



Biogas Support Programme (BSP)

Nepal

Context

- Nepal is a landlocked country divided in three geographical regions: mountains, hills and Terai (plains in south).
- 76,6% of the population is living with less than 2 US\$ per day
- 85% of the population is engaged in the agriculture sector
- In rural areas the dependence on biomass is over 95%, and even close to 99% in some districts.
- Heavy dependence on fuel-wood resources has negative impacts on the local and global environment.
- Besides, the harassing burden of collecting fuel-wood and dung weigh heavy primarily on women and children; the smoke emitted from biomass combustion has adverse effects on health;

Main figures concerning the project

Executive Agency: AEPC

Implementing Agency: BSP-Nepal

Partners: SNV, NBPA, NCFN, ADBL, DeD, etc.

Financing: DGIS, KfW, GoN, World Bank (GPOBA and CDM).

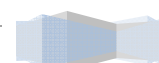
Projects	BSP I & II	BSP III	BSP IV
Duration (Years)	5	7	7
Budget (\$us millions)	9.5	21.8	18.7

Brief Description of the Project and Results

The Biogas Support Programme (BSP) in Nepal managed the installation of over 200,000 domestic biogas plants between 1992 and 2009. The plants use cattle manure to provide biogas for cooking and lighting. The slurry that is co-product of the plant is used as organic fertilizer. The history of biogas in Nepal is quite ancient, but the first phase of the BSP project started in 1992 only. As the project was very successful, it was prolonged several times. It is currently the end of the fourth phase, whose main objective is to further develop and disseminate biogas plants as a mainstream renewable energy solution in rural Nepal, while better addressing poverty, gender and social inclusion and regional balance issues. At the same time, it aims for ensuring enhanced commercialisation and sustainability of the sector.

Main Achievements and Lessons Learnt Regarding Scaling Up Mechanisms

1. A **supportive government policy** (subsidies, low interest rates on loans, favourable fiscal policies and incorporation of quantified objectives in the Five-year plans).
2. The **supportive long term donors' commitment** is another factor of success since they are continuously funding the project since 1992 avoiding "stop and go" effects.
3. The setting-up of **an efficient Public-Private Partnership** has been essential and is one of the main lessons learned by the project:
 - The public sector has to facilitate and coordinate the sector
 - The private sector is responsible for biogas plants installation and after-sales services.
4. The technical assistance of SNV for **technical aspects as well as for institutional strengthening and R&D**.
5. The **quality of the products** guarantees owners' satisfaction and project sustainability.
6. The organisation of the biogas companies in an association to **regulate the sector, prevent bad practices and strengthen the capacities of the biogas companies** (technical aspects, business management, accountability, marketing skills, etc.)
7. Provision of **subsidies** for making biogas systems affordable with additional (but probably not sufficient) subsidies for remote areas as well as for poor and less favour groups.
8. Provision of **credit supports from AEPC through local cooperatives and other MFIs** as an additional support for poor families for who subsidies are not sufficient (but there are still some difficulties to reach remote areas).
9. Good **monitoring and quality control mechanisms**.



1. Project description

a. Context and Environment

Nepal is a landlocked country of 147,180km² characterized by its diversity. It is divided in three geographical regions: Mountains, Hills and Terai. It is a multi-ethnic, multi-lingual (over 10 specific language groups) and multi-religious (Hinduism 80%, Buddhism 11%, Islam 4%, Christianity, etc.) country with subtle social diversity.

The agricultural sector, in which over 85% of the people are engaged, is the mainstay of the economy. With 55% of the population (most of them living in rural and remote area) living under 1.25 US\$ per day and 76.6% under 2 US\$ per day, Nepal is the poorest country of South Asia. In most rural areas, the dependence on biomass is over 95%, and even close to 99% in some districts. The heavy dependence on the fuel-wood resources has negative impacts on local (e.g. deforestation around the village, dung that is burned instead of remaining in the fields reduces the soil fertility, etc.) and global (greenhouse gases emissions) environment. Besides, the harassing burden required for collecting fuel-wood and dung impacts primarily women and children and the smoke emitted from the burning of biomass has adverse health effects. For all these reasons, biogas has a huge potential to improve the life of people living in rural areas while protecting the environment.

b. The Innovation

The biogas plant is a system that transforms organic material via an anaerobic reaction. The reaction leads to two products: the biogas and the slurry. The biogas is a mix of methane and carbon dioxide that can be burned as fuel for cooking, lighting or possibly some productive activities. The slurry that is the remaining material can be used as organic compost.

The design of the digesters promoted by the project has been developed in Nepal based on the Chinese fixed-dome plant. The digester is built in a pit in the ground, near to the house. The body of the digester is an underground cylindrical tank, built from bricks and mortar. The fixed hemispherical dome, which acts as a gasholder, is made of concrete, cast over an earth mould on top of the tank.

To function properly, biogas plant needs at least two cows or similar cattle (24 kg per day). Villagers are used to handling cattle dung and using it as a fuel, since it has traditionally been made into flat dung cakes, dried and burned in cooking fire. Besides, digester could also be connected to the toilet, improving sanitation.

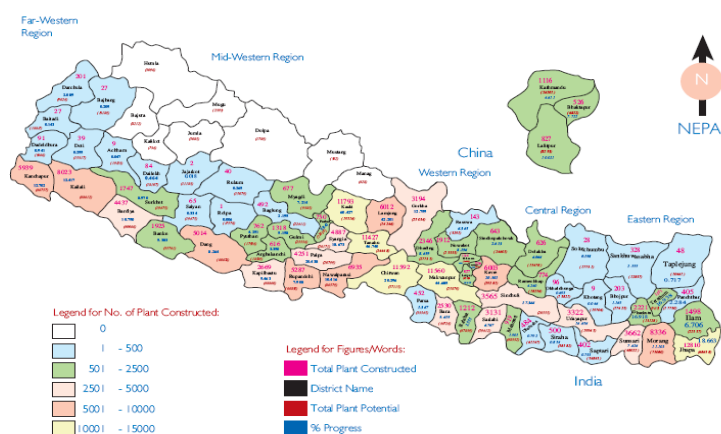
The digesters proposed by BSP project are made in four sizes, with total volume from 4 to 10 m³, and each one produces between 1 and 2.5 m³ of biogas per day. The capacity and gas production depends on the dung supplied, and also on the location of the biogas plant. In cooler places gas is produced more slowly, and a tank with larger volume is needed.

