieved.

SNV has initiated CD support in each country programme and supported training schemes for technicians, masons and other staff. These training programmes are being continued under the programme offices, with the involvement of the different implementing agencies. Biogas promotion has also been effective. The approach has been different in the different countries: with BCs and POs doing the work in Nepal and Bangladesh, under umbrella agencies, while government agencies have a much greater involvement in Vietnam, Cambodia and Laos.

The way that SNV sees the Nepal and Asia Biogas Programmes and their CD aspects, especially the five key features, is seen as valid. It has allowed the programmes to be very successful, and to be working towards sustainability. The quality control mechanism, used in each country, has allowed a high proportion of plants installed to continue to be used over time. Targets have not always been reached, for various reasons, but installations rates have been steady. Internationally recognised awards have been awarded to several of the country programmes.

The grouping of biogas users in a village, or wider geographic unit, as tested in both Cambodia and Bangladesh, has a value that could be employed more widely. Users can help each other in plant use and maintenance. Construction and follow-up is more efficient if construction teams are working within a limited area.

The work of replacing ODA with carbon offset finance from both CER and VER sources has been slow, but is becoming successful. Doubts have been expressed that COF can replace ODA in the short term, but good progress is being made, especially in the growing voluntary carbon market.

However, there are weaknesses in the programme:

- The CD towards a market approach has not enabled organisations in the private sector to have fully effective commercial operations.
- The turn-over of masons is an issue.
- Extension of the best approach to the use of bioslurry needs to be better coordinated.
- The quality of biogas appliances needs to be improved, based on work done in Cambodia.
- The programme's success in installation numbers and quality control has relied on a tight development focus that makes the programme unable to respond to other development priorities.

Recommendations

- CD is needed to enable construction companies to have a more commercial approach
- Similar CD could be offered to the MFIs involved in some programmes
- BUNs needs to be more widely used across ABP.
- Studies could be made of ways to reduce the turn-over of masons, where this is an issue.
- The best practice for bioslurry use needs to be identified and used throughout ABP.

- Best practice for the design and manufacture of biogas appliances needs to be shared throughout ABP.
- Studies of the economic value of wider benefits are needed. Results can be used in carbon-offset finance applications.
- Biogas programmes should be better integrated into wider RE policies.
- Expertise in the use of AD, available from within the programme, should be made available to groups interested in using AD to process other wastes and for other purposes.

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1

Introduction

SNV Netherlands Development Organisation is an international development organisation providing capacity development services to local organisations in three sectors (agriculture, water & sanitation and renewable energy) through local presence in 36 least developed countries. One of the largest biogas programmes SNV is undertaking is the Asia Biogas Programme (ABP). It was started with financial support from the Netherlands Directorate General for International Cooperation (DGIS) and works in Vietnam, Lao PDR, Cambodia and Bangladesh. With ABP coming to an end soon, SNV wanted an external evaluation of the capacity development approach used in the programme. ABP was developed from the Biogas Support Programme (BSP) in Nepal, so this was included in the evaluation. The emphasis in this evaluation is on learning and improvement; not on accountability.

The SNV biogas programme in Nepal started in 1992. The success of this programme inspired the Asia Biogas Programme (ABP) launched in Vietnam in 2003 and followed by projects in Cambodia (2006), Bangladesh (2006) and Lao PDR (2007). SNV have also launched biogas programmes in Pakistan and Indonesia in 2009 and started a programme in Bhutan in 2011. By the end of 2011, 418,423 households (2.44 million people) have been equipped with biogas plants through these programmes.

One key aspect that has been implicit in these programmes has been that of Capacity Development (CD). Since 2000, the aspect of CD has been seen more explicitly as an essential part of the work of SNV and had been defined in certain contexts of their work [van der Velden 2005][SNV, 2007a]. One issue that has been identified is that of semantics, the terms used for describing the work of CD must be defined clearly. A Glossary has been added to this report for this reason.

As part of the process of defining the CD work of SNV more explicitly, proposals were invited for an evaluation of the CD work of the Asia Biogas Programme. A team of three consultants undertook this evaluation by looking at the work of SNV in Nepal and four countries in which the ABP is operating (Vietnam, Cambodia, Bangladesh and Lao PDR) and attempted to draw out the CD aspects of the work in each country.

The analysis has involved an evaluation of a large number of reports made available by SNV. The majority of reports were written in terms of the activities that were done in order to achieve the aims and objectives defined for the programme. Previous monitoring studies and evaluations, both internal and external, were designed to check on the effectiveness of those activities and to determine whether the defined aims and objectives were being achieved. Although CD was defined by SNV as key to their work, limited explicit reference is made to the concept in most of the reports available from SNV, so this has to be interpreted from an implicit understanding.

The other side of the evaluation work was a visit to the five countries by the three members of the evaluation team to allow them to talk to stakeholders involved in the SNV country programmes. Brief field visits were made to clients who were using biogas plants to supply them with domestic fuel. The sample of clients visited was far too small to allow an assessment of the impact of the programmes, but allowed the team to more fully understand the many user surveys of much larger samples of clients in the different countries and to put the results of these surveys into context.

1.1 Purpose and Objectives of the Evaluation

1.1.1 Purpose

The **main purpose** of the evaluation is to extract lessons from the Asia biogas programmes that can inform further development of the biogas and other RE programmes in Asia but also in other parts of the world. The findings of the evaluation will *not* be used for decision-making on the continuation of financial support to the programmes, as such is beyond the current policy framework of Directorate General for International Cooperation (DGIS).

1.1.2 Objective

The **main objective** of the assignment is to evaluate the specific capacity development approach of the national programmes on domestic biogas in the five countries.

More specifically, the evaluation of capacity development will address the following basic questions through a participatory, learning-oriented process:

- How can the capacity-development approach of the programmes be improved?
- How can (external) support for capacity development to the programmes be improved?

1.1.3 Main Focus

The evaluation focuses on issues of capacity development at all levels and from SNV's perspective as they have emerged over the past 22 years. It also focuses on CD approaches aimed at looking at the enhanced capacity of visionaries, their transformational leadership capacity, their innovative management and their ability to translate vision/strategy into practice. The evaluation focuses on the capacity (skills and competencies), the process, systems and structure in place that enables SNV and its partners to succeed in translating strategy into implementation and expand its success to other countries.

1.2 Methodologies

The approach to the evaluation provided common and consistent framework for assessing all five country programmes while taking into account the specifics of each country context. Inventories of stake-holders in the programmes were defined to provide a platform for clarifying key CD issues in each key sector that was formed part of the stake-holder group. The questions that were asked of the different stake-holders were related to their respective roles in the national programmes.

1.2.1 Literature Review

The literature base from which information was drawn came from four main sources. SNV offers a wide range of literature provided for the public realm on its web-site (www.snvworld.org/en/sectors/renewable-energy/publications). A range of reports from the different countries were downloaded and used as the basis of the evaluation. The country offices of SNV supplied copies of reports that were used in planning, managing and evaluating the programme in that country. Some of these reports were for purely internal use (so are marked as "unpublished" in the bibliography). The other source of information came from SNV's repository in SNV HQ in the Hague in the Netherlands which was eventually made accessible via a password protected link. (Copies of these reports on the public web site are also marked "unpublished"). The fourth source of information came from sources outside SNV. Both BSP in Nepal and the biogas programme in Vietnam had won Ashden Awards, so there is an overview of these programmes on the Ashden website (www.ashden.org). The work of SNV has been reviewed by many outside organisations, many of which had their own views of the programmes in the five countries.

The information contained in these reports was used in the inception phase to provide an overview of the programme. It was also used to provide evidence and more detailed information related to comments by the stake holders in the discussions and interviews. However, the amount of information available was much more than could be easily assimilated by the team in the course of the visits to the various country programmes. The literature review work was continued, following the visits to the different country programmes. The work of drawing out the CD aspects of the work proved time-consuming.

1.2.2 Development of Questionnaires

Research guidelines and questionnaire were developed considering the sector of the people such as government agencies, private companies, biogas users, NGOs, donors, financial institutions and SNV programme offices in each country. These questionnaires were tested in Nepal by interviewing various people from different sectors, which were also used with people in the four other countries. Different sets of questionnaires are attached in Annex III.

1.2.3 Interviews and Stake holders' meeting

Representatives from key stake holder organisations were invited to a stake holders' meeting, in each country. Using brainstorming techniques, a matrix of key factors involved in developing the capacity of the biogas programmes in different sectors were defined and prioritised. This matrix was used as the basis of a series of focussed interviews with key stake holders from the various sectors. The emphasis were placed on determining the relative influence of the different factors in the different sectors, as well as discovering any further factors that were not already identified in the stake holders' meeting.

The publicly stated aim of the stake holders' meeting and interviews was to determine the importance of the various factors involved in capacity development of the biogas programmes. Work was done on developing the inventory of stake holders, defining their capacity and capability for further improvement in

taking the country programmes forward. The lists of the persons interviewed in different countries are attached in Annex II.

Using the country visits, the team of consultants collected primary data from stake holders involved in the biogas programmes as well as the SNV biogas teams in each country. The evaluation was aimed at describing both the nature and effectiveness of SNV's CD interventions in the biogas programmes. The consultants aimed to identify the capabilities and skills of the stake holders, including their technical and management capacities, leadership capabilities, governance as well as their marketing systems and processes. The consultants aimed to capture the growth in capacities among stake holders and assess to what extent this can be linked to SNV's support. The meetings also captured ways in which stake holders have self-developed through their participation in the biogas programme (endogenous CD) Perceived capacity needs (current and future) were also captured to inform the forward looking aspects of the report.

The initial stake holder's meeting was done in Nepal, so that the methodology and the particular questionnaires used can be tested. The approach was refined in Nepal and then used in the other countries. The current activities of the stake holders and their contributions to the SNV supported biogas programmes were assessed within the broad framework of the programme intervention logic and the CD aims. Specific factors to be included in the assessment of stake holder activities and roles were listed in the report. The information collected by these meeting was continuously assessed and revealed major critical elements and their reinforcing relationships. The programmes of all the countries are attached in Annex I.

1.2.4 Field visits

Short field visits were made to clients who were using biogas plants in the five countries. The sample of clients visited in each country was far too small to allow an assessment of the impact of the programmes. The visit allowed the team of consultants to more fully understand the many user surveys of much larger samples of clients in the different countries and to put the results of these surveys into context.

The demand for biogas technology in each of the five countries was reasonably high, as biogas technology offers many benefits. The clients who were using the systems were very happy with the technology and had confidence in its use. The main issue was the affordability of the technology.

1.3 Dimensions of biogas extension

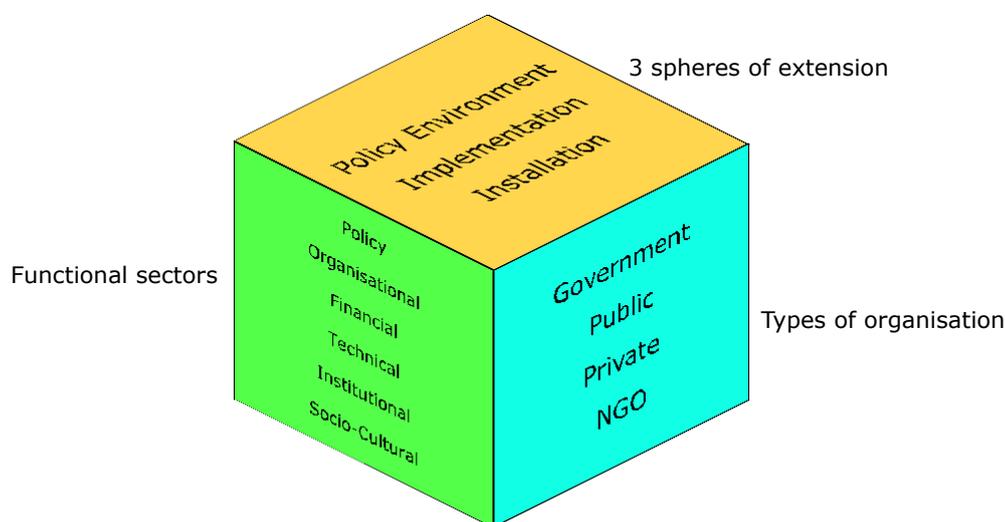


Figure 1 Dimensions of biogas extension

The Capacity Development Portal on the FAO web site (<http://www.fao.org/capacitydevelopment/capacity-development-home/en/>) shows a diagram on which Figure 1 is based. The figure illustrates that CD is multi-dimensional and can be viewed from several different angles. The figure shows just three dimensions, defined in the terminology used in this report (see Glossary), as:

- 3 spheres (or levels) of extension;
- functional sectors; and
- types of organisation.

The model of capacity development described later in the report uses three levels of involvement with the work, defined as concentric circles, or spheres. The inner sphere is concerned with the actual work of installing biogas plants. The sphere that surrounds that is the work of implementation, which is defined as the direct support services that are required. The outer sphere is the enabling environment and includes aspects such as the government policies related to the work and the provision of subsidy and loan finance.

Biogas extension involves different types of organisation, which can be seen as another dimension of the work. Organisations involved in biogas extension can be defined as government, non-government (NGO) or private, mainly depending on the source of their funding. Other types of organisation could be included, such as academic, but these were not directly involved in the work of biogas extension, although some of the work of R&D and evaluation were sub-contracted to academic consultants.

A third dimension relates to the functional sectors that are involved in biogas extension. The six that can be included are policy, organisational, financial, technical, institutional and socio-cultural. Policy needs to be planned and made by government organisations (with the support of NGO and private organisations) in the sphere of policy environment, but is implemented by government, NGO or private organisations within the implementation sphere.

A simple model, illustrated in Figure 1, demonstrates that there are many ways to view the work and the capacity development support required to enable it to function and grow. This report attempts to reflect this picture and presents different views of the work of biogas extension using a "faceted" approach. The key to understanding this approach is seen how each section relates to the central theme and provides a different view of it. The term "facet" refers to a carefully cut jewel, such as a diamond, in which the central "fire" of the jewel can be viewed from different directions, through the different facets.

2 The Emergence of CD in Development

In the 1990s, international development agencies introduced Capacity Development as a major part of their development support for developing countries. Development agencies realised that ignoring the lack of capacity of development institutions at all levels in developing countries had led to the failure of many development programmes. Tackling the capacity deficits is a necessary prerequisite to sustainable development and poverty reduction which could not be addressed through financial and technical support alone. By the year 2000 with the active promotion of the concept by development agencies, capacity development became a leading approach to the implementation of sustainable development in developing countries.

As a conceptual approach, capacity development was also linked to the search for viable alternatives to the dominant 'top-down' aid model, by refocusing attention on the crucial role of local professionals and support structures (both governmental and non-governmental) in driving sustainable development [Schipper, 2012]. Today several international development agencies including SNV have incorporated capacity development support as a major part of their development support to developing countries. The World Bank refers to capacity development as the key to development effectiveness.

2.1 Capacity Development - General Concepts and Definitions

Over the last 15 years application of various CD concepts has grown significantly within the development sector in the Southern Hemisphere (The South). Development agencies have realised that development support in the South will only be sustainable if the capacity of the core players are strengthened. Enhancing the capabilities of individual players in the partner institutions ensures effective implementation of development initiatives and the production and delivery of quality products and services.

This realisation has encouraged development agencies and their national partners to shift the focus from project-based short-term technical fixes to programmatic approaches that emphasise country ownership and capacity [WB, 2009a]. Capacity development therefore entails the sustainable creation, utilisation and retention of that capacity, in order to reduce poverty, enhance self-reliance and improve people's lives. Some of the key definitions of capacity development which are relevant to this report are summarised below.

2.1.1 Defining Capacity and Capacity Development

The term Capacity Development has a very broad variety of meanings within the international development community. It is referred to as an instrument, a process, an objective, a general approach to development and the reason for as well as the overall solution to the failure of many development attempts so far. It is important for the reader to understand the concept of CD in order to be able to apply it in the promotion of Biogas in the selected countries and beyond.

Short definitions of **Capacity and Capacity Development (CD)** presented below will clarify the differences between Capacity and Capacity Development as there is often confusion among Development Practitioners to the relevant meaning of capacity and capacity development to their organisations.

2.1.2 Definition of Capacity

Capacity is defined by CIDA as "abilities, skills, understandings, attitudes, values, relationships, behaviours, motivations, resources and conditions that enable individuals, organisations, networks/sectors and broader social systems to carry out functions and achieve their development objectives over time" [Bolger, 2000]. UNDP defines **capacity** as: "the ability of individuals, institutions and societies to perform functions, solve problems, and set and achieve objectives in a sustainable manner" [UNDP, 1997].

Capacity has also been described variously as: "the ability [of an organisation] to function as a resilient, strategic and autonomous entity" [Kaplan, 1999]. According to Ubels, capacity is defined as "the ability of a human system to perform, sustain itself and self-renew" [Ubels, 2010]. "the ability of people, organisations and society as a whole to manage their affairs successfully" [OECD, 2006]; The 'abilities, skills, understandings, attitudes, values, relationships, behaviours, motivations, resources and conditions that enable individuals, organisations, networks/sectors and broader social systems to carry out functions and achieve their development objectives over time' are seen as capacity. The definitions above clearly describe what capacity means to the development practitioner.

Capacity is the means to plan and achieve defined objectives while capacity development describes the process to achieve the defined goal. For an activity to meet the standard of capacity development as practiced and promoted by UNDP, it must **bring about transformation that is generated and sustained over time from within**. Transformation of this kind goes beyond performing tasks; instead, it is more a matter of changing mindsets and attitudes.

2.1.3 Definition of Capacity Development

UNDP and World Bank generically define capacity development as the process by which individuals form their abilities to achieve development goals [UNDP, 1997]. They describe "**CD as a locally driven process of learning by leaders, coalitions and other agents of change that brings about changes in socio-political, policy-related, and organizational factors to enhance local ownership for and the effectiveness and efficiency of efforts to achieve a development goal**" [WB, 2009b]. CIDA also defines CD as "approaches, strategies and methodologies used by developing countries, and/or external stakeholders, to improve performance at the individual, organizational, network/sector or broader system level" [Bolger, 2000].

The definition above draws the line between capacity and capacity development. Capacity is the ability to perform whereas CD is the process or approaches to enhance the capacity of individual, organisation or society to significantly improve performances.

The Paris Declaration on Capacity Development

In the review of aid effectiveness, capacity development is consistently recognised as one of the most critical issues for both donors and partner countries. At the UN conference on Aid Effectiveness in Paris in 2005 delegates made a declaration that there is a need for southern partners to take responsibility for their own capacity development. The declaration states "The capacity to plan, manage, and implement dialogue through implementation, monitoring and evaluation, and account for results of policies and programmes, is critical for achieving development objectives from analysis and dialogue through implementation, monitoring and evaluation. Capacity development is the responsibility of partner countries with donors playing a support role. "It needs not only to be based on sound technical analysis, but also to be responsive to the broader social, political and economic environment, including the need to strengthen human resources Paris 2005). The declaration also highlights the need for significantly enhanced support for country efforts to strengthen governance and improve development performance.

During the conference partner countries made commitment to Integrate specific capacity strengthening objectives into national development strategies and to pursue their implementation through country-led capacity development strategies where needed. Donors declared commitment to "Align their analytic and financial support with partners' capacity development objectives and strategies, make effective use of existing capacities and harmonise support for capacity development accordingly" (Source: (2005 Paris Declaration on Aid Effectiveness))

All sides acknowledge that, without sufficient country capacity, development efforts in many of the poorest countries are unlikely to succeed, even if they are supported with substantially enhanced funding.

In this context, the Declaration calls for capacity development to be an explicit objective of national development and poverty reduction strategies.

2.2 UNDP's Capacity Development Approach

For UNDP, an essential ingredient in its capacity development approach is **transformation**. For an activity to meet the standard of capacity development as practised and promoted by UNDP, it must **bring about transformation that is generated and sustained over time from within**. According to UNDP, transformation of this kind goes beyond performing tasks; instead, it is more a matter of changing mindsets and attitudes.

2.2.1 Capacity Development and Empowerment

Capacity development is also about empowering individuals, leaders, organisations and societies to work for transformational change that is generated, guided and sustained by those whom it is meant to benefit. Enhanced capacity generated from within an organisation or a local community serves a valid development purpose.

2.2.2 The Three Levels of Capacity Development

UNDP identifies three (points) levels where capacity is grown and nurtured. These are: **enabling environment, the organisation and the Individual**. These three levels influence each other in a smooth way– the strength of each depends on, and determines, the strength of the others.

The three are summarised below:

The enabling environment: is the broad social system within which people and organisations function. It includes all the rules, laws, policies, power relations and social norms that govern civic engagement. It is the enabling environment that sets the overall scope for **capacity development at policy level**.

The organisational level: refers to the internal structure, policies and procedures that determine an organisation's effectiveness. It is here that the benefits of the enabling environment are put into action and a collection of individuals come together. The better resourced and aligned these elements are, the greater the potential for growing capacity.

At the individual level: are the skills, experience and knowledge that allow each person to perform. Some of these are acquired formally, through education and training, while others come informally, through doing and observing. Access to resources and experiences that can develop individual capacity are largely shaped by the organisational and environmental factors described above, which in turn are influenced by the degree of capacity development in each individual.

2.2.3 The Four Core Issues

There are **four core issues** that seem to have the greatest influence on capacity development at the different levels described above. These core issues are picked up from empirical evidence and UNDP's first-hand experience and it is in these four domains that the bulk of the change in capacity happens.

The four core issues are:

Institutional Arrangements: the policies, practices and systems that allow for effective functioning of an organisation or group. These may include 'hard' rules such as laws or the terms of a contract, or 'soft' rules like codes of conduct or generally accepted values.

Leadership: Leadership is the ability to influence, inspire and motivate others to achieve or even go beyond their goals. It is also the ability to anticipate and respond to change. Leadership is not necessarily synonymous with a position of authority; it can also be informal and be held at many levels

Knowledge: Knowledge, or 'literally' what people know, underpins their capacities and hence capacity development. Seen from the perspective of our three levels (identified above), knowledge has traditionally been fostered at the individual level, mostly through education. But it can also be created and shared within an organisation, such as through on-the-job training or even outside a formal organisational setting through general life experience, and supported through an enabling environment of effective educational systems and policies.

Accountability: Accountability exists when rights holders are able to make duty bearers deliver on their obligations. From a capacity development perspective, the focus is on the interface between service providers and oversight bodies. More specifically, it is about the willingness and abilities of institutions to put in place systems and mechanisms to engage citizen groups, capture and utilise their feedback as well as the capacities of the latter to make use of such platforms

2.3 Summary: CD in the Development Sector

In a nutshell CD is broadly recognised in the development sector of the South as a highly effective process of enhancing the capacities of institutions and communities enabling them to respond effectively to socioeconomic challenges of communities in which they operate. CD practitioners assist communities to enhance appropriate capacities which enable them to respond effectively to development challenges. CD is not just limited to one-time training events, but a continuous process that also involves enhancing the capacity of the society as a whole enabling the society to take the responsibilities for its own development. Providing CD support to local communities ensures that the community owns the development process through the sustainable use of the enhanced capacity.

Capacity development builds on and harnesses rather than replaces indigenous capacity. It is about promoting learning, boosting empowerment, developing social capital, creating enabling environments, integrating cultures and orientating personal and societal behavior [UNDP, 2003].

From the narratives above it is clear that the concept of CD is much broader than the training and technical assistance approaches that are often put forward as answers to the capacity problems in developing countries. Capacity development is about acquiring skills and capabilities, improving performance, enhancing management and governance. CD is enhancing the ability of people, organisations and broader societal institutions to manage development more effectively to achieve results. CD is closely intertwined with the governance agenda and benefits from efforts to improve laws and institutions, leadership, transparency, and accountability [OECD, 2009].

2.4 Capacity Development and Good Governance for the Promotion of Biogas Technology

The promotion of biogas technology in developing countries often formally takes place at policy level initially between development agencies and high level government officials. Capacity development support is often provided for high level government officials enabling them to formulate and promote Renewable Energy (RE) (including Biogas) technologies at policy level. Capacity development support at this level can therefore be seen broadly as a process of promoting Good Governance by enhancing the individual and organisational capacity at policy level for the promotion of biogas technology at national level.

Enhancing organisation's capacity for Good Governance also means encouraging officials at policy level and managers at execution/implementation level to be accountable to their stake-holders. They also need to be transparent, responsive, consensus oriented and to exercise equity in their promotion of Renewable Energy from policy to implementation. It ensures that political, social and economic priorities are based on broad consensus in society and that the voices of the poorest and the most vulnerable are heard in decision-making over the allocation of development resources.

Good governance also entails enhancing the Capacity of people and institutions which are involved in the promotion of Biogas in the selected countries to provide efficient and effective support at policy level (enabling environment). This includes formulating policies, legislation, dealing positively with power relations and social norms. It also means enhancing the capacity of the people at execution and implementation level (project managers and staff, masons, user groups etc.) to exercise the principle of good governance in providing enhanced capacity support to stake-holders. This means promoters of Biogas at all levels in these countries should encourage good governance practices in their promotion of Biogas from policy to execution/implementation. External agencies which provide the bulk of the CD support to partners need to actively encourage governance practices as part of their contributions to the promotion of Biogas. The CD support is also provided at implementation level through the provision of learning processes, to strengthen implementing organisations (National Projects/programmes) to provide efficient and effective services to Biogas Users. |

In terms of biogas development the CD process often start with the introduction of biogas technology through the installation of pilot plants at local level. Development agencies encourage the national government to take ownership of the programme and to formalise the processes. The government formulates RE/Biogas policies in order to create an enabling environment for the promotion of RE/Biogas (technology) plants nationwide. The government creates and apex body under an appropriate Ministry for the coordination of the RE/Biogas sector. Capacity Development at this level requires enhanced capabilities in formulating policies which govern the mandates, priorities, modes of operation and coordination of all the players in the sector. |

External agencies (such as SNV) provide CD support to governments to formulate Renewable Energy policies and to provide strategic direction to the renewable energy (biogas) sector. Some CD support is also provided to the apex bodies which are mandated to supervise/coordinate/guide/monitor the operations of the biogas programmes nationwide. Apex bodies also establish contacts with funding agencies to fund the biogas programmes through subsidies and credits. Apex bodies support the establishment of an entity to manage the installation of the pilot plants, mobilising and training local stake-holders to manage projects and programmes at the implementation stage. Enhancing the capacity of Masons and Technicians to install plants and promote the RE/Biogas technology to defined markets (farmers and other rural dwellers).

2.5 SNV's Strategy 2007- 2015

The SNV Strategy of 2007-2015 reflects an enhanced commitment to quality, engagement and effectiveness. The Strategy places firm emphasis on SNV's commitment to provide CD support to National Partners. Summary of the strategy is provided below:

2.5.1 The Core Elements of SNV's Strategy

The seven core elements of the new strategy are:

- Orient its activities on impact in two areas, basic services (BASE) and income, production & employment (PIE), and focus on specific targets within these in the context of national development priorities;
- Engages strongly with local capacity builders, as they are essential to the sustainability of poverty reduction efforts and thus to SNV's success;
- Maintains advisory services as its core business, but as these are insufficient to help achieve impact on their own, SNV complements them with additional 'delivery channels';
- Embraces 'governance for empowerment' as a concept and body of expertise that is critical across all its work;
- Views its clients as part of broader actor constellations and help strengthen micro-macro linkages in order to accelerate impact on poverty and governance;
- Seeks to substantially diversify our partnerships and resources to leverage our expertise for increased impact;
- Sharpen its drive for quality in staff, work processes and result measurement.

2.6 SNV's Strategic Shift: From Implementation to CD Support

2.6.1 Overview

SNV made a major shift from the direct management and implementation of projects in partner countries to providing capacity development support through local capacity development providers (LCDPs) in 2000.

Rationale

The rationale behind such a fundamental policy change was ***the need to de-emphasize the traditional focus on donor-driven financial accountability and to find innovative ways to engage better with, and contribute to, genuine capacity development of SNV's local partners.***

SNV's Corporate Capacity Development Strategy

As part of its new corporate capacity strategy SNV has sharpened its focus on capacity enhancement as its core business. ***Emphasis is on ownership of the process and steering by the client.***

SNV's Capacity Development Goals

SNV's goal is to ***catalyse sustainable development processes.*** SNV support people to access and develop the capabilities, services and opportunities needed to live a healthy, productive and otherwise fulfilling life, while sustainably using the natural resources they depend on.

SNV Overall Capacity Development Approach

SNV's capacity development approach is aimed at supporting local actors to strengthen their performance in realising poverty reduction and good governance. SNV also continue to engage with local capacity builders enhancing their capacity. SNV continues to provide capacity support to local communities through local Capacity Development facilitators.

SNV support local partners in developing countries to develop mechanisms needed for formulating and implementing development policies; creating an enabling environment; and establishing networks with government, the private sector and NGOs

2.6.2 Key Characteristics of SNV's Capacity Development Approach

To help implement the strategic shift, SNV adopted a capacity-development approach with the following key characteristics (see also Table 1):

- A focus on delivering advisory services to 'meso level' organisations (at provincial and district levels) that cannot afford to pay commercial rates for such advice.
- The recognition that clients are 'in the driver's seat', with SNV's role being to assist them in achieving their development ambitions. Services are thus 'demand-oriented and client centred' as opposed to 'donor and adviser driven'.
- At the same time SNV, as a development organization, wants to contribute to development impact. Therefore SNV works in specific sectors or themes, where impact targets are formulated through dialogue with its clients and other stakeholders.
- SNV's ultimate goal is to ensure that its clients and partners achieve impact.
- Hence, SNV contributes to the improved performance of its clients to achieve such impacts.
- To a considerable extent, SNV can carry out its advisory work on the basis of a core subsidy and some programme funding. Consequently, the organization is able to work flexibly with existing clients, while simultaneously seeking to strategically engage with new clients as demand and need arise.

2.6.3 Key Elements of SNV Corporate CD Approaches

- SNV engages strongly with local capacity builders, as they are essential to the sustainability of poverty reduction efforts and to achieve sustainability. Engages closely with local partners through networking and training
- SNV maintains advisory services as a core business, but as these are insufficient to help achieve impact on their own, these efforts are complemented with additional 'delivery channels'. SNV's advice includes formulating and implementing Development Policies:
- SNV takes on 'governance for empowerment' as a concept and body of expertise that is critical to the success of its work. SNV applies 'governance for empowerment' as key concept in development practice:
 - Assists in creating enabling environments:
 - Guides the strengthening of institutional mechanisms
 - SNV Core Capacity Development Services

SNV CD support includes developing local capacities, strengthening governance systems, and making markets work for the poor. This is done through the provision of services in the following three areas:

- ***Advisory services***

SNV's advisory services focus on creating effective solutions with local impact. They form the core of SNV's work and provide SNV with an in-depth knowledge of local context and the agendas of local actors, rooted in a long-standing presence in over 30 countries. SNV Advisory services are geared towards the development of organisational and leadership capacities, catalysing market-based solutions and supporting enabling environments.

- ***Knowledge networking***

SNV enables local organisations and local capacity builders to access, apply and continuously renew knowledge. They can be specific to a basic services sector or value chain, but also relate to cross-sectoral themes such as capacity development and governance. They also provide the evidence base for policy influencing and advocacy. Knowledge networking entails the development, facilitation and sharing of knowledge. Its aim is to produce results in the form of explicit knowledge, learning processes or networks of clients and other actors.

- ***Evidence-based advocacy***

Sustainable poverty reduction at scale requires changes of structures, institutional arrangements, policies and practices. On the basis of a sound understanding of markets and our advisory experience in Agriculture, Renewable Energy, and Water, Sanitation & Hygiene, SNV joins forces with governments, the private sector and civil society to enrich national and international policy debates. SNV and its partners jointly develop innovative policies, strategies, and legal and institutional arrangements, as well as financing mechanisms that sustainably benefit people living in poverty.

2.6.4 Ongoing Contribution through CD Support

SNV continues to contribute to poverty reduction and improved governance in partner countries through strengthening the capacity of national partners. SNV CD support focuses on institutional strengthening and local ownership of development initiatives.

SNV will continue developing capacity for demand-driven change processes with a local dimension [SNV, 2007a].

- Capacity development for impact: Capacity development services are more effective in contributing to the reduction of poverty and the promotion of good governance if they are context-sensitive, evidence-based, offered to (groups of) clients that have the potential to make a difference to the lives of poor people, and if they are explicitly focused toward impact.
- SNV's Core Business is Developing The Capacity of its Partners: Ensuring That Partners Have Full Ownership of the process. SNV support the Client/Partner to focus on the steps and processes necessary to ensure that the Client/Partner develop the capacity Required To Achieve Its Defined Objectives.
- National ownership and the challenge of the micro macro divide: The relevance of our work is greatly increased when our capacity development services are embedded within 'home grown' national development priorities and agendas.

Table 1 Brief list of SNV's Capacity Development Strategies

3 Aspects of Biogas Extension

The work of a biogas extension programme in a development context involves a careful balance between many different priorities. Development priorities emphasise the need to maximise the impact of the work, while also demonstrating a concern for disadvantaged communities. Governments have their own priorities which are often influenced by immediate political concerns, while longer term development concerns can often received less emphasis than they should. Private companies have their own priorities, which are more related to concerns over cash flow and finance. The multi-dimensional nature of CD means that these priorities need to be considered from different points of view.

The primary reason for stake holders (including government departments, development groups, and private companies) to become involved in a biogas programme is the number of benefits that it provides. However the cost of the technology and these benefits needs to be considered. There are different approaches that have been used to encourage people to use biogas to gain the benefits.