BSP have also provided design guidance and other advices for the installation of around 100 larger biogas plants in schools and hospitals in Nepal (50 m³).

The benefits of the domestic biogas plants are numerous and as varied as:

- **Gender:** biogas system reduces the time and labor for the collection of traditional fuels for cooking. Both activities are mainly done by women and children. The workload reduction provides opportunities for women to start other activities including income generation ones.

District Wise Biogas Plant Construction in Nepal (from 1992 to 2007)



Main advantages of the domestic biogas system

Average size of the plant: 5.7m³

Average Cost: 450€

Reduction of workload: 1,100 hours/years

Fuel saving: on average each plant saves 2,000kg of firewood and 32 litres of kerosene per year.

GHGE reduction: between 2.5 (new CDM methodology) and 4.9 Teq CO₂/ year/plant (old methodology).

Average production of slurry: 10m³ per year that can be used as organic compost

- **Health:** by offering a smoke free kitchen, the use of biogas decreases eye and lung problems. Besides, the connection of the toilet to the biogas plant achieves better hygienic conditions.
- **Poverty alleviation:** For poor farmers who are unable to afford chemical fertilizers, the good quality of organic slurry enhances agricultural production. For richer farmers, the slurry can substitute the use of chemical fertilizer. Besides, the biogas reduces the expenses for cooking for those who used LPG (due to local restriction or lack of fuel-wood). Nevertheless, it is quite difficult to reach the very poor farmers since they do not have livestock and thus can not benefit from a biogas plant.
- **Employment generation:** biogas plant construction is a labour-intensive process and creates numerous jobs with the setting-up of biogas companies and workshops.
- **Environment:** deforestation is reduced at the local level, as well as greenhouse gases emissions. Besides, by returning bio-slurry to the field, the depletion of nutrients and organic matter in the soil is reduced. For well-off farmers, the slurry replaces chemical fertilizers.

The main benefits perceived by the beneficiaries are the saving of times and/or money to purchase the fuel (firewood, dung, coal or gas) as well as the improvement of indoor air quality. The production of the slurry is a decisive argument only for a part of the beneficiaries, not all of them are using the slurry as compost or in its liquid form. Besides, when the bio-digester is connected to the toilets some cultural barriers related to the human excrement have to be overcome. The environmental aspect (deforestation, climate change, etc.) are perceived as incentives to purchase biogas only by a minority.

c. The Stakeholders

Biogas Sector Partnership Nepal (BSP-Nepal) is the implementing agency of Biogas Support Programme (BSP) Phase-IV. BSP-Nepal was established as an NGO in 2003 to take over the implementation responsibility of BSP, which formerly was managed directly by SNV. Its prime roles are to provide training to users and biogas companies, ensure quality and long-term reliability of plants, and manage the programme of subsidies to assist users with the purchase of plants. BSP-Nepal does not itself install biogas plants, but accredits the work of private companies.

The Netherlands Development Organisation (SNV) launched the Biogas Support Programme (BSP) in 1992 with the financial support of DGIS and was the implementing organisation till 2003. Currently, SNV mainly provides technical assistance to the programme and channel DGIS fund.

International Cooperation of the Netherlands (DGIS) is the historical donor of BSP. It started funding the project from the very beginning (1992) and continually till now. Its financial support (both for the project management and the subsidies) will stop with the end of the phase IV.

Kreditanstalt für Wiederaufbau of Germany (KfW) started funding the BSP with the Phase-III, which started in 1997. KfW's financial support, which mainly backs the subsidies for the biogas plants, will probably continue beyond the phase IV.

Government of Nepal (GoN) has been supporting the development of biogas since 1975, when it introduced biogas in the development plan and by the disbursement of interest-free-loans. Now the GoN bears an increased share of the financial participation in the project.

Alternative Energy Promotion Centre (AEPC) was established in 1996 to promote alternative energies with a focus on the rural sector. This is the executive "arm" of the GoN for all programs related to alternative and decentralized energies. AEPC is in charge of the supervision of BSP-N and the control of subsidy distribution.

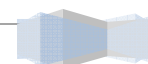
Nepal Biogas Promotion Association (NBPA formally NBPG) was established in 1994 in association with the biogas construction companies. It works for the development and promotion of the biogas sector mainly through the organisation of the private sector.

Biogas companies (BC). They are the "executive arm" of the programme, installing and maintaining the biogas plants all over the country.

Banks and Microfinance Institutions (MFIs). They provide loans and other financial products to households and biogas companies.

National Cooperative Federation of Nepal (NCF/N) signed a MoU with AEPC in 2007, to promote biogas through its members and to maximize the micro-credit flow through cooperatives.

Numerous others partners are contributing to the success of BSP: Ashden Award, UN-Habitat and ICRC, RAIN Foundation, etc.



d. The Beneficiaries

Households: Over 200,000 households in the 75 districts of Nepal received technical and financial support for the construction of their own biogas plants. All of the households are living in rural area, and some of them in very remote regions.

Biogas Construction Companies (BCC) and workshops. More than 70 BCCs and 15 workshops received technical support, training and qualification from the project, creating more than 11,000 direct and indirect jobs.

The Government of Nepal (GoN). The GoN has been receiving technical support to develop adequate national policies and regulations regarding domestic biogas. Besides, the project contributes to poverty alleviation and economic development efforts carried out by the GoN.

e. Project History and Innovation Diffusion



2. Approach for scaling up, replication and mainstreaming

a. Institutional and Legal Context

Supportive Government Policy

The Government of Nepal (GoN) has a long tradition, dating back 1975, for promoting biogas in Nepal. The provision of low interest rates loans and subsidies for biogas systems is indicative of the government's support to promote this technology. Besides, the GoN incorporated, in the 7th Five-Year Plan (1984-1989), a target for the installation of biogas systems. In 1984-86, a subsidy representing 50% of the loans' interest was introduced for the families purchasing a biogas plant. Subsequently, this inciting policy was extended to provide a 25% subsidy on the installation cost. The 8th Five-Year Plan (1992-97) defined the government institutional framework for developing Nepal's alternative and decentralised energy resources. As a result, AEPC was established under the Ministry of Environment, Science and Technology (MoEST) in 1996 and is now under Ministry of Environment (MoE).

Alternative Energy Promotion Centre (AEPC)

The objectives of AEPC are (1) to recommend policies to GoN, (2) to promote the development of appropriate rural energy technologies, (3) to establish strong partnership between industries, NGO, governmental organisation, cooperatives, banks and donors, (4) to establish a database, test station and information centre, (5) to conduct R&D on Renewable energy technologies and (6) to supervise, monitor and evaluate alternative energy programmes.

In the framework of BSP, the role of AEPC is to supervise the work carried out by BSP-N, manage and control the distribution of the subsidies, as well as to give policy feedbacks to the GoN based on their experience "in the field". These advices and feedbacks are decisive for the elaboration of new laws or the modification of existing policies.

Fiscal Policy

The 9th Five-Year Plan (1998-2003) set a target for establishing 90,000 biogas systems by the end of 2003. To help to achieve this target, the GoN has exempted biogas systems and all accessories from the Value Added Tax (VAT) in year 1998/99. Currently, all imported appliances for biogas systems are exempted of taxes.

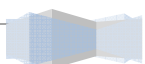
Local Authorities

The *District Development Committee* (DDC) and the *Village Development Committee* (VDC) are the main actors at the local level. They are slowly becoming aware of the benefits of the biogas, but their action for the development of biogas sector used to be very limited.

However, the situation is changing. 32 *District Environment & Energy Units* (DEEUs) have been recently established in 32 DDCs. Further, WB and UNDP support the District Energy and Environment Sections (DEESs) in 40 DDCs. These units and sections established with support from AEPC, have three main objectives, among others: (1) the coordination, at the district level, of the different actors (NGOs, MFI, banks, private companies, etc.), (2) make the promotion of renewable energies (including biogas) and (3) monitor RE programs at the local level.

These structures are very new and their intervention still limited, but they should shortly be among the major actors at the local level. Some of them are already playing an important role to monitor the quality of the biogas plants constructed by BCCs.

Last but not least, some DDCs start to provide additional subsidies for biogas and/or technical support. It could be very interesting that most of the DDCs/VDCs would follow these footsteps, particularly for the distribution of additional subsidies to the poor and/or remote households. According to the principle of subsidiarity they are more informed than the central level which households are in difficulty and which kind of energy is suitable for each village depending on the local context. But there are barriers in the current management limiting the DDCs/VDCs, and lack of political leadership of local representatives is an important hindrance to the impulsion of a positive dynamic at the district/local level.



b. Demand Generation

Promotion Activities

To promote biogas technology all over Nepal, BSP is acting at different levels (national, district, local) and combining numerous methods. General awareness is built through various publications and distributions of pamphlets, posters, bulletins, calendars, yearbook and through radio and TV programmes. Radio programmes are adapted to the local context and broadcasted in local languages. BSP stakeholders are also used to participate in exhibitions, trade fairs and other local events. At the village/community level, the strategy is adapted depending of the level of penetration of biogas plant in the area. In the areas where biogas has already been introduced, the Biogas Construction Companies (BCCs) are in charge of “developing their own market”. On the other hand, in districts and areas where penetration is low, BSP-Nepal requires local partners to organise village/community meetings to present to the villagers the benefits of biogas plants and the technical and financial supports they can received from the project. An important part of these village meeting are carried out by local cooperatives with the coordination of NCF-N.

Promotion & Marketing

At the local level, the principal actors for the promotion of the biogas remain the BCCs. They are in charge to make their own promotion, “generate their own market”. Thus, the companies receive a *Management and Promotion Training* from NBPA to enhance their marketing skills. They also received some brochures, pamphlets and posters to support them in their action. Besides, they can ask NBPA to adapt and broadcast radio spots in their area of intervention.

The problem was that BCCs were initially not aware of their responsibilities regarding promotion and marketing. Fortunately, thanks to management and marketing trainings, BCCs are becoming - step by step - aware of the importance of such actions and of the role they have to play.

Promotion Activities in Low Penetration Districts (LPDs)

Despite of a 700 Rs. extra subsidy in the LPDs, the trend is still not encouraging since less than 5% of biogas plants have been constructed in these areas. To improve the situation, BSP-Nepal has been focusing its promotional efforts through large national networks such as the National Co-operative Federation of Nepal (NCFN), Federation of Community Forest Users’ Groups – Nepal (FECOFUN), Nepal Terai Engineers’ Society (NTES) and other partners at the local level (local authorities or NGOs, CBOs, etc.). The main idea is to make the promotion of the biogas via a “public voice”, which is more efficient than a “private voice”. The local members of the national networks and the others local organisations (authorities, NGOs, cooperatives, MFIs, CBOs) know the people, the local language and culture. Besides, they are already used to work with those people and have long term commitment with them. The people will be much more trusting in those organizations than in private companies they have never seen before.

Box 1 – Example of a village/community meeting organised by NCF-N (or other organisations) in Low Penetration Districts

BSP-Nepal allocates Low Penetration Districts (LPDs) to the National Co-operative Federation of Nepal (NCF-N) where they are in charge of organising awareness-raising and promotion meetings. NCF-N contacts the concerned Cooperative District Unions or its local members (generally multipurpose or Saving & Credits cooperatives) which organise the meeting and make sure that most of the villagers are present. A NCF-N trainer, specialized in biogas issues, comes and explains about the benefits of biogas plants, the procedures of installation as well as about the financial support that villagers can receive from the project. NCF-N also influences and guides the cooperative to introduce biogas loan portfolio in each cooperative.

Generally, a representative of a BCC is present during the meeting but does not intervene. It is only at the end of the meeting, when some villagers are convinced but ask “OK, sounds good. But now, how can we get one of those biogas plant?” that the BCC representative is introduced. Thus, interested/convinced households can directly be in contact with the BCC and even sign “order forms”. To organize such meetings, NCF-N receives some money from BSP-Nepal (5-6,000 Rs per promotion campaign). This subsidy is used to pay some salaries, to buy tea and biscuits for the event, as well as to prepare a banner or other promotion support if necessary.

Though the awareness has increased in the LPDs, the unwillingness of BCCs to open branches in such districts is another issue to be addressed to maximize the promotion of biogas plants in LPDs. Setting-up a Public-Private Partnership with the BCC, local cooperatives, NCF-N and BSP-N may be a successful strategy to mitigate such issues.