3.1 Benefits of biogas

The benefits of biogas are listed in many SNV reports [van Nes, 2009]. They can be divided into three levels:

- the benefits for the customers who use the plant;
- the benefits for the local environment; and
- the benefits for the international environment.

The main benefits of a biogas plant for a family have been assessed in numerical terms in Table 2:

Benefits:	average biogas plant serving a family of 6 persons
Reduction of workload (especially women)	900 hours per year (2.5 hours per day)
Saving of firewood	1,800 kg per year
Saving of agricultural waste	600 kg per year
Saving of dried dung	250 kg per year
Saving of kerosene	45 litres per year
Reduction of CO2 emission	4.5 ton per year
Improvement of health	No indoor pollution, improved sanitation through dung management and attachment of toilets to the biogas plant (for 70% of all plants)
Increase of agricultural production	Increase (up to 40% for selected species) in yields

Table 2 Benefits of biogas as assessed in Nepal [de Castro, 2008]

3.1.1 Benefits for customers

A biogas plant is a masonry-lined pit in the ground into which a slurry of well mixed animal dung and water are fed each day. Microbes in the animal dung continue to digest the food materials remaining in the dung to generate a fuel gas (60% methane with 40% carbon dioxide and other gases). The remaining slurry contains fertiliser chemicals, such as nitrogen, potassium, phosphorus and trace elements that have been released as the food materials are digested and can be used as a fertiliser on crops.

The immediate benefit from a biogas plant is a clean cooking fuel, which replaces other fuels such as firewood. The bad effects are removed, such as wood smoke, the time required for wood fires and incidence of burns. Biogas is instantly available in the morning and heat can be easily controlled, by turning a valve. The children of a biogas plant owner can be given a hot breakfast before they go to school. The outsides of cooking pots are very clean, without soot. Women’s clothes and skin are also much cleaner. The removal of smoke has very positive health benefits, particularly for women and children as wood smoke causes eye irritations and respiratory problems.

While feeding a biogas plant requires collecting of animal dung, firewood collection takes much longer and carrying it is hard work and can strain people's muscles. Dung for a biogas plant needs mixing with water. Wood requires cutting and storing in a dry place. User surveys show that people using biogas save tentatively 3 hours a day, which can be used for productive activities. User surveys in Indo-China suggest that the main benefit of a biogas plant is the reduction of smell from the use of dung from pig sties close to the house. People can allow piglets to grow larger before they are sold, giving a higher price.

Biogas can also be used for lights in place of kerosene, although the efficiency of both are low. Kerosene smells and can spill and catch fire if lamps are knocked over. Gas lights are fixed, so the danger of fire is reduced. User surveys show that a biogas plant can save a family tentatively 32 litres of kerosene a year, if it is used for lighting.

Many biogas plants have latrines attached, so it improves sanitation. Pathogens and parasites are not completely eliminated in a biogas plant, but they are severely reduced. WWF identified that a latrine can reduce the number of snake bites, as women do not need to hide behind bushes at dawn and dusk for toiletry purposes.

The effluent slurry from a biogas plant has an improved fertiliser value over the use of raw dung. The fertiliser value can be further increased by further processing, such as by mixing it with dry biomass material and composting it. Composting also further reduces pathogens that may be still present in the slurry.

3.1.2 Benefits for local environment

The major impact of biogas technology is the replacement of wood for cooking fuel, so reducing deforestation. User surveys suggest a family with a biogas plant tentatively saves the use of 2,000 kg of wood a year. WWF has calculated that 1,000 biogas plants in an area can save 33.8 ha of forest from clear felling. Tree cover is essential for the survival of many animal species, such as tigers, as well as preventing the degradation of land. Deforestation is seen as a major cause of landslides in Nepal, as tree roots stabilise the ground on steep hillsides, as well as allowing rain to penetrate into the soil along their branches, trunk and roots, to maintain the watersheds that store water that supply springs.

The use of a local supply of fertiliser from biogas slurry reduces the need for artificial fertilisers, which can pollute the environment. Compost also acts to enhance the soil, as it helps the soil to retain nitrogen and other plant nutrients in the top surface and releases them slowly, so the plants can use them. Inorganic chemical fertilisers, such as urea, are water soluble and leach out of the soil more quickly and pollute water courses encouraging algal growth.

3.1.3 Benefits for the wider environment

The two main causes of anthropogenic global warming are deforestation and the use of fossil fuels. Trees absorb carbon dioxide from the atmosphere, so their removal reduces the rate at which carbon is sequestered. If they are used unsustainably as wood fuel and are not replanted, they also add carbon dioxide to the atmosphere. When fossil carbon is burnt, it adds extra carbon dioxide to the atmosphere.

Since the use of biogas plants reduces the rate of deforestation and also replaces the use of kerosene for lighting, it has been recognised that a biogas extension project does reduce the amount of carbon dioxide released into the atmosphere [Devkota et al, 2011]. Several biogas programmes have been accepted for registration by the CDM Executive Board. The first biogas programme accepted under CDM was the SNV programme in Nepal [CDM, 2005a]. However, the methodology was changed, so BSP/N had to reapply under the new rules to be accepted for further carbon offset finance following the first two phases [CDM, 2009].

Further refinement of the CDM methodologies have been able to include the use of the fertiliser from composted biogas slurry [Ter Heegde, 2008]. The production of inorganic fertilisers is very energy intensive, so its replacement reduces the use of fossil carbon.

3.2 Historical Context

3.2.1 Historical context in Asia

Biogas was originally discovered in the late 19th century in both India and China, when it was found that sewage in a closed container generated a flammable gas, methane. Large programmes were set up in the

1970s in both China and India [Fulford, 1988]. The Chinese programme built large numbers of plants (1,600,000 a year), but the plants were of low quality and had a lifetime of less than 5 years. However, they did develop a range of valuable designs [NSPRC, 1985], [van Buren, 1979]. NGOs from other countries sent staff for training in the new approach. The Indian programme run by KVIC (Khadi and Village Industries Commission) [Moulik, 1990] used a floating metal design. Various groups such as PRAD (Planning Research and Action Division of the State Planning Institute of Uttah Pradesh) and AFPRO (Action for Food Production) adapted Chinese designs for use in India. Poor follow-up in this programme meant that many plants were poorly maintained and people stopped using them.

In Nepal, a biogas programme had been started by DCS (Development and Consulting Services) of UMN (United Mission to Nepal) and the ADB/N (Agricultural Development Bank of Nepal), as the Gobar Gas and Rural Equipment Development Company Ltd (GGC), following a government initiative in 1976 with initial funding from USAID [Fulford, 1988]. ADB/N took over the programme with funding from UNDP and UNCDF (United Nations Capital Development Fund) [Karki, 2007]. GGC asked SNV to provide Technical Assistance in 1988, so two volunteers were recruited in 1989. ADB/N, GGC and SNV agreed to ask DGIS for Financial Assistance to continue the work under BSP (Biogas Support Programme), so a thorough assessment and feasibility study [Leermakers, 1993a][Leermakers, 1993b][Leermakers, 1993c] was made.

3.3 Approaches to Biogas extension

Different biogas programmes in different places have used different approaches to biomass extension. The type of organisation that runs the programme will often determine the approach.

In India, the programme has been run under government organisation, so the approach was strongly top-down [Moulik, 1990]. The Indian government, through the Ministry of Agriculture, and then DNES (Department of Nonconventional Energy Sources), defined annual targets for plants to be built. KVIC subcontracted the work of building plants to local constructors. In China, a proclamation by Chairman Mao encouraged the building of biogas plants [Moulik, 1985]. The actual work was done by local people under the guidance of political cadres.

The result of these government inspired programmes was that large numbers of plants were built, but they were not used properly and people stopped using them. In India, the companies did not take responsibility for the plants they built and customers were not followed up. In China, political cadres lacked technical expertise, so the quality of the construction was poor.

In Bangladesh, an academic institution, BCSIR (Bangladesh Council of Scientific and Industrial Research) built several hundred biogas plants of different designs in the 1980s, but the quality was very poor and most did not work at all, or failed after a short time [Rahman, 2007]. The quality did improve, once an engineer from BCSIR had been trained in China. However BCSIR did not have a follow-up programme.

In India, NGOs became involved, such as AFPRO, became involved, but their priorities changed over time. NGOs in less developed nations rely on outside funding so are heavily influenced by the funds they can attract. The NGO approach is that they are paid for the work that they do, but the payment does not necessarily depend on that work achieving results.

The third main approach is to run a biogas extension programme in the private sector. This approach was pioneered in Nepal with the formation of the Gobar Gas and Agricultural Equipment Development Company (GGC) by UMN (United Mission to Nepal) and ADN/N (Agricultural Development Bank of Nepal) in 1976. Since it had funding from outside aid groups, such as USAID and UNDP, its approach was more like that of an NGO. The earnings of the company, and its local offices, were dependent on the number of biogas plants that were built. As a monopoly, however, the overheads of the GGC were high and there was limited encouragement to improve efficiency.

The SNV approach involves several different organisations, including those from the governmental and private sectors, as well as some NGO groups as well. This multi-actor approach balances out the different pressures that motivate the different organisations. Working with several installation companies leads to a degree of competition that leads to operational efficiency. Also each company can have a base in a local area of the country, so staff can build local relationships which form a base for effective sales efforts.

3.4 Use of subsidy for a biogas programme

Many financial analyses have been done on biogas, especially when the programmes were first introduced, and most demonstrate a benefit:cost ratio that is marginal [Fulford, 1988][FAO, 1996] i.e. a plant owner might just save enough to cover the costs of the plant over its lifetime. Many farmers in developing countries do not see savings as cash, rather in the saving of time.

A wider economic analysis of biogas, putting a value on externalities, such as reduced deforestation, improved health, etc, gives a benefit:cost ratio much greater than one. This offers an argument for providing a subsidy to biogas plant users. The national governments of India and China provided subsidies, but smaller countries of Asia, such as those in which the SNV ABP is involved, needed outside support in the form of ODA.

More recently, biogas has been seen as a way to replace fossil carbon fuels. Biogas also replaces firewood from unsustainable sources and reduces deforestation. It is accepted as an approach to reducing the generation of anthropomorphic carbon in the atmosphere, which is seen as a cause of global warming. The Kyoto protocol through the CDM defined a mechanism for dealing with these external costs, so carbon offset finance could replace subsidy from ODA. Present thinking sees carbon offset finance as a commercial transaction rather than a subsidy. Interviews with stake-holders in the various countries offered confused opinions as to whether carbon offset finance (COF) could replace ODA as a means to offset the externalities of the cost of biogas plants. At one of the stake holders' meetings it was suggested that a thorough review needs to be done of the costs of domestic energy from all sources, so that energy subsidy policies could be rationalised. Such a review would need to be done country by country, with the involvement of the governments of each country.

An attendee at one of the stake-holder meetings claimed the actual levels of subsidy used in the biogas programmes were arbitrary and needed to be placed on a firmer footing. Full economic analyses should be done in each country to determine the wider value of the benefits gained from a biogas programme. The analyses can be used as a basis for writing documents for carbon offset groups. For example, WWF saw the value of carbon offset by biogas as being much higher than some of the aid agencies.

3.5 Subsidy as a mechanism to ensure quality control

Biogas technology developed a poor reputation for reliability in Asia, as the programme in China had a low success rate (probably less than 50%). The success rate in India was about 60% under a very bureaucratic, top-down government programme [Moulik, 1985]. SNV recognised the need to provide high quality technology for their biogas programmes.

In some of the countries in which SNV has started programmes, there were existing biogas technologies inspired by the programmes in India and China. Rather than developing new technologies, SNV adapted the existing technologies to ensure high quality and reliability. They worked with local technicians to develop a standard version of the local design and defined key dimensions to be used to check that the plant and trained masons to build to the required quality. The plant is then checked by the supervising technicians, to confirm and record the key dimensions are within the defined specifications.

The size of the plant required for a customer depends on both the amount of biogas required and the amount of animal dung available to feed the plant. The technicians and masons work with the user to determine the right plant size and where it should be built. The user is shown how to use the plant and to do routine maintenance. The staff are trained to do this work and record what they have done in the plant record.

Each plant record is transferred to a central database held by the managing organisation. Each record is checked, so the subsidy can be released. Money is paid from a central fund to cover part of the cost of the plant. The amount paid as subsidy varies between different country programmes and also within some country programmes. In some of the programmes the subsidy is paid to the construction organisation, in others it is paid direct to the customer.

The process of making the subsidy payable once the quality has been checked and approved works as a powerful mechanism to ensure quality control.

3.6 Training aspects of CD

The training and coaching of different actors in the biogas programme is an essential part of the CD in SNV's support to the programme. The programme office produces materials for both promotion and training in the local language which are used by the implementing organisations to train technicians, masons and users. The training includes basic theoretical aspects as well as practical training, using the concept of "learning by doing".

As the programme expands, the skills are passed from one generation of supervising technicians and masons to the next group. "On the job" training is a key feature of the approach. The emphasis on quality control reinforces the need for supervising technicians and masons to ensure they gain a high level of skills. The training gives new members of staff a thorough exposure to the culture of quality that impacts the ongoing programme.

SNV did attempt to sub-contract the training work to external organisations in several of the countries of the ABP. The success of this approach has been variable. While it fits into their multi-actor modality, as people from the academic sector are involved in the programme, the approach and objectives of most training centres does not fit well with the needs of the programme. Many academics, especially those working in Asia, have a culture of training that is strongly biased towards giving students a theoretical understanding of a subject. The concept of providing students practical skills has a very low priority in their thinking. The emphasis in many training colleges is getting students to learn enough to pass their exams, and technical skills are not an area that can easily be tested via a conventional examination system.

There is a further dimension to this cultural divide between practical and theoretical training approaches. Staff of the biogas programme can gain very high levels of practical skills to enable them to fulfil the tasks they are required to do and improve the effectiveness of the programme. However, these skills are not valued in the wider society, which sees the certificates that are obtained from passing exams as being of much greater worth. Therefore the installation companies see a high turnover of practical staff. Once good staff have gained sufficient practical skills to earn a good income, they leave and look for better opportunities. These can include work on the larger construction companies in their own country, as many countries in Asia have rapid urban expansion; a move to the Middle East, where construction workers are even more in demand; or using their savings to do a more theoretical training course that gives them a certificate at the end.

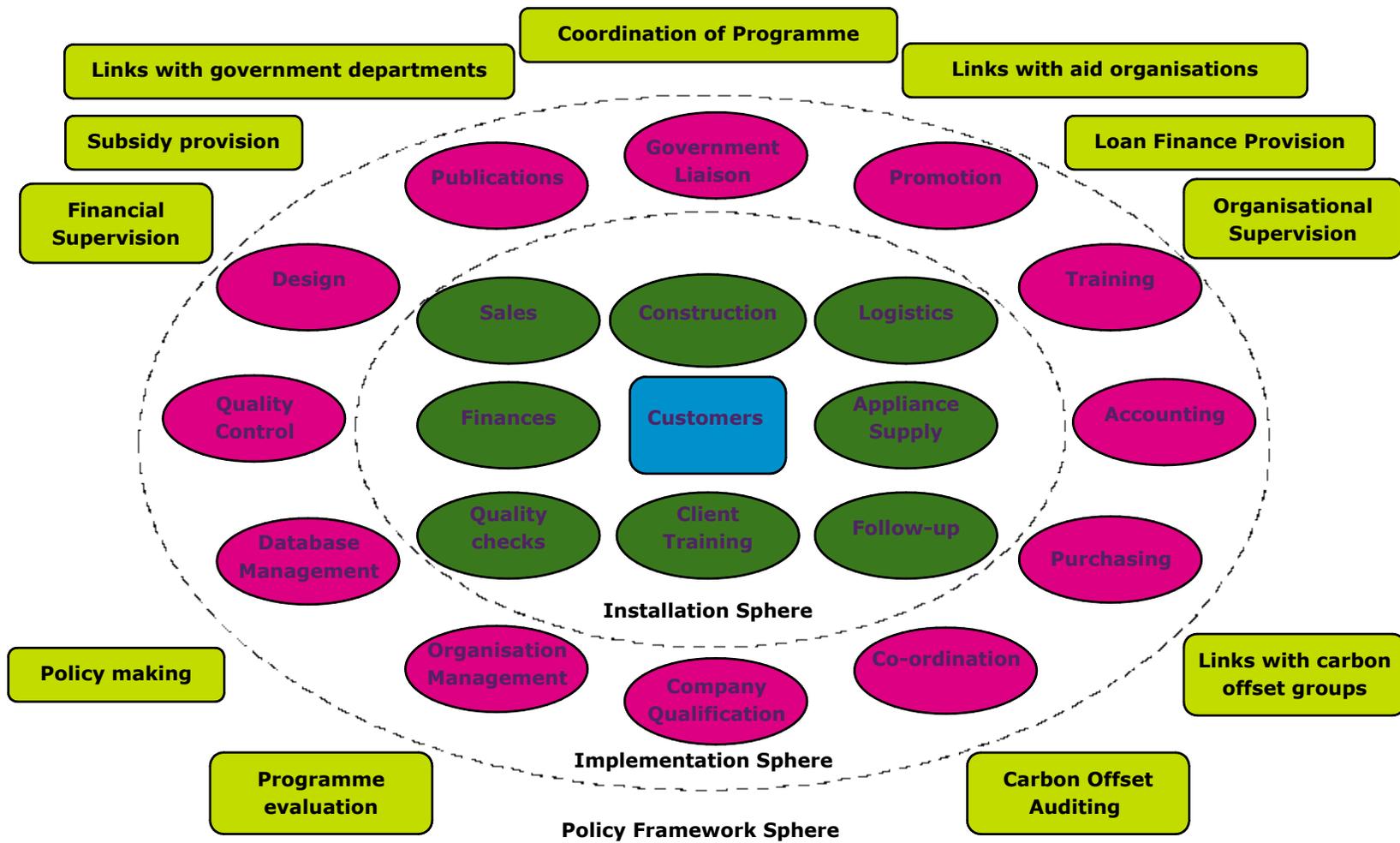


Figure 2 Model of biogas extension

4 A Model of Biogas Extension

4.1 Biogas extension tasks

The work of biogas extension involves a range of tasks [SNV, 2005a] that all need to be performed for the process to work effectively. These tasks can be placed in one of three concentric “spheres” or levels [SNV, 2010],[SNV, 2012b] of work (see Figure 2):

- Installation: the micro level “core” activities of selling, constructing and follow-up of biogas plants;
- Implementation: the meso level “support” activities of supply of materials and equipment, administration, promotion, training database management, quality control, accounting and financial support, including the provision of subsidy; and
- Policy Framework: the macro level “enabling environment” activities, such as government support policies, subsidy policies of both national government and aid organisations, promotion activities through national media, and co-ordination with other development programmes.

4.1.1 Installation activities (Micro level).

The ultimate core of a biogas extension programme is the customer, who actually purchases and uses the technology. The process of extension involves building relationships with each customer, persuading them of the benefits of investing in biogas plants and ensuring they get good quality technology that works well. This relationship should continue after a plant is constructed, with user training and follow-up visits, to ensure the customer has no problems in the use of the plant [Leermakers, 1993b].

In the SNV model approach, the work of installation should be done by private companies or NGOs, who employ sales people to sell plants and masons to construct them. The main capacity development requirement is to enable the staff of these companies to be well trained and motivated to do this work. In some countries, part of this work is done by other agencies, such as government extension offices.

In the process of selling and constructing a biogas plant, there are a range of direct support activities in which the local company or NGO must also be involved. There is a logistical process to ensure materials, components and appliances are on site when they are needed. The companies make different arrangements with customers, who may be able to save money by providing some of the materials, such as sand and gravel, themselves. A biogas plant is built in a hole in the ground, so the labour to do this may be provided by either the customer or the company. Staff within the company need to be provided with the capacity to plan the logistical arrangements for the different approaches.

The core process has a financial aspect, as the company must receive payment from the customer, as well as assisting the customer to receive subsidy and loan finance. In some countries the subsidy is paid directly to the customer and in others, the company receives the money, once the customer has agreed that the plant is in place. Where loan finance is supplied, it can be provided by local MFIs (micro-finance institutes) or by banks, with the help and support of installation company staff.

The quality control mechanism is another aspect of the core sphere. Plant construction work is checked against a defined specification. Each plant should be checked by a member of staff of the construction company, while an external checker checks a sample of plants built by each company each year. The details of each plant built are recorded and sent to the local company office, who sends a copy to the group administering the country programme. Each plant is given a unique code, which is placed permanently on the plant, either on a plate fixed to the structure or inscribed in the cement plaster on the outside while it is still wet.

The manufacture, supply and installation of gas appliances is also part of the core sphere. In some countries, the manufacture of appliances (gas burners and lamps) is done by workshops run by an installation company. In other places appliances can be purchased from manufacturers who are not considered as part of the country biogas programme and who might be in other countries, such as India and China.

A major benefit of biogas is the supply of good quality fertiliser based on the effluent slurry. However, this benefit will not be realised unless the customers are trained to use the slurry in the correct way. The sales personnel (extension agents) of the companies need to be trained in the use of the slurry, so they can train

the customers. The company staff may also need to work alongside agricultural extension workers, who can offer more detailed advice on the best use of the slurry on the crops grown by the customers.

4.1.2 Implementation Activities (Meso level)

The core activities need a range of direct support work, which can be located in a surrounding sphere or at the meso level. The implementation agencies can be an organisation (or organisations) that is separate from the installation companies, but which supervises and co-ordinates their work. Alternatively, it can be an association of the installation companies that does similar tasks. There must be a level of independence of the implementation organisation from the work of installation, to ensure critical aspects of the work, such as finance and quality control, are done properly.

One of the tasks of a body that seeks to provide an overview of the task of biogas extension is the official recognition of the companies involved. Companies wanting to become involved need to be prequalified by meeting specified regulations, such as the employment of only fully-trained masons, the readiness to only use standard designs of plant and a readiness to provide training to the customers [Bajgain, 2006]. The companies also need to demonstrate that they are fully registered according to the national government regulations and have sufficient working capital. Since the companies are usually only paid once a plant is constructed, they need to finance the cost of material and staff themselves.

The work of selling biogas technology needs to be supported by promotion through suitable media, such as pamphlets, newspapers, radio and TV, so that people are exposed to the technology and its benefits. If promotion is to be effective, information needs to be updated and presented in various different ways that catch people's attention and keep them interested. The type of media used must also be carefully considered and targeted at the people who are most likely to purchase biogas plants. If people in the rural area of a country have poor literacy, print media will be much less effective than radio publicity, for example. However, the work of presenting biogas technology in radio programmes in a way that encourages people to listen is a challenging task.

The staff in the installation companies need to be trained to build biogas plants to the defined specifications and to check them. This involves running courses and also preparing booklets and other training materials that can be used in the courses and then kept by the staff for reference in their work. SNV uses an apprenticeship training approach in which new staff learn "on the job" by working with experienced people. As well as the masons and construction supervision staff, other staff of the installation companies also need to be trained in effective logistic management and financial accounting. Companies need to have a policy that allows their staff to advance if they are doing their jobs well. Training is therefore not only required for staff when they first join the company, but also ongoing training should be offered for staff who want to advance and improve their work and gain better positions and salaries if they do so.

One area in which the customers need training is in the best use of the effluent slurry as a fertiliser. Training courses need to be organised for the installation company staff on how to explain to the customers how to use their slurry. Further pamphlets are required to cover this aspect of the work. Agriculturalists need to be involved, either as advisers from agricultural colleges or agricultural extension services, or as employees of the organisations doing the implementation work.

The supply of finance for subsidies and loans requires effective accounting procedures to consolidate and check the information from the installation companies. Loans can be made available from banks, but most banks see rural loans as requiring excessive resources. SNV encourages the involvement of MFIs which can manage the loans at the local level. Banks sub-contract the local work to MFIs, while supporting the programme by providing them with soft loans. While customers usually deal directly with MFIs, with or without the help of the company building their biogas plants, there is a need to co-ordinate the relationships between the different organisations centrally. MFIs may need a similar pre-qualification requirement to be involved in lending for biogas technology, depending on government regulations.

In many cases, the supply of materials is organised by installation company staff from local resources. However, the supply of some materials, such as reinforcing steel rods, and especially the supply of some components, such as gas valves, is organised centrally. Purchasing such supplies in bulk can often reduce the cost, especially if they need to be imported from outside the country.

One major task is running a quality control mechanism. When a biogas programme is to be started, work is needed to define a design for a biogas plant that can be shown to be reliable and straight-forward to build. The quality control procedure depends on a list of key parameters that can be measured to ensure a plant

will work well when it is filled with slurry. These checks will be made by the staff of the company that builds the plant, but independent assessors check a sample of the plants built by each company each year, to ensure standards are maintained. Subsidies are only released if these sample plants meet the specifications. If some of the less critical parameters are not met, a fine might be imposed, so the company does not receive the full subsidy.

The information provided by the companies and independent assessors for each plant is added to an overall database kept by the national implementation group. This data is then the basis for allocating subsidies and provides a resource when the programme is audited each year and also for the yearly reports of the programme.

SNV has a policy of monitoring and evaluation of its programmes. For a biogas programme, this means assessment of the impact of the work by regular user surveys. A sample of customers is chosen from the database, randomised as far as possible, and these customers are visited by people who are not connected with the work of biogas extension. The survey is usually contracted out to a local NGO or company who specialise in rural development assessment work. Other monitoring work includes a yearly internal assessment by the staff involved in the programme, including the presentation of financial reports, as well as other external evaluations of the work by independent groups experienced in rural development programmes.

Carbon offset finance has demanded a higher level of scrutiny, as detailed audits are required of the amount of carbon saved by running a programme. These audits include more thorough user surveys, again visiting a sample of the customers of biogas installation companies to check that the technology is being used in a way that replaces unsustainable fuel wood, so reduces the potential release of carbon dioxide into the atmosphere. These audits attempted to define values for the energy used by rural households, so that the carbon saving could be estimated. These audits also check the record keeping of the biogas installation companies and the accuracy of the database held by the implementation organisation.

4.1.3 Policy Framework (Macro level)

Renewable energy is now seen as an important strand in the policy of national governments. The supply of domestic energy has a political dimension at the macro level, as it is an issue that impacts most people. A biogas programme, especially if it is supported by subsidies from outside the country (from ODA or COF), needs to have government involvement, as it usually requires agreements from government departments to function. If the programme is to operate on a scale that will have an impact on society and the environment, it will affect the overall domestic energy supply and the government of the country will need to include it in their domestic energy policy.

Different departments of the government are likely to be involved, so one task that needs to be done is that of coordinating their work. Subsidies from outside the country will usually need to have the agreement of the Ministry of Finance, as it affects the national budget. Domestic energy is likely to come under the Ministry of Energy and Resources, while a programme that reaches domestic households in the rural areas means that the Ministry of Agriculture and Livestock is also likely to want to take an interest. SNV encourages the government of a country to set up a coordinating committee, with representatives from different ministries, as well as from aid agencies, so the approach can be discussed and differences resolved.

One, or more, government departments usually take responsibility for the biogas programme and set up an office, or an Apex Body (AB), to supervise the programme. This office has an overview of the implementation work and acts as a final check on the tasks of promotion, quality control and administration. It has the job of finally approving the subsidy and checking the financial management of the biogas programme on behalf of the government. It recommends how the government makes policy under which the programme operates. Certain aspects of the programme, such as the prequalification of companies, require legal authority, which requires government action administered by the AB. The AB may also be responsible for other renewable energy technologies, such as solar, micro-hydro etc. so can coordinate the work of extension for the whole renewable energy sector.

Finance for subsidies (or carbon offset finance) is provided by the government of a country and/or from ODA from either bilateral or multi-lateral (usually UN) aid organisations. Requests for subsidy will come through the AB and be directed to the organisations that have agreed to support them. Usually targets are set for each year for the number of plants to be built, so that budgets can be set for the provision of subsidy. In a similar way, agreements for loan finance need to be made with national or international

banks, so that the money can be made to the MFIs that are involved in the programme. Once a yearly target has been defined, the MFIs can work out the finance that they need to provide loans. The work of providing carbon offset finance to a biogas project is even more complex, as audits are required to ensure that the programme is saving the carbon that it claimed.

The AB, with the support of the government department(s) to which it belongs, needs to work with the different groups that have agreed to provide subsidy, loan and carbon-offset finance, to ensure that the plan is being followed. Some groups can make their own plans for a different approach to a programme, which may distort the work of other groups. Other government departments can also seek to set up other programmes for their own purposes. The work of coordinating the different groups involved in the programme can therefore be complex.

The work of improving the technology used in the programme and also the best use of biogas slurry needs the involvement of research and development groups. In the SNV model, this work is sub-contracted to other organisations who offer support at the policy level. This includes tests of biogas appliances and research work as to the best use of biogas slurry on a range of different crops.

The work of monitoring and evaluation of the programme is directed at policy level. Contracts are placed with suitable groups with a good reputation for evaluating rural development work. Carbon offset audits need to be done by groups that have been trained to do the work and approved by organisations involved in carbon offset finance.

4.2 SNV's approach to biogas extension

SNV has defined an approach on the building of viable biogas programmes under five key headings [van Nes, 2009]:

- Facilitating thorough, participatory and context-specific preparation
- Establishing a sustainable sector as the ultimate long-term objective
- Interlinking impact and capacity development targets
- Promoting a market-oriented approach
- Attributing sector functions to multiple stake holders

4.2.1 Preparation

SNV see the key to getting the above tasks done effectively is choosing the right groups to do the different tasks. Time must be spent at the beginning of the launch of a new programme to understand the context in which the programme will be working and identifying the organisations already involved in the area. The analysis considers four key aspects, technical, social, economic and environmental, all within the political context of the country.

If a country already has experience of using a biogas technology, a study is made of the designs of plant used and to see whether they can be adapted to make them more effective. The technical potential for a programme relates to the numbers of animals on farms and the amount of dung that is produced to run the plants. The demand for biogas is also likely to be much higher in places where people face a fuel wood shortage and are desperate for an alternative source of cooking fuel. The number of animals on a typical small-holding is another factor. It is usually recommended that customers have three cattle or more, or at least 6 pigs, in order to obtain enough gas for cooking.

Social aspects include people's attitudes to animal dung and their willing to work with it. People in Indo-China have a long tradition of using both animal dung and human sewage as fertilizer and have little social resistance to using biogas slurry in the same way. People in other countries may be much more resistant to collecting animal dung and using it to feed a biogas plant. Another social aspect is the position of women in society, as they benefit most from its use. A biogas plant requires that people are settled on their own land and have animals in local stables which can provide the dung.

The types of organisations already involved in the extension of other technical aspects to rural communities are also considered. There may be a good history of adoption of renewable energy technologies, such as solar home PV systems. There may be a strong agricultural extension system, helping farmers grow a wider range of crops or encouraging improved livestock for milk or meat to improve family nutrition

The financial aspects are also considered. The existence of local MFIs means that people will be able to take loans to pay for biogas technology. The readiness of governments to accept the use of subsidies for a biogas programme is another factor. Most governments already have policies on the use of domestic energy, so are willing to adapt those policies to include the use of biogas as an alternative to kerosene and LPG.

Previous attempts with a biogas programme in a country may have both positive and negative effects. If similar designs of plant have been built, but have not worked well, there will be a sense, both within government circles and also in the public realm, that biogas does not work. If other designs have been used, such as cheap plastic systems which have a short life-time, people are more likely to pay for a good quality system that they will know will last much longer.

Once these studies are complete, a detailed plan is drawn up in collaboration with the national government of the country. The government is requested to set up an office (an Apex Body) within one of its ministries to work with the biogas programme. A partner organisation is contracted or set up by SNV to run the programme agency, in collaboration with the government apex body. Detailed agreements are required to manage the financial side of the project, so that subsidy finance can be made available as soon as it is needed. Links may also be required with banks and MFIs to enable customers to gain access to loan finance.

Installation groups are encouraged to become involved in the work. Preferably these groups should be private companies, which are prequalified according to a set of defined regulations. The staff of these extension groups need to be trained to do the work. If there are groups already involved in building biogas plants in the country, the staff can be trained to develop their skills to build plants according to the quality control standards that are being established. If biogas technology is a new innovation for a country, skilled people may need to be brought from other places to train the staff of partner organisations who are interested in being involved.

The initial capacity development approach requires many dimensions, which need to be put in place simultaneously. A programme will start with a few partner groups who work together to set up all the required processes. Other partner groups can then be added to expand the programme, as people become experienced in their work and are then able to train and support others. The initial process of setting up such a project can be time consuming, but it cannot be hurried if a good foundation is to be established.

4.2.2 Sustainability

The aim of a biogas programme is that it should be established in a way that allows it to continue to function without the support of outside aid agencies. Once a programme has been started, it must be helped to grow and develop until it becomes a critical mass that is self-sustainable [van Nes, 2009]. This can take a long time. The initial work must be strongly supported, as the work of capacity development in the programme is expensive in terms of both staff and financial resources. As the programme grows and local staff gain experience and confidence, outside support can be reduced. Eventually it is expected that such a programme will run independently of outside support.

The work of building up of partner organisations and their staff involved in a biogas programme requires a range of capacity development approaches. Once people have developed key skills in all of the aspects of the programme, they need to gain confidence in those skills, so they can take on more responsibility for the work. People need to have a sense that they can progress within the programme as their skills develop, so they can take on increased responsibilities and the rewards that go with them. While SNV may be very involved in the partner programme agency in the initial programme, it seeks to withdraw its involvement as the project proceeds and the local staff become more able to run the programme without SNV support.