Make Owners of Biogas Plants the Ambassadors of the Technology

Most of the BSP stakeholders are convinced that the best promotion is the quality of the plants. If the performance of the plants is good, owners will be very satisfied and they will promote them amongst their relatives, friends and neighbours. By doing so, they will publicize the technology as well as the company. Thus, more and more people will hear about biogas plants and purchase it, the more a “virtuous cycle” will be created:

Good quality = Satisfaction of the owner = best solution for promotion

Slurry Promotion

A better promotion of slurry is imperative to promote biogas more efficiently and to enhance its benefits. The promotion of the use of slurry as bio-fertilizer has been on-going for several years but the result has not yet proven to be satisfactory. In order to increase the level of awareness regarding the use of slurry and by the way better promote biogas plants, BSP-Nepal as carried out several activities:

- More than 200 Agriculture Technicians from different District Agriculture Development Offices have been trained on the importance of Bio-slurry as organic manure.
- A total of 26 persons from different partner organizations participated in the bio-slurry programme.
- About 15,000 leaflets and posters have been distributed to biogas users and farmers through biogas companies and partner organisations (NGOs, CBOs, etc.) involved in biogas promotion.
- Two locations for Bio-Slurry Villages were identified and 51 biogas users have been trained on proper bio-slurry management and its use.
- Studies have been carried out to document better the benefits of the slurry as bio-fertilizer;

Biogas Scaling-Up and Pro-Poor Approach

To introduce biogas for the first time in an area, the project first focuses on medium or well-off families (that have the investment capacity to buy a biogas plant), and if possible that are living close to a river. By being situated close to a river, the cost related to the transport of sand and stones are cut down. The objective to reach poor, marginalized and remote people comes in a second step, when the technology is already tested and demonstrated in the area. Those people will be reached by providing additional subsidies. Besides, pro-poor orientation and outreach of the programme have been enhanced through applied research and studies for the identification and development of appropriate and optimised designs (e.g. easiest to transport in order to reach remote areas).

c. Offer strengthening

One of the strengths of the BSP project lies in the successful development of a commercially viable and market oriented biogas sector (even it is still heavily reliant on external funding and support) by the development and strengthening of 72 private biogas companies and 16 biogas' appliance manufacturing workshops.

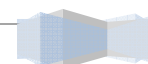
Capacity building

Since the project started, over 6,000 people have been trained in plant construction, and 200,000 users have been trained in operation of biogas plants and minor repairs. Trainings are organised by NBPA and funded by the project. BSP Nepal made the strategic choice not to train individual masons but only the staff working for a Biogas Construction Companies (BCCs) or recommended by it. This choice has different advantages. First of all, the selection of the masons who will be trained is made by the BCCs themselves, thus BSP-Nepal has neither to make a selection of the masons by itself nor to find out masons too train in rural area.

By doing so, the masons that received the trainings are already in contact with the BCC and have already some commitments with the sector. After the end of the training, they have in most cases the guarantee to work for the BCCs that introduced him. Besides, the trained mason is already working with or in relation with a BCC, increasing the probabilities that he will stay and work for biogas sector, and he will not walk out for another job after few months.

Masons Trainings Organisation

First the masons receive 7 days of theoretical training with NBPA. After this, they have to make 53 days of “internship” (practical training) with a BCC. After the end of the training period, the BCCs give some feedbacks to NPBA regarding masons' skills. NBPA records the trained masons and sends a dossier to BSP for the registration number. Each trained mason receives an “accreditation card”. After 1 year of practice, the mason can participate to an “advance training” in order to become supervisor.



Strengthening the Capacities of the BCCs

In addition to the technical trainings for masons, BSP-Nepal and NBPA are organising trainings for BCCs. The objective of these trainings is to strengthen BCCs by giving them additional skills in financial management, business management and marketing.

The marketing training is an important part since it is directly related to demand generation. During these trainings, NBPA explains to the companies about methods to deal with customers, rules regarding promotion and selling, etc. Besides, NBPA provides the BCCs with promotion materials: pamphlets about biogas benefits and slurry management, posters, calendars, DVD, etc. At the beginning, it was difficult to make the BCCs aware of their role for the promotion of biogas; but now, they are better understanding marketing benefits. They are even requesting NBPA to organise exhibitions and radio broadcastings in their area of work.

Box 2 – Certification and Strengthening of the BCCs

Certification of the BCCs

To receive a "certification", the BCCs have to go through different steps. First, they have to go to NBPA office with a "recommendation letter" from the local agency of NPBA. The central office checks if there is no complaint or other problem with this company and issues a letter for BSP-Nepal. After what, BSP-Nepal will make 82 points of control before issuing the certification. The certification is mandatory to benefit of the subsidies scheme.

Annual Target and Grading System

When a company is certified, it defines an annual target of biogas plants installation. The target is based on the human resources of the company when it is the first year of certification and on the previous year results for the other companies.

After the completion of the plants, companies send completion reports as well as the yearly maintenance reports to BPS-Nepal. At least 5% of the new plants constructed by a company are controlled to check quality of construction. In addition, 5% of the plants constructed the two precedent years are controlled in order to assess the quality of the After Sale Service (ASS). All data on the quality indicators as per quality observation of BSP-Nepal are used to calculate the Biogas Performance Index (BPI) of the company. This index which is calculated using a set of indicators (number of plant constructed, average default in the construction, quality of the ASS, etc.) is used to grade the BCCs. The grading scale is divided in 7 categories ranged from "AAA" (Excellent) to "E" (Very poor).

Depending on their position in this grading system, the companies are imposed penalties when the constructed biogas plants do not meet the required quality standards. This way, the companies are held responsible for the quality of their work but not the users. Companies under upper grades ("AA" and "AAA") receive additional monetary incentives.

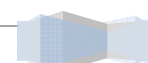
If a company is qualified as D or E grade, NBPA meets it in order to identify the reasons of those poor results. Based on the conclusions of this meeting/assessment, the company receives some additional training to strengthen its capacities. The trainings, which are adapted to the identified weaknesses, can be as varied as resource management, marketing skills development, accountability and financial discipline, technical trainings, etc. If a company is rank as "E grade" for two consecutive years, it loses its "certification".