The financial aspect of a biogas programme is one dimension that has been difficult to make sustainable. Biogas is seen as a technology that has marginal financial benefit for the customers when direct costs are considered. The major economic benefits only appear when the external costs are considered, such as those that affect the local and world environment as well as the health of the customers purchasing the plants. This means that external support will continue to be required. National governments need to be encouraged to supply some of this support, but government officials and politicians need to see the achievements and impact of a successful programme to recognise this. The recent availability of carbon offset finance allows the possibility of an income stream that reflects the wider external benefits of the technology. However, the complexity and bureaucracy that carbon offset finance involves means that

further capacity development work in the form of training and confidence building is required before programmes can take full advantage of this.

4.2.3 Targets and capacity development

Approaches to development work in developing countries can be very target oriented. The success of a development programme, such as a biogas programme, is usually measured by the number of plants installed. There is a temptation to take short cuts in order to increase numbers, but this can prevent effective capacity development work that makes the programme more sustainable in the long run. Also the primary aim of the programme is to ensure that the benefits of the technology are realised. This means that a much better measure of the success of the programme is the number of plants that continue to be used by the customers who purchase them. This requires that the plants need to be made to a required quality, so they continue to function effectively. The installers also need to follow-up customers, to make sure that they are happy with using the technology and can have access to repair and maintenance if they run into problems.

Alongside the orientation towards targets, SNV places a major emphasis on the need for capacity development in their partner organisations. Alongside the target of installed biogas plants, a target of the number of companies capable of installing reliable biogas plants is a better measure of success. A core activity required to achieve this target is that of training of staff, both initial training, but also ongoing training that enable people to enhance their capabilities and develop their roles in the programme. The impact of this work is measured through regular users' surveys that check that customers are continuing to use their plants and are saving fire wood and fossil fuels by doing so.

The capacity of government officials, particularly the staff of the apex body, to supervise and coordinate the programme is also a key issue. Training can be offered to these officials to enable them to do their work more effectively. The impact can be monitored by SNV staff who are working alongside them and evaluated by outside consultants given contracts to evaluate the programme as a whole. Since government organisations have their own approaches to career development and job progression, it is important to ensure that the apex body and the associated government offices have a corporate culture that encourages and enhances the programme. When staff move on and are replaced, the colleagues of new members of staff can then bring them up to speed and encourage them to gain the skills required to maintain the quality of the programme.

4.2.4 Market oriented approach

The aim of the programme is to have large numbers of customers in rural areas using biogas technology and enjoying its benefits. A market oriented approach places the customer at the core of the programme; all of the programme activities are oriented towards ensuring they have a high quality plant at a price they can afford.

The quality control mechanism is one of the keys to this. Quality control does not only apply to the need for technical quality, although this is an essential part of the way the programme is run. The quality of the marketing of the technology is also important. The sales people from the installation companies need to relate effectively to the customers and help them to make the decisions that will ensure they have plants that meet their expectations. This includes a readiness to refuse a sale to a customer who has an inadequate number of animals to provide the dung to feed the plant. It also includes a readiness by the installation companies to ensure customers are properly followed up and able to obtain a quick service if they have problems with their plant.

Quality control means that the installation company makes its own checks on the plants that it builds. Details of each plant built are recorded, along with measurements of key parameters, and sent to the programme agency to add to the database. Independent checks are made of a sample of plants built by each installation company, both of technical aspects and also of the opinion of the customers of the way the sales people worked with them. Regular user surveys of more established plants check that a sample of the customers are still happy with their plants and continue to use them.

All of these checks are made against defined written standards, so objective measurements of quality can be made. Technical standards are defined as detailed drawings and checklists that are used by the installation companies to guide construction work and to allow them to check on their own internal standards. Well performing companies are rewarded with quality certificates that they can use in their publicity materials. If several plants chosen from sample built by a particular company are not up to

standard, they will be penalised by a cash fine on the whole batch of plants from which the sample was taken. Since the programme agency pays a subsidy on each plant for which records are submitted, it is clear which plants have been checked and to which batch they belong. A cash fine can be subtracted from the subsidy that would have been payable. Installation companies that regularly build plants that come below standard can be ejected from the programme and their qualification removed.

4.2.5 Use of multiple stake holders

The different types of organisations involved in biogas extension each have an important role to play, so a key to an effective programme is to assign relevant functions to the appropriate stake holders. The market-oriented approach suggests that installation should be done by several private companies, so that a level of competition can encourage efficiency and effectiveness.

Implementation requires an organisation that coordinates and directs the work, so this is best done by an NGO or a government organisation. In Bangladesh, the implementing organisation is a private company, but IDCOL is responsible to government organisations and does not earn its primary income from its work in biogas extension.

Most organisations involved in the policy sphere are usually directly run by the national government, or, as in the case of banks, independent but closely related to government. Other organisations in this sphere, such as aid organisations, are international and relate to other national governments, or the United Nations. Private organisations can be involved in offering carbon-offset finance, consulting and evaluation work. Academic institutions can also be involved in some of these areas, as well as in R&D work and training. These groups work under contract to government or international organisations.

Effective preparation for a biogas extension programme is the identification of the correct organisations to perform the different functions. The programme is kept running successfully through careful coordination of the stake holders and ensuring all of the functions are being fulfilled.

Actor - activity	Promotion & marketing	Investment Financing	Construction and A.S.S	Quality Management	Training Extension	Institutional Support	Monitoring & Evaluation	Research & Development	Programme Management
Biogas Committee									●
Apex Body							●		●
Credit providers		●							
SNV office	●			●	●	●	●	●	●
Biogas agency	●		●	●	●	●		●	●
Construction Companies	●		●	●	●				
Research groups								●	
Consulting Groups					●		●		
					Initialising/coordinating			●	
					Executing			●	
					Supporting/assisting			●	

Table 3 Typical Actor/Activity Matrix for ABP

Some of the organisations want to take a larger role than the one assigned to them. This would give them extra power in the programme and allow them to take control over part of it. This would imbalance the programme, so should be resisted. A typical matrix showing various actors and the activities in which they are engaged is shown in Table 3 [van Nes, 2009]. The shape of this matrix will vary from country to country, as different actors do different activities.

As far as possible, SNV aims to involve organisations that already exist in a country in the work of biogas extension, rather than setting up new organisations. Many of these organisations have already attempted

to work in the biogas field, so recognise the benefits of working with SNV, who has gained experience in this area. SNV offer these organisations the opportunity of capacity building to strengthen their capabilities. SNV also offers the opportunity for these organisations to network with others within a larger programme, so their particular strengths can be enhanced and used more effectively.

SNV also emphasises the need for transparency and accountability for itself and all the actors. The costs of a biogas plant and the amount available as a subsidy is publicly available, so there is no suspicion that some actors are trying to manipulate the system for their own ends. User surveys and evaluation reports are made publicly available, so that the effectiveness and impact of the programme can be seen clearly by everyone.

4.3 Skill analysis for biogas extension

In order for the biogas extension tasks to be effectively performed, the organisations involved require particular skill sets for which capacity development is required. An assessment of the effectiveness of SNV's capacity development approach needs to consider these skills and the ability of the involved organisations to employ them.

4.3.1 Skills required by customers

A biogas programme can only be seen to be successful if customers are using plants properly and gaining the benefits that the technology offers. SNV has tested this in all of the countries in which it is working through user surveys. Customers need to have a sense of ownership of their plants and feel that the operation of those plants is part of their daily routine. They need to know how to do routine maintenance work themselves. They also need to know what to do if they have a problem with their plant. The effectiveness of capacity development at this level can be defined by the proportion of plants that are still being used several years after installation.

A further skill set required by customers is the use of the effluent slurry as a fertilizer. While energy for cooking is the primary motive for the purchase of a plant, the benefits from the use of the slurry are also important. The use of a latrine attached to the plant is not a skill as such, but is a measure of the acceptance of the technology and a realisation of all its benefits.

4.3.2 Skills required for Installation (Micro level)

The primary skill for installing a biogas plant is required by the masons who do the actual construction work. SNV organise training courses and also encourage installers to provide on-the-job training. Masons need to be backed up by a supply of materials and biogas equipment, which often need to be purchased locally. The logistical skills can either be taught to the masons or taught to technicians who supervise the work. The technicians also need the technical skills required to check that the plant is being made to the defined dimensions. Both technicians and masons are taught marketing skills, so when one plant is being built, they can encourage other people in the area to buy one.

Masons and technicians also need to be trained to teach the customers of the plants they are building to use the plant and to do routine maintenance. They also need to be able to explain to the customers the benefits of biogas slurry as a fertiliser. Technicians should be taught how to do effective follow-up work and how to plan effective visits to previous customers.

A concern of biogas programmes in many countries is the retention of masons. Well-trained skilled masons are in demand by construction companies both in the country in which they are working and also in countries in the Middle East, which can pay much higher salaries. Courses should offer trainees effective motivation to continue to work on biogas programmes by explaining the wider benefits of the programme.

4.3.3 Skills required for Implementation (Meso level)

The key skills required by the staff of implementation organisations are those of planning and management. These skills are closely linked with marketing. Ideally several biogas plants should be built in an area at one time, so that resources can be used efficiently. Implementing organisations are involved in the training of installation staff, so staff need to be trained to train others in the skills of construction, quality control, marketing and follow-up. Implementing organisations are also involved in quality control, so people need the skills of data management to keep track of each plant built, the quality checks and the follow-up visits. Staff also need to have financial management skills to keep track of payments, subsidies and loans.

Separate MFIs often deal with loan finance, but their staff need to be properly trained and their work checked by the implanting organisation.

Biogas equipment also needs to be purchased for use by the installers. This can be manufactured by workshops owned by some of the installation companies, by other manufacturers or purchased from elsewhere. Most programmes monitor the quality of biogas equipment and offer training to workshop staff in its manufacture.

Training and marketing usually need media to be available, so media skills are also required. These range from the writing and publication of leaflets and booklets, to producing radio, video and TV programmes. Implementing organisations often offer courses to groups of customers and potential customers, so staff need the skills to communicate with rural people. Such courses will include the right use of biogas slurry as a fertiliser, so some staff need to be trained to communicate these skills as well.

4.3.4 Skills required at Policy Framework (Macro level)

The skills at the policy framework level are not usually imparted through training courses, although some information can be conveyed through conferences and workshops. Policy formulation and application requires government staff to have a sense of ownership and commitment to the biogas programme. Capacity development takes time, as these staff need to understand the wider benefits of the programme and what policies are needed to allow those benefits to be realised. People also need to recognise the best ways to apply those policies through the Apex body, providing direction, co-ordination and clear decision making. SNV works through advisers who offer guidance to politicians and government staff and also lobbying when they propose unhelpful ideas.

Staff of the Apex body may need orientation courses to enable them to supervise the biogas programme. They need to have the skills to co-ordinate the work of implementation, including ensuring the quality control system is functioning, with effective data collection and management. This is linked with effective dispersion of subsidies, so skills are needed to monitor and audit the financial aspects of the programme. The planning of the programme needs to define annual targets for construction, but skills of resource management are required to ensure the targets can be met.

5 Biogas Programme in the Five Countries

The Biogas Support Programme was started by SNV in Nepal in 1992 and the ideas developed in Nepal inspired the Asia Biogas Programme, starting in Vietnam in 2003. ABP was extended to Cambodia and Bangladesh in 2006 and Lao PDR in 2007. The ABP programme proposal [SNV, 2004a] aimed to further develop the market for biogas as an indigenous, sustainable energy source.

Since then, there are plans already under way to extend the programme to other countries in Asia and even further to Africa and Latin America. The model, as defined above, was followed in each country, adapted to the political and practical situations of each country. The success of the programmes in the initial five countries by the end of 2011 is defined in terms of the numbers of plant built as shown in Table 4.

Country Programme	Year started	Plants built in 2011	Plants built by 2011	Investment cost \$
Nepal	1992	19,246	250,476	663
Vietnam	2003	23,372	123,714	621
Bangladesh	2006	5,049	20,756	488
Cambodia	2006	4,826	14,972	430
Lao PDR	2007	439	2,405	448
Total		56,802	418,423	

Table 4 Achievements of the five programmes (based on [ADB, 2012])

5.1 Biogas Support Programme in Nepal

When GGC, ADB/N and SNV initiated the Biogas Support Programme (BSP) in Nepal in 1992, the initial challenge was to encourage the involvement of other companies which would compete with GGC and remove the monopoly it had on biogas extension. All preparations for this were done during phase I of BSP. In consultation with all stake-holders, a prequalification procedure was defined to allow other construction companies to become involved from July 2004 onwards. BSP provided training for the staff of these companies. This approach provided the basis for their multi-actor approach. In 1994, when NBPG was formed, there were 11 biogas companies (BCs) involved in biogas extension. The numbers grew steadily until 2000 when it peaked at 49 [Karki, 2007]. There was a further jump in the number of companies involved in biogas extension to 60 in 2006 after which NBPG became NBPA.

The need to provide a policy environment through which subsidy could be provided also encouraged SNV to work with government departments to find one in which an apex body could be based. In 1996, AEPC was set up under the Ministry of Science and Technology (MoST, later to become Ministry of Environment, Science and Technology MoEST). This completed the framework of organisations involved in biogas extension, covering the three main spheres of activity (installation, implementation and policy environment), otherwise classed as the Micro, Meso and Macro levels. In order that all the activities can be done effectively, relationships had to be formed and strengthened between all of the stake-holders, which are shown in Figure 3.

The Nepal biogas programme by SNV was developed over four phases and is now in a transition phase:

- Phase I July 1992 to July 1994
- Phase II July 1994 to February 1997
- Phase III March 1997 to June 2003
- Phase IV July 2003 to June 2010 (extended from the original plan of June 2009)
- Transition Phase July 2010 to June 2014 (planned [BSP, 2007]) |

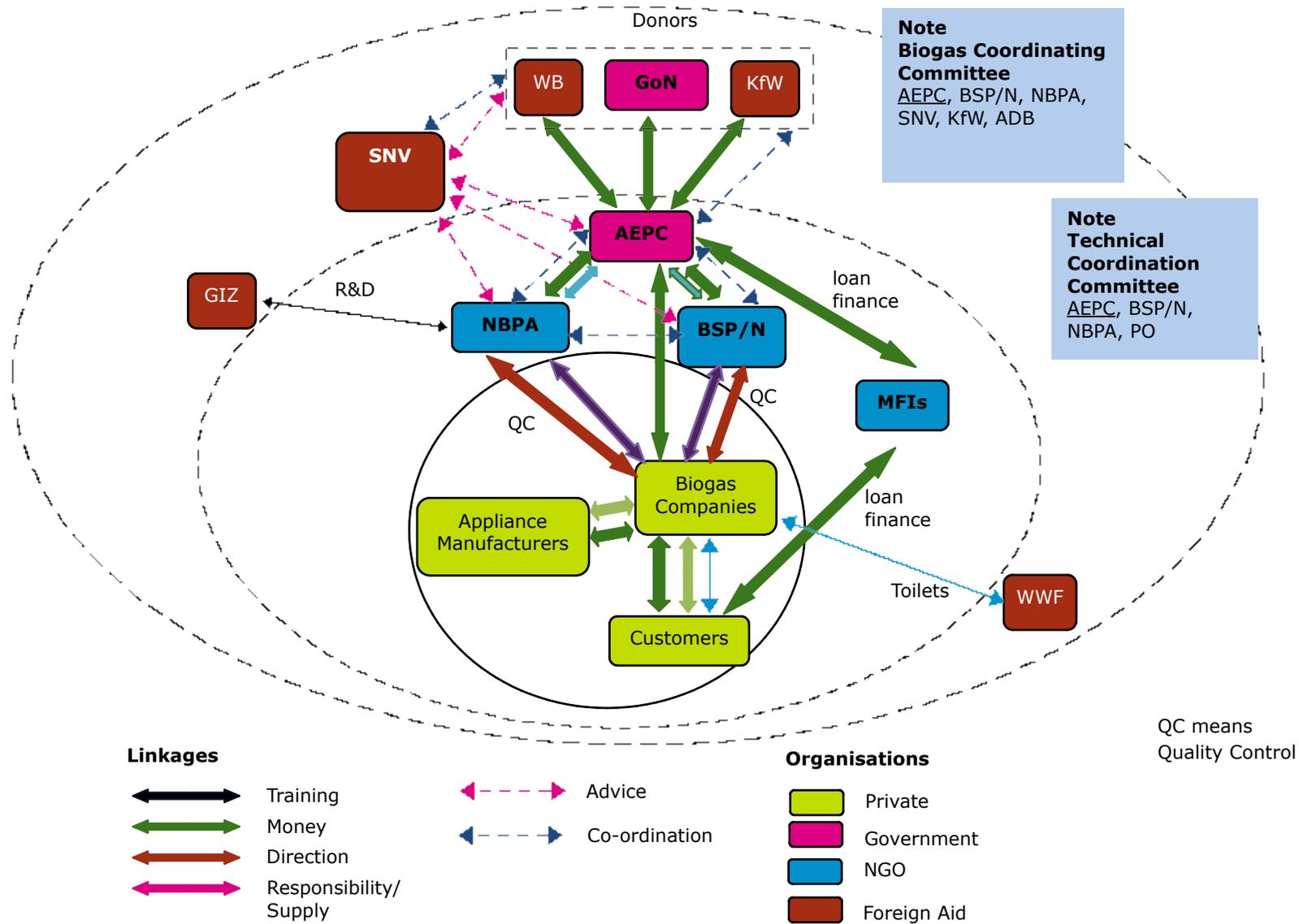


Figure 3 Relationships within the Nepal Biogas Programme

Since June 2010, SNV has been providing guidance and advice to the programme, but financial support is from GoN and KfW [BSP, 2010].

5.1.1 Micro level installation activities

The installation activities at the micro level are done by the biogas installers (BCs), which are private companies. They are involved in the direct marketing to customers, constructing the plants and doing follow-up work. At the end of 2011, there were 82 BCs involved in the Nepal programme [BSP, 2012]. The other main group involved at the micro level are the manufacturers of components required in the construction of biogas plants and the gas appliances provided with the biogas plants. In 2006, there were 14 such workshops and the number had increased to 18 by the end of 2011. Some of these workshops are owned by biogas construction companies, but others make biogas equipment alongside other products. The relationships at the micro level are primarily contractual arrangements between suppliers and customers. The customer has a biogas plant installed in his property by the BC and pays his part of the price, either directly or from a loan from an MFI. The contract includes training from the BC in the use of the system, the supply of a users' manual and follow-up from the installer for one year and a guarantee of quality because of internal checks. Manufacturers contract to supply orders for components and appliances from BCs for payment.

Capacity development has concentrated on enabling the BCs and workshops to become more efficient in management, marketing, installation and after sales [Biscons, 2009]. Mason training courses have been key to installation work, as there is a high turn-over of construction staff.

5.1.2 Meso level implementation activities

The implementation activities at the meso level are done jointly by BSP/N and NBPA under the supervision of AEPC [BSP, 2006]. The programme is also supported by loan finance from local MFIs, who provide loans directly to customers. BCs facilitate linkages between MFIs and customers. BSP/N has been registered as an NGO. NBPA is a non-profit association of private companies (funded by membership fees) and is effectively an NGO. Relationships involve supervision and monitoring, especially of quality control; administration and data management, especially of subsidy; and coordination.

The responsibility for running the biogas programme for the three initial phases in Nepal was that of BSP/N, under the SNV programme. The fourth phase was run under BSP-N, registered as an independent NGO and SNV moved towards an advisory role, although they still provided subsidy. In the transition phase, support is provided by KfW and GoN. The main work of BSP/N, now BSP-N, is the quality control mechanism, checking of a sample of biogas plants built by each of the installation companies and approving the release of subsidy money to those companies. Installation data is collected and added to the central database. BSP provides training materials to the BCs as well as promotional materials for use at all levels. BSP is also responsible for research and development and provides technical support to the whole programme.

NBPA works with the installation companies and provides training courses for masons and other staff. It provides business support services and represents the companies in their relationships with BSP/N, AEPC and other groups. It also purchases biogas plant components that need to be imported in bulk and provides them to the BCs. They are responsible for local promotion activities, particularly for encouraging the use of biogas slurry as a fertiliser.

AEPC is the apex body for the biogas programme and takes responsibility for it on behalf of GoN. It provides the subsidies for the programme, which are administered by BSP/N, as well as providing loan finance to MFIs for disbursement to customers from the Biogas Credit Fund (BCF), supported by GoN and banks. It subcontracts external support services for the programme, such as an annual users' survey, from outside consultants. AEPC reports directly to the government through the ministry of which it is a part (Ministry of Environment in 2012).

Capacity development involves ensuring a deeper sense of involvement and ownership by staff of NBPA, BSP/N and AEPC; using the quality control mechanism to ensure high standards, thus ensuring the sustainability of the programme.

5.1.3 Macro level policy environment activities

The Biogas Coordinating Committee (BCC) was set up to allow the biogas programme to work with government ministries and aid organisations, although AEPC handles most of the administration work. They

relate to government organisations such as the Ministry of Finance (MoF) and the National Planning Commission (NPC). BCC also work closely with aid organisations, especially SNV, KfW and the World Bank and ADB, which have provided subsidy and loan finance. They coordinate the involvement of these groups with others keen to recognise the benefits of biogas technology, including the Department of National Parks and Wildlife Conservation (DPNWC) and WWF, who see the effects of reduced deforestation and provide subsidies to install latrines alongside new biogas plants.

AEPC is also responsible for the work of promotion for other renewable energy technologies (RETs), such as solar and micro-hydro technologies, so they coordinate this work of promotion with that of biogas. They guide government departments in formulating policies to encourage the use of all RETs, including biogas. Support is offered by GIZ through volunteers doing R & D work in various aspects of RETs, including biogas.

The work of SNV in this area has been to provide capacity development to the organisations involved and to coordinate the support from different groups. During the four main phases of the programme, SNV worked with AEPC to manage the subsidy from DGIS, and later, that provided by KfW and GoN. After the end of Phase IV, SNV has been providing advice and other support to ensure the programme continues to run in the way it was established.

5.1.4 The Emergence of CD in the SNV Biogas Programme in Nepal

When SNV decided to initiate the Biogas Support Programme in Nepal in the early 90's, it did so when capacity development support to development initiatives in the South was not a major approach of corporate SNV. The pioneers of the earlier biogas programme which started in Nepal established the work with support from USAID and UNDP in the late 1970s and 1980s, by creating the Biogas Support Programme (BSP). BSP started as a programme of SNV and the related office was transformed into a National NGO, as BSP/N. SNV's office in Nepal (SNV/N) supported BSP and then BSP/N by channelling funds from DGIS and other aid groups for support programmes in the biogas sector. Currently BSP/N spends about 25 percent of its total budget (excluding regular subsidy) on capacity development support, including research and development, and training in various skills (such as technical, management, marketing and finance).

SNV has provided Technical and Functional Capacity Support through staff training, including for managers and technical professionals. It enhanced the capacity of field staff, training them and providing a backstop for them in financial management, project management, marketing, resource mobilisation and quality control. SNV CD support was provided initially to strengthen the actors under BSP to enable it to carry out its defined functions. SNV took the lead in supporting the expansion of biogas plant extension work throughout Nepal through BSP, working with other government and private sector organisations. BSP/N organise training for masons, supervisors and managers and encourages the involvement of women trainees in all of these areas.

SNV provided CD support through the:

- Training of independent contractors to manufacture Biogas Plants
- Facilitating the Training of Masons to construct Biogas Plants.
- Marketing Biogas Plants through promoting the concepts to communities in rural Nepal.
- Establishing linkages with apex bodies of Government Institutions involved in the Renewable Energy Sector (e.g. AEPC).
- Establishing linkages with international Funding and Development agencies involved in supporting Renewable Energy programmes KfW, UNDP, WB).
- Strengthening other national and local institutions involved in Biogas Development, enhancing their roles, process, structures and functions enabling them to deliver.
- Sending Experts out to enhance the capacity of individual and institutions on building successful Biogas plants in other Asian countries (Vietnam, Cambodia and Laos).

5.1.5 Skills Audit of the Nepal Programme

Looking at the Nepal programme as a whole, it has demonstrated steady success, despite complex political issues that were outside the influence of any of the stake holders involved in the programme. In particular, the work of scaling up the installation programme was affected between 2001 and 2006 during the Maoist revolt. The steady growth in the programme up to mid 2001 was disrupted [Karki, 2007]. However the BCs

managed to keep installation numbers fairly steady at about 15,000 plants per year, even though these were well below the targets of about 25,000 per year. Once greater political stability was established, the numbers of plants built per year have steadily increased to over 19,000 in 2011 [ADB, 2012]. Although the country is still far from being fully political stable, the stake-holders are able to continue their work.

Micro-level skills

At the micro-level (installation), large numbers of masons and technicians have been trained and the 82 BCs involved in installation are confident in their ability to continue their work, according to their representatives in NBPA. The quality control mechanism is very well established and all the BC staff know how to record the details of each plant built and submit them to BSP-N to obtain the subsidy. The emergence of local MFIs has allowed many people to obtain loan finance. This has allowed more people to purchase biogas plants. However, staff of the MFIs that were questioned wanted further training in financial management, especially in the use of computers and mobile devices (such as tablets) to do so.

One issue at the micro-level is the retention of masons. The BCs employ masons on a casual basis and pay them the local rate for their work once they are trained. Since biogas plants cannot be built during the rainy season, masons work for other companies and are often paid more. Many are not willing to return to building biogas plants. Persuading them to do so is an issue that needs further consideration.

Meso-level skills

At the meso-level (implementation) staff are well-trained and motivated for all the routine tasks required for the programme. Staff of NBPA, BSP-N and AEPC are confident that they could continue the work along the lines that had been developed over the previous 20 years. There are people with good skills in all of the key areas: training, promotion and publicity, administration, quality control and database management, and financial management.

One area that needs further capacity development was identified by staff of the MFIs, who wish to develop skills in electronic management of loans. The work of checking repayments by staff who need to visit families would be much easier, if they knew how to use mobile electronic devices such as tablets, to make data entries and synchronise these with a central database held in their office. Another area was that of forward financial planning in the BCs. While BCs are good at book-keeping and presenting yearly accounts, they are less confident at writing budgets and predicting cash flows, especially any possible cash crises that might occur.

Macro-level skills

Staff at AEPC are confident in the systems they need for running and monitoring the biogas programme. They are experienced in setting and checking targets and in oversight of the quality control mechanism. There is a good sense of ownership of the biogas programme and in encouraging commitment from the different ministries that need to be involved in supporting the programme.

One area in which good skills have been developed is in defining protocols for CDM. The first set of protocols were developed with the help of staff from SNV. A change of policy in UNFCCC meant that a new set of protocols needed to be written to continue receiving carbon-offset finance, but programme staff managed this effectively.

One area of concern expressed by AEPC staff was how to more effectively integrate the biogas programme into the wider renewable energy and rural development frameworks. The staff of each programme, such as that of biogas extension, have undergone capacity development related to that programme. They saw a need for training in the co-ordination of different programmes, so a development worker in a particular rural area can define the most appropriate technologies and approaches to meet the needs of the people in that area. Rural people have a range of needs, such as improved agricultural practices, energy for cooking and lighting, improved water supplies and sanitation. Development workers require the skills to define the solutions that can be offered and to prioritise the most urgent.

A classic demonstration of the issue is that of training farmers to use biogas slurry effectively as a fertiliser. A visit to two neighbouring farmers with biogas plants showed very different results. One said that his attempts to use biogas slurry for vegetables was not successful, as they did not grow well. His neighbour said he had a measurable increase in production with biogas slurry. The second farmer had been taught to compost the slurry with dry biomass, while the first used fresh effluent. The first may have been advised by

a mason or technician with little agriculture training, while the second was advised by a member of staff who understood the right approach.

One policy for much of the Nepal Biogas Programme was to sub-contract research and development work to outside organisations. The effect has been to reduce its importance within the programme as a whole. Comments by NBPA staff who have worked in biogas since 1977 (as part of GGC) suggested that this had made the programme more rigid and less adaptable. There is presently some capacity to do R & D, resulting in designs for smaller scale systems (internal volume of 2 m³), but it is much less than had been available in the past.

5.2 ABP in Vietnam

Following the success of the biogas programme in Nepal, SNV set up the wider Asia Biogas Programme. The Ministry of Agriculture and Rural development (MARD) in Vietnam had started working in biogas technology and were looking for support. SNV and MARD staff jointly wrote a proposal in September 2000 for a Biogas Programme in Vietnam (BPV) and an agreement was eventually signed in January 2003 [SNV, 2004b]. At the Meso level, SNV set up a Biogas Programme Office (BPO - later BPD, Biogas Programme Division) in May 2003 [SNV, 2004b] which worked very closely with the Department of Agriculture (DA) under MARD, who set up Provincial Biogas Programme Offices (PBPOs - later PBPDs, Provincial Biogas Programme Divisions) in each of the provinces in which the programme was planned to work. At the Macro level, the National Biogas Steering Committee (NBSC - more recently NSC) was set up to oversee the programme, but has not been very effective, due to a weakness in coordination between the different government ministries [van Nes, 2006]. Relationships are shown in Figure 4.

The technology side of the programme was fairly straightforward. MARD had already tested a version of the Chinese dome design which it wanted to use in the extension programme. It had defined standards for a range of designs that were being made in Vietnam (Standard No 10 TCN 499-2002) [Tuyen, 2009] and had determined that the ones defined as KT-1 and KT-2 were the most appropriate. The design had been promoted by the Institute of Energy over 10 years and appeared to be reliable [SNV, 2004b] and there were sufficient people available who could train new masons to make it. The supply of biogas appliances was not seen as a problem, as there was a reasonable range available from China, some of which were also being made in Vietnam. It was not considered important to define standards for appliances.

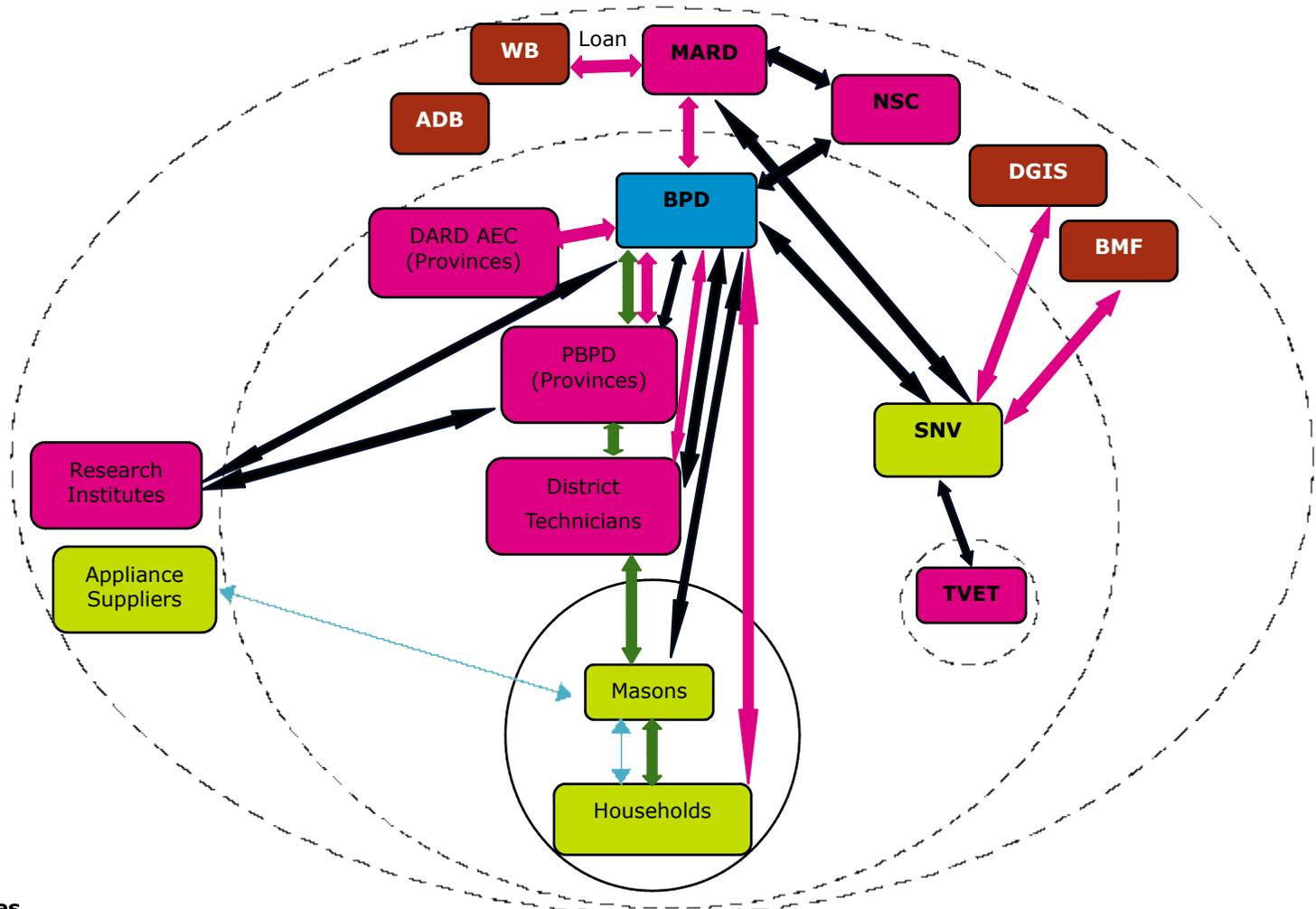
The programme has been run in two phases:

- Phase I May 2003 to December 2006 (planned to end in January, but extended by a “bridge phase”);
- Phase II January 2007 to December 2010 (Phase II has also been extended).