Research & Development

The promotion of a unique design of biogas plant has numerous advantages to run the program: it is easier to train BCCs, to make the biogas plant promotion, to carry out the quality control, to deal with the subsidies and to monitor the project. This is a good strategy to start a project and introduce a new technology. Nevertheless, this is a hindrance for the innovation of private companies. In Nepal, after 20 years dealing with a unique design, people could not imagine that biogas plant could be different. Thus, it is very difficult to convince the BCCs and households to adopt a new design.

Now, additional room has to be made for innovation and new designs must be introduced. The necessity to develop new designs in order to reach a broader number of beneficiaries is now evident and different surveys have been started recently:

- Easily transportable materials are needed to reach the remote area (access only by foot). "Plastic bags biodigesters" could be an appropriate solution for those areas and research is on-going in this way.
- In Terai region, cement is very expensive. Thus, research is currently on-going to assess the feasibility and cost-effectiveness of prefabricated plastic domes.



d. Resources mobilization

Long Term Donors' Commitment

An important factor in the success of the BSP has been the dedicated vision of its principal donors: the Directorate General for International Cooperation (DGIS) is supporting the programme, via SNV, since 1992. Since the third phase (started in 1997), this financial support of DGIS has been complemented by the co-funding of the German Development Bank (KfW). Last but not least, the support of the Government of Nepal (GoN) to biogas sector started in 1975, by providing interest-free loans. Since the beginning of the Phase IV, the financial contribution of the GoN increased by 1% each year to reach 28% of the total subsidy contribution of the program in July 2010.

The continuous support of these three organisations has definitively been one of the main factors that led to the smooth and sustainable development the biogas sector in Nepal, avoiding the "stop and go" effects (due to the irregularity of the funding) that are responsible for the failures of numerous projects of renewable energy and energy efficiency all over the world. Nevertheless, the support of the DGIS will end with the Phase IV in 2010. This is creating a new challenge for BSP stakeholders, especially to cover the costs related to project management: these have been - till now - covered by DGIS, while the support of KfW and GoN were almost exclusively funding the subsidies.

To face this new challenge different possibilities are analysed for the elaboration of a project proposal for a fifth phase. One of the most likely scenarios is that a part of management costs will be covered by a share of the CDM incomes. Besides, most stakeholders agree that a reform of the sector is very necessary. The sector and the different organisations have to be made more efficient probably by moving towards a performance based system. Thus, the allocation of responsibilities of the different stakeholders probably needs to be reorganised in order to make the implementation of each component of the project as efficient as possible. A management audit is currently on-going to identify the relevant reforms to be carried out.

Biogas Plant Cost and Subsidy Policy

The biogas plants' costs mainly depend upon two factors: size and localisation. In 2007, they were ranged from 25,000Rs (340 us\$) for a 4 m³ plant in the Terai to 47,000Rs (635 us\$) for a 10 m³ plant in remote hills. This cost is very high in a country where 76.6% of the population live with less than 2 us\$ per day. Thus, to develop the biogas sector in Nepal and especially to reach remote and poor farmers, subsidies are definitively necessary.

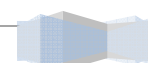
The amount of the subsidy perceived by the family is linked to the size of the biogas digester and the geographical location. This subsidy scheme is designed to encouraged farmers to install the more appropriate smaller plant size. The subsidy for the smaller size systems (2, 4 and 6 m³) is higher than for the 8 m³ plants. The plants larger than 8 m³ were deemed to be too large for household use and only affordable to wealthy farmers, and therefore removed from the subsidy schemes. Besides, the subsidy scheme was designed to correct the difference in cost between the areas by providing higher subsidies to families in remote locations. The 40 districts categorized as "Low Penetration Districts" receive an additional subsidy of 700Rs. Since 2006, an additional subsidy for poor has been set-up for plants smaller than 6 m³. More recently this subsidy became available for less favoured groups such as dalits, janajatis and conflict victims. In addition, transportation subsidies, ranged from 2,000 to 4,000 Rs., has been introduced for remotest districts.

Region	2, 4 & 6 m ³	8 m ³	Additional subsidy for the less favoured groups ¹ (for plants < 6 m ³)
Terai districts (20)	Rs. 9,700	Rs. 9,000	Rs. 2,000
Hill districts (40)	Rs. 12,700	Rs. 12,000	Rs. 2,500
Remote hills districts (15)	Rs. 16,700	Rs. 16,000	Rs. 3,500

Subsidy rates (for FY 2009/10) (Source: BSP Year Book 2009)

In addition to supporting farmers for purchasing biogas plants, the subsidy scheme provides an opportunity to enforce strong quality control measures. In order to receive the subsidy payments, biogas construction companies are required to certify that they have met the quality control standards set by the project. Thus, besides making the biogas systems more affordable for poor farmers, the subsidy is also used as a guarantee of quality for the biogas plants delivered to farmers.

¹ For Poor, Salit, Janjati, Utpidit and Conflict Victim



Micro-Credit and Credit Support

The biogas sector has a long tradition of credit support. In 1975, the GoN was providing for the first time interest-free loans for biogas users. Lots of modifications have been made since this date regarding the financial support strategy to develop the sector. Albeit important subsidies are provided to farmers, their contribution remains very important for most of them. Thus, about one third of the farmers have to turn towards micro-credit mechanisms.

Historically, these loans were delivered by the Agriculture development bank (ADB). But Cooperatives/Micro-Finance Institutions (MFIs) are now taking the lead, and in 2009, the majority of the loans were provided by MFIs.

In order to promote the development of micro-credit for biogas plants, a Biogas Credit Fund has been set up. This revolving fund created by the KfW with a donation of 500,000€ is managed by AEPC. It provides loans to Cooperatives/MFIs with an interest rate that is about 4%. In 2007, the existence of this loan enabled to 180 MFIs to provide the farmers with medium terms loans with an interest rate ranged from 10 to 14%. Cooperatives which are mainly Multipurpose or Saving & Credits Cooperatives, interested in providing such loans to their members received technical support (to manage biogas credits, explains the associated risk to this specific biogas loans, trainings about the risk, benefits of biogas, cost benefits, recovery rate, etc...) from AEPC as well as from the NCF-N. In the recent days, National Cooperative Bank - established to provide financial services to cooperatives- has also been initiating the financing of renewable energy technologies including biogas.