Phase I started work in 12 provinces, extending up to 20, while Phase II further expanded to cover 43 provinces. However, in 2011, ADB was keen to provide a subsidy for a biogas programme, so SNV allowed them to fund the programme in 12 provinces, releasing funds to extend the time over which Phase II could be run. However, the Government of Vietnam (GoV) have been very slow in providing promised subsidy funding to the project.

Phase I was very successful, with the number of plants built (18,000) being much higher than the target (10,000). The programme then went through a period of weak management, with a high turn-over of staff [KPMG, 2008], so Phase II had a poor start. New staff in BPD reorganised the way the programme was run and the office seemed to be in a strong position when the evaluation team visited. However, two key members of senior MARD staff were unavailable, one due to a serious medical condition, so it was difficult to assess that side of the programme. The staff in the provincial office that the evaluation team visited seemed very committed to the programme. However, there was a new person in charge of the PBPD, and it had previously been supervised, as one of many responsibilities, by the head of the Provincial Agricultural Extension Centre (PAEC) under the Provincial office of the Department for Agriculture and Rural Development (DARD) [SNV, 2012b].

The success of BPV Phase II can be assessed by their obtaining of an Ashden Award in 2010 [Ashden, 2010]. The installation of 78,000 plants by the end of 2009 was seen as comparable to other biogas programmes that had received awards in other parts of the world such as China and India.



Linkages

- Training and TA
- Quality control
- Other
- Money
- Advice
- Co-ordination

Organisations

- Private
- Government
- NGO
- Foreign Aid

Figure 4 Relationships within the Vietnam Biogas Programme

5.2.2 Micro-level Installation Activities

The actual installation is done by masons who are subcontracted by the biogas technicians in the district agricultural extension centres (AECs) of DARD. The masons are self-employed, and work in the informal private sector, as they are not registered as companies. The masons are trained by the programme and then registered. Registered masons are able to employ other people to help them, but must ensure that the plants are built strictly to the defined standards. Such a group is classed as a Biogas Construction Team (BCT) [de Castro, 2004]. Most are unwilling to be registered as private companies, as the overhead costs to do so are high. The masons earn money by building biogas plants and are paid by customers. They can often earn extra by suggesting further improvements to the customers' houses and surroundings.

The work of obtaining gas appliances is usually done by the masons, who usually have a list of local suppliers. This side of the work is not monitored by the biogas technicians. The appliance suppliers work with the mason and the customer to provide and install biogas stoves and lights. There are other appliances available on the market, such as biogas powered rice cookers, if the customer can afford them.

5.2.3 Meso level implementation activities

The work of quality control is done at the meso level. Technicians based in the district offices of DARD AEC check each plant, once it has been built, and send details to the PBPD. These are collated and sent to BPD, where they are entered on the database. The subsidy for that plant is then released and sent directly to the customer via the Vietnam Post Office [SNV, 2004b]. The system is seen as effective, but slow. The technicians were often given responsibility for checking biogas plants along with a range of other jobs related to the livestock extension [Dung et al, 2009]. BPD also does independent checks on plants in most of the provinces in which the programme is operating. The aim is to check at least 2% of the plants being built [SNV, 2012b]. Careful checks are also made of all the forms submitted by biogas technicians and these are sent back if they are not properly filled-in.

There is no facility for loan finance for biogas plants in Vietnam. The Agribank (Vietnam Bank for Agriculture and Rural Development) was set up to provide loans in rural areas, but only provides them to poorer farmers. Any family that owns sufficient pigs to run a biogas plant is unlikely to be able to obtain a loan from this bank.

BPD initially took responsibility for the training of masons [SNV, 2005b]. As the numbers grew, the work was handed over to the PBPD technicians, who used experienced masons to train new ones [SNV, 2011c].

BPD did try to involve local vocational training schools in the work of training masons, but this proved unsuccessful [SNV, 2011c]. The quality of the training courses offered by the schools was too low, even after the teachers had received careful training by BPD staff. This approach was replaced by training courses for experienced masons to help them train others (ToT - Training for Trainers).

A major part of BPD's work is biogas promotion [SNV, 2011c]. They produce leaflets for encouraging new users and also safety leaflets and user manuals for customers for whom plants are being built. BPD works with national media in Vietnam, such as newspapers, radio and TV, although the cost of making TV programmes is high. Local promotion work is done through the holding of workshops across the country along with tours by villagers without plants to places that are using biogas. A tradition of the communist party in Vietnam is the use of public loudspeakers in villages which offer encouragement to the people. Programmes could be made to encourage the use of biogas technology, which could be broadcast over these systems.

The main R & D work under BPD was that of finding the best way to use biogas slurry as a fertiliser. Much of this work was sub-contracted to local universities. The results enabled new leaflets to be printed and distributed that explained the benefits of the use of biogas slurry [SNV, 2012b]. BPD is also responsible for finding sub-contractors for the yearly biogas users surveys. These have become much more important recently, as the programme has been seeking carbon offset finance through the Voluntary Gold Standard by employing an outside consulting group [SNV, 2012b].

Capacity Development work is primarily aimed at masons and the biogas technicians in MARD, to provide the skills for effective biogas extension and to encourage them to have a sense of ownership of the programme. Since the technicians are civil servants, who have the potential for career progression, new people must continually be trained as experienced people take better jobs. The building up of the private sector in the form of the masons in the BCTs is difficult, as they are not part of an organised body. The

formation of private companies in Vietnam is complex and involves an excessive amount of bureaucracy, so requires the help of lawyers and other advisors and is expensive. Few local masons have the education or financial capital to consider registering themselves as a company.

5.2.4 Macro level policy environment activities

SNV works closely with BPD to offer support and guidance. It also provides the subsidy money from DGIS, as required by the project. It also works closely with MARD to provide support and guidance to keep the programme running effectively. The establishment of BPD as a division of LPD in MARD in 2007 gave the programme greater credibility, as it was previously seen as an office linked with the Ministry. One issue that occurred in 2011 were plans by both ADB (QSEAP - Quality and Safety Enhancement of Agricultural Products) and the World Bank to set up their own biogas projects in different provinces of Vietnam [SNV, 2012b]. SNV persuaded them to coordinate their work with BPD. Different provinces were allocated to the different programmes to prevent overlap and duplication of effort, although MARD still acts as the coordinating body.

A weakness in the policy environment has been the lack of support from government ministries other than MARD for the programme. The national steering committee, NSC, was supposed to bring representatives together from most of the government ministries, but many lacked a willingness to be involved [de Castro, 2008]. The first effective meeting was held in December 2009 and it has been active since then. However, as a national coordinating group, it is still seen as fairly ineffective. Comments by people in interviews suggested that representatives from ministries other than MARD lack enthusiasm. Programmes for the extension of different renewable energy technologies come under different government ministries, so the coordination between the renewable energy sectors is also weak.

Another recent issue is the formation of the Vietnam Biogas Association (VBA) to include other groups who are keen to be involved in a biogas programme. VBA includes VACVINA who had promoted biogas plants with a flexible plastic gas holder and a manufacturer of biogas plants made from composites (glass fibre reinforced plastics). A representative from NSC is also on the VBA, so the different aspects of biogas extension work can be coordinated between different government departments, as well as between government, NGOs and private companies.

5.2.5 CD in the SNV Biogas Programme in Vietnam

SNV has worked closely with MARD to provide Technical and Functional Capacity Support to MARD staff, expanding their existing skills in agriculture and livestock development to include biogas extension. The establishment of a new skill group of biogas masons in the private sector is a key feature. BPD provides the training that enables these people to form BCTs to install quality biogas plants, sell gas appliances and work with the local DARD technicians to allow the customers to obtain subsidies. The training includes technical, organisational, financial and marketing aspects.

The training of technicians and masons is a key component of the CD input into a biogas programme. In total about 1400 masons and 820 technicians have received training by the end of 2011 (based on [Dung, 2011]). Of these, 42 technicians and 22 master masons have been trained to teach others. An emphasis has been placed in the training of women as well as men for these roles. Since every trained mason in a BCT employs a supporting team, the total number of trained staff is much higher. There is also an emphasis on on-going training, as masons and technicians want to progress with their work.

SNV provided macro-level Capacity Development through their work with senior staff of MARD and other government organisations, as well as encouraging co-ordination between biogas programmes offered by other aid agencies.

BPD has a major role in biogas promotion, including using workshops and training courses for customers and potential customers. Biogas promotion is not a difficult task in Vietnam, as most people do recognise the benefits and are keen to have the technology [Dung, 2011]. The only issue is normally how people can pay for them, especially as obtaining loans for biogas plants is almost impossible from official sources. There is a demand for more information, especially on the use of the bioslurry, but this is being addressed by BPD and new leaflets are being sent around the PBPDs.

5.2.6 Skills Audit of the Vietnam Programme

The rapid development of Phase I of BPD demonstrated good success, although it was not sustained initially in phase II, due to a lack of effective management capacity. The issues were addressed, with new staff who were able to provide the required capacity development to get the programme back on track.

Micro-level skills

The development of the BCTs and their empowerment through capacity development has proved very effective. The masons are working within the informal private sector that enables them to generate a reasonable income for the whole team. This has led to a good sense of commitment to the programme by the masons and a readiness to work with the technicians of the local DARD. The growth of BCTs, led by trained masons, is generating jobs in rural areas. Masons are already involved in providing building services for local people. When they build biogas plants, they can offer to provide other home improvements, thus increasing the size of the job and the money earned from doing it.

However, this approach is inherently insecure, as the BCTs are not registered as companies, since the process is very bureaucratic and expensive in Vietnam. Masons are independent operators and are ready to take other work opportunities, if they become available. They will look for other work, if the demand for biogas plants in their local area reduces. Many masons are building plants outside of the programme, where customers can afford to pay without needing a subsidy. There is little motivation for masons to offer follow-up services to customers, apart from maintaining their own reputations for good service in their local areas. Since BCTs are not legal entities, they cannot be held responsible if problems occur.

Meso-level skills

The technicians based in MARD at the provincial and district levels working within the PBPD offices appear to be well trained and well motivated. The field visit to one province showed staff who were enthusiastic and had a good understanding of the project. Wider surveys by other groups have found technicians who were tempted to take short cuts in approving biogas plants for a subsidy [de Castro, 2008]. They relied on the mason's word that the plant was built correctly, rather than making a visit to check the quality of the plant. There is no mechanism to encourage proper checking [KPMG, 2009], as the subsidy is paid directly to the customer. If a mason builds plants that are of poor quality, they will not be paid by customers. As they work within the local community they will quickly gain a bad reputation. They can also lose their accreditation with the PBPD which would stop them building more plants. However, there is no mechanism to assure that technicians are properly checking plants, if their masons are building to a high quality. This can lead to complacency and a slow reduction in quality over time. Competition between mason groups is fairly strong, so there is a temptation for them to cut corners to reduce costs.

PBPD and DARD staff appear to have a range of responsibilities alongside their work on the biogas project. Normally staff manage to balance their different tasks. However, when another task has a high priority, such as dealing with serious animal health issues, biogas work will be neglected [BPD, 2011a].

Macro-level skills

The staff of BPD that the evaluation team met were also very committed to the programme and had a good understanding of their work. Unfortunately, the evaluation team were unable to meet with the senior staff from MARD due to unforeseen circumstances, but reports of their work suggested they were as fully committed to the programme as the provincial staff with whom the team were able to meet.

The work of biogas promotion is effective, with a good range of leaflets and training manuals being produced. BPP staff have developed good skills in the use of media, including radio and television, although the making of such programmes is time-consuming and expensive. Local information in Vietnam is often disseminated via loudspeaker systems in villages, so BPV are looking into adapting radio programmes to use this system.

BPV staff wish to develop their capacity to deal with the carbon offset market. They worked with ADB to develop a PoA-DD (Program of Activities Design Document) [BPD, 2011b]. More recently, BPV have been working with Nexus Carbon for Development in Singapore to write documents for VGS (Voluntary Gold Standard), which should provide more income. In anticipation of receiving a contract, they have been doing monitoring at the level required by VGS [SNV, 2011d]. It is hoped that the income from carbon offset sources can replace the need for future ODA.

MARD acts as the Apex Body as well as being involved in the programme through their Provincial and District Offices. Netherlands Embassy staff explained that the Steering Committee provides co-ordination with other ministries, but is not involved in making policy. The work of policy making therefore lacks a broader view of how the biogas programme meets the needs of the people of Vietnam. There needs to be a greater integration of the programme into a wider plan for the use of renewable energy in Vietnam.

The evaluation team also met representatives of VBA, who appeared very enthusiastic about becoming involved with BPD, although they were still in the process of becoming established. There are many similar associations of stake-holder groups in Vietnam. VBA included other groups involved in biogas extension work, such as the suppliers of a composite plastic system, who saw the benefits of the quality control approach of BPD. They also saw opportunities to act as a pressure group to persuade the government to develop a wider renewable energy policy for Vietnam. Biogas could have a wider role, such as for processing food processing wastes and for providing fuel for the generation of electricity, but the way the government was organised made this difficult, as these ideas involved ministries other than MARD. VBA looked to BPD and SNV to help them develop organisational skills, to enable them to become more effective.

5.2.7 Other aspects of BPV

The subsidy level in Vietnam is lower than in any of the other countries in the ABP. The Government of Vietnam (GoV) provides a hidden subsidy to the programme, as the Provincial and District technicians are paid members of staff of MARD and do not need to earn an income from the selling of biogas plants. However, provincial offices of LPD in MARD find the programme to be a drain on their resources [KPMG, 2009]. MARD provides the provincial offices with an inadequate budget for the work they need to do. Staff have commented that the quality control had become too complicated, so the QC process was simplified [SNV, 2011d].

The earning potential from owning a biogas plant is much greater for customers than in other countries in ABP. An economic assessment found that the cost of a plant could be recovered in about 2.5 years [Zwebe, 2012]. The main reason for purchasing a biogas plant is to remove the smell from pig dung. Farmers own one or two sows which breed litters of piglets each year, which are fattened for sale. As the piglets grow, they need more to eat and produce more dung. Since the pig sties are traditionally placed close to the house, the smell from the pigs steadily increases. With a biogas plant, people can process the dung to an effluent that has much less smell, so they are willing to keep the piglets much longer, so get a much higher price for the meat. The benefits of cooking gas and garden fertiliser from the plants also save money and encourage people to keep more pigs near their houses.

5.3 ABP in Bangladesh

There has been a long history of interest in biogas in Bangladesh, but the development of an effective installation programme took a long time. It started with an interest by groups such as the Bangladesh Agricultural University (BAU) in 1972, followed by the Bangladesh Academy for Rural Development (BARD) and Bangladesh Council for Scientific and Industrial Research (BCSIR) and various other groups. Various plants were built between 1976 and 1989, both of the floating drum design and the fixed dome design, but the quality was poor and sprang leaks [Rahman, 2007] A BCSIR engineer went for training in China in 1989. The Government of Bangladesh (GoB) set up a Biogas Pilot Plant Project in 1995, which was more successful [van Nes, 2005]. The second phase up to 2004 involved 50 NGOs and built 17,194 plants. The government and various aid agencies provided subsidies and the NGOs were given a service charge for the work.

A survey of the plants built under the previous programmes [Ghimire, 2005] showed the need for a standardised design with an effective quality control mechanism, as 21% of the sample were not working and only 47% were considered satisfactory. The benefits of using the plants properly were seen as high, although the use of biogas slurry was very poor. The report recommended that biogas extension should be done in the private sector, with effective central management.

After a further study [van Nes, 2005], SNV decided to work with IDCOL (Infrastructure Development Company), a private limited company set up by the Government of Bangladesh as to handle investments in energy infrastructure. They were already involved in solar home PV installation as well as larger energy projects. IDCOL, with the support of SNV, set up the National Domestic Biogas and Manure Programme (NDBMP) to manage the work of biogas extension. A Biogas Programme Office (BPO) was set up to work

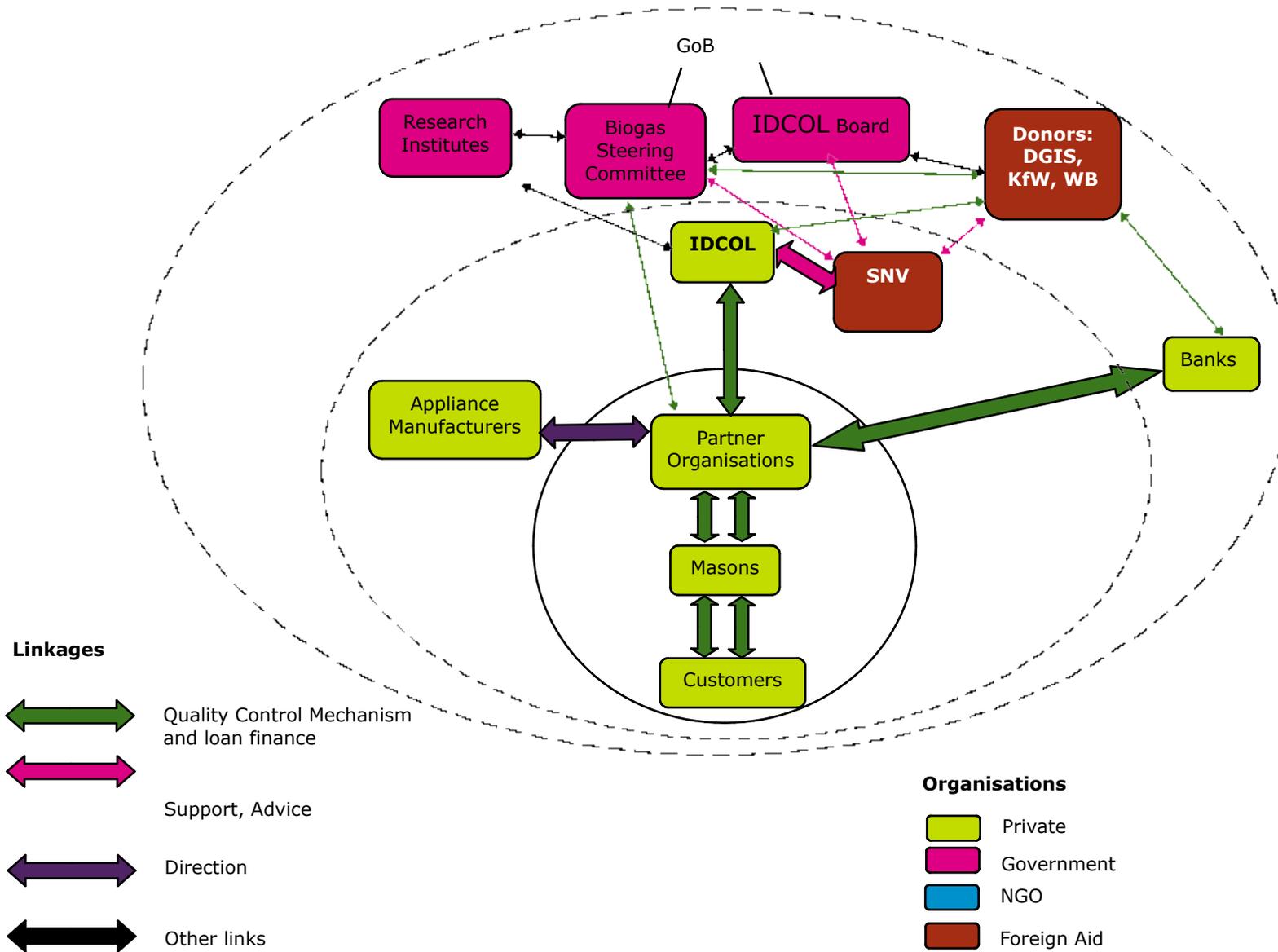


Figure 5 Relationships within the Bangladesh Biogas Programme

with existing stake holders involved with biogas extension [Bajgain, 2006]. Relationships between stake-holders are shown in Figure 5.

IDCOL works with partner organisations (POs), who do the actual installations. One PO is Grameen Shakti, part of the Grameen group, which includes Grameen Bank, and was set up as a not-for-profit company to popularise renewable energy. By 2006, they had installed more than 100,000 solar home systems for which they received an Ashden Award, along with other international awards. They had started a biogas programme in 2005, and with 6 divisional offices, 44 regional offices and 300 unit offices, employing 800 engineers and 1,000 field staff, they already had a good capability for the work.

When the NDBMP started, there were a total of 12 POs, many of which were closely linked with MFIs, so the use of loan finance was already an integral part of their approach. SNV offered reliable subsidy finance from DGIS, with an effective approach to subsidy management based on a quality control system. The GoB was already providing subsidies for biogas extension, so were willing to support a more effectively managed programme [Bajgain, 2006]. KfW were also willing to offer support, although the actual provision of finance was delayed [de Castro, 2008].

The commercial approach defined by SNV and IDCOL meant that the POs had to be registered as private companies. This did encourage the involvement of other groups, so that the number of POs in mid-2012 had risen to 35. The relationships between the different stake holders is shown in Figure 5.

SNV, through IDCOL, established a set of quality standards for biogas plants in Bangladesh using the design that BCSIR had adapted from China. Key design parameters were defined and minor improvements made, based on SNV's previous experience. Following the weaknesses of previous biogas programmes, the work of promoting the technology proved difficult, as there was a sense that biogas did not work well in Bangladesh. NDBMP had to work hard to promote biogas by developing publicity materials, using print media as well as TV programmes and local village meetings.

The feasibility studies and implementation plan estimated that a technical potential for biogas in Bangladesh was 3 million plants [Bajgain, 2006], so the initial targets were set high (36,450 between 2006 and 2009). The actual number installed was less than half the target in the first two years and 10,019 (less than 1/3) by the end of 2009, so the programme targets were revised downwards. The reasons for low achievements were not clear. Natural disasters, in the form of cyclones and floods, do disrupt ongoing development work [de Castro, 2008]. The statistics used to assess the technical potential were out-of-date. Cattle, traditionally used as work animals in Bangladesh, had been replaced by machinery in many places, so cattle ownership had dropped since the figures had been collected.

5.3.1 Micro-level Installation Activities

The POs work with the customers to install biogas plants. As most POs already had experience with installing solar home PV systems, they have tended to use a similar approach. However, a PV system is much easier to install than a biogas plant, and most of the quality control can be done in the factory. The work of building a high quality biogas plant on a customer's site requires more time and effort and the POs feel they do not earn enough for the extra work required. The number of POs had increased to 38 at the end of 2011, but there were only 35 named POs involved when the evaluation team visited in mid 2012. Some of these POs had not built any biogas plants in the first half of the year and the monsoon will stop them doing so until the last quarter of the year.

As with other biogas programmes, the masons are employed as they are needed and not given full time contracts. The POs are involved along with the BPO in training masons. However, there was a complaint from the POs who put their time and effort into training, that other POs poach their workers from them. The problem of qualified masons getting better paid work within Bangladesh or overseas is also a concern for the programme.

There are three types of PO: CPOs only do construction work; LPOs are effectively MFIs, offering loans for customers to purchase biogas or solar PV technologies and LCPOs do both construction and offer loans to customers [de Castro, 2008]. There is a tendency for more of the POs to become LCPOs as they earn income from both aspects of the work. Loan finance is available to the LPOs and LCPOs via IDCOL, but also directly from the banks to which they are linked.

5.3.2 Meso level implementation activities

IDCOL acts as the implementing agency for NDBMP through the BPO. They work with the POs, doing pre-qualification and running the QC mechanism. BPO technicians under IDCOL check 50% of all the plants constructed by POs in each year [SNV, 2012c], and release subsidy payments to the POs whose plants meet quality standards. A 20% sample of plants built by each PO in previous years are also checked to ensure follow-up work is done effectively. A further payment is made to those POs that meet the standards. The information collected from the POs on each plant built and the results of the QC checks are entered on a central database.

Two major tasks done by IDCOL are biogas promotion and training of PO staff. Promotion is done through a range of different media, including leaflets, radio, TV and cinemas, village fairs and exhibitions, billboards and street drama [SNV, 2012c]. The effect of the hard work that has been done on promotion can be seen in the way that local people in Bangladesh are becoming much more positive towards the benefits of the technology. Training work is done within the local offices of the POs, using materials and support from IDCOL. Emphasis is placed on training female motivators in the POs to sell biogas plants to women in rural villagers. Training is also given to experienced supervisors in the POs to act as trainers for their staff. PO staff are also trained in management and finance.

The manufacture of biogas plant components and gas appliances is done by two workshops that are independent of any of the POs. The quality of the workmanship of samples of products is checked by IDCOL technicians before the workshops can supply these items to POs.

One area that was seen as weak in NDBMP has been the use of bioslurry [de Castro, 2008], but much more emphasis has been placed in this area as the programme proceeded. SNV employed an agriculturalist to help train the staff of POs in this area. Biogas promotion has included more information on this subject, so people in rural areas are becoming much more interested in using the compost produced. During the field trip as part of the evaluation, visits were made to one or two farmers who saw an opportunity to sell the compost that they were producing to their neighbours, thus getting further income from owning a biogas plant. The wet slurry that was collected from the plant in slurry pits was transferred to other pits where it was dried. Air drying, under a roof or tree cover, was seen as better than sun drying, as the water evaporated more slowly and less nitrogen was lost from the compost.

5.3.3 Macro level policy environment activities

Government support for NDBMP has been limited. GoB does not have a policy on the use of renewable energy technologies [de Castro, 2008], despite the work of various agencies to expand the use of solar PV, as well as biogas. They have proved very slow in making agreements with different agencies, which has caused problems at times for the cash flow to the programme. They have not proved supportive in coordinating the work of NDBMP with other initiatives for biogas in Bangladesh. For example, they have proved resistant to the idea that POs should work with the owners of plants built by BCSIR to repair them and get them working properly [de Castro, 2008].

This means that the IDCOL Board of directors is effectively the apex body for biogas in Bangladesh, as it does include representatives from government departments. One of the major CD tasks of SNV is to encourage the government ministries to see the opportunities that renewable energy offers. During the evaluation visit, the team member attended a Consultation meeting entitled "Upscaling Renewable Energy in Bangladesh: Role of Development Partners" at the Power Division of the Ministry of Power, Energy and Mineral Resources (MPEMR) attended by planners and other decision makers in Bangladesh.

There is a Biogas Steering Committee (BSC) with representatives from the key government ministries including MPEMR and the Ministry of Agriculture and this handles policy development and the approval of annual plans for the programme [NDBMP, 2009]. There are also representatives of SNV, KfW and other interested bodies on the committee. A sub-committee (the Operations committee - OC) assists the BPO with detailed operational support and advice.

One real achievement of BSC has been to establish research and development contracts for the best use of biogas slurry with the Bangladesh Agricultural Research Institute (BARI). After trials lasting three years of biogas slurry prepared in different ways on a range of different crops [Noor, 2012], they have defined official standards for the use of biogas slurry under the programme. It is hoped to encourage Agricultural extension workers of the Ministry of Agriculture to use these standards in their work with farmers who have biogas plants in Bangladesh.

5.3.4 CD in the SNV Biogas Programme in Bangladesh

SNV has worked closely with IDCOL to provide the capacity development they needed to run the programme. Many of the POs already had a good capacity to extend other renewable energy technologies, such as solar pv systems and ICSs, so only required training in the technical aspects of biogas extension. Again, some of the POs were already working on biogas technology, so IDCOL and SNV needed to revise the design that they were already using and train the existing masons to use the improved design. The POs themselves were then able to provide the mason and technician training to allow the growth of the programme.

IDCOL did not have a biogas programme when it took responsibility for NDBMP, so developing the organisational capacity to manage such a programme took longer than expected. The original targets for biogas construction were based on false assumptions. The number of cattle assumed to be in the country was based on an older survey, but people were replacing cattle with machinery for farm work, so the number of cattle was reducing. Many families had only one or two cattle, but a biogas plant requires four or five to supply adequate gas. The number of families capable of installing biogas plants is thus much lower than the available data suggested.

There is a cultural incompatibility between the expectations of SNV and IDCOL, who see biogas extension as using a business modality and the Partner Organisation (POs) who, despite pre-qualifying as private companies, still retain an NGO approach. The POs therefore set themselves high yearly targets, which they are unable to fulfil. The profitability of biogas installations is low, but the effort required to install a plant is high. POs tend to concentrate their resources on other programmes, such as solar home systems (SHS) and improved cook-stoves (ICS), that give a higher income for much less effort. Several stake holders stated that they are motivated to install biogas plants because they see the benefits to the environment, even though they do not see a profit in doing the work.

5.3.5 Skills Audit of the Bangladesh Programme

The levels of available skills in the POs is high, as they are very experienced in the work of the extension of renewable energy technologies, such as solar pv and ICS. However the commitment of the POs to the biogas programme is weakening. The number of POs had risen to 38 at the end of 2011, but only 35 were registered as part of the programme in mid-2012. The number of plants actually built was only 1/3 of the target at the end of 2009. The rate of installation has increased from 1,200 plants per year to 5,000, but the planned 10 times increase to 12,000 per year has not happened.

Micro-level skills

The training of technicians by POs is very effective and the quality of the biogas plants built in Bangladesh has been markedly improved since the project has been running. An evaluation team member attended part of the first day of a training course and it was well organised. The POs themselves are confident in their ability to build biogas plants to the required quality standard and to do the work of biogas extension. Many are also experienced in micro-finance and have good skills in managing loans for rural families.

The commitment of POs to the work of biogas extension is less clear, as it does compete with their work in the extension of other rural energy technologies. They see building biogas plants as less profitable than installing solar pv home systems and ICSs. However, many do see the environmental value of biogas technology and are prepared to continue the work.

A major issue at the micro-level is the retention of masons. The bigger POs complain they they spend time, money and effort on the training of masons, only to see them being hijacked by other POs. Masons are employed on a casual basis and building of biogas plants stops in the monsoon season. Masons often move to other work for which they are paid better. The POs claim this staff turn-over is as much as 60% per year.

Meso-level skills

The work of biogas promotion and quality control does seem to be effective. IDCOL and the POs involved in NDBMP are involved in providing training courses, as well as producing publicity materials. Their efforts have changed the public perception of biogas from being a failed technology to one that offers rural families good benefits in terms of both cooking and fertilizer.

The quality of the biogas plants built in Bangladesh under NDBMP was much higher than those built before the programme was started. However, the quality could further be improved [Ghimire, 2010]. User surveys of both users and non-users indicate that people in rural areas do recognise the benefits of a biogas plant [Young, 2010]. The reasons for not having a biogas plant are usually a lack of cattle and therefore the cattle dung to feed the plant and lack of available space in which to build it.

However, the work of follow-up by the POs seems to be very variable [Ghimire, 2010], and 52.9% of a sample of customers interviewed felt the after-sales service could be improved. Only 19% of the customers felt they had been properly trained in the use and routine maintenance of their plants. 12.5% of the sample claimed that POs were not willing to come to their plants to fix them when they had faults. Only 17.3% of the sample of customers understood that they had a 5 year guarantee on their plant. Other responders were confused over the guarantee and 16.4% did not know that they had a guarantee at all. The POs that provided loans were more ready to offer support than those who were only involved in doing construction work. The database of the plants built and their condition is not as well kept as it could be. [Ghimire, 2010]. Some of the data entries were unreliable, suggesting that plants were not always as well checked as they should be.

Macro-level skills

The work of co-ordination of biogas extension with that of other renewable energy technologies is done by the POs themselves, as they are involved in a range of different programmes. However, the work of co-ordination is less effective at the macro level, as there is a lack of clear policy and direction within government departments. Although there is a Biogas Steering Committee, with representatives from different government departments, it only works to co-ordinate the programme and does not act as an Apex Body for biogas or any of the renewable energy programmes. IDCOL acts as both the Apex Body and the implementing organisation, so there is a lack of a broader policy overview.

One policy achievement by IDCOL has been persuading BARI to do research work on the use of bioslurry as a fertiliser. A three year research programme has demonstrated the benefits of the bioslurry as used on various crops grown in Bangladesh. The next step is persuading agricultural extension workers from the Ministry of Agriculture to be trained in the value of bioslurry and to teach Bangladeshi farmers about its use.

5.3.6 Other aspects of CD in NDBMP

The evaluation team member attended a meeting of representatives of the POs with senior staff from BPO, from both IDCOL and SNV. A major ongoing issue appears to be the cultural clash between the NGO and commercial approaches. Many of the POs still see the subsidy as a payment from BPO for the work of building a biogas plant and were claiming that this was inadequate. Explanations that the work of building biogas plants was a commercial activity from which they were supposed to derive an income were not understood. They claimed that the costs of building a biogas plant were so well known that they could not find any way to obtain a profit.

The POs always seem to be operating on a financial tight rope, as they do not have working capital reserves to cover the delay between purchasing the materials to build the plant and to pay the masons and the time when money is released from loan and subsidy finance to meet those costs. Few managers had an proper understanding of financial management or how to write a proper business plan. They had basic training in book-keeping and knew how to balance the books, but not how to calculate future cash flow.

One approach that had been advocated in Bangladesh was the Cluster Construction Approach [NDBMP, 2009], to take advantage of the greater efficiency of building a group of biogas plants in the same area. At the basic level, a village that had more than 30 biogas plants constructed in it was classed as a Biogas Village. Three biogas villages that were close to each other become a Biogas Union; 16 villages become a Biogas Uppajilla; while 40 become a Biogas District. Such larger groupings reduce the cost of travel for the staff of POs and the BPO; they allow local people to share their understanding of the running of their plants; and they reduce the costs to the POs.

There seems to have been a shift in thinking about the use of bioslurry in the NDBMP, following the success of the trials at BARI. Customers were beginning to recognise the commercial value of properly processed bioslurry as a fertiliser. The owners of two plants visited by the evaluation team member saw the potential of selling air-dried slurry to their neighbours. Both had excess slurry from dairy cattle and one had a commercial chicken operation. There is a need to encourage extension agents from the Department of

Agricultural Extension to share the BARI research results with the farmers with whom they have contact. SNV has employed agriculturalists with experience of using compost to enhance crop production. However, they do not seem to have found an effective role within NDBMP or ABP as a whole.

In the present programme, there had been little consideration for the benefits of carbon-offset finance. However, IDCOL has been working with a Japanese company to develop an approach to VER finance. There is an expectation that this type of carbon-offset finance could be used to replace ODA subsidy in the biogas programme in the future. Planning and discussions still seem at an early stage.

5.4 ABP in Cambodia

Following the success of the programme in Nepal and Vietnam, SNV widened ABP to include Cambodia in 2006. The National Biodigester Programme (NBP) in Cambodia is a partnership between the Ministry of Agriculture, Forestry and Fisheries (MAFF) and SNV Netherlands Development Organisation. Other donors are also involved, such as GIZ and PIN (People in Need). The main objective is the establishment of a sustainable, market-oriented bio digester sector in the country.

A fixed-dome bio digester model was designed to be suited to Cambodia, to deal with the local weather conditions, to meet the gas requirements according to the local cooking patterns, to match the availability of local materials, and to reduce construction costs. The biodigester programme started in three provinces in 2006 and has now expanded to 14 provinces out of a total of 17 (Lucok David 2012).

A total of 16,770 household biodigesters was constructed up to April 2012 out of a total technical potential estimated to be about 500,000 plants (NBP/SNV, undated). A subsidy of US\$ 150 is provided for construction for all plants and the loan finance is provided from two large micro finance institutes called PRASAC and AMRET. SNV/NBP has established 44 Biodigester Construction Companies (BCCs), of which 40 are still involved, and trained 615 masons of which 318 are still involved. In order that all the activities could be done effectively, relationships were formed and strengthened between all of the stake-holders, who are listed below and shown in Figure 5.

MAFF is the owner and host organisation, DGIS/SNV, BMZ/GIZ, PIN are donors and the stake-holders of the programme are:

- HIVOS : VER Buyer
- FMO : Dutch Development Bank, provides soft loan to PRASAC MFI and Amret MFI
- PRASAC-MFI : Providing special loan for plant construction
- Amret-MFI : Providing special loan for plant construction
- ACLEDA Bank : Channelling of subsidy funds to farmer
- DTW : Produce biogas appliances, R & D
- PPI : Technical Training institute for masons and supervisors
- CIEDC : Providing training to BCCs
- CEDAC : Implement PBPO in Kandal, Kampot, Prey Veng, KTM
- BCCs : Biodigester Construction Companies (build plants)

A Biogas Steering Committee was set up by NBP, involving several stake-holders such as BCC, IMFs, and the PBPOs, to be involved in policy level issues and developing strategy.

5.4.1 Micro level installation activities

Installation activities are done by the biogas construction companies (BCCs), which are private companies owned by experienced masons. They are involved in direct marketing to clients, constructing the plants and doing follow-up work. At the end of 2011, there were 44 BCCs involved in the Cambodian biogas programme. Local manufacturing of biogas appliances is currently done in a mechanical workshop (DTW) in the capital Phnom Penh. The biogas stoves, gas pipes, gas taps and water drains are continually being improved to make them more user-friendly and durable, based on user feedback and testing. Problems at the workshop include the lack of adequately skilled engineering graduates from local universities, the high turn-over of engineers once they are trained, and an unreliable as well as expensive power supply.

The relationships at the micro level are primarily contractual arrangements between DTW and NBP. The client has a biogas plant installed in his property by the BC and pays his part of the price, either directly or

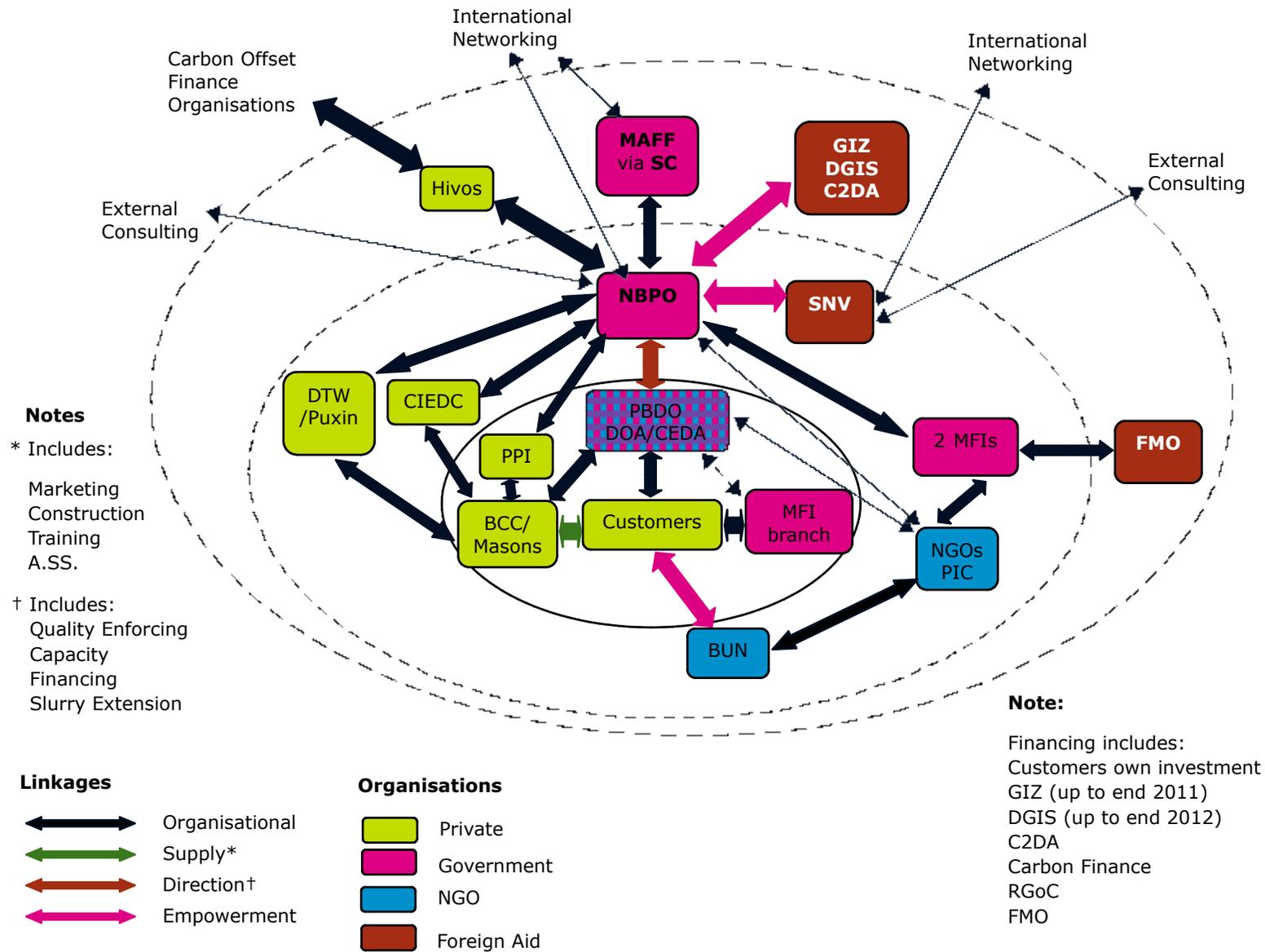


Figure 6 Relationships within the Cambodia Biogas Programme

using a loan from an MFI. The contract includes training from the BC in the use of the system, the supply of a users' manual and follow-up from the installer for one year and a guarantee of quality because of internal checks.

Capacity development has concentrated on enabling the BCCs to become more efficient in management, marketing and business counselling. Mason training courses have been considered as key issue to installation work, as there is a high turn-over of construction staff. Likewise, development of few more manufacturers is another issue for the manufacturing of biogas appliances.

5.4.2 Meso level implementation activities

The work of quality control is done at meso level. NBP in Phnom Penh is responsible for technical and financial services and advice to the provincial offices of the programme, for monitoring and evaluation, research and development, administration of farmer grants and coordination of activities. There are 15 staff in NBP who conduct the following activities.

1. Promotion and marketing materials developed and distributed;
2. Technical training and refresher training to masons and supervisors; and
3. Users training, village workshop, small group meeting.

An NGO, Centre d'Etude et de Development Agricole Cambodgien (CEDAC), has been a major partner of SNV in the National Biodigester Programme since October 2007 and works to promote the use of biogas in four provinces. In other places PBPOs, local offices of the Department of Agriculture, work to promote and disseminate biogas in their areas. Institutes such as Preah Kosmak Polytechnic Institute (PPI) provide vocational training to masons and supervisors, offering a 10 day theory course at the centre followed by a practical course at the field with a master mason. Most of the BCCs have been formed by masons trained by Cambodian Indian Enterprise Development Centre (CIEDC) working with NBP since 2008. More than 615 masons and 90 supervisors have been trained under the programme. These masons are paid on a casual work basis and their wages are lower than the market rate, so drop out ratio is high. Refresher courses on a regular basis is required to enhance their capacity.

NBP signed a project implement agreement with a Czech INGO, People In Need (PIN) for further development of a permanent, market oriented, biogas sector for sustainable energy supply in rural Cambodia in May 2011. PIN has provided support to BCCs and has provided subsidies for some of the plants (1,500 up to December 2012). PIN also supported the programme through the establishment and coaching of 25 village based Biodigester User Networks (BUNs) in Takeo province [NBP, 2012]. The BUNs support their members by sharing information, providing access to spare parts and also by encouraging other people in their local communities to buy plants.

5.4.3 Macro level policy environment activities

SNV works closely with MAFF to provide technical and capacity support to the staff in biogas extension. GoC is interested in the programme but stated that they have limited financial resources. GoC has a promise of support for rural development from the IFAD fund (International Fund for Agricultural Development), which includes funding for NBP to build 4,000 digesters [IFAD, 2011]. The Ministry of Agriculture has a technical working group on climate change which will develop policy for adaptation and mitigation on climate change and could be another source for biogas implementation.

By May 2008 a VER purchase agreement was reached with the Hivos Climate Fund from the Netherlands. This agreement entails the sale of the VER rights for 5,000 biodigesters over a 10 year period. On the request of Hivos this agreement was revised and a new agreement was signed in September 2010 in which the sale of VER rights for all plants built by the programme in the first eight provinces are covered till 2018.

The programme obtained a new VER registration in June 2011. The verification process of the VGS project ran almost parallel with the verification of the first carbon monitoring period covering the period from 24 May 2009 to 31 August 2010. This resulted in the issuing of 34,112 GS-VERs in November 2011. After offsetting with the carbon revenues already issued by Hivos for 2009 and the reimbursement to NBP of 50% share to cover the last validation and verification costs, the total income from VER during the reporting period is US\$ 121,770 [NBP, 2011].

FMO has made US\$3 million loan finance available for a 10 year term (November 2007-October 2017) including five years grace for principal repayment. In addition PRASAC and AMRET receive a grant of US\$50

from FMO for each loan they make (NBP 2011). In turn the MFIs on-lend to farmers at an interest rate of 1.2% per month on a declining balance basis; generally for terms of up to 24 months. This subsidised rate of interest was based on a study that indicated, without real justification, that farmers preferred a low interest rate and would, otherwise, not invest in a bio digester.

5.4.4 The Emergence of CD in the SNV Biogas Programme in Cambodia

SNV CD support was provided initially to strengthen the NBP to enable it to carry out its defined function. SNV took the lead in supporting the expansion of biogas plant extension work throughout Cambodia through NBP, working with other government and private sector organisations. SNV provided CD support through training, facilitation, establishing linkages both with the government and donors and strengthening local institutions.

The biodigester design is based on the Deenbandhu model which is well proven and widely disseminated in India. NBP's business model and programme oversight is still project-donor-government-oriented. Planning is dominated by the number of bio-digesters to be constructed each year and the inputs required achieving these numbers. The bio digester program started in three provinces in 2006 and has now expanded to 14 provinces of a total 17 eligible provinces.

Only one RE programme exists in Cambodia: the National Biodigester Programme (NBP). The government has an electrification strategy, in a separate ministry, but does not recognise NBP as part of that initiative. However, NBP does complement the strategy through the reduction in need for electricity for lighting and cooking. It also benefits the economy by reducing the demand for chemical fertilisers.

5.4.5 Skills Audit of the Cambodia Programme

The biogas programme in Cambodia has demonstrated success and growth and the government has taken ownership. The supervision on after sales services and users' training is being done by PBPOs and NGO. The programme has achieved good results in scaling up of the use of biogas, but there is a lack of work on other renewable energy technologies.

SNV's input provides TA to NBP and they also act as a budget holder for ABP and GIZ funds. This has provided good impact on the quality and effectiveness of these services. This support may need to continue as at present or adapted for the second phase. A critical factor for ongoing success is financial support for the programme for at least another 3 to 4 years until the carbon funds are available.

Micro-level skills

Biogas users surveys show that a large majority of customers are satisfied by their plants. This was supported by the team member's visit to 7 plants. 96% of the sample of 139 plants surveyed in 2011 were still working. Lack of cash among farmers and the absence of an affordable credit were cited by the PBPOs as the main bottlenecks for the construction of biogas plants. Farmers did mention they would have to sell some livestock in order to fund the plant.

The biogas plants so far in Cambodia has been built for average income level families and the poor groups within communities cannot afford them. There has been an issue in obtaining spare parts for appliances and biogas equipment and getting support from the BCCs to do repair and maintenance. Where biogas users' networks (BUNs) have been established, people can help each other to obtain spare parts, to operate their systems as well as promote them to others.

The existing managerial capacity of the BCCs needs development to distribute biogas systems more widely in the country. Staff need help to improve their capability in enterprise development and marketing of the plants. In order to develop the private sector component of NBP, BCC directors need to acquire and apply a range of business skills to manage their companies more effectively. The staff in the PBPOs and NGOs responsible for implementation also need to further develop and demonstrate adequate capacity in managing franchise operations.

Local manufacturing of biogas appliances is currently done in one mechanical workshop (DTW) in the capital Phnom Penh. The biogas stoves, gas pipes, gas taps and water drains are continually being improved to make them more user-friendly and durable, based on user feedback and testing. Problems at the workshop include the lack of adequately skilled engineering graduates from local universities, the high turn-over of engineers once they are trained, and an unreliable and expensive power supply.

There are two MFIs (PRSAC and AMRET) intensively involved in providing loan to the users for the installation of biogas plants in Cambodia. Their offices are limited to certain provinces and districts. The future expansion of the biogas programme needs to be financed in a more sustainable and equitable manner and allow for the entry of a larger number of financial institutions. This will require the use of a market rate of interest that is now close to 2% per month.

The Provincial Department of Agriculture offices organise promotion and extension, implement the activities of the programme, organise capacity building for masons and government staff involved, and provide quality control of construction and after sales services. Similarly, CEDAC supported PBPOs installed 2845 biogas plants since 2007 through their 8 BCC and 62 masons

NBP would like the BCCs to take a stronger role in the promotion and expansion of the biogas programme. BCC staff are less educated and have little vision for the expansion of their businesses. The idea of forming a self-regulating business association comes from NBP rather than from the BCCs themselves. However, there is a need to set CD criteria for managers, such as effective business orientation with minimum qualifications of 3-5 years experience and having technical know-how in the field of biogas.

The work of PIN in setting up BUNs provide parallel CD provision at the grassroots level. Customers are given skills to make the best use of their plants.

Meso-level skills

At the meso-level (implementation) staff are well-trained and motivated for all the routine tasks required for the programme. Institutes such as Preah Kossmak Polytechnic Institute (PPI) and CIEDC provide vocational training to masons and supervisors.

The promotional activities are being done by staff from both NBP and PBPOs and, also, to some extent from BCCs. NBPO staff are skilled in developing promotional materials such as leaflets, folders and T-shirts. These are given to staff of PBPOs, BCCs and MFIs, who effectively use them for dissemination and distribution to the grassroots level.

The BCC and PBPO supervisors have gained effective skills in checking construction against the standards set by NBPO and defined in the construction manuals. They receive occasional supervision from NBPO technicians, who also offer them further training. NBPO technicians also double check a sample of plants each year, to confirm the work of both masons and supervisors.

The use of bio-slurry has been well developed in Cambodia. About 86% of farmers collect the bio-slurry and use it as fertiliser. 41% of customers compost their slurry with dry biomass material under cover (using slurry huts, which need to be 150% of the size of the digesters). PBPOs employ bio-slurry coordinators, who check and evaluate the use of bio-slurry [NBP 2011]

Macro-level skills

SNV's main role is in providing TA to NBP and acts as a budget holder for ABP and GIZ funds. This has provided a good impact on the quality and effectiveness of these services. This will need to be continued for a second phase, although the approach may need to be adapted. SNV is advocating the importance of a sustainable sector as a long-term objective and plays an active role in mobilising the required resources for subsequent phases of biogas programmes. Success and tangible impact are the crucial ingredients required to convince governments and donors to continue providing financial support to national programmes (Wim van Nes et al, 2008).

MAFF acts as the Apex Body although the PBPOs are also part of the same ministry and act implementing organisations. The Biogas Steering Committee allows other ministries within GoC to be involved in the work. Biogas is the only RE technology available in Cambodia, so there is no government policy for the integration of renewable energy.

The establishment of BUNs by PIN has enabled the biogas programme to make an effective impact on the lives of villagers in Cambodia. However, further integration of biogas with the other aspects of village life, such as livestock, agriculture, health and sanitation would enable the programme to be scaled up.

The work of developing BCCs in Cambodia is effective, with proper selection, training and establishment. However, staff do need further skills development in the areas of entrepreneurship, business management, marketing and promotion. The establishment of an Association of BCCs would allow them be more effective,

such as by decentralising ASS and bulk ordering of biogas parts and appliances, such as lamps , pressure meters, and cookers from China. A link between such an association and BUNs would assist in the supply of spare parts in rural areas.

5.5 APB in Laos

Laos is the smallest (in terms of population) of the 5 countries covered by this evaluation but with vast natural resources and a growing middle class. Biogas appeals to both the middle class as well as the poor. The government plays a major role in promoting biogas through the BPP. The BPP has trained technicians and masons and middle and senior members of BPP have through learning processes and practical experience learned the art of starting and managing Biogas projects. This is an institutional collective capacity that needs to be nurtured and used to expand the use of Biogas plants as healthy, economically and environmentally sound technology with potential to reach even the remotest part of the country.

5.5.1 Capacity for Growth and Sustainability

The Government of Laos is keen to ensure the continuity of the Biogas project as part of its renewable energy policy. The questions of survivability and sustainability have become increasingly important in terms of continuing the SNV supported biogas initiatives in Laos. CD is said to be primarily an endogenous process led by national actors and agencies. In terms of the Laos BPP implementation initiatives CD process ensures the strengthening of policy formulation, execution of plans and programmes and enhancing technical competencies to implement Biogas programmes in the Provinces. It also involves enhancing the overall capacity of BPP to effectively execute and implement biogas programmes according to approved national policies.)

The organisational setup that ensures that the BPP operate most effectively its biogas programme, covering the three main spheres of activity (installation, implementation/execution and policy environment) is shown in Figure 4 below. SNV's relations with organisations at the Micro, Meso and Macro levels include CD support at all three levels. SNV's CD support ensures that all BPP carries out its activities most effectively. SNV's relationships with government, BPP other entities and stake-holders is shown in Figure 4 below.

5.5.2 BPP's Capacity to Continue the Biogas Programme.

The question is: *"is the capacity to implement formulated policies and programmes of the Laos biogas initiative available in BPP and strong enough to ensure successful continuation of the programme?"* Several developing countries' development programmes have survived as long as there are continuous funding supports from international funding agencies. Several government implemented development programmes supported by foreign aid in developing countries have had serious sustainability problems when donor funding support ends. Factors such as leadership capacity at execution and implementation level as well as the capacity of local ownership of the local Biogas initiatives are often not taken into account at policy formulation level. In Laos formulation of Biogas policies is the responsibility of the Ministry of Agriculture and Fisheries. The capacity to formulate and execute biogas policies for implementation is critical for BPP which needs an enhanced capacity to manage the implementation process including coordinating the activities of Technicians, Masons and build relations with users and potential users. The BPP management need enhanced capacity at implementation level to organise CD support for Masons not only in technical skills but also marketing and sales of biogas plants. It is also important that the capacity of local communities need to be enhanced to ensure that they own the process of mobilising potential users, marketing and organising loans and subsidies locally.

5.5.3 Summary of Current Capacity of BPP

With five years as a pilot project there is a rich store of Capacity Development potentials that can be tapped on should the project be transformed into a full project. Should the project end in 2012 however, such capacity potential will be lost and it's likely to affect the progress of the biogas programme supported by SNV.

Capacity to formulate policies for the execution of Biogas programme in Laos: Policies that led to the establishment of BPP and the initiation of the Biogas Pilot programme. The Ministry of Agriculture and Fisheries ensures that biogas policies are implemented. To ensure effective implementation of programme the BPP must have the necessary enhanced management and organisational capacity to manage the process.

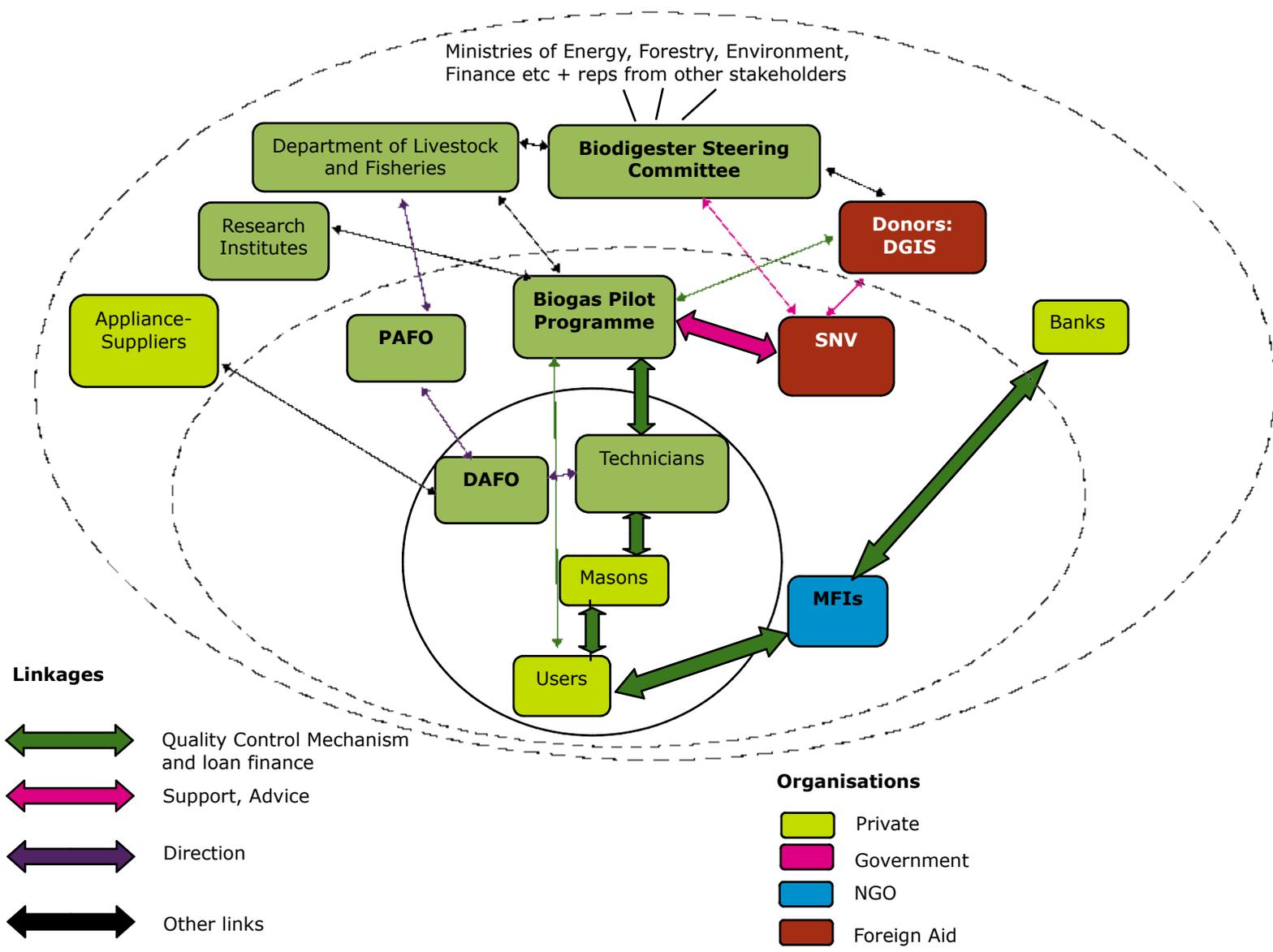


Figure 7 Relationships within the Lao Biogas Programme

The evaluation team member believes that the following enhanced capacity has contributed to the progress of the BPP in the management and organisation of the programme. These include the:

- Capacity to mobilise human and financial resources for the implementation BPP initiatives.
- Capacity to organise and implement BPP approved programmes.
- Capacity to publicise and markets the Biogas Plants to rural and suburban households
- Technical Capacity to construct quality Biogas Plants
- Capacity to train and mobilise Masons to carry our marketing, after sale services and develop customer relations.
- Capacity to introduce and carry out trials of new Biogas plants

5.5.4 Current Capacity Gaps

A list of critical issues within BPP has been identified:

- Lack of adequate information on motivation of village chiefs, household head figures, and sons and daughters of households to accept biogas digester plants.
- Limited access to finance for poor households in target areas,
- Retaining poor workers in a team of master masons,
- Lack of understanding of customer households on Operation and Maintenance (O&M).
- Inability to utilise local materials in the construction biogas digester plants,
- Masons and DAFO staff lack the capacity to use the variety of sales promotion techniques available.
- There is a lack of accountability mechanism for biogas service delivery (clarification on who is accountable for what).
- Coordination among masons and DAFO in conducting sales promotion needs to be strengthened.
- Little attention is paid to after-sales service, especially after warrantee period is ended.
- The lack of coherent strategies and approaches to capacity development among stake-holders
- Little attention to monitoring and evaluation of programme and projects

5.5.5 Suggestions for Possible Capacity Development Support

Ways in which the capacity issues could be addressed are suggested:

- Develop coherent strategies and approaches to capacity development among all stake-holders
- Capacity development for DAFO and masons to develop deeper understanding of customer needs and to motivate households to install plants
- Developing the capacity of DAFO to encourage masons to deliver quality services and to carry out regular after sales services.
- Technicians and masons should be trained and equipped to use the variety of sales promotion techniques to ensure positive impact on potential users.
- Enhancing the capacity of DLF and PAFO to enhance collaboration and ensure effective partnership.
- Capacity development support for masons on sales and marketing and customer relations.
- Enhance the capacity of masons in order that they can carry out variety of plant constructions.
- Enhance the capacity of BPP staff to carry out efficient monitoring and evaluation of biogas implementation programme.
- Enhance and/or strengthen after-sales service, especially after warrantee period is ended.

5.5.6 Laos Capacity for Innovation

During one of our field visits with the Biogas team, we inspected a smaller biogas digester that feed on agriculture waste as well as dung. The digester was installed in February and according to the users they depend on it almost for all cooking for a family of four. SNV is still observing the performance of this particular plant but the signs are positive. If trials are successful it will be a breakthrough for SNV Biogas programme. The much needed innovation constructing a smaller more affordable plant passed on existing

technology. It is an enhanced capacity to innovate resulting in the production of a plant which does not depend solely on animal waste (such as cow and buffalo dung) and cheaper to construct.

5.5.7 Potential Capacity for Growth Expansion

The BPP Biogas project covers only 5 of the 17 provinces. This means that there is a significant potential for the expansion of biogas to most or all of the remaining 12 provinces. The BPP is 5 years old and has supported the production and installation of nearly 2700 biogas plants in Laos. For reason of affordability the users of BPP's biogas plants can be categorised as middle class (urban and rural) dwellers. Those who probably can afford the plant probably even without subsidy.

There is however potential to expand geographically and economically (to those who cannot afford a plant at current cost even with subsidies). The poor can be reached with supply of small affordable non dung biogas plants. According to the Director of BPP the government is supportive of expansion of biogas to all the 17 provinces in Laos.

5.5.8 SNV's Capacity Support to BPP

The work of BPP is actively supported by SNV. SNV advisors provide direct support in the field of capacity building, knowledge brokering and advocacy, with the aim to develop a commercial viable domestic biogas sector in Laos. In doing so, it follows the lines of SNV's 'multi stakeholder sector development approach'. SNV's capacity Development support includes project management, technical support and finance, whereas knowledge brokering and lobbying are to expose the programme and to exchange lessons from other programmes in and outside Laos.

5.6 Overall Nepal and Asia Biogas Programmes

One of the benefits of working within an integrated programme is the ability of the people in the different programmes to meet together and discuss the issues that they are facing. There is an annual meeting of the programmes in the Asia region and some of the people involved in the various programmes also attend meetings organised by other groups, such as ADB.

One area in which experience can be shared, allowing for effective CD in the different programmes, is that of carbon finance. The carbon offset schemes, such as the CDM devised by UNFCCC, are complex and other, voluntary schemes, such as the Voluntary Gold Standard, have adopted a similar approach. People in those programmes who have made successful applications to these schemes, such as those in Nepal, can offer effective training and support to people in other programmes who are beginning the process.

Studies of the economic value of the wider benefits of installing biogas plants could be done in each of the countries. The results would be used to assist in the writing of the documents that are required for carbon offset applications.

Results of research work done in one country can be shared with others. For example, the Bangladesh programme was successful in involving BARI in research on the use of bioslurry and these results are being shared with the other programmes. The Bangladesh programme appointed an agriculturalist to work in this area, although the person employed to do this work did not appear very effective.

The wider group can also initiate research that has application across the programmes. For example, three institutions were contracted to test the stoves and lamps used in the different programmes [Khandelwal, 2009]. An engineering organisation in Cambodia is developing improvements to the stove design and is able to use the results of this research. Stove and lamp manufacturers in other programmes should aim to use these improved designs.

One of the ADB inspired groups on which people from various biogas programmes are involved is Energy4all [ADB, 2010][ADB, 2012]. This group includes representatives from biogas programmes in India and China and has several meetings. They have looked at ways to get failed biogas plants that have been built in India going again. They have also been asked to evaluate a biogas programme plan for Sri Lanka. However, the meetings are not happening as often as was planned and key people have withdrawn from involvement, so this initiative appears to be stalling.

6 Overview of Asia Biogas Programme

6.1 Capacity Development Services in ABP

The approach to CD that SNV has defined for ABP is summarised in Table 5 below.

• Facilitating thorough, participatory and context-specific preparation
• Establishing a sustainable sector as the ultimate long-term objective
• Interlinking impact and capacity development targets
• Promoting a market-oriented approach
• Attributing sector functions to multiple stake holders

Table 5 SNV’s Services to Biogas Development [van Nes, 2009]

6.1.1 Facilitating thorough, participatory and context-specific preparation

In all of the five countries visited, the work of preparation seemed to have been very effective. In Nepal, the preparation used an action-reflection approach, as new ideas had to be developed by testing them in practice. The work of pioneering a new approach to biogas extension involves discovering new aspects that need to be considered as a result of each new action. The preparation work in the other four countries were done by members of SNV staff who had already gained good experience in Nepal, so had a good idea of what they should expect. However, each country is different, so the approach had to be adapted to the local conditions.

Part of the preparation work has involved working with national government ministries to get them involved in the programme, but response in the different countries has been very different. The enthusiastic involvement of one government department or corporation does not mean that the rest of the government is interested. The formation of an apex body in Nepal took much time and effort, despite a readiness of government ministries to be involved. In Bangladesh, the process of forming an apex body has still not been completed. In Vietnam, there was a programme already being run by MARD, who did become deeply involved in the SNV biogas programme. However, the process of setting up a biogas coordinating committee has taken a long time and other ministries are not deeply committed to it. Involvement by government in Cambodia and Laos seems much greater.

6.1.2 Establishing a sustainable sector as the ultimate long-term objective

The key factors in ensuring a programme is sustainable are the ownership of the programme by all the stake holders and access to ongoing funding. The use of ODA means that the programme is not sustainable, as it depends on the involvement of INGOs and external government bodies or UN agencies. The process of enabling a programme to be seen as an essential part of people’s livelihoods does take time and SNV (with the support of DGIS and KfW) have been ready to spend time. The availability of carbon-offset finance offers the potential of a replacement for ODA. Each CER or VER contract is time-limited, but sequential contracts are possible, as long as the programme keeps running. ABP has enabled the programmes in most of the countries, apart from Laos, to get into a position where such contracts can be negotiated.