Private Banks

Private banks could not compete with the loans provided by the Biogas Credit Fund (BCF) because of their higher cost of fund and not been able to mobilize their funds to finance biogas plant through MFIs' networks. Currently, MFIs are not willing to borrow from private banks as they are benefiting from the attractive interest rate offered by BCF. Thus, some of them are developing alternative financial products. For example, the CEDB (Clean Energy Development Bank) is providing the following products:

- Microcredit product: They provide loans to end users via the biogas companies. At the beginning of the construction, the biogas company asks for a loan to CEDB. After the completion of the biogas plant, the loan is transferred to the client (biogas owner) who will benefit from a 2-3 years loan with a rate of 12-13% (This innovative approach enables CEDB to provide loans with interest rates similar to those applied by MFIs, without benefiting from the BCF). The biogas company is in charge to collect the periodical payment and they will receive in exchange some fees (1-2%) for this duty.
- Subsidy financing product: the time between the completion of the plant and the payment of the subsidies to the private companies could last up to 4 months. CEDB provides some loans to cover this time lag between the completion of the plant and the payment of the subsidy. The loan is reimbursed when the subsidy is paid to the company by AEPC.
- Bank guaranty facilities: BCCs need such a guarantee to insure the advance payment (for the subsidies), they received from AEPC (10% of the subsidies in advance based on the target number of plant of the companies).

As long as the Biogas Credit Fund will provide privileged interest rate to the MFIs, private banks will not be able to be competitive on this matter. But as soon as this fund will stop, these private banks will be able to provide MFIs with loans.

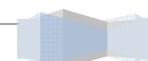
Sustainability of the Sector/Market

Regarding the sustainability of the market, the key questions that need to be answered² are probably
"Will the market continue to develop itself without external support?"
 or *"Is there a sustainable market for the biogas plant without subsidies?"*

In 2007, the subsidies ranged between 18% (for a 8 m³ plant in the Terai) and a little more than 50% (for poor people living in the remote hills)

Most stakeholders agree that if the supportive policies for the biogas sector had to stop now, the sector would suffer of a big "shock". The demand (especially in Hills and remote hills where subsidies rates are superior to 30%) would drastically be reduced, leading to the end of most of the biogas companies, who will not be able to sustain their activities. Just the biggest BCCs will resist and continue to work with a market reduced at its minimum. Thus, the extension of mid and long term subsidies mechanisms seems to be the key question for the further development of the biogas sector in Nepal.

² Even though the question of the sustainability could not only be reduced to the existence or not of subsidies.



Box 3 - CDM: A Promising but Hazardous Path

BSP partners started working on CDM in 2001. **BSP became the first CDM project in Nepal with registration of two CDM projects** in 2005: 19,396 plants constructed under the Phase IV have been registered with and approved by the CDM Executive Board (EB). An Emission Reduction Purchase Agreement (ERPA) for the two projects has been signed with the World Bank for trading of the Emission Reductions from the two projects for first seven years starting 2004/05 as the first crediting year. The negotiated rate, in the final agreement signed in 2006, was 7 US\$ per ton of carbon for Certified Emission Reduction (CER). Initially, **it was estimated that each biogas plant will save about 7.4 Tons CO₂eq**, but the rate has been capped at 4.99 tons per year per system due to limitations of a Small Scale Methodology (*I.C.: Switch from Non-Renewable Biomass to Renewable Energy Sources*), generating an annual carbon revenue (net of project development and verification expenses) of about 400,000 US\$.

Annual Emission Reduction Report and Community Benefit Report have been sent regularly. But the verification of first round of reports only took place in January 2007. The **EB also took long time to deliberate** and finally informed in August 2008 that the monitoring was not acceptable, an appeal was made in October 2008, which took 6 months to be accepted. **Till now, only the payment for the two first crediting periods has been made.**

Meanwhile, the **EB scrapped the existing methodology**, mainly for two reasons: 1) saving of non-sustainable firewood is interpreted as "avoided deforestation", a category not included in the CDM, and 2) there are issues of possible "project leakage", that are difficult to monitor. The Nepal Delegation in the 2006 CoP/MoP in Nairobi (Kenya) put up a strong lobbying and arguments. The CDM EB further improved the methodology, and sent for concurrence of the Bali CoP/MoP in 2007. The **new methodology** (*I.E.: Switch from Non-Renewable Biomass for Thermal Applications by the User*) was approved in January 2008, but savings obtain via this methodology are barely reaching **2.5 tons of CO₂eq. per plant per year.**

After approval of this new methodology, BSP-N, AEPC and KfW have been working together to **develop new biogas CDM project based on a programmatic approach.** A Programme of Activities Design Document (PoA-DD) is likely to be registered soon with the CDM EB for the plants built after June 2007. Albeit, the upfront cost for PoA is higher, this approach as the advantage to reduce the transaction cost as well as future hassles: once it will be approved, all the "biogas projects" included in the "Programme" will be eligible for the next 28 years.

In parallel, the 42,000 plants installed between April 2005 and June 2007 are planned to be registered as regular CDM projects.

The **Voluntary Emission Reduction (VER) market is another mechanism for getting carbon credits.** BSP-Nepal and AEPC are working with WWF-Nepal to develop a new biogas project called Gold Standard Biogas VER Project (GSP) in conservation buffer zone areas. Those carbon credits could be sold on the voluntary market. The Gold Standard ER methodology leads to a net annual emission reduction of 4 tons CO₂eq. per plant.

Sale of the Organic Compost

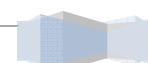
Each plant produces about 1.75 tonnes of organic compost each year, which owners use to replace the use of chemical fertilisers and improve soil quality. Some of the compost is sold and can even be bought in a department store in Kathmandu! Compost can also be used for fish-food. Thus, innovative solutions and new market opportunities have to be developed in order to offer new outputs for the slurry that could be a new opportunity for the farmers to generate additional incomes thanks to the biogas plant.

e. Decisional and organizational processes

Institutional Linkage

Stakeholders involved in the project are numerous and have been slightly changing during the different phases of the project.