The programme that has been running longest, the one in Nepal, is seen as being close to being self-sustaining. The process of obtaining CDM contracts has been difficult, especially as it had to be repeated when the rules were revised. However, CER contacts are seen as an important source of finance to keep the programme running. There is an issue in the number of plant installed, over 0.25 million by the end of 2011, is seen as about 1/4 of the technically feasible plants that could be installed (about 1 million). This means that the “lower hanging fruit”, the clients most responsive to biogas promotion, have already purchased plants, so extra work is required to reach the rest of the market. The representatives of BSP and NBPA claimed in interviews that they were confident in their ability to continue to sell biogas plants.

The programmes where government departments have a high involvement, such as Vietnam and Cambodia, will remain sustainable as long as the governments do not change their priorities. Again, the provision of carbon offset finance will commit them to keep to the contracts, so the programme offices need to ensure that new contracts are always being negotiated for future work.

While the government of Bangladesh has taken little official interest in the biogas programme, many of the POs, especially Grameen Shakti, have strong influence in the country and can ensure the programme is sustainable. The POs are even more interested than the BCs in Nepal in keeping the supply of external funds flowing into the programme, so carbon offset finance is a gain a key to the sustainability of this programme.

6.1.3 Inter-linking impact and capacity development targets

One essential feature of ABP has been the quality control mechanism, as it has encouraged the development of construction skills in the masons and management skills in the implementing organisations. The identification of a biogas plant design in each country and defining clear standards for its manufacture has been the basis of this approach. The designs used in the different countries are different, as the aim was to develop existing skills as far as possible, rather than introducing new ones. This was less valid in Cambodia and Laos, where there was not a suitable design already being built, so masons had to be trained in making designs from elsewhere.

Good quality control, along with effective follow-up, is seen as important to keep biogas plants running for the clients who are using them. Regular external user surveys in the different countries suggest that the approach works well and a large majority of respondents are satisfied with their plants.

6.1.4 Promoting a market-oriented approach

The encouragement of the installation of biogas plants in the private sector has been complex. While the involvement of many private construction companies in the programme in Nepal enabled it to begin functioning effectively and allowed it to expand, it has not been as straightforward in other countries. In Bangladesh, the POs mainly come from a background of installing solar home PV systems as NGOs, so it is proving difficult to persuade them to think as commercial operations.

Government agencies are involved in the work of implementation in Vietnam, Cambodia and Laos, so it is only the work of actual construction that is fully in the private sector. Cambodia has the benefit that NGOs are involved alongside the government agency. However, the mason groups in Vietnam work in the informal private sector, so are unable to be fully organised as commercial groups.

One CD issue that does need to be more effectively addressed is the training of implementation groups in financial planning and management. Few of the managers in the Nepal BCs or the Bangladeshi POs have an understanding of business planning to ensure an effective cash flow in their operations. The majority of installers work hand-to-mouth, monitoring day-to-day financial activity rather than planning for the year ahead.

6.1.5 Attributing sector functions to multiple stake holders

The multi-actor approach was initiated in Nepal, where it was observed that a single biogas agency, GGC, tended to develop a top-heavy management structure and was inefficient and relied too heavily on external financial support. The need to have involvement at each of the three levels (micro, meso and macro) meant that government agencies, NGOs and private companies all had to be part of the programme. The programme office needs to be able to balance the different approaches and motivations of the different types of organisation, but this is an essential skill for which SNV has been able to offer CD support.

While getting the balance of the main tasks involved in running the different biogas programmes under ABP has worked well in the different countries, the attempts to involve other people in some of the tasks has been less successful. The ownership of a role in the programme is dependent on a group feeling that they are at the core of the programme. The approach adopted of sub-contracting tasks has not generally proved effective. For example, the training of technicians and masons in the installation of biogas plants works very effectively when done by more experienced staff, under the direction of the biogas programme office. Attempts to subcontract the work to local vocational training agencies in various countries, including Vietnam and Nepal have not proved a success. There is a degree of success in doing this in Cambodia, as PPI and CIEDC, local training institutes, have a sense of being part of the programme.

Research and Development is another activity that has been sub-contracted to other groups, with the result that has become seen as less important. Even when the work is done effectively, it seems difficult to encourage the use of the results of the work. For example, research on the efficiency of biogas appliances was done in three centres, in China, in India and in the Netherlands, showed the need for improvements. Changes are being made by the appliance manufacturers, but it is not seen as a priority. Again, Cambodia

is an exception, as the appliance manufacturer is working hard to improve the stoves that they make. Research on the use of biogas slurry as a fertiliser has been done very successfully by a government research centre (BARI) in Bangladesh. However, it is not really clear how the results of this work can be effectively incorporated into the programme.

6.2 Other aspects of the SNV approach to CD in ABP

The multi-dimensional nature of CD as applied to biogas extension means that ABP needs to be viewed from a range of facets. Fundamentally, it is a development project and must be assessed using philosophy of development imperatives. It can also be viewed as a commercial operation, as SNV encourages the installation of biogas plants to be done by private companies or NGOs, but not by government agencies.

6.2.1 ABP as a development programme

The initial proposal for ABP and the annual plans define aims and objectives in development terms. The high level goal is: "To improve the livelihoods and quality of life of rural farmers through exploiting the market and non-market benefits of domestic biogas" [SNV, 2005a]. The benefits of biogas technology are clearly defined, so the benefits can be maximised by installing large numbers of plants. Each country under the programme sets itself targets for the number of plants to be built each year, so its success is superficially determined by the number of plants installed.

As a development programme, general development imperatives are assumed. The benefits of biogas should be made available to the poorer sections of a community, especially to people in more remote areas. There is a concern for the effects of a development project on women and children, whether their lives are improved or made harder. These concerns can modify an approach that emphasises numerical targets. Domestic biogas technology is seen as benefiting women and children, as it hugely reduces the work required to cook food and offers a much healthier domestic environment. However, making biogas more available to more isolated and poorer communities is much more difficult, and tends to reduce the rate at which plants can be built.

The aim of sustainability requires that local organisations take progressively more responsibility. There is a tension between wider development goals and the more localised aims of national organisations. Governments have political motives that distort programmes. Ideally the provision of a technology that makes the lives of people easier and less unhealthy meets political aims and is welcomed by governments. However, there is always the danger that officials seek to take short cuts and look for short term goals. Renewable energy seems to be an issue that is subject to political fashion, so governments in most countries tend to launch new initiatives that quickly lose their impetus, as new political concerns take priority.

SNV has been able, in ABP, to keep the balance between all these imperatives and establish a programme that is steadily becoming sustainable in the five countries visited under the evaluation. However, as it withdraws its involvement, there is always a danger that political and other pressures could disrupt any of the national programmes and distort the way in which it is run. Sustainability can not be guaranteed.

6.2.2 Commercial aspects of ABP

Although the actual construction of biogas plants is done in the private or NGO sector in the five countries visited in the evaluation, the work cannot be considered as being organised as a fully commercial operation. The CD work of SNV has emphasised the technical and management aspects of the programmes, but has not enabled the managers of the installation companies to develop a full business approach to their operations. There is lack of an understanding of financial planning, of doing the calculations required to determine the profitability of each plant built. The staff of the installation companies have been well trained in book-keeping and can provide detailed accounts of the work they are doing, but they have not made the next step of seeing how those financial transactions will work in the future.

There is also a tension between the desire of the private companies to make a profit and the development imperatives of other stake-holders. There is limited commercial motive for installation companies to target the poorer and more isolated communities with biogas technology. This work requires the use of much greater resources and yields much lower income, so the profitability is much reduced. In Nepal, the subsidy system has been designed to encourage the companies to reach out into more difficult areas, with additional payments. The danger is that the companies aim to work at the edge of these areas, so they gain extra subsidy payments, while expending the minimum of extra resources.

In Bangladesh, various managers of POs stated that their involvement in building biogas plants was motivated primarily because the technology offers benefits to clients. They felt the commercial side of their work made little sense, as they made much better profits from installing solar home PV systems. They claimed that the solar installation work was actually subsidising their involvement in the biogas programme. Their lack of training in detailed financial analysis makes it difficult to know whether their ideas can be substantiated.

6.2.3 Development focus

In most biogas extensions in Asia, there has been a major emphasis on the targets for the number of plants built. This has been true in the large programmes India and China, as well as in Nepal and ABP. This has meant a general focus on one application of biogas technology, that of its use in rural areas for domestic purposes, using animal dung as a feed stock. In the past, there have been attempts to look at other approaches, such as building larger plants for communities for use in village industries, but these have mostly been unsuccessful. The real success in Nepal and ABP, and also in India and China, has been in the area of dung fed, rural, domestic biogas plants, so this has been the prime focus of the work.

Governments and development agencies have always had good reasons to encourage this focus, as it provides energy in areas that are difficult to reach with other technologies, such as electricity and fossil fuels. By making life easier in rural areas, young people are slightly less likely to migrate to the urban areas. The environmental benefits of rural biogas technology, in the reduction of deforestation and improvements to people's health, also provide an imperative.

However, this approach does not meet more recent development concerns for the needs of people in the rapidly growing urban areas. As the number of people in a confined space increase the sanitation problem becomes much higher than that in rural areas, where sewage can be spread thinly over much larger areas of land. The disposal of food wastes in urban areas is difficult, as the animals that consume such wastes in rural areas are not available. Biogas could be used to deal with such problems in urban areas, but the previous tight focus on rural domestic plants fed with dung means that ABP is not in a position to adapt to these new issues. A programme to meet these development imperatives would need to be started from scratch, rather than developed from the existing biogas programme.

6.3 Overarching Issues for the Nepal and Asia Biogas Programmes

While the individual country programmes have particular positive and negative issues, there are some that are common to several or all of the programmes. These issues, especially those relating to CD, can offer insights into how such programmes can be developed in other places.

6.3.1 Overarching issues at the core level

A positive aspect of biogas in all of the countries is the readiness of local people to accept and use the technology. All of the programmes have placed an emphasis on regular user surveys, often annual, and these have demonstrated very positive results. In all of the programmes, a large majority of the users are satisfied with the technology and continue to use their biogas plants to provide cooking fuel. Most of the defined benefits of biogas are realised, such as reduced firewood use, reduced time needed for cooking, and improved health.

The attitudes to human sanitation in Nepal has changed, with most customers attaching latrines to their plants and using them. Fewer customers in Vietnam, Cambodia and Laos have attached latrines, mainly because they had effective sanitation systems before the plant was built. However, they did benefit from much reduced foul odours from animal pens. The impact on human sanitation in Bangladesh was much less, as people were less willing to attach latrines to biogas plants.

The impact of the use of bioslurry as fertiliser was very mixed, both between programmes and within programmes. Some customers in all programmes quickly understood the benefits and make good quality compost and saw gains in crop production. A few farmers in Bangladesh saw the potential to sell their surplus processed bioslurry to other farmers. Other customers failed to see the benefits of the bioslurry and claimed that it did not improve crop production.

6.3.2 Overarching issues at the micro level

The training of masons and technicians to enable high quality plants to be built was a key feature of all of the biogas programmes. The use of standard biogas plant designs that could be checked, enabled the quality control mechanism to function effectively.

However capacity development is not limited to the provision of skills; it also encourages the ownership of the programme by staff. In Nepal, Bangladesh, Cambodia and Laos the masons do not own their work, as they are employed as casual staff. They are not motivated to be loyal to the biogas companies for which they work. They can use their skills in construction projects that pay more, so they have no motivation to continue to be involved in the biogas programme. The high turn-over of staff is a natural consequence.

In Vietnam, masons are self-employed, so their commitment to the programme relates more to their motivation to work in their local community. Since their customers recognise the benefits of the biogas plants that they are building, so there is a steady demand for the technology and the masons have a commitment to build plants for more people. However, the masons are always ready to build other things that the customers may require, such as extensions, improved animal sheds and courtyards. There is no explicit motivation for masons to be loyal to the programme.

In Nepal and Bangladesh, construction staff recognised that masons could not progress in their careers within the present organisational structures. If other staff in all the programmes received further training in their particular roles, they could advance within the organisation. Technicians could become managers and managers had a chance to be involved at more senior levels. However in Nepal, there is a move by some of the masons to set up their own construction companies, which would allow them to break through this barrier.

6.3.3 Overarching issues at the meso level

Training of the managers involved in biogas extension was another key feature of the biogas programmes. The staff of all the different groups involved, in the BCs in Nepal, the POs in Bangladesh, the MARD provincial and district offices in Vietnam and their equivalents in Cambodia and Laos, as well as the coordinating organisations in each country, have the skills to manage the different aspects of their programmes. The quality control mechanisms are well run and financial management is reliable, if sometimes slow, in all programmes, so subsidy and other payments can be clearly audited.

There is a lack of an understanding of financial planning and budgeting in many of the organisations involved in biogas extension. While they can set yearly targets and define the expected costs, managers are less good at predicting cash flow, especially the critical points when they might need loans to cover potential short-falls.

While MFIs are not seen as under the direction of the programme office in the countries where they are involved in biogas extension, MFI staff would appreciate the offer of further training. In Nepal and Bangladesh, they need similar training in financial planning to staff in the extensions organisations. In Nepal, MFI staff identified the need for training in the use of computers and mobile devices for loan management.

6.3.4 Overarching issues at the macro level

The value of biogas, as a renewable energy technology, is fully recognised within the governments of the five countries considered by the study. However, in most countries, the programme is seen as belonging to a particular government department and other departments are less willing to be interested or involved. In Nepal, the involvement of AEPC as an Apex Body, gives the biogas programme a higher profile, although AEPC staff not directly involved in the work appeared to be less interested. In Bangladesh, government support is fairly weak and the biogas steering committee has little influence at government level.

In Bangladesh, NDBMP has recognised the value of building several biogas plants in one place at the same time, so groupings of biogas plant owners are encouraged. In Cambodia, BUNs (Biomass User Networks) are being formed by PIN (People in Need), so that users can help each other with using and maintaining plants. Such group approaches could be adapted in the other country programmes.

Integration of biogas with other renewable energy technologies is another issue, although attitudes do vary between countries. Integration is most effective in Bangladesh, as many POs were already involved in the

extension of other RE technologies. However, there is no government policy that covers the work. AEPC do have an overview of the extension of all RE technologies in Nepal, although they are struggling to integrate their approach. In Vietnam, Cambodia and Laos, different RE technologies come under different government ministries, so very little work has been done on integration.

Carbon-offset finance is an area in which the different programmes are gaining experience. Nepal has been the most successful, although there are issues in replacing ODA as a source of subsidy finance. Carbon-finance negotiations are complex and do require high skill levels, so further CD is needed in this area.

7 SNV CD Support for Nepal and ABP.

The overall objective of the programme in Nepal and the ABP is to further develop the market for biogas as an indigenous, sustainable energy source in participating countries. The capacity development services provided do vary from country to country but there are common themes.

7.1 Capacity Development Services in Nepal and ABP

The SNV CD approach for Nepal and ABP entails elements of empowering national and local partners, actively involved in the biogas development in the region. The aim is to improve governance and management as well as technical and functional capacities in order to improve the quality of biogas plants in the region.

7.1.1 A Summary of Nepal and ABP CD

The key features of the SNV approach to CD in ABP are listed below. These features have been described in detail for the programmes in the 5 countries in the evaluation.

- Multi-sectoral:
 - Many stakeholders
 - Choose right stakeholders in right places
 - Establish permanent model for each country
- Training
 - Learning by Doing
 - Demonstration and Participation
 - Action/Reflection approach
 - Monitoring and evaluation
- Quality Control Mechanism
 - Standardisation
 - Quality checking and enforcement
 - Subsidy payment on checked results
 - Institutional development and strengthening
 - Enabling a sense of ownership
- Institutional Strengthening
 - Use of training of all players
 - Develop effective management processes
 - Offer intellectual and material support
 - Mapping of key relationships
 - Strengthening the relations between key players
- International Networking
 - Channel funding from ODA to programmes
 - Information exchange between programmes
 - Support for private sector institutional development
 - Sharing understanding of Carbon offset finance

7.2 Providing CD Support to Institutions at all Levels

In order to continue to be effective in supporting the expansion of biogas programmes, SNV and its national partners in Nepal and the ABP countries need to continue its CD support to partners. There are countries within the ABP, such as Cambodia, which are well established and are carrying out successful biogas Programmes. There are others, such as Laos, which are relatively newcomers. The continued sharing of successful CD strategies and approaches will help strengthen the emerging ABP countries. CD support need

not only be in terms of training and staff development, but also in terms of institutional strengthening at all levels.

More effective mechanisms are needed for the formulation of biogas policies at the macro level, especially involving relevant government institutions. Formulated policies are executed through meso level organisations and implemented through micro level organisations. More thorough capacity development support would enhance the capabilities of people working at the policy level in all of the countries enabling them to formulate more effective biogas policies and to strengthen the enabling environment for these policies to be executed.

In Cambodia, the use of biogas user networks has been seen to empower biogas customers to make the best use of their technology at the grassroots level. In Bangladesh, demand for biogas from people in one geographical place is seen to make the work of extension much more efficient. Such approaches to the mobilisation of local communities would enable CD to have a much wider impact on peoples lives, far beyond that of running a biogas programme.

At implementation level CD support is also needed to enhance their capabilities and enabling them to establish networks with the user communities (stake-holders), NGOs and community-based organisations. CD support may also be needed to enhance their capabilities to manage the implementation of Biogas Programmes. Other CD support maybe needed to improve marketing and promotion, organisation and management, research and development (R&D) through national and local partners in the ABP countries.

7.3 Levels of Capacity Required

Experience has shown that for any enterprise (such as a biogas programme) to be successful the initiators need to have put together people with variety of skills and competencies and who are capable of combining their skills and competencies collaboratively in practice for optimum outcome. In some of the biogas programmes specific capacity enhancements may be required by certain individuals or organisations to run more successful projects and programmes.

A summary of the areas in which eight aspects of capacity development is required is presented below:

7.3.1 Macro level:

- **Capacity to Formulate Policies and Programmes and to Initiate Strategic Networks**

Funding Agencies and other Strategic Partners on Renewable Energy work with the national government to provide the capacity to provide strategic direction to the management of organisations involved in biogas initiatives. Policies need to be streamlined in order to be geared to ensure innovation, diversification, product development, market penetration and building strong links with national and international partners. The programme office must establish and maintain strategic partnership with funding Agencies and other partners

- **Capacity to Execute Policies and Programmes should be formulated at the Ministry Level**

This includes formulation of yearly plan, budgets and programmes and Capacity to coordinate at policy level. CD provides the ability to delegate execution responsibilities to those with the enhanced capacity to communicate, collaborate, coordinate the formulation of annual plans and programmes and to select those who are capable of managing implementation effectively. It is also necessary to formulate product development, research and development, marketing, networking and publicity strategies.

7.3.2 Meso level

- **Capacity to Manage the Implementation of Plans and Programmes:**

CD will enable stake holders to plan and organise publicity programmes as well as marketing and networking activities. Managers at implementation level need to ensure masons and technicians are well trained and motivated to carry out their work, carrying regular surveys to ensure that plan and programme are going well. Local masons and technicians provide a source of new customers/clientele; but managers must also ensure workers on the ground do not lose touch with clientele, local government officials, village elders, civil society leaders and others.

- **Capacity to Implement (Operationalised) Programmes and Plans effectively:**

Project Finance, Administrative and Field Staff, Technicians, Masons, project motivators, need to be endowed with the technical capacity not only to build and install but educate and motivate users to be acquainted with their plants. They also need the capacity to support research and development by providing materials and help in the testing of prototypes.

7.3.3 Micro level

- **Capacity to construct and install the plants:**

There is a need to enhance the capacity to construct or install the plant and also to carry out after sales service, planned maintenance and repairs.

- Capacity to manage construction companies

Biogas plants are sold to customers, so companies need to make a profit to pay their staff and to continue to operate, so the managers need management, business and entrepreneurial skills.

- **Enhancing the Capacity of untrained Users:**

Through Training of Trainers (ToT) programmes to enable customers to use and carry out minor maintenance of their plants

- **Capacity to conduct research and development:**

There is also a need to develop capacity to conduct R&D as well as other studies to ensure the biogas programmes have the capacity to innovate, adapt products and services to current and future environment. The programmes need to be able to test new products and assist with their launching and marketing.

7.3.4 Capacity Enhancement along an Unbroken Chain

These suggested capacity enhancements should not be a standalone activity in or along the chain. From policy formulation to implementation, after sale services and maintenance, there should be a strong link to ensure that each entity performs its part of the defined task effectively. Thus ensuring that the defined goal is successfully accomplished.

7.4 Summary of SNV's CD Support to ABP

SNV CD support activities to Nepal and ABP countries are modified to suit the need of the partner institutions in a particular country. SNV's CD support to Nepal and ABP countries includes involving the assessment of the CD needs of the various institutions involved in the wider RE sector. These include organisations which are responsible for policy direction, management and execution and implementation. In some countries the Apex bodies for the formulation of biogas policies are concerned Government Ministries. Institutions that manage the execution of the programmes are also concerned Government Departments or companies or NGOs. The organisations that manage the implementation are the biogas projects. The description above may differ from country to country. SNV continues to provide CD support through partners or consultants to the biogas sector in the Nepal and the ABP countries.

SNV advisors provide direct support to all the country programmes under ABP in the field of capacity building, knowledge brokering and advocacy, with the aim to develop a commercial viable domestic biogas sector. In doing so, it follows the lines of SNV's 'multi stakeholder sector development approach'. SNV's capacity development support includes project management, technical support and finance, whereas knowledge brokering and lobbying are to expose the programme and to exchange lessons between all the country programmes.

8 Conclusions and Recommendations

8.1 Conclusions

The SNV biogas initiative has a successful history in the Asian Region. The programme can be said to be reaching maturity as the technology has been adapted to changing circumstances. The numbers of biogas plants that have been built in Nepal and the ABP countries have been impressive (418,423 by the end of 2011), although the targets in each country programme have not been fully achieved.

SNV's emphasis on CD, through their multi-stake-holder approach, has enabled organisations in Nepal and the ABP countries to be established that are effective in the work of biogas extension at all levels, including policy making and planning, implementation and installation. The primary focus of these programmes, the biogas plant customers, are provided with a technology that is reliable and easy to use and that provides them with real benefits. These benefits extend to the local and international environments.

The frameworks under which the different organisations function within the programmes in the different countries vary, as SNV has adapted their CD approach to meet the particular socio-political needs of each country. The installation work is market-oriented and is being done by private companies in each country, although nature of these companies does vary. In Nepal, BCs are local construction companies, while in Bangladesh, the POs still tend to operate as NGOs despite being registered as companies. In Vietnam, the BCTs work in the informal private sector, while those in Cambodia and Lao PDR the masons are employed by local construction companies (BCCs) run by master masons. In Nepal, the implementation is coordinated by two NGOs: BSP and NBPA, while in Bangladesh, it is done by a private company: IDCOL. In Vietnam, Cambodia and Laos, that responsibility falls under a government ministry concerned with agriculture. Nepal has a clearly defined Apex Body, in AEPC, which is responsible to a government ministry and separate from the work of implementation. In the ABP countries, the apex bodies are the organisations also involved in implementation, i.e. IDCOL in Bangladesh and the government ministries in Vietnam, Cambodia and Lao PDR.

Each programme in the five countries is overseen by a coordinating or steering committee, with representatives from various government ministries. However, the commitment of ministries, other than those directly involved in the programme, is fairly weak, apart from their representation on these committees. Nepal has a good overall renewable energy policy, which seeks to integrate the various REs. Bangladesh also integrates the work of RE extension, but this is done by the extension agencies, the POs, rather than as a defined government RE policy. In Vietnam, different REs are under different ministries, and the government has no overall policy to integrate the work of RE extension and the situation is similar in Cambodia. In Lao PDR, the extension of other REs has not been considered.

SNV's CD work in the five countries has concentrated on training schemes for technicians, masons and others, as well as developing capacity for education and information dissemination through various media at national, provincial, district and village level. The training programmes and the work of dissemination are being continued effectively under the programme offices, with the involvement of the different implementing agencies. The quality control mechanism has proved very effective in ensuring that a high proportion of biogas units continue to work and provide good benefits to customers. The international reputation of the programme is very high and different country programmes have received awards to recognise this.

The grouping of biogas users in a village, or wider geographic unit, has a value that could be employed more widely. Users can help each other in plant use and maintenance. Construction and follow-up is more efficient if construction teams are working within a limited area.

The work of replacing ODA with carbon offset finance from both CER and VER sources has been slow, but is becoming successful. People involved in aid agencies that support the work of biogas extension are still doubtful that COF can replace COD completely in the short term, as the carbon prices in the market are very erratic. An agreement to replace the Kyoto Protocol when it expires at the end of 2012 has not been achieved, so the carbon market is beset by uncertainty. However, the voluntary market is developing and, despite the failure of international governments to agree, many international organisations are committed to its growth.

There is a wide range of opinions as to the value of the wider benefits of the biogas programmes. WWF puts a much higher value on the fossil carbon saved and the reduced deforestation than some of the European aid agencies.

The overall programmes in the five countries are at different stages. that in Nepal is seen as almost self-sustaining, with a good income from carbon offset finance, while that in Laos is still in the process of getting going. The programme in Vietnam is working well, but still needs support and guidance to become better established. The character of the Vietnam programme may change as VBA becomes more established. The programme in Cambodia is well developed and is on the way to becoming self-sustaining, but needs more time to allow new initiatives to become established. The Bangladesh programme is subject to a range of different pressures, both from the POs internally and also externally from other agencies.

However, there are weaknesses in the programme that may need further CD, or even new approaches, so they can be addressed:

- The installation companies in the five countries are not fully effective commercial operations. While they are good at construction and routine management, including financial management, staff lack the skills of financial planning. They are unable to predict cash flows over the operational year and to manage their working capital effectively.
- The high turn-over rate of trained masons, particularly in Nepal, Bangladesh and Cambodia, demonstrates a weakness in personal management in these companies. Once masons are trained, they have the opportunity to work in more lucrative jobs in their own countries or overseas.
- There is a need to offer CD to staff of the MFIs that are involved in the programmes in Nepal and Bangladesh in financial planning and electronic management of loans.
- The work of extension in the use of bioslurry is very mixed across the country programmes and also within many of the programmes. SNV has only appointed experts in the use of compost in agriculture in the Bangladesh programme, although they are not considered effective.
- Little priority has been placed on the quality of biogas appliances in the country programmes. A study done in 2009 showed weaknesses in the design of the stoves used in the Nepal and Bangladesh programmes. This issue is being addressed by an engineering company in Cambodia.
- The programme's success in installation numbers and quality control has relied on a tight development focus that makes the programme unable to respond to other development priorities. In order to do this, new programmes would need to be planned and developed, probably by organisations other than SNV.

8.2 Recommendations

The following suggestions should to be considered to ensure that the programme continues to have the required capacity to carry out its defined policies and programmes successfully and to be extended to other places, both in Asia and elsewhere.

8.2.1 Improvements for the programmes in Nepal and the ABP countries

- The market oriented approach lacks a wider dimension, so further CD is required to enable the biogas construction companies in Nepal and the ABP countries to adopt a more commercial approach. The BCs in Nepal and the POs in Bangladesh need training in financial planning. The BCTs in Vietnam and the BCCs in Cambodia need much more training to enable the master masons to run their teams as effective private companies.
- Similar CD could be offered to the MFIs involved in the programmes of Nepal, Bangladesh and Cambodia, to enable them to follow a more commercial approach.
- The idea of Biogas User Networks, as developed by PIN in Cambodia, could be used more widely in ABP.
- The issue of the high turn-over of masons needs to be addressed, especially in Nepal, Bangladesh and Cambodia. A study could be made of the reasons that trained masons leave the programmes, so they can be encouraged to have a greater commitment to the work.
- Further CD work is required to ensure all the technicians responsible for relating to biogas customers in Nepal and the ABP countries are able to explain the best approach to the use of bioslurry. An experienced agriculturalist is required, who can visit all of the programmes to identify the best way to

process bioslurry to make compost, and then revisit them to train the technicians. This person would also be able to offer similar CD to agricultural extension staff in government agencies in these countries.

- The work of biogas appliance development in Cambodia needs to be shared across the programmes in Nepal and the ABP countries. As improved stove designs are developed and tested for efficiency, ease of use and safety, the manufacturing enterprises in Nepal and Bangladesh need to be trained in their manufacture. The programme in Vietnam should be ready to work with local suppliers and manufacturers of biogas appliances, so that designs can be tested for efficiency, ease of use and safety, so that BCTs can offer the best designs.

8.2.2 Broader issues

- The work of writing documents for carbon offset finance is complex, so experience and CD in this area should be shared between the different programmes. Ways could be found of sharing some of the work, in order to reduce the high costs involved.
- Studies should be made of the broader economic value of the benefits that result from the biogas programmes in the five countries. The results of the analyses of this data can be used in the documents that are needed for the applications for carbon offset finance.
- The integration of biogas programmes with the work of extension of other RE technologies should have a higher priority at all levels in the five countries. Technicians could be much more effective if they could offer a range of different RE technologies to meet the needs of the customers they are visiting. This would mean the biogas programme offices would need to talk to other groups involved in RE extension work. This is already beginning to happen within AEPC in Nepal and within the POs in Bangladesh, although policies are required to make these conversations more effective. This work would need to be initiated in Vietnam, Cambodia and Lao PDR.
- The application of anaerobic digestion to other uses should be considered. This will include its use in urban areas to process food wastes and, also, its use to deal with food processing wastes. Such an approach would not fit into the existing programmes as they are presently managed, but the expertise that has been gained in Nepal and the APB programmes might be shared with other groups interested in setting up projects to meet these wider development imperatives.

9

Bibliography

- ADB (Jan 2010) Energy for All Brochure; ADB
- ADB/SNV (Mar 2012) Progress and planning report of E4ALL Working Group on Domestic Biogas; ADB/SNV
- AFC Consultants (Apr 2012) Country Market Assessment for Asia Regional Biogas Fund Cambodia; KfW
- Amrit B. Karki et al (Jul 2007) Biogas sector in Nepal, highlighting historical heights and present status; NBPA
- Ashden (May 2010) Ministry of Agriculture and Rural Development (MARD), Vietnam and Netherlands Development Organisation (SNV); Ashden
- Bajgain, S (Jan 2006) Implementation Plan: National Domestic Biogas and Manure Programme in Bangladesh; SNV
- Bajgain, S, Shakya, I, Mendis, M S (2005) The Nepal Biogas Support Program: A Successful Model of Public Private Partnership for Rural Household Energy Supply; SNV
- Biscons Consultants (Mar 2009) Capacity Assessment of Biogas Companies and Appliance Manufacturing Workshops; Biscons Development And Management Consultants
- Bolger, J (May 2000) Capacity Development: Why, What and How?; CIDA Vol.1 No.1
- BPD (Feb 2012) Biogas Program for the Animal Husbandry Sector in Vietnam; SNV/BPD
- BPD (Nov 2011) BPII Plan & Budget 2012; SNV/BPD
- BSP (2010) Modality of Biogas Support Programme (BSP) - January 2011_July 2012; BSP
- BSP (Feb 2011) Biogas Support Programme (BSP) Phase IV - Annual Progress Report 2010; BSP
- BSP (Mar 2012) Results reporting Format for Biogas Support Programme (BSP) 1992 - 2011; BSP
- BSP (May 2006) Biogas Support Programme Phase IV Multi Annual Plan for Remaining Period; BSP
- BSP (Oct 2007) Concept Paper for Preparation of BSP Phase V; BSP
- Bulmer, Andrew, Finlay, John, Fulford, David, Lau-Wong, Mamie M (1985) Biogas: Challenges and Experience from Nepal (Vol I and II); United Mission to Nepal
- Buysman, Eric (Mar 2012) Monitoring report For the verification of National Biodigester Programme Cambodia; NBPC/SNV
- CDM (Dec 2009) CDM-SSC-CPA-DD: Nepal Biogas Support Program-PoA; UNFCCC
- CDM (Nov 2005) CDM Project Activity Registration and Validation Report Form; UNFCCC F-CDM-REG
- CDM (Nov 2005) CDM-SSC-PDD: Biogas Support Program - Nepal (BSP-Nepal) Activity 1; UNFCCC
- Chandararot, Kang (Oct 2006) Cambodia Institute of Development study, for National Biodigester Programme; CIDS
- de Castro, J F M (Sep 2004) Quick Review of the Biogas Programme in Vietnam; DGIS
- de Castro, J F M, Kanel, N R, Jha, P (Jun 1999) Mid-Term Review of the Biogas Support Programme Part I of Phase III; SNV
- de Castro, J, Phan N H T, Sacklokham, S, Somith, S, Hossain, M Z (Nov 2008) Mid-Term Review of the Asia Biogas Programme; SNV
- Devkota, G P (2001) Biogas technology in Nepal: A sustainable source of Energy for rural people ; Mrs. Bindu Devkota, Maippee
- Devkota, G P (Aug 2003) Analysis of Biogas Leakages from Household Digesters; Winrock International
- Devkota, G P, Joshi, K M, Shrestha, S (Jul 2011) Annual biogas users' survey 2009/2010 for Biogas Support Program; NESS Kathmandu
- Dhakal N H (Sep 2008) Financing Domestic Biogas Plants in Nepal; Centre for Empowerment and Development
- Dung, Nguyen Quang (Jun 2011) Biogas User Survey 2010-2011 BDP FLR in Vietnam; Independent Consultant Group
- Dung, Tran Viet, Hung, Ha Viet, Hoa, Huynh Thi Lien (Feb 2009) Biogas User Survey 2007-2008; Independent Consultant Group
- FAO (2012) The Three Dimensions of the FAO Capacity Development Framework; FAO

FAO (Sep 1996) Biogas Technology: a Training Manual for Extension; Food and Agriculture Organization of The United Nations

Fulford, David (1988) Running a Biogas Programme: A handbook; Practical Action Publications

Fulford, David, Roque, Joy, Poudyal, Tej Ram (Aug 1991) Evaluation of Financing and Construction of Biogas Units; UNDP Bureau for Policy Development

Ghimire, Prakash C (Mar 2006.) Study on Identification of the best Biodigester Model for Lao PDR; Biogas Practice Team

Ghimire, Prakash C. (Aug 2010) Technical Audit of Biogas Plants Constructed under the Framework of NDBMP in Bangladesh; Renewable Energy Consultant development Partners, Nepal

Ghimire, Prakash C. (Dec 2005) Technical Study of Biogas Plants Installed in Bangladesh; Renewable Energy Consultant development Partners, Nepal

IDCOL (Jan 2006) Implementation Plan, National Domestic Biogas and Manure programme in Bangladesh; IDCOL/SNV

IFAD (2011) Kingdom of Cambodia: Project for Agricultural Development and Economic Empowerment (PADEE); Project Design Report; IFAD

Jerome, M, Baril, M, Nhung, N M (Jan 2009) Biogas Programme for Animal Husbandry Sector of Vietnam, Project Consultancy Report; KPMG

Jerome, M, Baril, M, Woo, T (Jun 2009) Biogas Programme for Animal Husbandry Sector of Vietnam, Cost-Benefit Analysis; KPMG

Kaplan, A (1999) The Developing Of Capacity; Community Development Resource Association

Khandelwal, K C, Gupta, Vibha K (Feb 2009) Popular Summary of the Test Reports on Biogas Stoves and Lamps prepared by testing institutes in China, India and the Netherlands; SNV

Klerx, Gerrit (May 2007) Private sector development study for the national Biodigester programme Cambodia; NBPC

Leermakers, Mieke (1993) Extension of Biogas in Nepal - Part 1; SNV

Leermakers, Mieke (1993) Extension of Biogas in Nepal - Part 2; SNV

Leermakers, Mieke (1993) Extension of Biogas in Nepal - Part 3; SNV

Lucok, David (Apr 2012) Country market assessment for Asia regional Biogas Fund- Cambodia; KfW

Lusthaus, C, Adrien, M-H, Perstinger ,M (Sep 1999) Capacity Development: Definitions, Issues and Implications for Planning, Monitoring and Evaluation; Universalia Occasional Paper No. 35

MinEE (Jan 2010) Cameroon National Biogas Programme; Ministry of Energy And Water Resources (MinEE) Republic Of Cameroon

Moulik T K (Mar 1985) The biogas prograsmme in India and China: a compartive analysis of experiences; Indian Institute of Management, Ahmedabad

Moulik, T K, Mehta, Swarti (Aug 1990) Biogas technology: the Indian Scenario; Indian Institute of Management, Ahmedabad

NBPC (Mar 2012) Annual activities and Financial report 2011; SNV/NBPC

NBPC (undated) Brief Overview of National Biodigester Programme; NBPC/SNV

NBPC (undated) National Biogas Programme: Long term planning and financing; NBPC/SNV

NBPC (undated) The National Biodigester Programme Cambodia: Building Capacity for Delivery of Clean Energy to Poor Rural Households; NBPC/SNV

NDBMP (Dec 2009) Implementation Plan 2010-12; NDBMP, Bangladesh

NDBMP (Jan 2006) Implementation Plan National Domestic Biogas and Manure Programme in Bangladesh; IDCOL/SNV

Noor, Shamsun (2012) Bio Slurry Presentation; BARI (Bangladesh Agricultural Research Institute)

NSPRC (1985) The Collection of designs for household hydraulic biogas digesters in rural areas; National Standard of the People's Republic of China

OECD (2006) Capacity development: Key to development results; OECD web page

OECD (2006) The Challenge of Capacity Development: Working Towards Good Practice; DAC Guidelines and Reference Series, A DAC Reference Document

Otoo, S, Agapitova, N, Behrens, J (2009) The Capacity Development Results Framework: A strategic and results-oriented approach to learning for capacity development; World Bank

Rahman T (2007) Biogas and its history; Energy Revolution

Schipper, E L F (Jun 2012) Transformative adaptation; Capacity.Org Journal, Issue 45

SNV (May 2008.) Sustainable poverty reduction: SNV Asia results and strategies 2007-2010; SNV

SNV (Apr 2012) National Biogas Programme in Cambodia Concept Note Phase II, 2013 - 2018; NBP/SNV

SNV (Feb 2012) Biogas Pilot Program 2012 Plan and Budget Revised version ; SNV

SNV (Jul 2011) The Capacity Development Framework for the Biogas Pilot Project's Mafons; SNV

SNV (Mar 2012) Biogas Pilot Project (BPP) FINAL DRAFT Annual Report 2011; SNV

SNV (Nov 2011) Biogas Pilot Project (BPP) Biogas User Survey 2011; DLF MAF Lao PDR/SNV

SNV (Oct 2006) Implementation Plan For A Biogas Pilot Program (BPP) In Lao PDR ; SNV

SNV (Oct 2006) SNV, Implementation Plan for a Pilot Programme in Lao PDR; SNV

SNV (2007) Capacity Development From theory to SNV's practice ; SNV

SNV (2007) Strategy Paper 2007 - 2015: Local impact - Global presence; SNV

SNV (2010) Biogas Sub Sector: Actor Constellation map; SNV

SNV (2011) Laos Fact sheet; SNV

SNV (2011) SNV Code of Conduct; SNV

SNV (2011) SNV's Request For an Evaluator for Biogas ABP 2011; Evaluation Of Capacity Development in the SNV-Asia Biogas Programme

SNV (Feb 2011) Biogas Programme for the Animal Husbandry Sector in Vietnam - Annual Report 2010; SNV

SNV (Feb 2012) Annual Report 2011, Biogas Program for the Animal Husbandry Sector in Vietnam; SNV

SNV (Feb 2012) Asia Biogas Programme Revised Annual Plan & Budget 2012; SNV

SNV (Jan 2005) Support Project to the Biogas Programme for the Animal Husbandry Sector - Annual Report 2004; SNV

SNV (Jun 2012) Asia Biogas Programme Project reference:; SNV Renewable Energy Positioning Paper

SNV (Mar 2004) Annual Report 2003 and Activity Plan & Budget Revision 2004; SNV

SNV (Mar 2008) Biogas programme for the Animal Husbandry Sector in Vietnam Annual report 2007; SNV

SNV (Nov 2004) Asia Biogas Programme: Access to sustainable energy for 1,300,000 people: A proposal prepared for DGIS/DMW; SNV Renewable Energy Positioning Paper

SNV (Nov 2011) BP II Plan and Budget 2012; SNV

SNV (Oct 2007) Corporate Standards for SNV Primary Process; SNV

SNV (Sep 2005) Logframe BP II PID; SNV

SNV (Sep 2007) Partnership and Resource Mobilisation Policy - 2007 - 2015; SNV Vision

Ter Heedge, Felix (2008) Domestic biogas projects and Carbon revenue: A strategy towards sustainability; SNV

Tuyen, Do Kim (2009) Overview Of Biogas Technology In Vietnam; Department of Livestock Production, MARD, Vietnam

Ubels, J, Acquaye, N-A, Fowler A (2010) Capacity Development in Practice; Earthscan, London.Washington DC.

UNDP (1997) Capacity Development A Technical Advisory Paper 2; UNDP Bureau for Policy Development

UNDP (2003) Human Development Report 2003: Millennium Development Goals; Oxford University Press, New York

UNDP (2008) Capacity Development: Practice Note; UNDP

van Buren, A, Crook, M (1979) A Chinese biogas manual; IT Publications (Practical Action Pubs)

van der Velden, F, Leenknecht A-M, Haijntink A (2005) Capacity Development Services: A learning approach to enhancing capacity in SNV E; SNV

van Mansvelt, Rogier, Sras, Phanny, Pino, Mariela (Mar 2012) Biogas users' survey; SNV/NBP

van Nes, W (Nov 2006) Support Project to the Biogas Programme for the Animal Husbandry Sector in some Provinces of Vietnam; SNV

van Nes, W, Boers W, Khurseed-UI-Islam (Aug 2005) Feasibility of a national programme on domestic biogas in Bangladesh; SNV

van Nes,W, Lam, J, ter Heegde, F, Marree, F, Nguyen, Q, Watts, H (Jan 2009) Building viable domestic biogas programmes: success factors in sector development; SNV

van ter Heedge, F (2008) Domestic biogas projects and Carbon revenue: A strategy towards sustainability; SNV

VanJeroen (2009) Financing sustainability: Carbon Revenue for the poor; SNV

WB (2009) Capacity Development Resource Issues - Capacity Development in Practice; World Bank

WB (2009) Capacity Development Resource Issues - Definitions; World Bank

Yocarini, Lara (2007) Capacity Development for Impact: Where is the evidence? ; Impact Alliance

Young Consultants, Bangladesh (Oct 2010) Final Report on Biogas Users' Survey 2009; Young Consultants, Bangladesh

Zifu, L, Mang, H-P, Neupane, K, Huba, E-H, Lebofa, M, Wauthelet, M, Bajracharya, P (Sep 2009) Biogas audit Nepal 2008: final version Volume III; KfW and USTB

Zwebe, Dagmar (May 2012) The Biogas Programme for Animal Husbandry Sector of Vietnam; SNV

Annex I Evaluation Visit Programme

Overall Programme

The team of three consultants worked together in Nepal at the beginning of the evaluation, went separately to Bangladesh, Cambodia and Lao PDR and met together in Vietnam at the end. The overall programme is shown in Table I.1.

Dates	Team members	Place	Activity
24/4/2012	One	London to Kathmandu	Flight from UK to Nepal
26/4/2012	All	Kathmandu, Nepal	Meeting with SNV ABP staff
27/4 to 5/5/2012	All	Kathmandu, Nepal	Preparation work, inception report
7/5 to 11/5/2012	All	Kathmandu, Nepal	Interviews including Stake-holders meeting
12/5/2012	All	Kavre, Nepal	Field trip
14/5 to 16/5/2012	All	Kathmandu, Nepal	Interviews
17/5 to 18/5/2012	All	Kathmandu, Nepal	Inception report preparation
19/5, 20/5/2012	Separately	Kathmandu to: Dhaka, Phnom Penh, Vientiane	Flights to 3 country projects in Bangladesh, Cambodia and Lao PDR
21/5 to 26/5/2012	Separately	Dhaka, Phnom Penh, Vientiane	Interviews and field trips
26/5, 28/5/2012	Separately	Dhaka, Phnom Penh, Vientiane to Hanoi	Flights to Vietnam
28/5/2012	Separately	Hanoi, Vietnam	Initial discussions
29/5 to 31/5/2012	All	Thanh Hoa	Field trip[
1/6 to 10/6/2012	All	Hanoi, Vietnam	Interviews and report preparation
11/6/2012	Separately	Hanoi to Kathmandu	Finish and flights back

Table I.1 Overall programme for the evaluation visits

Between the interviews and field trips, the team spent time reviewing the many reports on the programme available from SNV, both publicly available from the SNV web site and also internal reports provided by SNV staff. Initially, the team spent time planning the programme and later on spent time analysing responses and writing draft reports.

The main visits in Nepal are shown in Table I.2. All three of the evaluation team interviewed people in Nepal. The time between interviews was spent in identifying and reading literature, planning the programme, analysing the data and preparing reports.

Date	Programme	Stakeholder	Location
26 April 2012	SNV ABP Meeting	SNV country leaders	Godavari village resort
3 May 2013	SNV	Anuj Joshi	SNV Office
6 May 2013	WWF WB DANIDA BSP/N	Yugan Manandhar/ Santosh Nepal Ashish/Rabin Shrestha Shiva Sharma Balaram and Team	Various offices in Kathmandu
7 May 2012	AEPC	Govind Pokharel	AEPC
8 May 2012	SNV RERL/UNDP	Saroj Rai Satis Gautam	Various offices
10 May 2012	NBPA	Lok Nath Ghimire Krishna Subedi Kishore Gyawali Shekhar Aryal	NBPA
12 May 2012	Field visit to Kavre – Observation and interview		
13 May 2012	KfW	Shanker Pandey	KfW
14 May 2012	MFIs AEPC	Kedar Sapkot Narayan Timilsina Govinda Pokharel Samir Thapa Raju Laudari	Various offices in Kathmandu
15 May 2012	SNV	Rem, Saroj, Anup	SNV
16 May 2012	Norwegian Embassy	Bibek Chapagain	
18 May	SNV	Presentation to Katmandu staff	DNV
19 May	Travel from Kathmandu		Travel to Dhaka and Phnom Penh
20 May	Travel from Kathmandu		Travel to Vientiane

Table I.2 Programme for the evaluation visits in Nepal

The main visits in Cambodia are shown in Table I.3. One of the evaluation team visited Cambodia.

Date	Programme	Stakeholder	Location
19 May 2012	Travel from Kathmandu		Phnom Penh
21 May 2012	Introduction to NBP Meeting with BCC, visit biodigester Meeting Takeo PBPO	Prog. Staff BCC, Users Mgmt team	NBP Office Prey Kabbas district, Takeo Takeo
22 May 2012	Meeting with BCC Visit Biodigester Meeting with CEDAC- PBPO Meeting with PRASAC Meeting with AMRET	BCC house Plant users Mgmt team Manager Manager	Chhouk district, Kampot Chhouk district, Kampot
23 May 2012	Meeting with SNV Meeting with PIN Meeting with PRASAC Meeting with AMRET		SNV Office PIN Office PRASAC Head office AMRET Head office
24 May 2012	Meeting with DTW Meeting with NBP Meeting with CEDAC Meeting with PPI Meeting with CIEDC	Mr. Harold Pearson Dr. Hem Chantha Mr. Pann Norar.	DTW workshop NBP Office CEDAC Office PPI office CIEDC office
25 May 2012	Meeting with Steering Committee (MAFF) GIZ		NBP Office GIZ Office
28 May 2012	Debriefing meeting Travel to Vietnam		SNV Office

Table I.3 Programme for the evaluation visits in Cambodia

The main visits in Bangladesh are shown in Table I.4. One of the evaluation team visited Bangladesh.

Date	Programme	Stakeholder	Location
19 May 2012	Travel from Kathmandu		Dhaka
20 May 2012	IDCOL MPEMR BGEF	Team Key people in RE Dipal Chandra Barua	Office Consultation meeting Upscaling RE in Bangladesh Over Supper
21/05/12	KfW Bangladesh Biogas Development Forum	Tazmilur Rahman Mr Gofran	Over Lunch Over Supper
22/05/12	IDCOL Component Manufacturer Green Housing & Energy Grameen MOP Grameen Shakti	Managing Director Managing Director Managers Managers	Various offices in Dhaka Grameen Bank Offices
23/05/12	Stake holders meeting	PO representatives	Operational Committee
24/05/12	Bangladesh Agriculture Research Institute Field Plants	Research Staff Biogas user	BARI main buildings
25/05/12	Travel to Hobiganj Field Plants	Biogas User	Hobiganj
26/05/12	Visit staff training programme Field plant being built SNV	Teachers and trainees at Grameen Shakti offices Rajeev Munankami	Hobiganj Dhaka
27/05/12	Travel from Dhaka		Hanoi

Table I.4 Programme for the evaluation visits in Bangladesh

The main visits in Lao PDR are shown in Table I.5. One of the evaluation team visited Lao PDR.

Date	Activity	Stakeholder	Location
20 May 2012	Arrival at Vientiane		Vientiane
21 May 2012	Introduction to BPP BPP Programme Manager SNV Senior Re Sector Leader SNV Biogas Advisor	SNV and BPP Staff Souphavanh Keovilay Mr. Bastiaan Teune Mr. Bounthavy Sengtakoun	BPP Office
22 May 2012	Project Director BPP BPP Technician Field visit to biogas plants	Mrs. Phassaly Phissamay	DLF office Outside Vientiane
24 May 2012	BPP Programme Director Field visit new biogas plants	Dr. Khamphay Thammavong	BPP Office Outside Vientiane
26 May 2012	Travel from Vientiane		To Hanoi

Table I.5 Programme for the evaluation visits in Lao PDR

The main visits in Vietnam are shown in Table I.6. They were done by the team as a group. The time between interviews was spent in identifying and reading literature, planning the programme, analysing the data and preparing reports.

Date	Activity	Location
28 May 2012	Discussions on schedule details Interview with BPD team	SNV BPD
29 May 2012	Field visit to Thanh Hoa province	
30 May 2012	Interview with district people committee and district technician Interview with commune people committee Interview with mason team Interview with 2- 3 biogas users and 2 potential biogas users	Tho Xuan District Provincial Office District Office Commune Users
31 May 2012	Back to Hanoi	
1 June 2012	Meeting with Embassy of the Netherlands Meeting with SNV	Netherland Embassy SNV
4 June 2012	Debriefing meeting at Biogas office	
5 June 2012	Vietnam debriefing	
6 June 2012	Meeting with VBA	Biogas office
7 June 2012	Final debriefing preparation	
8 June 2012	Final debriefing	SNV
11 June 2012	Meeting with Naa Aku and Departure	SNV

Table I.6 Programme for the evaluation visits in Vietnam

Annex II People Interviewed

Names of People Interviewed in Nepal

SN	Name of person and position	Name of Organisation	Place
1	Santosh Mani Nepal, Director- policy and support	WWF	
2	Rabin Shrestha, Energy Officer	WB	
3	Ashish Shrestha, Operations Analyst	WB	
4	Shiva Sharma, Senior Programme Officer	Danish Embassy	
5	Bala Ram Shrestha, Executive Director	BSP - Nepal	
6	Khagendra Khanal, Assistant Director	BSP - Nepal	
7	Saroj Rai, Adviser	SNV	
8	Satish Gautam, National Programme Manager	RERL	
8	Gopal Joshi, Regional Advisor	RERL	
10	Keshav Pradhananga, Regional Advisor	RERL	
11	Narendra KC, Regional Advisor	RERL	
12	Sunjita Pradhan	RERL	
13	Kishore Gyawali, Advisor	NBPA	
14	Shekhar Aryal, Past present	NBPA	
15	Bishnu Belbase, Programme Manager	NBPA	
16	Shanker Pandey	KfW	
17	Niraj subedi, Project Manager	KfW	
18	Sabitri Sharma,	User	Kavre
19	Sanu Chhetri	User	Kavre
20	Som Nath Banjara	User	Kavre
21	Binod P. Banjara	User	Kavre
22	Kedar Sapkota	FMI	Kavre
23	Narayan Dutta Timilsina, Lalitpur	Cooperative, MFI	Kavre
24	Dr. Govind Pokharel, Executive Director	AEPC	
25	Samir Thapa, Senior Energy officer	AEPC	
26	Raju Laudari, CDM Manager	AEPC	

Names of People Interviewed in Vietnam

SN	Name of Participant	Position	Organisation
1	Trinh Ba Lap	Commune chairman	Tho Truoz
2	Thas Thi	Vice Chairman	Tho Truoz
3	Trinh Ba Hien	Leader of commune, Public security	Tho Truoz
4	Tran Thi Hong	Land Management Officer	Tho Truoz
5	Le Thi Quang	Deputy Head of Agriculture Unit Tho Xuan district	Tho Xuan People's committee
6	Le Tien Dung	District Biogas Technician	Tho Xuan People's committee
7	Triuh Doan Bog	Land management Officer	Tho Xuan People's committee
8	Hoang Khai Hoi	Director of PBPA, Thach Hoa	Thach Hoa Province
9	Nguyin	Provincial Technician	Thach Hoa Province
10	Hoay Sy Ban	Biogas Mason of Tho Xuan district	Tho Xuan district
11	Trinh Huu Chau	KT1 Biogas household	Tho Truoy Commune
12	Nguyin Xuan	Potential biogas household	Tho Truoy Commune
13	Ngo Thi Dung	Agriculture extension officer	Agricultural Community services
14	Le Minh Nghia	Biogas Mason	Xuan Hoa commune
15	Biu Van Binh	Biogas user – KT1 – 12 cum -2012	Xuan Hoa commune
16	Ha Van	Biogas user – KT1 – 12 cum- 2007	Xuan Hoa commune
17	Le Van Hien	Vice director of Dept. of Agriculture and Rural Development	DARD, Thach Hoa province
18	Dr. Le Hung Quoc	President	Vietnam Biogas Association
19	Pham Van Thanh	General secretary	Vietnam Biogas Association
20	Ms. Ho Thi Lan Huong	Member	Vietnam Biogas Association
21	Hoang Anh	Vice Director	Quang Huy Company Ltd.

Names of People Interviewed in Bangladesh

SN	Name of Participant	Position	Organisation
1	Rajeev Munankami	SNV Advisor	SNV
2	Nazmul Haque Faisal	Senior Programme Manager	IDCOL
3	Rasel Ahmed	Investment Officer	IDCOL
4	S.M. Formanul Islam	Director Legal Affairs	IDCOL
5	Tazmilur Rahman	Senior Programme Manager, Energy	KfW
6	M A Gofran	Biogas Consultant	Grameen Shakti
7	Dr Mosraq Ahmmed	Managing Director	Green Housing & Energy Ltd
8	S Monuar Tarique	Deputy Director, Dhaka Office	Department of Environment
9	Aminul A.B.M. Haq	Biomanure expert	SNV
10	Dr M S Islam	Head, Dept Int Coop and Development	Grameen Shakti
11	Engr Mohammed Roqibul Islam	Manager	Grameen Shakti
12	Abser Kamal	Acting Managing Director	Grameen Shakti
13	Egnr Md Jalal Uddin	Ast Enginner	Grammen Shakti
14	Ehsanul Bari	Assist General Manager	Grameen Motsho O Pashusampad
15	Md Monuar Hossain	Assist General Manager	Grameen Motsho O Pashusampad
16	A.K.M Badrul Alam	Deputy General Manager	Grameen Motsho O Pashusampad
17	Md Ehsanul Bari	Managing Director	Grameen Motsho O Pashusampad
18	Monzur Hossain Zimmu	Secretary General	Bangladesh Renewable Energy Society
19	Dipal Chandra Barua	Chairman	BGEF
20	Mohammed Salim	Area Manager	Ghashful
21	Rahman (Bulbul) Renwanoor	Managing Director	Rahman Renewable Energy Co
22	Salah Uddin Murad	Chairman	Angikar International Pvt Ltd
23	Apurba Kanti Choudhury	Senior Scientific Officer	Bangladesh Agricultural Research Institute
24	Shamsun Noor	Chief Scientific Officer	Bangladesh Agricultural Research Institute
25	Md Jalal Uddin Sarker	Chief Scientific Officer	Bangladesh Agricultural Research Institute
26	Dr Md. Asadul Haque Bhuiyan	Principal Scientific Officer	Bangladesh Agricultural Research Institute
27	Mollah Amzad Hossain	Editor	Energy and Power Journal
28	Sattya Ranjan Bhattacharjee	Managing Director	Phocos Solar

Names of People Interviewed in Cambodia

SN	Name of Participant	Name of Organisation	Position	Address
1	Mr. Em Bunthy	BCC	Director	Bati district
2	Mr. Hay Keo	Biogas User	Owner	Knang commune, Takeo province
3	Mr. Chhouy Phaly	Biogas User	Owner	Veal village, Knang, Takeo province
4	Mr. Torn Seng Kim	Biogas user	Owner	Veal village, Knang, Takeo province
5	Mr. Bou Phorn	Biogas user	Owner	Ang village ,Knang, Takeo province
6	Mr Seng Meng	DA - PBPO	Admin	Dept. of Ag., Takeo province
7	Mr. Sok Daro	DA - PBPO	Coordinator	Dept. of Ag., Takeo province
8	Mr. Khin Daravuth	CEDAC-PBPO	Director	Chhouk, Kampot
9	Mr. Luy Khemrath Darith	CEDAC-PBPO	Coordinator	Chhouk, Kampot
10	Mr. Lay Tho	CEDAC-PBPO	Supervisor	Chhouk, Kampot
11	Mr. Chrun Chran	CEDAC-PBPO	Bio Slurry coordinator	Chhouk, Kampot
12	Mr. Keo Sam Ol	BCC	Director	Chrey , Chhouk, Kampot
13	Mr. Keo Poeun	Biogas user	Owner	Krang snay commune, Kampot
14	Mr. Keo Por	Biogas user	Owner	Krang snay commune, Kampot
15	Mr. Keo Sokhreng	AMRET	Branch Manager	AMRET, Kampot
16	Mr. Sut Samnang	PRASAC	Sub-branch manager	PRASAC, Kampot
17	Mr. Jan Lam	SNV	Advisor	SNV, Phnom Penh
18	Mr. Nico Janssen	SNV	Coordinator	SNV, Phnom Penh
19	Mr. Petr Schmied	People in Need	Head	Chork village, Takeo
20	Mr. Oum Sam Oeun	PRASAC	DGM	Phnom Penh
21	Mr. Chheng Yanith	AMRET	Deputy head-credit	Phnom Penh
22	Mr. Sok Kimseng	AMRET	Micro Credit manager	Phnom Penh
23	Mr. Harold Pearson	DTW	General Manager	DTW, Phnom Penh
24	Ms. Suon	DTW	Assist GM	DTW, Phnom Penh
25	Mrs. Lam Saoleng	NBP	Prog. Coordinator	NBP, Phnom Penh
26	Dr. Yang Saing Koma	CEDAC	President	Phnom Penh
27	Mr. In Sathoun	PPI	Trainer	PPI, Phnom Penh
28	Mr. Rath Rachana	PPI	Administrator	PPI, Phnom Penh
29	Mr. Teang Sak	CIEDC	Deputy Director	CIEDC, Phnom Penh
30	Dr. Kao Phal	DAHP	Director	Trea Village, Khan Meanchey, Phnom Penh
31	Dr. Sar Chetra	DAHP	Deputy Director	Trea Village, Khan Meanchey, Phnom Penh
32	Mr. Peter Bolster	GIZ	Team leader	Phnom Penh

Names of People Interviewed in Lao PDR

Names of Persons Covered	Designation	Date
Bastiaan Teune	Senior RE Sector Leader	21 May 2012
Souphavanh Keovilay	BPP Programme Manager	21 May 2012
Bounthavy Sengtakoun,	SNV Advisor	21 May 2012
Mrs. Phassaly PHESSAMAY	Project Director BPP Vientiane	22 May 2012
Technician (Name not recorded)	BPP	22 May 2012
Dr. Khamphay THAMMAVONG, DVM	Programme Director of BPP	24 May 2012

4 Questionnaires with Answers

4.1 Nepal

SNV

What do you see as your achievements in the biogas programme?

SNV has been changed. Current work and thinking focus on three sectors: agriculture, water and sanitation and renewable energy. It has provided CD through advisory services and is producing and developing knowledge. Likewise unique modality, quality management, company qualifications, sector development networks, standardisation of the technology, sanitation from toilet attachment are other achievements of the programme.

What capacity development issues were addressed in order to enable these achievements?

SNV implemented the programme and created BSP/N and focused on CD towards NBPA. In this case government of Nepal, private sector and NGOs actually drives the programme and SNV is bringing them together.

What were the CD issues at the start of the programme and how were they addressed?

CD is changing mind set where vision and leader is missing at the start of the programme but at present it has focused on leadership capacity development, sector vision development, biogas for business and capacity fight.

In which areas were these CD issues addressed?

CD issues were addressed in technology development, private sector development (NBPA), CD on managerial, policy development, slurry integration in biogas programme, support to AEPC.

What assumptions were made about the need for CD in these areas?

In order to make the programme sustainable, AEPC and other partners also should move accordingly.

How effective was the CD work in these areas?

Development of project cycle modality, end uses of biogas for electricity generation, technology improvement are some of the issues addressed. Likewise, registration of biogas in CDM project is another big issue which has been addressed.

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD required?

Present position of CD is satisfactory. However, CD further required is not only for domestic plants but also for large size institutional, non dung and non concrete focused plants. Also should focus on slurry utilisation, private sector network development and institutional set up.

How does the biogas programme fit into the wider renewable energy programme in your country?

Solar PV system for lighting, hydro has huge potential and should have mini grid connection, ICS for rural areas and biogas for cooking as well as electricity generation as well as proper utilisation of slurry as manure. There is a need of coordination of all renewable energy programme.

What are the issues in the future, including wider RE integration, that are likely to demand further CD that has not already been addressed?

The future issues are: Carbon support, Entrepreneurship support to companies, R&D for both small and large size plants. For the sustainability: investment on R&D. Challenges for the programme are: capacity to scale up, technology innovation, market regulation, people focused, and making use of internal expert in the sector but not to lose the focus on biogas.

Government Organisations (AEPC)

What do you see as your achievements in the biogas programme?

Approaches which are adapted in other countries, promoting private sector, demand based approach and users' contribution. Likewise, enhance capacity of private sector, influence on policy, government contribution to the programme, harmonisation of development partners and carbon revenue are some of the achievements of the programme.

What capacity development issues were addressed in order to enable these achievements?

Training to company staff, technicians and masons. Good relation with the partner organisations.

In which areas were these CD issues addressed?

Private sector development, promotion, marketing etc. AEPC has no branches and still needs NGO support. BSP/N supports AEPC in quality monitoring.

What assumptions were made about the need for CD in these areas?

Installation of good quality biogas plants and providing good services to the biogas owners.

How effective was the CD work in these areas?

Very effective

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD required?

Presently only one design and hence need to adapt other designs and sizes and focus to pro-poor for poorer people. Some of the examples could be: Improvement in the kitchen and improvement in the appliances. Should also focus on commercial and institutional plants.

Are there any critical issues in the CD provision in the biogas programme?

High investment cost and high water table conditions especially in Terai region are some of the critical issues.

How does the biogas programme fit into the wider renewable energy programme in your country?

Coordination with other renewable energy programme such as micro hydro, solar, ICS, wind etc.

What are the issues in the future, including wider RE integration, that are likely to demand further CD that has not already been addressed?

Technological innovation, multi-stakeholders programme, carbon finance and social output are some of the issues for the future and long term design.

Donor agency (KfW DANIDA, Norwegian Embassy and WB)

What do you see as your achievements in your involvement in the biogas programme?

Subsidy development model, institutional framework, joint donor approach, development of industries and linkages with AEPC are some of the achievements in the programme.

What capacity development issues were addressed in order to enable these achievements?

Existing strategy is not well thought out and is not really invisible and the programme is subsidy driven and commercialisation is still part driver. Integration is key now; value addition of BSP/N and AEPC has recently started the thought of integration.

In which areas were these CD issues addressed?

Organisational and implementation model, market based approach.

How effective was the CD work in these areas?

Biogas tube technology and BSP/N should look from strategic point of view and credit flow mechanism to be improved. Donors' motivated towards poverty level and subsidy to be combined with credit.

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD required?

KfW to be part of RREP; SNV could be partner of the RREP, Integrated approach and add value to the process.

Are there any critical issues in the CD provision in the biogas programme?

How to revive when no subsidy? And how to sell the plant when no subsidy? Are some of the critical issues.

How does the biogas programme fit into the wider renewable energy programme in your country?

Coordination with other renewable energy programme such as RREP, RERL etc. May help to fit into the wider renewable energy programme.

What are the issues in the future, including wider RE integration, that are likely to demand further CD that has not already been addressed?

The future issues and the CD that has not addressed are: Hybridisation of the technology, diversification or integration of the programme and carbon financing and its household rights and R&D including cold climate biogas plants.

NGOs (BSP/N, NBPA)

What do you see as your main achievements?

Promotion and extension, quality control, R&D, slurry management, institutional strengthening and marketing are the main achievements of the programme.

What were the CD issues at the start of the programme and how were they addressed?

Masons, company supervisors and users were trained at the start of the programme. Later on MFI established and private sector developed.

In which areas were these CD issues addressed?

Credit units established in AEPC. Human resource development in private sector, low cost design plants and small sized plants are being developed.

What assumptions were made about the need for CD in these areas?

Capacity of all actors to be developed.

How effective was the CD work in these areas?

Requirement level of mason is difficult to find out, underpaid mason and drop out is high,

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD required?

Masons, company supervisors and users are well trained. However, CD to be focused on: technical innovation, Research and development, and low cost designs. Likewise, management capacity of stakeholders especially for the supply of appliances to be enhanced and subsidy gap to be fulfilled.

Are there any critical issues in the CD provision in the biogas programme?

Innovations for large scale plants. Likewise, single model and only dung fed plants are other limitations of the programme.

How does the biogas programme fit into the wider renewable energy programme in your country?

There is a need of coordination with other renewable energy programme.

What are the issues in the future, including wider RE integration, that are likely to demand further CD that has not already been addressed?

Marketing and promotion to be more focused. Diversification and integration of the programme is another area to be addressed.

Users

Why did you buy a biogas plant?

Biogas plant is built for cooking, lighting; make use of slurry as compost and environmental sanitation through toilet attachment.

How did you know about biogas?

Know from different sources such as neighbours who installed a biogas in his house, company people and promotional means.

How did you cook before you had biogas?

We cook food on firewood before having biogas plant.

What do you see as the benefits of biogas?

We see benefits of gas for cooking and lighting and slurry as manure.

How did you pay for the plant?

Most of them were installed in cash and some on credit. Those who installed on credit pay loan by selling agricultural products and in some cases who are employed from their salary.

Would you have paid the extra cost if there had not been a subsidy? (workout cost with and without)

Some would pay the extra cost if there had not been a subsidy where as others wouldn't pay if there is no subsidy.