Historically, SNV was the implementing agency of the program. At the end of the phase III, the question "how to manage the project out of SNV?" was risen as a first step toward the independence of the biogas sector in Nepal. Several existing organisations were potential candidates to become the new implementing agency, but the decision was taken to create a new autonomous body with legal recognition of its own. BSP-N (Biogas Sector Partnership – Nepal) has been set-up as an independent

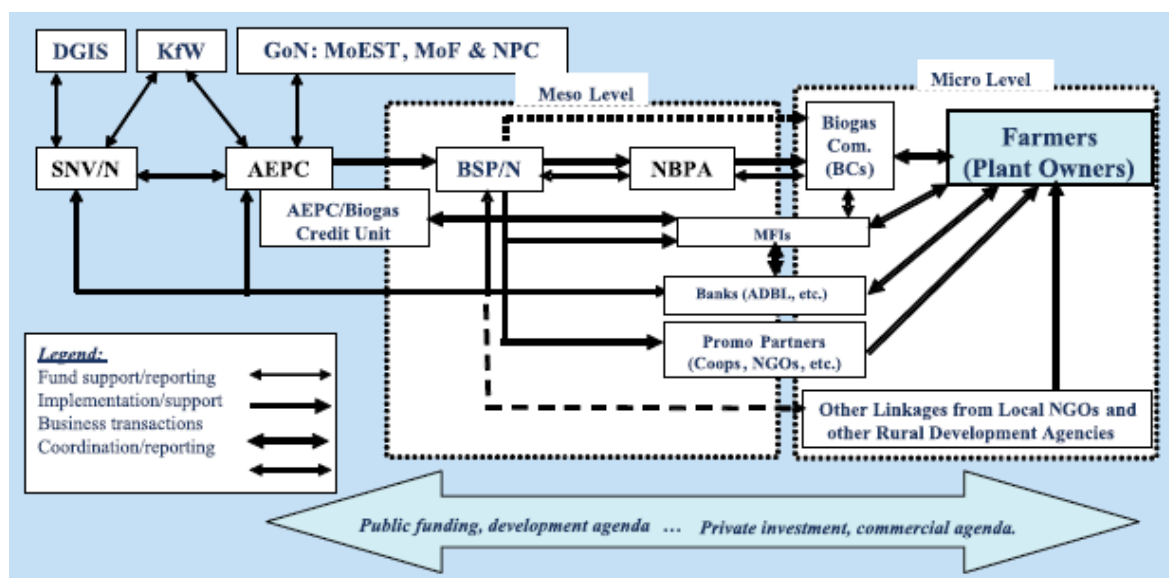


national NGO in 2003. Its main objective, as implementing agency, is to facilitate, promote as well as to regulate the development of the biogas sector.

NBPA (formally NBPG) is an umbrella organisation of the biogas companies. Its main objectives is to promote the biogas, train and monitor masons and supervisors of the BCC, coordinate the BCCs and regulate the sector (via the code of conduct) as well as to offer promotion support to the BCC and arrange and supply biogas systems materials and appliances. (*For more information, cf. Box 4*)

AEPC is responsible of the program on the behalf of the government in order to control the “good use” of the funds, to monitor the implementation as well as to favour the development of the micro-credit sector through the Biogas Credit Fund and by providing support to the MFIs.

The following frame presents the institutional set-up during the fourth phase of BSP.



Institutional Set-Up of BSP Phase IV (source: SNV)

This institutional set-up is said to be well established and efficient for the development of the biogas sector during the fourth phase. Nevertheless, with the end of this phase, that coincide also with the end of DGIS financial support, the institutional set-up needs to be reorganised taking in account the strengths and weaknesses of each of the remaining institutions, in order to implement the next phase even more efficiently. The reorganisation of the activities needs to be done on efficiency-based approach. Most of the stakeholders agree that each component has to be assessed independently in order to determine which organisation is the most relevant to implement each component as efficiently as possible while tending toward a scenario where most components are run by the private sector.

Holistic Approach

In order to develop further the biogas sector in Nepal, most stakeholders agree that strategic partnerships have to be developed with other sectors. Numerous opportunities exist to develop a transversal approach. For example:

- In cooperation with health & sanitation sector, toilets attached to biogas plants could be promoted
- Development of channels to market the slurry, or of income generating activities using the organic fertilizer or crop and vegetable production could be done with the ministry of the agriculture,
- Poverty alleviation projects could be linked with the BSP, by supporting the poorest farmer to buy a buffalo and after some time purchase a biogas plant.³
- More promotion and awareness-raising activities could be carried out with Micro Finance Institutions.

Even if the development of transversal projects looks very attractive and seems to be necessary to develop further the biogas sector, numerous hindrances have to be overcome to reach such a goal. One of the most important barriers is probably the difficulty - if not the incapacity - of the different ministries and related organisations to work together and to share objectives and budgets.

³ Unless the programme ties up partnerships with the other programmes to support multiple livelihood options, biogas plants will never reach to the poorest families.

But some “links” already exist, as testified by a project of AEPC project that trained the “Junior Technical Associates” (JTAs) of the development offices of the Ministry of Agriculture, mainly regarding the benefits and management of the slurry produced by the biogas plants.

Box 4 – Nepal Biogas Promotion Association (NBPA)

History

NBPA (formally NBPG – National Biogas Promotion Group) was created in 1994 as an umbrella organization. The creation of this organization was responding to a real demand of the biogas companies (bottom-up approach). The memberships of NBPA are private companies (no individuals) involved in the biogas sector. NBPG became an association (and changed the previous name to become NBPA) in 2007/08, in a view to broaden out the perspective of the organization.

The main objectives of NBPA are:

- Advocacy and promotion of the biogas program at micro and meso levels
- Improvement and quality control of the biogas systems
- Importation of some appliances and distribution to biogas companies
- Masons and supervisors trainings and “certification” of the private companies
- Self-regulation of BCCs through a “code of conduct” and other appropriated mechanisms.

Besides, NBPA is supported by an advisory board of 15 persons, divided in working groups in charge of the review of the policies, the code of conduct, etc.

Main Difficulties Faced by NBPA

At an early stage, NBPA faced the common difficulties linked with the institutional set-up of an organization (good management practices, monitoring system for the travels of the staff, financial management, etc.). These difficulties as well as some weakness related to the lack of qualified and trained staff were overcome to improve the efficiency of the structure.

Financial Sustainability of the NBPA

But the financial sustainability of the structure remains a difficulty. The costs of most activities are, currently, paid by the program (for training, promotions, and other activities). Only the management cost remains at the charge of the structure, and is covered by (small) registration fees paid by the members of the association (BCCs) (1,500Rs/company/year).