Are you happy with your investment? Was it "worth it"?

Yes, majority of them are satisfied with the investment.

Would a biogas plant be useful if you did not have cattle?

No, gas would not be enough if the plant is fed only with nightsoil feeding.

Micro Finance Institutes (Atma Nirvar Vegetable Products, United Saving and Credit Co-operatives)

What do you see as your achievements in your involvement in the biogas programme?

650 plants financed by Atma Nirvar and 120 by United saving and Credit Cooperatives. Health Education for All (HEFA) provides cement supports for Atma Nirvar. Also established agriculture production centre and supply maize and vegetable seeds.

What capacity development issues were addressed in order to enable these achievements?

AEPC is providing credit money at 6% interest and users at 14%. Loan repayment period is two years. All the members are the share holders. United Saving and Credit Cooperatives provides loan also for income generating activities.

In which areas were these CD issues addressed?

They give slogan of one house one biogas plant. They have linkages with AEPC, and other commercial banks.

How effective was the CD work in these areas?

These FMIs provide the list of interested persons to the Biogas Installation Company and the company used to install the plant all at a time. FMI collect local construction materials themselves.

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD required?

They also do prefeasibility study for all the loan plants and provide loans but this need to strengthen their capacity as they are not very aware about the biogas technology.

Are there any critical issues in the CD provision in the biogas programme?

There is a need to develop capacity to manage the programme effectively from roots to the leaves. Financial management training is needed to enhance the capacity of the FMIs.

How does the biogas programme fit into the wider renewable energy programme in your country?

Not much investment in other RETs.

4.2 Cambodia

SNV

What do you see as your achievements in the biogas programme?

Multi-sectoral approach, high quality technology, quality control mechanism, sanitation from toilet attachment.

What capacity development issues were addressed in order to enable these achievements?

Technology orientation, Training to users, masons, technicians, quality standardisations, monitoring and evaluation, Establishment of BUN, Availability of both loan and subsidy.

What were the CD issues at the start of the programme and how were they addressed?

No CD issues at the start of the programme as there was no private sector and these were not addressed properly.

In which areas were these CD issues addressed?

Technology development, private sector development (BCC), Users' networking (BUN), CD on managerial, policy development, slurry integration in biogas programme, support to DTW and PBPOs.

What assumptions were made about the need for CD in these areas?

Government and NGO – technology orientation based on the need of the client

How effective was the CD work in these areas?

Very effective

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD required?

Good capacity development. CD further required is at BCC level and provincial level, market regulation

How does the biogas programme fit into the wider renewable energy programme in your country?

No other RET activities in the programme. RET is under different Ministries in Cambodia.

What are the issues in the future, including wider RE integration, that are likely to demand further CD that has not already been addressed?

Carbon support, Establishment of BCC association, Entrepreneurship support to BCC, establishment of few more biogas appliances manufacturers, R&D for small size plants. For the sustainability: investment on R&D, Vocational development. Challenges for the programme are: market regulation, people focused, and making use of internal expert in the sector but not to lose the focus on biogas. The concept of packing four country programme into one regional programme is not benefit as it is country specific.

Government Organisations (Steering Committee - MAFF)

What do you see as your achievements in the biogas programme?

Multi-sectoral approach, Reduction in deforestation, environmental protection, animal raising.

What capacity development issues were addressed in order to enable these achievements?

Training to technicians and masons

In which areas were these CD issues addressed?

Private sector development, promotion, marketing etc

What assumptions were made about the need for CD in these areas?

Installation of good quality biogas plants

How effective was the CD work in these areas?

Very effective

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD required?

Further CD required to supervisors for monitoring, PBPOs for management and masons for quality construction and village level promotion.

Are there any critical issues in the CD provision in the biogas programme?

High water table conditions.

How does the biogas programme fit into the wider renewable energy programme in your country?

RET in Cambodia is under different Ministries

What are the issues in the future, including wider RE integration, that are likely to demand further CD that has not already been addressed?

BCC – Behaviour, management and book keeping.

Donor agency (GIZ and PIN)

What do you see as your achievements in your involvement in the biogas programme?

Clean kitchen, no smoking, no black shoot in the rural houses

What capacity development issues were addressed in order to enable these achievements?

Operation and maintenance, promotion skills, material support, accounting support to users

In which areas were these CD issues addressed?

Organisational and implementation model, market based approach

How effective was the CD work in these areas?

Private sector promotion, joint performance

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD required?

Visibility of NGO in the country is required from SNV. Need TOT for extension, promotion and marketing activities.

Are there any critical issues in the CD provision in the biogas programme?

Fund raising capacity, Government should invest money on biogas or should put some effort in finding donors.

How does the biogas programme fit into the wider renewable energy programme in your country?

Solar energy could be appropriate for Cambodia

What are the issues in the future, including wider RE integration, that are likely to demand further CD that has not already been addressed?

Financing problem and SNV should look other sources but NBP is not in a capacity of fund raising

NGOs (CEDAC)

What do you see as your main achievements?

2845 plants installed by 8 BCCs, 2845 plants were controlled, users training, promotion, village workshop, bio-slurry programme etc

What were the CD issues at the start of the programme and how were they addressed?

CD issues started only after the biogas programme is introduced.

In which areas were these CD issues addressed?

BCC training, and mentoring from CIEDC, monitoring, quality control, refresher training to masons and supervisors, monthly meeting with supervisors and BCCs.

What assumptions were made about the need for CD in these areas?

Do not know

How effective was the CD work in these areas?

Requirement level of mason is difficult to find out, underpaid mason and drop out is high,

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD required?

BCCs selected from farmers or masons and need to develop their capacity

Are there any critical issues in the CD provision in the biogas programme?

Human management within BCC, CIEDC should develop special training tools to BCC and masons.

How does the biogas programme fit into the wider renewable energy programme in your country?

Not centralised but needs to be centralised

What are the issues in the future, including wider RE integration, that are likely to demand further CD that has not already been addressed?

Marketing and promotion to be more focused.

Users

Why did you buy a biogas plant?

Cooking, lighting, make use of slurry as compost and environmental sanitation

How did you know about biogas?

Knows from his friend and neighbours who installed a biogas in his house

How did you cook before you had biogas?

Firewood

What do you see as the benefits of biogas?

Gas for cooking and lighting and slurry as manure

How did you pay for the plant?

Most of them were installed in cash and some on credit. Those who installed on credit pay loan by selling pigs, chicken, coconuts, rice etc

Would you have paid the extra cost if there had not been a subsidy? (workout cost with and without)

Some paid and some still paying.

Are you happy with your investment? Was it "worth it"?

Very satisfied

Would a biogas plant be useful if you did not have cattle?

Not sure

Financing Institutions (AMRET, PRASC)

What do you see as your achievements in your involvement in the biogas programme?

208 plants financed by Amret and 27 (only this year) by PRASAC.

What capacity development issues were addressed in order to enable these achievements?

Relation with PBPOs, BCC and promoters.

In which areas were these CD issues addressed?

Loan amount is small and less client for biogas

How effective was the CD work in these areas?

Approve loan in three days if all documents are presented. In some cases loan is provided even with a letter from the commune but normally they need collateral such as land and building.

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD required?

They also do prefeasibility study for all the loan plants and received US\$ 50 from FMO for the plants they provide loans.

Are there any critical issues in the CD provision in the biogas programme?

Loan limits to actual plus 200 and should not be limited if he is capable to pay.

How does the biogas programme fit into the wider renewable energy programme in your country?

Not much investment in other RETs.

4.3 Bangladesh

SNV

What do you see as your achievements in the biogas programme?

Transferring Nepal modality to Bangladesh

What capacity development issues were addressed in order to enable these achievements?

Providing IDCOL with the confidence and capability to run the programme

What were the CD issues at the start of the programme and how were they addressed?

Bangladesh is very different from the rest of Asia. Strong NGO sector, which does not see the market approach as valid.

In which areas were these CD issues addressed?

Standardisation and quality control were lacking

What assumptions were made about the need for CD in these areas?

There was an ongoing biogas programme, but there was no quality control or follow-up

How effective was the CD work in these areas?

The public attitude in Bangladesh about biogas has changed from negative to more positive

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD support required?

The process of persuading POs to change from their NGO thinking to a more business based approach is still a challenge

How does the biogas programme fit into the wider renewable energy programme in your country?

There is a very strong solar home PV programme in which many of the POs were already involved. They are also looking at work in ICS

What are the issues in the future, including wider RE integration, that are likely to demand further CD support that has not already been addressed?

The government has taken little interest in RE. The main work is persuading government officials to develop RE policies

Note: Rajeev Munankami, the SNV Advisor, was very busy with other meetings during the evaluation visit. He seems to be under a lot of pressure and said he had not been able to eat at home for the previous two weeks.

Government Organisation: BARI

The lack of involvement of government bodies in RE work in Bangladesh meant that an interview with policy makers was not possible.

BARI (Bangladesh Agricultural Research Institute) are involved in research on bioslurry use as a compost.

What do you see as your achievements in the biogas programme?

Testing the use of bioslurry as a fertiliser on a range of crops and demonstrating its effectiveness.

What capacity development issues were addressed in order to enable these achievements?

BARI already has the capability of doing agricultural research, so CD was not required.

Are there any critical issues in the CD provision in the biogas programme?

Agricultural extension workers, under the Department of Agriculture, need to be taught about the benefits of bioslurry, so they can teach them to the farmers with whom they are working.

Donor agency (GIZ)

What do you see as your achievements in your involvement in the biogas programme?

There was a long history of work in biogas in Bangladesh, but it was not successful. The government funding was very erratic. SNV, with strong support from KfW, has enabled funding to be secure, so the programme is working properly.

What capacity development issues were addressed in order to enable these achievements?

The POs were very interested in building biogas plants, but lacked organisation and coordination. SNV, with KfW help, were able to put a programme together

In which areas were these CD issues addressed?

Technical and financial support, awareness raising, generating momentum through effective organisation

How effective was the CD work in these areas?

The POs are building biogas plants, but not meeting their yearly targets

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD required?

The rate of construction is too low. 50% of the KfW financial support budget has still not been used

Are there any critical issues in the CD provision in the biogas programme?

KfW is looking to GIZ to provide further technical assistance to allow biogas to be used for purposes other than for cooking. SNV methodologies do not fit well in Bangladesh, they need to be more flexible in their approach. There is a gap in understanding between SNV and managers of POs

How does the biogas programme fit into the wider renewable energy programme in your country?

POs, especially Grameen Shakti, have created a very strong network devoted to RE and are committed to the whole of Bangladesh

What are the issues in the future, including wider RE integration, that are likely to demand further CD support that has not already been addressed?

Older non-functional biogas plants, built by BCSIR, need to be repaired, but government resistant to idea. The research results from BARI on the use of bioslurry need to be extended to farmers across the country.

MFIs, Loan funders

Many POs provide loans as well as installation biogas plants, so it was not possible to separate the two activities. However, loan recovery was much lower for biogas than from solar home PV systems.

IDCOL

What do you see as your main achievements?

Setting up a biogas programme that was much more effective than the previous one run under government agencies.

What were the CD issues at the start of the programme and how were they addressed?

Bangladesh already had effective RE extension programmes for solar PV and ICS, but the programmes for biogas were weak. The reasons for the weakness needed to be identified and sorted out.

In which areas were these CD issues addressed?

Standardisation and quality control were two main issues. Also biogas technology was seen as complicated and expensive and did not work well.

What assumptions were made about the need for CD in these areas?

The government's approach to biogas extension was poorly organised, so a different approach was needed. As a strong organisation in the private sector, IDCOL was able to offer good direction.

How effective was the CD work in these areas?

The public attitude to biogas technology is changing from negative to positive.

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD required?

The POs feel that they cannot earn sufficient income from building biogas plants. The work is more difficult than installing solar home PV systems, but less profitable. The concept of biogas villages, where a cluster of plants can be built in one place, allows the construction work to be more efficient.

Are there any critical issues in the CD provision in the biogas programme?

Many masons are trained under the programme, but do not stay. They either move to other POs or work in other places.

The subcontracting of bioslurry research work to BARI has been effective, but the work took a long time (3 years). Government bodies are very slow and are too busy with other activities.

SNV does not commit sufficient manpower to do effective CD in the Bangladesh biogas programme.

How does the biogas programme fit into the wider renewable energy programme in Bangladesh?

Most of the POs were already involved with solar home PV installation and ICS extension. However, GoB does not have an RE policy and leaves it to the NGO sector.

What are the issues in the future, including wider RE integration, that are likely to demand further CD that has not already been addressed?

The main issue is the tension between the SNV modality and that of the POs, which needs to be resolved.

POs, including Grameen Shakti and Green Housing & Energy Ltd

Note: Most of the POs were represented at the Operational Committee meeting and made their views strongly felt.

What do you see as your main achievements?

Several POs were already involved in biogas extension work, but SNV provided an impetus to make the programme more effective.

What were the CD issues at the start of the programme and how were they addressed?

SNV offered training for staff and a good organisational approach through IDCOL. They emphasised the benefits of using bioslurry. The use of reliable subsidy was effective.

In which areas were these CD issues addressed?

POs were already involved in RE extension work. They did need to recognise the different approach that the extension of biogas technology required.

How effective was the CD work in these areas?

The training for supervisors and masons has been very useful, but much more is needed. There is a very high turnover of staff (over 50%), so more people always need training.

The subsidy approach is too bureaucratic and complicated. The cost of a plant is too tightly defined and the subsidy is inadequate, so POs cannot make a profit on installing biogas plants.

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD required?

The main issue is that the subsidy amount is too low, POs cannot make a profit on building biogas plants. Many are subsidising their biogas extension work from their work in solar home PV extension.

There needs to be development work on biogas technology. The present design cannot be built during the monsoon. A wider range of different plant designs is needed to meet the needs of different customers. The biogas appliances need to be improved, the present ones are inadequate.

Managers in the POs are not using the project documentation properly. There is the possibility of recording and forwarding required information electronically, but the managers do not know how to use the systems. There are training programmes, but they are keeping up with staff turnover.

Are there any critical issues in the CD provision in the biogas programme?

The POs feel that the SNV business model is not appropriate for Bangladesh. A much better business model is needed. The construction targets cannot be met each year (the plants numbers being installed are unlikely to be more than 40% in 2012).

How does the biogas programme fit into the wider renewable energy programme in Bangladesh?

The approach that SNV uses for biogas extension is very different from that already used by the POs for installing solar home PV systems and for the extension of ICS. The staff of the POs find it difficult to relate the different approaches. The POs had already developed a good approach for the extension of solar home PV and ICS, before SNV started the biogas extension programme.

There are no government policies defined for RE in Bangladesh, which means there is no overall coordination.

What are the issues in the future, including wider RE integration, that are likely to demand further CD that has not already been addressed?

Since many POs provide loans as well as installing biogas plants, poor performance in extension work results in poor recovery of loans, which further reduces the profitability of the biogas extension programme. The low profitability means that the follow-up work is inadequate, as staff are not paid on time.

Clients (several)

Why did you buy a biogas plant?

People told me about the benefits of biogas and bioslurry.

How did you know about biogas?

Encouraged by extension people (some were close to BARI, others learnt from Grameen Shakti). Saw how neighbours had benefited.

How did you cook before you had biogas?

Used biomass briquettes that were being made in the village.

What do you see as the benefits of biogas?

(Several) The family have plenty of dung (both cattle and chicken). We can dry the bioslurry and sell it to our neighbours.

How did you pay for the plant?

The extension company provides loans.

Are you happy with your investment? Was it "worth it"?

We see a good income from selling the bioslurry.

Would a biogas plant be useful if you did not have cattle? No

4.4 Laos

SNV

What do you see as your achievements in the biogas programme?

Supporting the Government to initiate and support the institutionalisation of the Biogas Programme in Laos. Laos now has a potential to expand its biogas programme beyond the 5 Districts covered so far.

What capacity development issues were addressed in order to enable these achievements?

SNV need to enter into dialogue with Policy Level government to promote Biogas as a clean energy for rural areas. To provide training and orientation support at Ministry level to help establish Biogas Pilot Programmes. SNV needs to continue its Capacity Support in enhancing the management capabilities of senior managers and to provide technical capacity support for Technicians, Masons and Users.

What were the CD issues at the start of the programme and how were they addressed?

The apparent Lack of Central policy to guide the running of the Biogas Programmes and the Lack of sufficiently Trained Masons to construct Biogas Plants

In which areas were these CD issues addressed?

Support in the establishment of BPP, in enhancing the managerial, capabilities of appointed BPP managers and supporting the training of Technicians and Masons.

What assumptions were made about the need for CD in these areas?

The central government's desire to introduce Biogas Technology in Laos and desire to build biogas plants in as many rural areas as possible.

How effective was the CD work in these areas?

Significantly effective

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD required?

Well trained Masons, project managed by capable managers. Enhancing the status of Masons and Technicians and encouraging them with incentives to stay and build more biogas units. CD support is also required in formulating strategies at Central and provincial levels. Enhance the roles of PAFO and DAFO to ensure that their roles are complimentary to each other.

How does the biogas programme fit into the wider renewable energy programme in your country?

BPP has not introduced other renewable energy programmes as other RE programmes are set up under different Ministries.

What are the issues in the future, including wider RE integration, that are likely to demand further CD that has not already been addressed?

The status of Masons within need to be established as part of an institution and their activities need to be well coordinated. Installation of more biogas plants, employing more technicians and engaging qualified Masons is likely to produce quality Biogas plant. Providing CD support to enhance their technical capabilities will give them the needed skills to carry out their duties. Providing CD support to technicians and Masons to enhance the after installations service to users and enhancing the capabilities of technical staff to carry out R&D for small size plants is likely to have significant benefit to those who cannot afford a bigger plant.

Biogas Pilot Programme (BPP)

What do you see as your achievements in the biogas programme?

Installation of 2700 biogas digesters in 5 of the 17 Provinces since 2007.

What capacity development issues were addressed in order to enable these achievements?

CD support in the establishment of BPP and enhancing the technical and managerial capabilities of PBB managers and Technician as well as Masons enabling them to do their work efficiently and effectively.

In which areas were these CD issues addressed?

Promotion of Biogas plants on television, radio and in newspaper. There were 185 TV advertisements and 254 radio commercials as well as advertisements in two newspapers including the Vientiane Times.

What assumptions were made about the need for CD in these areas?

Expansion of Biogas Plants in rural areas of Laos. R&D to develop biogas plants that are affordable and does not depend only on dung but also bio slurry.

How effective was the CD work in these areas?

Effective in the construction of biogas plants to households in selected 5 provinces.

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD required?

SNV continue to provide CD support to the programme in terms of training. Further CD required in soliciting funding for the programme as DGIS funding end in December. CD support is required in the employment, orientation and training of Technicians to market, supervises and monitors activities in the field. Enhancing the capabilities of Masons and institutionalising their activities will ensure that a significant numbers of them do not leave. Technicians and Masons with enhance capacity will be able to promote biogas plants to potential users thus increasing the numbers of household installing biogas plants.

Are there any critical issues in the CD provision in the biogas programme?

There is a need to provide CD support to DAFO and PAFO so they will clearly defined their role in promoting and monitoring Biogas Programme in the Districts and the Provinces.

How does the biogas programme fit into the wider renewable energy programme in your country?

Did not mention the Broad RET sector during the interview.

What are the issues in the future that are likely to demand further CD that has not already been addressed?

The Government and BPP management are worried about the possibility of non-renewal of funding by DGIS. This could be a setback for the programme.

SNV is requested to look for other sources funds as BPP has no capacity for fund raising. There is also a call for the Government to invest money and other resources on the promotion of biogas. The Government need to encourage fund raising and make some effort at raising funds for the promotion of Biogas in Laos.

Technician

What do you see as your main achievements?

I have provided technical advice and support to the installation of Biogas plants by Masons. I also help with the promotion of biogas plants, users training, and advice on the use of bio-slurry as fertilizer.

What were the CD issues at the start of the programme and how were they addressed?

There were very few Trained Technicians with the programme so promotion, assessments, and training in the proper use and maintenance Biogas Plants was slow.

In which areas were these CD issues addressed?

Promotion of Biogas Plants, training of Users, coordination with Masons became difficult because of lack of effective coordination among masons and Technician and the role plaid by DAFO and PAFO staff.

What assumptions were made about the need for CD in these areas?

Employ and train more Technicians and provide incentives to Masons to concentrate more on building Biogas Plants

How effective was the CD work in these areas?

Masons are not permanently employed by the programme and as free agents take on more higher paid jobs where ever they can get such jobs. The high turnover of Masons often slows down the construction of Biogas Plants.

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD required?

Masons are trained but have no incentives to work installing biogas Plants also because the fixed charges for the installation of biogas plants is often not enough to compensate for the work completed.

Are there any critical issues in the CD provision in the biogas programme?

There need to enhance the coordination of the programmes so that the Technician will be aware of his/her roles in relation with the Mason, DAFO/PAFO officials, Users and other programme staff. Introduce also quality control through after-sale -services

What are the issues in the future, including wider RE integration, that are likely to demand further CD that has not already been addressed?

All project staff from the Director to the Technician and the Masons needs to be trained to Market and promote biogas as a safe environmental friendly source of clean energy for domestic use in rural Laos.

Users

Why did you buy a biogas plant?

We use the plant for cooking, as an emergency light, covert bio- slurry as compost for agriculture purposes.

How did you know about biogas?

We got to learn about biogas through friends and relatives who actually own biogas plants and through promotion on TV and radio. We also visited a family who have installed a biogas in their house.

How did you cook before you had biogas?

Firewood and some electric stove

What do you see as the benefits of biogas?

It is clean, no smoke when cooking and extra benefit of emergency lighting and we also use the slurry as fertilizer.

How did you pay for the plant?

We arranged credit for the installation and we were also given subsidy.

Would you have paid the extra cost if there had not been a subsidy? (workout cost with and without)

I am not sure I would have installed the plant although I know the benefits.

Are you happy with your investment? Was it "worth it"?

Very satisfied

Would a biogas plant be useful if you did not have cattle?

We do not own cattle only pigs and poultry and we are able to cover mostly cooking. We even have hot water and emergency lighting.

How does the biogas programme fit into the wider renewable energy programme in your country?

Not aware of other renewable energy

II.2 Vietnam

SNV

What do you see as your achievements in the biogas programme?

The establishment of an effective biogas extension programme. It started very well. Then there were some problems, but it is working well again.

What capacity development issues were addressed in order to enable these achievements?

The designs that were being used by MARD needed to be improved and standardised as KT1 and KT2. Masons and technicians needed to be trained in their construction. A quality control system needed to be set up, with a database that includes details of each plant built.

What were the CD issues at the start of the programme and how were they addressed?

The masons trained to install the biogas plants could not register their work as private companies as this was too expensive and complex. They have to work in the informal private sector. The existing government structures, through MARD, had to be used.

In which areas were these CD issues addressed?

MARD were already motivated to run a biogas extension programme; the key needs were for quality control and training. Farmers quickly understood the benefits and were prepared to pay for a system that was much better quality than others on offer.

What assumptions were made about the need for CD in these areas? How effective was the CD work in these areas?

The construction of biogas plants in the private sector was successful, although the biogas construction teams work in the informal private sector. Attempts to involve local technical colleges in the training of masons and technicians was not successful.

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD support required?

MARD staff are skilled and well motivated to continue the programme. However, biogas is only one of their many responsibilities. The number of trained masons is adequate, although there is a turn-over of between 10 and 15%. Masons are keen to receive further training, especially in the running of their teams as businesses. The work with bioslurry has been developed and is being promoted, but could be even more effective.

How does the biogas programme fit into the wider renewable energy programme in your country?

There is no overall policy for renewable energy in Vietnam.

What are the issues in the future, including wider RE integration, that are likely to demand further CD support that has not already been addressed?

Different RE technologies come under different government ministries, so integration would be difficult. Other agencies have started biogas programmes, although they were persuaded to make these programmes part of BPO. Work is being done to develop methodologies for carbon offset finance, but this could be further developed.

MARD staff

Note: both the senior MARD staff in BPO were unavailable, due to sickness and personal issues. Interviews involved provincial MARD staff.

What do you see as your achievements in the biogas programme?

Biogas plants offer 4 main benefits: reduction of environmental pollution from animal dung, clean household energy, reduced workload for women and reduced release of greenhouse gases.

What capacity development issues were addressed in order to enable these achievements?

There was a low awareness of biogas before the programme, but effective promotion has changed people's attitudes. Now there is a high demand for biogas. People do see biogas as expensive, even with the subsidy. Bank loans are difficult to obtain and very expensive.

In which areas were these CD issues addressed? What assumptions were made about the need for CD in these areas?

People needed to understand the benefits of biogas.

How effective was the CD work in these areas?

Promotion has changed people's view of biogas. It is seen to provide good benefits, although it is expensive.

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD support required?

The training programme has been very effective, both with PBPO staff and masons. Some people want larger biogas plants than the ones available. The targets for plants built are too low, the construction teams want more work.

Are there any critical issues in the CD provision in the biogas programme?

Outside private companies are supplying a composite design of plant, but this is outside the programme. These are quick to install, but there is no quality control, so installations are not reliable.

Local MARD staff (District and Commune)

What do you see as your achievements in the biogas programme?

Improved local people's lives, by reducing pollution and it replaced wood or LPG for cooking.

What capacity development issues were addressed in order to enable these achievements?

Biogas technology needed to be integrated into other agricultural work.

In which areas were these CD issues addressed?

Training enabled staff to ensure quality control. The use of bioslurry as a fertiliser is seen as positive.

How effective was the CD work in these areas?

Bioslurry reduces the need for chemical fertilisers, but also reduces the need for pesticides, plants are stronger and can fight fungi and insects.

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD support required? Are there any critical issues in the CD provision in the biogas programme?

The promotion materials, leaflets and posters are good, but could be improved. We should have larger posters for use in the villages. There should be recorded material that we can use over our village loudspeaker systems. We could have contests between the mason teams to see how many plants they can install.

Mason

What do you see as your main achievements?

Since 2007, I and my team have built 1000 biogas units. I have 20 masons working with me. It takes 7 days to build a plant.

What were the CD issues at the start of the programme and how were they addressed?

We needed training in all the aspects of biogas plant installation.

In which areas were these CD issues addressed?

We had training in business management and marketing, as well as in actually building plants.

What is the present position in terms of CD? In which areas is CD seen to be adequate and in which areas is further CD required?

We want refreshment courses, so we can learn more. We want updates on new information. We want training in how to manage our business more effectively.

Are there any critical issues in the CD provision in the biogas programme?

We want to be able to bring questions and problems to the main office, so we can have help in solving them. We can only build biogas plants in the dry season. In the wet season we need to do other work, such as building houses.

Users

Why did you buy a biogas plant?

We wanted to reduce the smell from the pig sty close to our house and reduce the cost of the LPG we use for cooking.

How did you know about biogas?

We heard about biogas from the TV.

How did you cook before you had biogas?

We used LPG.

What do you see as the benefits of biogas?

We save VND 700,000 (\$33.60) a month on LPG and there is no smell from the pig sty. We have more than enough gas, so we want to run a pipe to my brother's house.

How did you pay for the plant?

We borrowed money from the family, but we can pay it back within the year.

Would you have paid the extra cost if there had not been a subsidy?

We spent more than the actual cost, as we had other work done. We needed VND 12,000,000 (\$576) to build the plant, but actually spent VND 85,000,000 (\$4082) as we improved the kitchen, built a veranda and paved the part of the garden.

Are you happy with your investment? Was it "worth it"?

The gas is good. The slurry is much better than the raw dung as a fertiliser. My brother uses it. We are setting up a vegetable garden where we want to use it. We want to learn more about maintaining the plant. There is a gas leak, but it does not matter as we have more than enough gas.

Would a biogas plant be useful if you did not have pigs?

We are looking for the other materials that we could add to the plant. Cattle dung is good. Waste materials, such as dead animals, could be added.

Vietnam Biogas Association

What do you see as the main benefits of the biogas programme to the people of your country?

The 40 members of VBA were working in biogas as individual groups, through VBA, we can work together. SNV showed how to do quality control. We want to use QC for all of the other biogas products, including the composite plants. The SNV programme has increased the potential market for biogas in Vietnam through their work of promotion. There is a huge market for the small scale systems built by the programme: 60% of farmers could use biogas systems, the ones that have between 10 and 20 pigs.

What do you see as the strength and weakness of the SNV biogas programme in your country?

The work of promotion has been very helpful in making biogas technology widely known. The KT1 and KT2 designs do work well. The work of coordination needs to be strengthened. The Biogas Steering Committee could be more influential; other government ministries and other aid organisations should be willing to be more cooperative. VBA is aiming to have an advocacy role, to work as a pressure group to persuade government ministers and aid staff of the benefits of biogas and other REs. The RE policies of the government need to be more effective.

Has the SNV biogas programme been appropriate for your country? Do you see any gaps in the way the programme has been run?

The biogas programme deals with the issues of wastes from livestock, of which there is a large amount as Vietnam is an agricultural country. It provides energy in rural areas and also bioslurry as a fertiliser. It also reduces the greenhouse gases going into the atmosphere. The members of VBA see food security as important and biogas helps to improve crop production. The SNV programme is only concerned with the brick built digesters and is not interested in the composite design or other designs. The bioslurry could be used in other applications, such as fish farms and the gas could be used to generate electricity. There is a lot of waste from food processing and larger agricultural operations but the present programme does not cover these feed materials. Quality control of gas appliances is something in which the programme could be involved.

How do you think the SNV biogas programme could be improved in the future? Is there anything missing that needs to be put in?

The greatest challenge for Vietnam is a lack of finance, especially for agriculture. People are not aware of environmental issues, especially the wider issues, such as climate change. The biogas sector is still new; the total number of plants, of all models (including plastic), is 500,000, for which 50% have received subsidy. VBA is still only been running a year. There is very good potential for expansion, but VBA needs help from SNV to get more organised.

VBA has a strategic plan, but it is still being formulated. They are developing a set of objectives, including aspects such as enhancing knowledge, improving technology, developing the market, doing policy advocacy and defining development challenges. They are seeking to define priorities. They also want to learn from the wider international work on biogas, especially the programmes in India and China.

Annex III TOR of the study

Aiming to inform and support its on-going capacity development operations, SNV Netherlands Developing Organisation is currently undertaking a series of corporate evaluations. A key sector in SNV's portfolio is renewable energy with Biogas as one of 3 sub-sectors. SNV's capacity development services in this sub-sector started in Asia and have recently expanded to Africa. One of the largest biogas programmes SNV is undertaking is the Asia Biogas Programme (ABP) with projects in Vietnam, Cambodia, Bangladesh and Lao PDR. It started in 2005 with financial support from the Netherlands Directorate General for International Cooperation (DGIS) and will end at the end of December 2012. The overall objective of the ABP is to further develop the market for biogas as an indigenous, sustainable energy source in the participating countries. With ABP coming to an end soon, a need is felt to undertake an external evaluation of the capacity development approach applied in the countries. In addition to the APB countries, SNV Nepal has had a long history of running a Biogas Support Programme (BSP), with similar approaches to ABP and support from DGIS. It will therefore be included in this evaluation as well. The emphasis in this evaluation is on learning and improvement; not on accountability per se. It is expected that the evaluation will help to advance sector development beyond the formal end date of 2012.

SNV is now seeking a qualified service provider to undertake an external evaluation of the five Asia biogas programmes.

This Request for Proposals (RFP) invites qualified Service Providers to submit proposals for the evaluation assignment. The Terms of Reference annexed to this RFP provides further details on the programme, the evaluation questions, timelines and management of the evaluation.

III.1 PURPOSE AND SCOPE

The purpose of the evaluation is to extract lessons and insights from the capacity development dimensions of the Asia Biogas Programmes to inform further development of biogas and other Renewable Energy programmes in Asia and other SNV regions. The findings of the evaluation will not be used for decision-making on the continuation of financial support to the programmes. The evaluation is focused on learning and improvement.

The main objective of the assignment is to describe and evaluate the specific capacity development approach of the national programmes on domestic biogas in the five countries. Specifically, the evaluation will address the following basic questions through a participatory, learning-oriented process:

How can the capacity-development approach of the programmes be improved?

How can (external) support for capacity development to the programmes be improved?

These two broad questions are further substantiated by potential sub-questions to be found in the TOR. The Service Provider collaborate with the SNV team to finalise the questions

DELIVERABLES

The key deliverable of the evaluation is an evaluation report including recommendations. A report outline will be agreed between SNV and the selected Service Provider. This will be formalised in an inception report to be finalised in the preparation phase of the assignment.

III.2 SERVICE PROVIDER PROFILE

SNV seeks a Service Provider with:

Proven evaluation expertise, with experience in international development and Capacity Development (CD) specifically

At least 6 years' experience of evaluating CD dimensions of multi-actor / multi-level development programmes

- Excellent analytical and facilitation skills
- Strong written and oral communication skills

- Expertise / experience in Renewable Energy and domestic biogas in particular would be an advantage

REQUEST FOR PROPOSALS

Interested Service Providers are invited to submit proposals for consideration by SNV. Proposals should:

Demonstrate understanding of the evaluation purpose and expected results

Propose an approach and broad outline of methods to be used

Provide information about daily tariffs and overall budget (excluding direct costs)

Describe the competencies and experience of proposed evaluators supported by evaluators' CVs and 2 evaluation reports)

Describe roles and responsibilities of evaluators

Indicate evaluator's availability in the period between December 2011 and May 2012

Include a declaration of independence from organisations that have been involved in designing, executing or advising any aspect of the SNV Asia Biogas or related programmes.