At mid or long term, the financial sustainability of the structure should be mainly guaranteed thanks to the services offered by the association: memberships, license for each biogas plant built by the companies (e.g. 50-200Rs/ plant), trainings, etc. The funds could be completed by a contribution coming from the government.

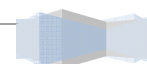
But for this, the association should provide the biogas companies with satisfactory services first. If companies are satisfied with the range and quality of services offered by the association, they will agree to pay for the membership and other fees. But, until now, NBPA is still too small to provide the BCCs with a satisfactory set of services. For this reason, the financial contribution of external donors is still necessary to support the development of the structure to reach the “critical size” that will enable its financial sustainability.

NBPA a Necessary Organization for the Development of a Sustainable Private Sector

To develop a sustainable private sector, it is very important to have an organization that regroups and represents them, both to defend the interests of the BCCs and to organize and “arbitrate” them. Besides, it was very important for BSP-N and AEPC to have a single interlocutor instead of a multitude of private companies. By this way, they can improve the control and the regulation of the companies while improving the legislative environment by including the requirements of the private sector. The creation of NBPA was born by a natural process as the companies need to regroup themselves

Code of Conduct

The code of conduct (CoC) was a request of the BCCs, in order to regulate the sector and to avoid bad behaviour and the development of an unhealthy market. The code of conduct allows maintaining the biogas plants at a fair cost and good quality while avoiding bad behaviour between competitors and facilitating the arbitration of the eventual disputes between BCCs. The non-respect of the code of conduct implies the disqualification of the listing of the “certified” biogas companies.



f. Monitoring and evaluation

ISO 9001

In order to guarantee the quality of the biogas plant constructed by the BCCs, as well as a strong quality management system and subsidy administration, BSP-N has developed a biogas quality standards to match ISO 9001-2000 quality system.

After Sale Service (ASS)

The cost of the biogas plant includes a three-year guarantee period with free maintenance provided by the BCC. Besides, the BCCs have to go and check the plants at least twice during the guarantee period. This is an additional incentive for BCCs to install high-quality plants. The combination of good installations, affordable finance, support and quality checking have led to very high success rates for biogas plants in Nepal: 97% of the plants installed under the BSP programme are still in operation.

Monitoring System

For each biogas constructed, the BCCs have to submit a "completion report" to BSP. This report contains: the name of the family with their photo and the photo of the plant under construction and completed, the name of the village with the direction and GPS localization, the "subsidy voucher" signed by the farmer (that confirms he received the subsidy from the BCCs) and other details related to the biogas plant. Each "completion report" is checked by BSP-N to insure that all the information is present. A "summary" of the reports is sent to AEPC that validates it and proceeds to the subsidy payment to the BCCs.

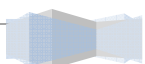
Quality Control and Monitoring

In order to ensure the quality of the biogas plant a strong quality control and monitoring procedure have been developed within the project. The reliability of this system has been reinforced with the participation of the project to the CDM. Each year, 10% of the plants are monitored with the following distribution:

- 5% of the new plants (1st year): quality control
- 2.5% of the plants constructed 1 year ago (2nd year): ASS control
- 2.5% of the plants constructed 2 years ago (3rd year): ASS control

This monitoring is done with a sampling method for 10% of the plants installed by each company. This method allows that all the companies will be monitored equally (10% of their installation rate). Additionally, an external consultant carries out, each year, a Biogas User Survey (BUS). This survey is based on another sample of 5% of the plants.

The actual quality control system works well but it is intrinsically expensive. Among many possible options, NBPA is developing an "Internal Quality Control" (IQC). The main idea is that quality monitoring of the plants has to be performed by the companies themselves (by filling in a dedicated form) and that they have to ensure the quality of the plants as well as the ASS. For each plant, the BCC has to send 3 reports: one after the plant completion and a ASS report for the each year during the ASS period. By this way, AEPC, BSP-N and NBPA want to reduce the monitoring cost by reducing the sample of plants they will have to monitor by their own, by only assessing if the "monitoring forms" filled by the BCCs really match with reality.



Abbreviations and Acronyms

ADBL	Agriculture Development Bank Ltd.	ISO	International Organisation for Standardisation
AEPC	Alternative Energy Promotion Centre	KfW	Kreditanstalt fur Wiederaufbau of Germany
ASS	After-Sale Service	LPD(s)	Low Penetration District(s)
BCC	Biogas Construction Company	MoU	Memorandum of Understanding
BCF	Biogas Credit Fund	MFI	Micro Finance Institution
BSP	Biogas Support Programme	NBPA	Nepal Biogas Promotion Association
BSP-N	Biogas Sector Partnership-Nepal	NCF-N	National Cooperative Federation of Nepal Ltd.
CBO(s)	Community Based Organization(s)	NGO(s)	Non-Governmental Organization(s)
CER	Certified Emission Reduction under CDM	Rs.	Nepalese Rupees
CDM	Clean Development Mechanism	PDD	Project Design Document
CDM EB	CDM Executive Board	PoA-DD	Programme of Activities Design Document
DGIS	Directorate General for International Cooperation of the Netherlands	R&D	Research and Development
DDC(s)	District Development Committee(s)	SNV/N	Netherlands Development Organization in Nepal
ER	Emission Reduction	VER	Verified Emission Reduction
GIS	Geographical Information System	VDC(s)	Village Development Committee(s)
GoN	Government of Nepal	WWF	World Wildlife Fund Inc.
GPOBA	Global Partnership on Output-Based Aid		

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List of Interviewed Persons and their Organizations

	Name	Organization	Function
1	Saroj Rai	BSP	Executive director
2	Bindu Manandhar	BSP	Chief – Promotion & Training
3	Samir Thapa	AEPC	RESS coordinator
4	Jeremy Stone	SNV	Advisor biogas/ Renewable Energy
5	Tom Torsch Krader	SNV	Sector leader/ Senior Advisor RE
6	Mr Mohan Raj Sharma	NBPA	Executive director
7	Mr ShankerRaj Pandey	KfW	Local expert
8	Ram Bhajan Shah	NCFN	General manager
9	Ms Chitra Kumari Subba	NCFN	Senior manager
10	Mr Dilip Kumar Archarya	Evrest Gobar Gas	Director + Secretary of NBPA
11	Dinesh Dulal	CEDB	Senior relationship Officer
12	3 biogas owners+ 2 neighbors		

